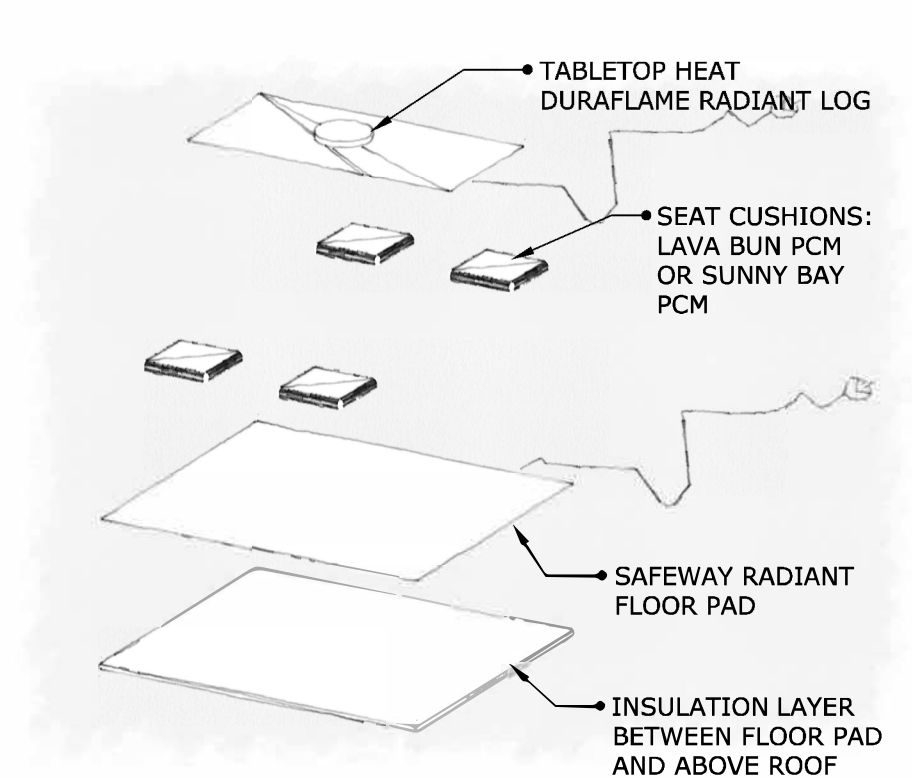


FREESTANDING WIND FENCING

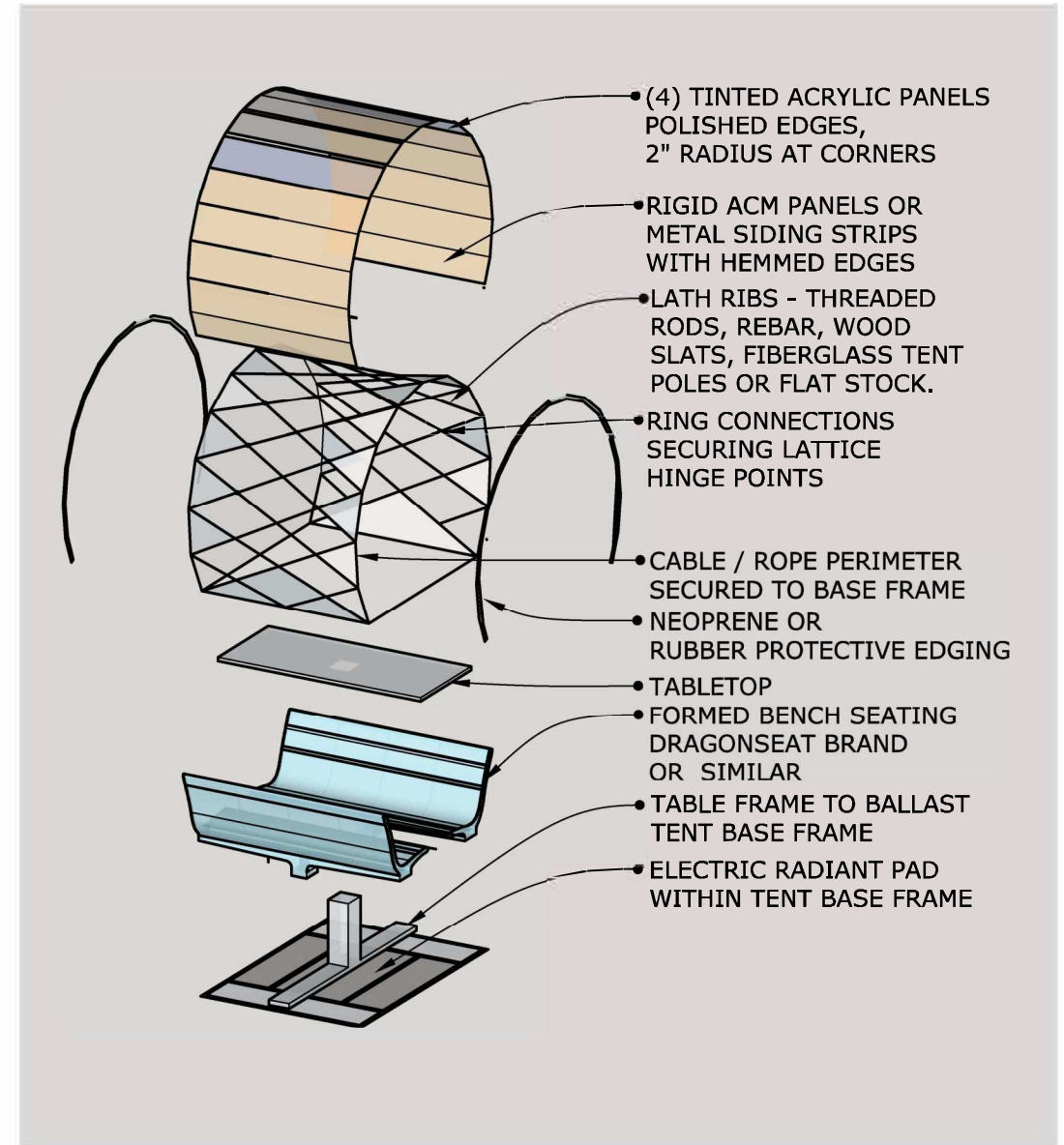


HEATING COMPONENTS

RECOMMEND KEEPING SNOW STORAGE CLEAR OF ROOF DRAINS AND PARAPET WALLS

• CONSIDER ONE WAY TRAFFIC IF TWO DOORS ARE AVAILABLE

• WALKWAY COLOR DARK TO PROMOTE MELTING



C SHELTER / POD



THE SKY'S THE LIMIT FOR COLORADO'S ROOFTOP DINING

UNIQUE CHALLENGES OF WINTER ROOF DINING

- Weight limit of the building structure
- Wind speeds
- Stairs prone to icing
- Snow removal

ASSUMPTIONS:

- Your rooftop is already rated for occupancy. In other words, your structure is designed and code officials recognize it as an occupied roof
- Check with your local building department on all modifications (temporary or permanent).

SIMPLE THINGS YOU CAN DO:

MARKETING:

- Communicate to your patrons to come prepared.
 - Recommend they bring blankets, hats, coats, etc. Maybe even make it a contest or theme, such as Ugly Beanie Weekend, Grandma's Quilt Contest, Sport a blanket, show your tartan
 - Perhaps have logoed blankets and hats for sale.
- Provide heated accessories to your patrons such as:
 - Lava Buns® or similar Phase Change material which can be sanitized and heated in the microwave and given to the guests as they are seated.
- Heated mats for: Tabletops, Bench Seating, Floors Under Tables (foot space)
- Post style propane heaters (Verify with your local fire department)
- Dragonseat® Heated benches

SAFETY:

- Have a thoughtful snow management plan. Keep it safe. Be cautious to not overload your structure, block roof drains or push up against perimeter flashing.
- Consider strategically locating snow mats. Commonly available electric snow-melt walkways and stair treads could be used to keep the main walking areas clear of snow and ice.

UNIQUE TO YOUR PATIO SOLUTIONS:

IF: You have gas service available

THEN: Consider gas fireplace tables and Dragonseat Heated Benches®

AND: Be cautious and check with your building official if you are considering these under a canopy

IF: You have an adjacent indoor space or structure

THEN: Consider attaching an awning structure to reduce overhead precipitation

IF: It is an open rooftop with no vertical structures

THEN: Consider a freestanding roof cover, such as umbrellas, tent, awning, AND: Consider a stabilized windbreak at the roof edge, from where wind flows (often Northeast). These can be various types of product such as vertical planting trellises, rancher type wind screens, etc. The goal is to be lightweight and allow plenty of air flow.

IF: Your budget allows for a prefabricated element

THEN: Consider a quarantined "pod" for each table – with air flow on opposite sides

IF: You do not have good ventilation, a semi-enclosed space.

THEN: Install a stand-alone HEPA air filter fan(s)

AND: Have a management plan for regular maintenance of the equipment

IF: You have concrete or stone pavers

THEN: Consider dark colored mats with an insulation factor at walkways for servers and patrons. Hard surfaces tend to retain the cold. Dark, softer surfaces will absorb heat and make the space feel warmer. This would also help reduce slipping in icy conditions.

THE SKY'S THE LIMIT FOR COLORADO'S ROOFTOP DINING

HEATING SYSTEMS

It is impractical to try heating the entire patio area by running propane heaters, large infrared electric heaters, or expansive radiant floor systems economically. Propane heaters are in very short supply. The operating cost of propane heaters is prohibitive. There are inherent problems with handling propane safely, including tank explosion and the fire risk near fabric covers and combustible enclosures. More sophisticated systems such as under floor hydronic radiant tubing would be wonderful, but are very expensive to install, operate and difficult to implement quickly.

Our concept puts the heat in direct contact with the customer where it can be efficiently applied using readily available, quick to implement, inexpensive systems. If customers have warm feet, warm legs, a warm bottom, and may touch a warm tabletop, they will feel warm. Further, if you can add a tabletop infrared device to warm their hands, upper body and head they will feel even more comfortable. These systems use little energy because they are actually touching and radiantly warming without heating the outdoors. In addition, these systems are easy to use as long as you understand the concepts involved.

We propose to use Phase Change Materials or PCM's in the seat cushion and table top. PCMs store large amounts of heat through a process called *phase change* radiating heat as a material changes from a gel to a solid. The most common phase change material is ice in drinks. Ice absorbs 144 Btu/pound to melt, but only 1 Btu/pound in liquid form to change temperature 1 degree F. That means ice can provide 144 times more cooling per pound than plain water by changing from a solid to a liquid.

The PCMs we recommend do the same, except they release large amounts of heat as they change from a gel to a solid material. While the material is "freezing" it releases heat while remaining at a constant temperature. For this to work the material must be heated above its "phase change" temperature so it will melt while storing hundreds of times more heat than a plain solid seat cushion material. The seat cushions or heating pads can be heated in the microwave for 1-2 minutes but stay warm for 1-2 hours. The seat covers could be custom-branded and sold as branded novelty items.

The tabletop cover would be made from a PCM material found in some comforters and passive heating pads and customized for each table size. Each time a new party is brought to a table, they receive individual PCM seat cushions and a tablecloth with the PCM material attached. Under the table we recommend a 3' x 5', 385-watt electric radiant heating pad that can reach 100°F, enough to warm your feet and provide radiant heat to your legs. This pad should be installed with a GFCI electric circuit for safety. To further improve comfort, we suggest providing a tabletop radiant heater, providing radiant heat to keep fingers, upper body, and faces warm. Total cost for a table of six is under \$700 depending on power availability. Operating cost for these systems is extremely low.

It would be quick to implement these accommodations, including microwaves to heat the seat cushions for a large party. The tabletop covers would be stored in a warm room to absorb heat into the phase-change material during non-dining hours so they would be ready for heating during dining hours.

BUDGETING

Seating Modifications						
PCM Seat Cushions/Pads	6	\$37	\$222	\$37	\$222	
Table Top Radiant Heater	1	\$150	\$150	\$200	\$200	
PCM Table Cover	1	unknown	unknown	unknown	unknown	
Heated Floor Mat 3'x5'	1	\$300	\$300	\$700	\$700	
			\$ 672		\$ 1,122	
Pod						
8' x 2' Tinted Acrylic Panels	4	\$ 130	\$520	\$ 200	\$800	
8' x 2' Rigid ACM Panels	20	\$ -	\$0	\$ 50	\$1,000	
Metal siding w/ hemmed edges	10	\$ 18	\$180		\$0	
Cable connectors	12	\$ 40	\$480	\$ 70	\$840	
Cabling (linear feet)	250	\$ 1	\$200		\$0	
.625 Tent Poles (26" long)	115	\$ -	\$0	\$ 6	\$696	
Neoprene Rubber Edging	32	\$ 1	\$16	\$ 1	\$32	
1/2" plywood framing	2	\$ 50	\$100	\$ 50	\$100	
Labor	24	\$ 48	\$1,152	\$ 75	\$1,800	
			\$ 2,648		\$ 5,268	
Building Modifications						
Wind break-Horse stall	2	\$ 336	\$ 672	\$ 772	\$ 1,544	
8' x 8' Canopy	1	\$ 150	\$ 150	\$ 500	\$ 500	
Mechanical Work	1	\$ 2,000	\$ 2,000	\$ 7,500	\$ 7,500	
Electrical Work	1	\$ 2,000	\$ 2,000	\$ 7,500	\$ 7,500	

MATERIALS PROPOSED

PCM Seat Cushions: Lava Buns® (\$36.95 on Amazon) <https://vesture.com/product-category/lifestyles/>

PCM Heating Pads: Sunny Bay (\$34.99 on Amazon)

Dragonseat Heated Benches®: <https://dragonseats.com/ski-resorts/>

Tabletop Radiant heater: Duraflame® electric radiant log. (\$144.89 on Amazon).

Safeway Radiant Floor Pad®: <https://www.floormat.com/heated-mats/snow-melting-mats/safeway-heated-floor-mat/>

PCM Material for Custom Table Covering: <https://phasechange.com/>