BERGER FOUNTAIN
LORING PARK MINNEAPOLIS, MN

Dunwoody College of Technology
3rd Year B.Arch Studio
Fall, 2018

Faculty: Paul Bierman-Lytle, AIA, LEED BD+C
Plan & Elevation

Mike Lenz / Oliver Huston
Connection Detail

Mike Lenz / Oliver Huston
Estimated Weight of Structure

Lexan = 1,975 lbs, 1,975 sq,ft,
Aluminum = 2,988 lbs, 447.5 lf
  Center frame = 945 lbs, 142.5 lf
  Outer 2 curved frames = 2043 lbs, 305 lf

5 Panels at 993 lbs per panel = 4,963 lbs

If not using aluminum for outer 2 curved frames -
  5 Panels at 584 lbs per panel = 2,920 lbs
Lexan (Polycarbonate)

Mike Lenz / Oliver Huston
Estimated Price for Materials

Lexan = $35,000

Aluminum
  Center Frames = $2,000
  Outer Curved Frames = $4,300

Paint/Tape/Lights = $10,000

Total = $47,000 to $51,300 for materials

Mike Lenz / Oliver Huston
Bent Aluminum Members
Special Effects, Lighting, & Materials
Glow-In-The-Dark Paint or Tape

Option 1

Mike Lenz / Oliver Huston
Electroluminescent Tape, Wires, or Panels
Option 2

Mike Lenz / Oliver Huston
LED Lighting

Option 3

Mike Lenz / Oliver Huston
Concept:

- Lightweight
- Inexpensive
- Easy Assembly
- Durable
- Relate to the Area
- Tensile With a Twisting Motion
- Fountain Shadow – (slightly transparent)
- Bright
- Changeable Lights
- Remain Key Feature at Loring
Precedents:

- Denver Airport
- Zenith by Massimiliano Fuksas
- Sydney Vivid Festival

Vivid Sydney 2018 Light Show
https://www.youtube.com/watch?v=Zlvsl83hDnE&t=20s
The Disney Tree of Life at The Animal Kingdom
https://www.youtube.com/watch?v=_dQE440tSwE
Renderings
The Form

• Uses Hexagonal shape from existing fountain base then the form twists upwards connecting to a circle with a dome.

• The twist allows for a kinetic looking structure when the projectors aren’t running. It encourages people to move around the form and view it from all sides, creating interest. It would also work well if the visuals projected onto the canvas were circular and could use the form to the projections advantage.

• The dome can be seen as an oculus to look out into space (reconnecting with nature) or a spotlight to attract people in the area.

• The form blends with the existing base and can still be used (slightly modified) for a future remodel of the basin area.

• The form is very large and meant to be as tall as the trees to be seen from the walker, the convention center entrance, MCTC, and the highway nearby urging people to come check it out.
Plans & Elevation

Jake Beaudet
Materials:

- **Aluminum Piping (8" x .125")**
  
  $\text{https://www.onlinemetals.com/merchant.cfm?pid=7083&step=4&showunits=inches&id=71&top_cat=60}$

  - Each slant (6) broken into two ~24' section. Each support is also 24'.
    ($600/24' section \times 18 \text{ total} = \$10,800$)
  - Each Side for Hexagon base is 30'
    (roughly $800 \text{ per.} = \$4800$)
  - (22) 1-2" Diameter Rods or Pegs on every other slant piece (spaced every 2') approx. 1-2 inches each
    ($130/6\text{ft rod}$)
  - 18 foot diameter ring = 56 foot circumference
    (~ $1600$)
  - Extra for Base Connections
    (~ $1800$)
  - Extra for connection pieces
    (~$5000$)

  = $\$24,130 + \text{Manufacturing & Labor Costs}$

10 lbs/ft $\times \sim 700 \text{ Linear Feet} = 7,000 \text{ lbs}$
Materials

• **Membrane or Fabric**
  

  • **Sail cloth**
    • ~8000 square Feet or 900 sq yards ($15-25/sq yard)
    • = $13,500 - $22,500
    • (0.50 lbs/sq yd)
    • = 450 lbs

  • **PVC Mesh Fabrics**

  • **Acrylic-Coated Polyesters**
Materials

- **3D Projector:**

  Extremely difficult to find specific prices. Very dependent on each project. This was one of the projectors I found I thought explained things clearly and might work well for this project.

  - [http://lumitrix.eu/#technology](http://lumitrix.eu/#technology)
Materials

• Plastic Dome:
  – *Like this except not transparent more frosted or even colored white*
  – *Another unknown cost. Most likely between $15,000 - $20,000*
Fabrication:

Grommet hooked on pegs, overlapped, capped, and an extra layer would cover the seam.
Native American Involvement

• Abstraction of a Tipi, encompasses all different style of Tipi to ensure inclusion

• Set-up/Tear-down Event W/ Volunteers

• Syd Bean (Videographer) + Blank Canvas = ART

• Opportunity to share perspectives and stories – hold special events

• Nature Integration
Jake Beaudet
Enclosure Measurements

24'

24'
Materials - Weight - Cost

Aluminum  
Recyclable  
Light Weight and Strong  
Corrosion Resistance  
4” square ¼” thick with c-channel

Polycarbonate  
Works in a wide temperature range  
UV resistance  
Abrasion Resistant Coating  
Formability

Estimated weight = 2,915lbs  
Aluminum 600lf @ 4.4lbs per lf = 2,640lbs  
Polycarbonate 1,700sf @ .75lbs per sf = 1,275lbs

Estimated cost for materials = $66,400 – 101,600  
Polycarbonate $5.00 – 10.00 per sf = $8,500 – 17,000  
Forms cost $10,00 - 15,000 each = $50,000 – 75,000  
Aluminum $13 - 16 per lf = $7,900 – 9,600
Mitchell Olson

Structure & Assembly
Renderings
Loring Park Cell Dome

By Oliver Huston
Inspiration

Plant cells
Special Features

Colored lighting for night. Potential for greenhouse effect to keep surface free of snow.
Structure & Materials

Option 1: Carbon fiber & acrylic panels
Option 2: Recycled aluminum & acrylic panels
Fabrication

CNC machining or equivalent precision fabrication.
Mobility
Possibility to be moved via crane to another part of the park during the summer.
Portability & Storage

Option 1: Disassembled into sections for storage.
Option 2: Disassembled into individual panels for storage.
Potential Sponsors

- **Morrissey Inc**: Minnesota precision machining, stamping & complex metal fabrication company.

- **Clearwater Composite, LLC**: Minnesota company that specializes in manufacturing carbon fiber tubes, plates and other parts.

- **Kreative Acrylics**: Minnesota company that specializes in custom acrylic fabrication.

- **3M Company**: 3M Company is known for their innovation, manufacturing, & engineering.

- **Cargill**: Cargill specializes in food, agricultural, financial and industrial products.
Reid Schumacher

The Ice Sail is constructed based on removal of the dandelion “stems” as currently practiced. This reduces overall structure width resulting in significant cost reduction. Over 230 stems are stored in Community Center basement for cleaning and weather protection.
PVC STRIP FOR THE ROOF

POLYCARBONATE

Aluminum Fabricated trusses
That are assembled with push Pins. Think Tent assembly
Ice Sail shape is directed to funnel severe northwest winds

Wind direction and volume
Base is constructed around existing fountain lights.

**WEIGHT**

- 1 Square foot of polycarbonate will be .78 pounds
- One side of polycarbonate will only be 499 pounds
- Each Façade is divided into 8 polycarbonate panels to mitigate the weight
- Each panel will weigh 64 pounds.
The Snow Flake tree enclosure is reduced in size and cost by removing dandelion "stems"
Design Factors

- Enclosure built without stems installed into fountain
- Smaller scale enclosure to reduce cost in materials and labor installation
- Durable and Lightweight material with modular assembly
- Tree form with a snowflake shape
  - Inspired by surrounding landscape and winter season
- Fountain is visible during winter season
- Ease of assembly to allow relocation of enclosure to another area of the park during off peak seasons as additional art sculpture
- 3-4 day assembly time
- 3-4 man team with use of lift and ladders
Crispin Vang

Precedent

Super Tree in Singapore  Snow Flakes  Tree of Life in Milan, Italy
Measurements

Plan
1/8" = 1'-0"

North Elevation
1/8" = 1'-0"

Level 3
17" - 6"

Level 2
12" - 0"

Plan
0" - 0"

Aluminum Leaf
1/8" = 1'-0"
Assembly

Installation Instructions

1. Stand one aluminum upright post
2. Install one horizontal upper/lower cross tube into side key hole slots on aluminum upright
3. Insert polycarbonate panel into top and bottom flanges on upper and lower cross tube (Insert panel horizontally)
4. Stand second upright and insert top and bottom cross tube into side key hole slots
5. Repeat steps 1-4 for remaining upright post and polycarbonate panels
6. Set structure base assembly to final site location (base assembly should be centered around fountain, dimension in field prior to anchoring to slab)
7. Using 3/8” drill bit, drill into slab 2 ¾” deep into all predrill holes in aluminum upright base plates (clean out holes of debris)
8. Insert into predrill hole 3/8” expansion anchor bolt and tap down, fasten with nut
9. Repeat steps for all upright posts
10. Insert angled upright extension through upright tube post from top, bolted into upright post (ensure angled extension is fully flush to post)
11. Install roof top housing through tabs bolted into upper cross tube
12. 2” extruded aluminum leaf bolted into angular uprights and connected to center post of roof housing with 2” steel cables

General Note: Assembly to be installed clockwise
Materials

- Aluminum Structure – 1,558 lb, $10,000-$15,000
  - 2” extruded aluminum leaf structure Finish: Green semi gloss
- 6” vertical upright post with key hole system (6)
  Finish: Black Semi Gloss
- 6” Black upper/lower cross tube (12)
  Finish: Black Semi Gloss
- ¼” Makrolon GP-V Pebble Poly carbonate panels (6) - 158lb, $15,000-$20,000
- 2” Steel cables (6)
- 3/8”(dia.) x 3 ¾” (Length) Expansion Anchor Bolt (24)
- 4000 K LED Lights
Crispin Vang

Relocation of “snow flake tree” to community garden
Crispin Vang
“fountain wind trail” is a kinetic enclosure with thin fins or “feathers” that move lightly with the wind
Erik Hall and Ted Tuggle

Precedent shape and materials – US WEST Stadium
Kolang Vang
ASSEMBLY

- Angled aluminum tubes for connection.
- 4 different sections, top is sloped at a small angle to prevent snow and water build up.
- Polycarbonate will be precut to desired size and bolted to the aluminum tubes.
- Design will have the same aspect as current plywood design: separate sections that would be stackable.
Weight: 1.717 Tons
Self-weighed construction, no extra weight needed to weigh down structure

Cost of Polycarbonate: +/- $34,350
Cost of Aluminum: +/- $10,000
Total cost: (Relative): +/- $44,350
AS SCULPTURES

Each half can be dismantled and moved to frame the entry at Loring Greenway.

Anywhere is possible

Bolted down with concrete anchor

Taller one is about 24’ high
Inspirational elements:
- Dandelions
- Hexagons
- Snowflakes
- Six-petaled flowers
- Existing plaza geometry
- Origami
- Sacred geometry

Image by Karla Schmitt
Karla Schmitt
Karla Schmitt
Precedents
Precedents
COLOR/LIGHT OPTIONS
MATERIALS

INTERIOR:
ACRYLIC, POLYCARBONATE, PLAXIGLASS

STRUCTURE:
POLISHED STEEL OR ALUMINUM

https://perspex.com/inspire-me/
https://www.regal-plastics.com/standard-acrylic-colors/
MATERIALS

Materials: Extruded aluminum structure with polycarbonate enclosure. Polycarbonate can be frosted or colored.

An estimated weight:
Polycarbonate: ~1050 lbs
Aluminum: ~5,400 lbs

An estimated price:
Polycarbonate: $5250 - $10,500
Extruded Aluminum: $64,800

STRUCTURE:
Extruded Aluminum

INTERIOR:
Polycarbonate
PLANS AND ELEVATIONS