7.4 ICE ROADS

1. GENERAL POLICY

1.1 Municipal Policy for the development and maintenance of ice roads that are maintained by the Municipality shall be guided by criteria established by Council.

1.2 The Municipality will provide an ice road for the public as approved by Council, when the Operations Department deems it safe for its employees and the travelling public. Liability Insurance must be in place before the ice road will be maintained.

2. DEFINITIONS

2.1 "Maintenance" – shall mean clearing of the ice road and the approach ramps of accumulated snow.

2.2 "Ice" – all references to loads or depth of ice refer to "Clear Blue Ice". Slush ice is not taken into account. The Municipality refers to the IHSA Best Practices for Building and Working Safely on Ice Covers in Ontario; Section 4; Table 3: Allowable Loads in KGS for A-Values and Effective Ice Thickness estimating ice loads to determine type of maintenance equipment that will be used and in determining when the road will open to the Public.

2.3 "Ice road" – shall mean a roadway from the termination of the publicly maintained road directly to the area requiring the ice road, via the shortest route, generally a width in excess of 10 meters.

2.4 "Clear Blue Ice" – Ice that grows below the layer of surface ice under calm conditions. It usually forms in vertical, columnar crystals that contain few air bubbles. It appears to be blue because it's clear enough to see the water underneath it.

3. ICE ROAD REQUIREMENTS

3.1 Listed below is the area within the Municipality that requires an ice road:

Cochenour to McKenzie Island

SEE FIGURE 1 – Ice Road Layout

4. PROCEDURE

4.1 The ice road will not be flooded by the Municipality; the ice road will be formed by natural freezing.

4.2 Measuring the thickness of ice will be started when "clear blue ice" has accumulated to a depth to support a person on foot – this will be determined by the Director of Operations. The thickness of the ice will be monitored on a weekly basis, with a minimum of 36 tests being completed along the proposed route. A minimum of 12 tests will be conducted along the centerline and on each edge of the proposed route.

4.3 The ice road shall be patrolled and conditions recorded at frequency determined by the Director of Operations based on the time of year and present weather conditions.

4.4 Areas of concern on the ice road shall be marked with barricades or reflective markers.

4.5 Vehicle windows shall be all the way down.

4.6 When working on the ice there shall be a minimum of two (2) people with no more than thirty (30) feet in distance from another person.

4.7 If any ice measurement is less than 30 cm the ice cover must be closed immediately and the public informed of closure.

5. SIGNAGE

5.1 A sign must be erected at each approach to the ice-road (2 signs). The signs shall have the following information:

McKenzie Island Ice Road
OPEN (or CLOSED)
Maximum Speed 20 km/h.
Maximum Allowable Weight xx,xxx Kg
Problems with Ice Road please call ASAP 807-727-2597

The maximum allowable weight may change based on weekly measurements.

6. MAINTENANCE

6.1 A Notice on Projects must be submitted to the Ministry of Labour prior to the preparation for the opening of the road and before any ice measurements are taken. Maintenance of the ice road will start after the erection of the signs and the ice road is deemed safe for travel by the Operations Department. All drilled test holes must equal or exceed 30 cm of "Clear Blue Ice" and maintenance of the ice road will cease once the ice no longer has 30 cm of "Clear Blue Ice". This determination will be the responsibility of the Operations Supervisor.

6.2 Snow will be removed from the ice road after an accumulation of 15cm.

7. REQUIREMENTS

7.1 Rescue Equipment shall be provided in a suitable location, on or near the work location.

7.2 Rescue equipment shall include:

- Axe or ice chisel
- Rescue Rope
- Belt or Harness with D Rings
- Ice Rescue Picks
- Whistle
- Warm Clothing
- Life Jacket or Floater Jackets
- High Visibility Clothing
- Gear Bag to Store Equipment / Ice Work Plan / Emergency Plan

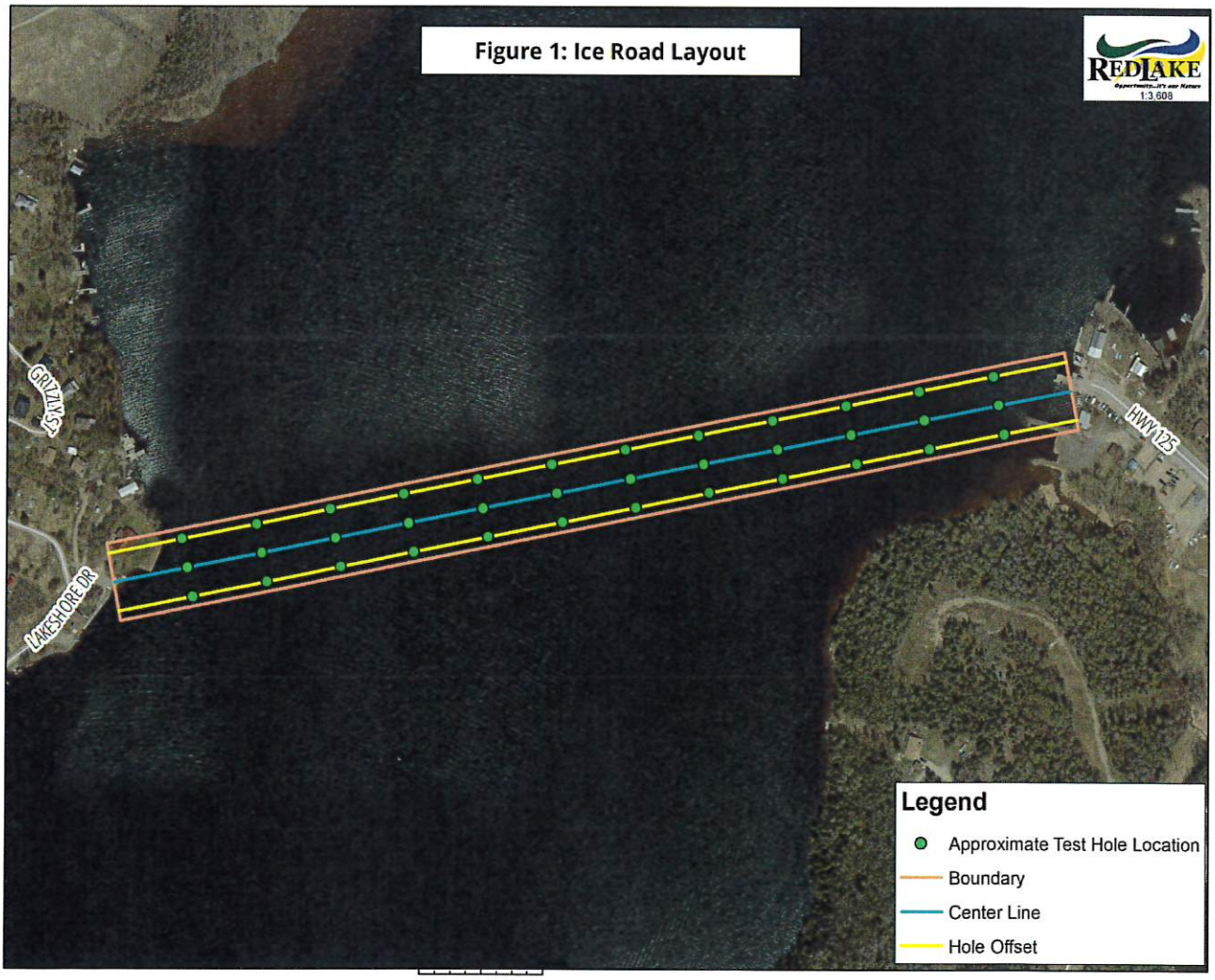
7.5 A whistle and ice picks shall be always worn by the employee while on the ice.

7.6 All vehicles will be equipped with ice picks as a precautionary measure to enhance safety on the ice road.

7.7 At no time should a worker be alone while working on the ice.

7.8 A written Standard Operating Procedure for Ice Coverings will include a clear emergency plan and be made available to all employees.

APPENDIX A
ICE ROAD LAYOUT



APPENDIX B
ALLOWALBLE LOADS IN KGS FOR EFFECTIVE ICE THICKNESS

TABLE 3: ALLOWABLE LOADS IN KGS FOR A-VALUES AND EFFECTIVE ICE THICKNESS

	Low Risk ← Allowable Load (P=kg) → Substantial Risk			
h=Effective Ice Thickness (cm)	**A=3.5**	**A=4**	**A=5**	**A=6**
	Low Risk (kg)	**Tolerable Risk (kg)**	**Moderate Risk (kg)**	**Substantial Risk (kg)**
20	1,400	*	*	*
25	2,200	*	*	*
30	3,150	*	*	*
35	4,300	4,900	6,120	7,350
40	5,600	6,400	8,000	9,600
45	7,100	8,100	10,100	12,100
50	8,750	10,000	12,500	15,000
55	10,600	12,100	15,100	18,100
60	12,600	14,400	18,000	21,600
65	14,800	16,900	21,100	25,300
70	17,100	19,600	24,500	29,400
75	19,700	22,500	28,100	33,700
80	22,400	25,600	32,000	38,400
85	25,300	28,900	36,100	43,300
90	28,300	32,400	40,500	48,600
95	31,600	36,100	45,100	54,100
100	35,000	40,000	50,000	60,000
105	38,600	44,100	55,100	63,500
110	42,300	48,400	60,500	**
115	46,300	52,900	63,500	**
120	50,400	57,600	**	**
125	54,700	62,500	**	**
127	56,450	63,500	**	**
Limitations: This table must be used in conjunction with the hazard controls identified in Table 4.				

*Refer to Table 5.
**Seek the advice of a professional engineer.

Gold's Formula has been used extensively since 1971 and forms the basis for all infallible measure of the carrying capacity of an ice cover and must be combined with ice monitoring, maintenance, and administrative hazard controls.

The required ice thickness for a given vehicle load must be determined in conjunction with the hazard control process outlined in Section 3. An appropriate A-value is chosen based on balancing risk level against operational controls. Those controls are usually linked to project requirements. For example, if the project requires heavy vehicle traffic and a high traffic volume, then it may not be feasible to design and build an ice cover based on a conservative (low) A-value. However, the risk posed by choosing a higher A-value can be balanced by implementing hazard controls to reduce the risk of the breakthrough hazard. Table 4 shows how A-values are used with appropriate controls to maintain the safety of the ice cover.