PROJECT BRIEF & BID SPECIFICATIONS

Residential Snow Melting System Installation & Quality Mandates

Project Parameter	Technical Specification & Siting Profile
Project Siting	Akron, Summit County, Ohio (Severe freeze-thaw region with average 47" seasonal snowfall)
Driveway Substrate	Concrete Pour (4" minimum thickness, fiber-reinforced, 6% air-entrained mix)
Walkway Substrate	Interlocking Concrete Pavers (maximum 2.5" thickness over compacted base layers)
Heating Technology	Electric twin-conductor cables (WSM series) or pre-spaced mesh mats (WSMM series)
Design Power Density	50 Watts per Square Foot (W/sqft) standard at 240V supply voltage
Control Interface	SNOPRO-100 Wi-Fi Forecast-Based Automatic Controller + Aerial-Mount Snow Switch

1. EXCAVATION, SUBGRADE, & PAVEMENT DRAINAGE (PAVING CONTRACTOR)

All excavation, soil preparation, base aggregate consolidation, and surface paving must strictly conform to local building codes and the Interlocking Concrete Pavement Institute (ICPI) Tech Spec 12. Pavement longevity in Ohio depends entirely on preventing water accumulation below the slab and resisting frost-heave forces.

A. Subgrade and Aggregate Base Consolidation

The native soil subgrade must be thoroughly cleared of all organic matter and compacted to a **minimum of 98% standard Proctor density** under ASTM D 698. A geotextile separation fabric must be laid over compacted clay or silty soils to prevent subgrade migration. The crushed aggregate base thickness must be a **minimum of 6 inches for pedestrian walkways** and a **minimum of 10 inches for driveways**. Base aggregates must meet standard DOT gradation profiles under ASTM D 2490 (see sieve table below).

Sieve Size	Percent Passing (ASTM D 2490 Base Profile)	Sieve Size	Percent Passing (ASTM C 33 Bedding Sand)
2 in. (50 mm)	**100%**	9.5 mm	**100%**
1 in. (37.5 mm)	**95% to 100%**	4.75 mm (No. 4)	**95% to 100%**
3/4 in. (19.0 mm)	**70% to 92%**	2.36 mm (No. 8)	**85% to 100%**
3/8 in. (9.5 mm)	**50% to 70%**	1.18 mm (No. 16)	**50% to 85%**
No. 4 (4.75 mm)	**35% to 55%**	0.600 mm (No. 30)	**25% to 60%**
No. 200 (0.075 mm)	**0% to 8% (Strict limit on fines)**	0.075 mm (No. 200)	**0% to 1% (Wash limit)**

B. The 2% Surface Drainage Mandate

Snow melting systems are designed to convert solid snow into liquid water, not to evaporate it. Slabs must be poured with a **minimum finished surface slope of 2% (1/4 inch of drop per linear foot)** to actively shed runoff. Melted water must be directed completely away from building foundations and pedestrian zones, and must never drain onto adjacent, unheated pavement where it will pool and refreeze into hazardous, liability-inducing ice sheets.

C. The Paver Sand Specification (The "Limestone Fine Ban")

For paver walkways, a consistently thick layer of 1.0 to 1.5 inches of bedding sand must be screeded over the aggregate base. This sand must conform strictly to the ASTM C 33 standard. **The use of limestone screenings, stone dust, or stone sand is strictly prohibited**. These fine aggregates break down, trap water around the heating

elements, and prevent drainage, leading to frost shifting and premature cable corrosion. If rain is forecast, screeded sand must be covered with a waterproof tarp; saturated bedding sand cannot be compacted, and digging it out from around already pinned heating cables is extremely labor-intensive.

2. RADIANT ELEMENT LAYOUT, DEPTH, & PHYSICAL PROTECTION (PAVING & CONCRETE CONTRACTORS)

Physical damage inflicted during paving is the single most common cause of heating cable failure. The masonry, paving, or concrete contractor must take maximum precautions to safeguard the embedded electrical elements.

A. Spacing and Thermal Depth Standards (The "3-Inch Rule")

For standard concrete or paver surfaces, heating elements must be spaced exactly **3 inches apart** to deliver the necessary 50 W/sqft power density to melt snow in northern climates. Loose heating cables (such as Warmup WSM series) must maintain this spacing. Heating mats (WSMM series) are pre-spaced on mesh and should be unrolled flat. To achieve optimal heat transfer, the heating elements must be positioned between **1.5 inches and 3.0 inches below the finished surface**. If cables sink deeper than 3 inches, surface melting times increase dramatically; if positioned shallower than 1.5 inches, they risk mechanical abrasion or cracking the concrete above.

B. Structural Expansion Joints vs. Control Joints

Heating cables or mats must NEVER run through or cross a full-depth concrete expansion joint. Slabs expand and contract separately; crossing a joint exposes the cable to extreme shear stress that will snap the conductor. Heating elements must be completely isolated to separate, independent slabs. For shallow "control joints" or saw-cut stress lines, cables may pass underneath provided they are buried at the proper 2 to 3-inch depth.

> ***MANDATORY EXCEPTION METHOD:*** *If the layout forces a cable to cross a structural expansion joint, the installer must loop the cable down into the subgrade. Apply a* ***2" x 2" downward bend or loop*** *at the joint. This loop pushes the cable safely below the depth of concrete saw blades and provides the necessary physical slack to let the concrete slabs expand and contract without shearing the copper wire.*

C. Cable Elevation & Mechanical Stabilization

Cables must never rest flat on the compacted base before a pour, as they will sink to the bottom of the concrete slab. The contractor must lay down a lightweight galvanized wire mesh over the base. The heating cable or mat must be secured to this mesh using heavy-duty, outdoor-rated plastic zip ties (50-lb rating). The wire mesh must then be elevated approximately 2 inches off the subgrade using plastic spacers (Mesh-Ups®) to ensure that the cables remain suspended and fully embedded in the middle of the poured concrete slab.

D. Specialized Masonry: Stairs, Step Treads, and Handrails

When heating concrete stairs, the installer must run exactly **3 parallel loops of loose cable across each standard 10-inch deep step tread**. The first of these three runs must always be positioned **directly along the overhanging outer nose of the step**. This ensures the step lip—the most critical slip-hazard area—melts completely clean. For stairways requiring handrails, a minimum of **6 inches of unheated clearance** must be left on the step edges. Because handrail posts are anchored by hammer-drilling into the concrete after it has fully cured, this 6-inch buffer prevents contractors from drilling directly through the buried heating lines.

E. Bituminous Asphalt Paving Safeguards

Fresh asphalt is mixed and poured at extreme, destructive temperatures. If pouring hot asphalt directly over the cables, the paving mixture **must cool to 230°F (110°C) or below** before coming into contact with the cables to prevent melting the outer zero-halogen polyolefin jacket. The maximum overall asphalt overlay thickness is limited to 2.0 inches to ensure proper thermal heat transfer. Contractors must pack and hand-roll the asphalt, or utilize a light mechanical roller weighing **no more than 1 ton**. Heavy multi-ton vibro-rollers will crush the embedded resistance wires and instantly void the product warranty.

3. ELECTRICAL CODE, CONTROL, & SENSOR INTEGRATION (ELECTRICAL CONTRACTOR)

All electrical rough-ins, panel hookups, control wiring, and final terminations must be completed by a licensed, qualified electrician in strict accordance with local Summit County codes and National Electrical Code (NEC) Article 426.

A. Panel Capacity, Relays, & Breaker Margins

Because the heating cables draw a significant continuous load, the electrician must verify that the home panel has sufficient capacity. The SNOPRO-100 Wi-Fi controller operates contactor relays to switch power. Standard electrical codes dictate that breakers must have a **120% capacity margin for continuous loads**. For example, a heating circuit drawing a 16-Amp continuous load must be connected to a dedicated 20-Amp breaker. All snow melting circuits must utilize a Ground Fault Equipment Protection (GFEP) protected breaker.

B. The Critical Factory Splice Rule (The "Air Burnout Warning")

The heating cable is connected to the non-heating power lead (cold lead) via a 6-inch heavy-duty factory splice. **This entire 6-inch factory splice and at least 6 inches of the non-heating power lead must be completely embedded in concrete, asphalt, or sand bedding. The splice must NEVER be pulled inside a conduit or left exposed to open air**. Because heating elements are resistive and produce continuous heat, they rely on the surrounding pavement to act as a heat sink. Leaving the splice exposed to air or trapped inside a plastic conduit sleeve will cause rapid overheating and catastrophic burnout.

C. Low-Voltage Conduit Separation

The system utilizes an in-slab temperature limit sensor and an aerial snow sensor. Low-voltage sensor wires **must always be run in a completely separate conduit** from high-voltage cold leads. Placing them in the same conduit is a code violation that creates extreme signal noise, resulting in control failures. Aerial sensors must be post-mounted above the roofline with a completely unobstructed 360-degree view of the sky, far from roof overhangs, trees, or hot dryer vents.

4. MANDATORY 3-STAGE ELECTRICAL DIAGNOSTIC TESTING PROTOCOL

To preserve the **10-year manufacturer warranty**, the electrician must measure and document cable resistance at three distinct project milestones. These signed logs must be registered with the manufacturer. If any test fails, STOP concrete work immediately.

Milestone	Test A: Insulation Resistance (Megger)	Test B: Total Cable Resistance (Multimeter)
1. Out of the Box	Connect 500 VDC Megger between core wire & ground. Must read > 10 Megohms.	Measure across inner conductors. Must be within 5-10% (Warmup) or ±15% (WarmlyYours) of factory spec.
2. Laid on Mesh	Test after securing system, before concrete pour. Must read > 10 Megohms.	Monitor continuously during concrete pour to detect immediate shovel cuts or damage.
3. Post-Pour	Test after concrete finishing, while curing. Must read > 10 Megohms.	Record final resistance. Complete signed warranty log sheet for registration.

Cable / Mat Code	Nominal Ohms	Stage 1 (Meg / Ohms)	Stage 2 (Meg / Ohms)	Stage 3 (Meg / Ohms)	Electrician Sign
e.g., WSMM-240/2000	28.8 Ω	_____ Meg / _____ Ω	_____ Meg / _____ Ω	_____ Meg / _____ Ω	x _____ _____ _____

_____	_____	_____ Meg / _____ Ω	_____ Meg / _____ Ω	_____ Meg / _____ Ω	x _____ _____ _____

5. CONTRACTOR VETTING QUESTIONNAIRE & BIDDING RED FLAGS

The homeowner should use these 5 precise vetting questions to interview concrete and electrical contractors bidding on the project. Do not hire any contractor who provides a flagged response.

Vetting Question	Acceptable / Professional Contractor Answer	Red Flag response (DO NOT HIRE)
Q1: Where will you place the 6-inch factory hot-to-cold splice on the cable during installation?	"The factory splice is an active part of the resistive line. It must be completely embedded within the concrete slab or aggregate base to act as a heat sink and prevent overheating."	"We'll pull the factory splice inside the PVC wall conduit to keep it clean and out of the wet concrete." (CRITICAL FIRE HAZARD — Trapped heat inside the conduit will melt the jacket and burn out the cable.)
Q2: How will you handle planned expansion joints in our concrete driveway layout?	"Heating cables cannot cross expansion joints because shifting concrete will snap the wires. We'll layout independent cable runs on separate slabs, or create a 2"x2" downward slack loop into the subgrade below the saw-cuts."	"We can lay the cables straight through the joints; they're strong enough to handle concrete shifting, or we'll just cut a slot through the joint expansion board to feed the cable." (VOIDS WARRANTY instantly.)
Q3: (To Concrete Contractor) What aggregate base and concrete mix design are we pouring for Ohio weather?	"We'll lay a 10-inch base of aggregate meeting ASTM D 2490. Concrete will be 4" minimum thickness, fiber-reinforced, and 6% air-entrained (microscopic bubbles to relieve expanding ice water pressure)."	"Oh, we just use a standard 3,000-psi gravel concrete mix. Standard concrete is fine, and fibers are unnecessary." (Standard concrete without air-entrainment will crack and spall in 10-15 years due to Ohio frost.)
Q4: (To Electrician) What electrical diagnostic tests are required, and when will they be performed?	"We must run a Megger test (>10MΩ) and a Multimeter ohm test (within 10% of spec) at three milestones: Out-of-the-box, Laid-on-mesh, and Post-pour, and fully log the values to register the 10-year warranty."	"We'll just plug the system in once the concrete is dry to see if it heats up. Tests aren't necessary if the cable isn't broken." (Missing signed testing logs automatically voids the 10-year manufacturer warranty.)
Q5: How will you keep the heating cable elevated inside the concrete slab?	"We'll stake a galvanized wire mesh base over the aggregate, zip-tie the heating cable to the mesh, and use plastic mesh-up spacers to elevate the wire mesh 2 inches, keeping cables 1.5 to 3.0 inches from the surface."	"We'll just lay the cables flat on the aggregate ground base and pour concrete over them, then pull the mesh up with hooks during the pour." (Hooks pull unevenly; cables will sink to the bottom, losing all surface heat.)

6. PROJECT SIGN-OFF & BID BINDING AGREEMENT

By signing below, the bidding contractor acknowledges they have read, understood, and agree to execute all layout, concrete, aggregate, electrical, and mandatory testing specifications outlined in this 4-page brief. Failure to adhere to these physical installation rules (such as factory splice burial or expansion joint avoidance) that results in cable failure will require the contractor to repair the pavement and replace the system at their own expense.

Homeowner Acknowledgement	**Contracting Firm Acceptance**
Signature: _____	Signature: _____
Date: _____	Date: _____