PARLOUR GROUNDING METHODS

"Tingle" voltages are defined as stray voltage (current) found in a milking parlour which is properly wired to code with all grounds properly bonded and intact.

Extensive studies of various dairy parlour installations in the Lower Mainland and Northern Washington State have been made. It has been concluded that the problem being dealt with is one of it “electrical pollution" attributable to the ever-increasing electrification of the modern farm.

It seems that the earth, which is defined as having electrically zero potential, is not acting as a voltage "sink" at all times in all locales. In effect, ground potential is a reality. This can be proven by driving electrodes short distances apart and measuring the potential.

Not only is there evidence of voltage gradients in a parlour along any horizontal surface which is perhaps attributable to the steel pipes (good conductors) anchored into the concrete (a relatively poor conductor), but gradients between surfaces have also been measured. The problem is compounded due to the fact that the milk pump is bonded to ground. The situation then becomes:

- The cow's front feet are on concrete at some potential V_1.
- Hind feet are normally on a steel grate at a different potential V_2.
- Rear quarters brush the splash plate which is anchored to a steel pipe out of the concrete and is at another potential V_3.
- Head, nose and tongue are in contact with the feeder at V_4.

When the machine is placed on the udder and milk begins to flow, the milk, which is a good conductor, ties the milk pump, which is at V_5 to the cow's udder.

Also, the operator standing in the pit area can be considered to be at a different voltage V_6 and enters into this complex circuit each time he handles the cow or milking claw.

The best possible solution to this problem at this time, is to create an equi-potential plane for the cow to stand on and bond this to the milk pump via the service entrance ground. In so doing, $V_l = V_2 = V_3 = V_4 = V_5 = V_6$, therefore, eliminating any possibility of a potential difference occurring within the milking parlour system.

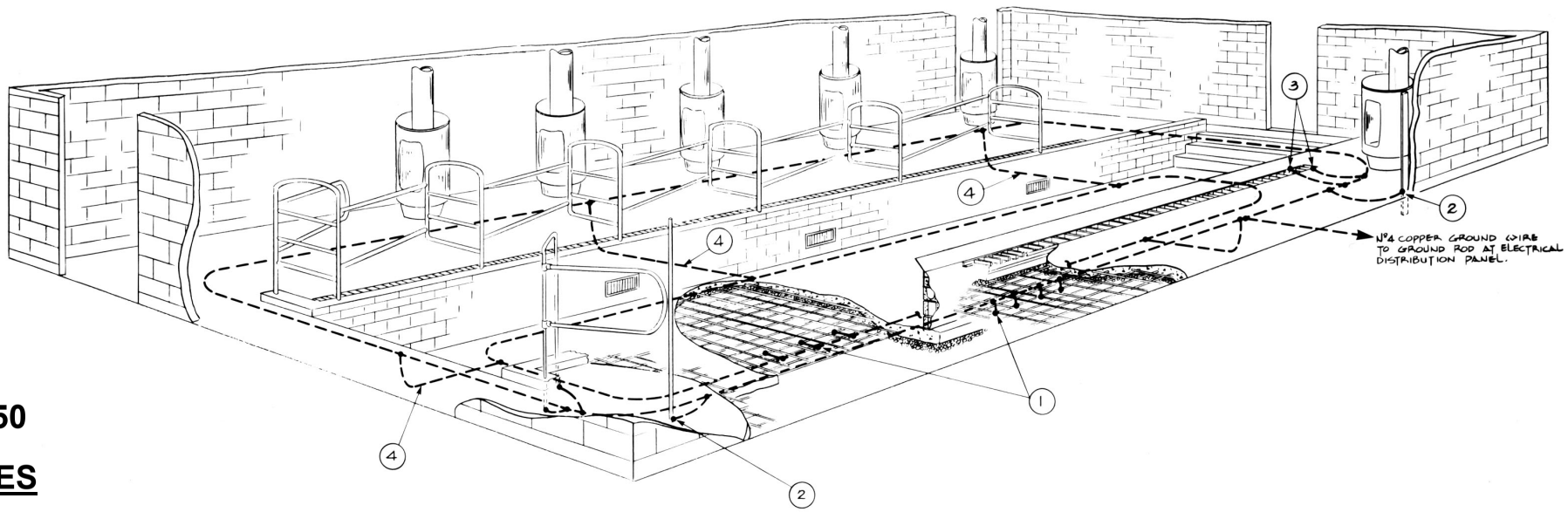
Figures 1, 2 and 3 depict the method now employed in numerous installations throughout the province. Plans are available from the Engineering Branch. (Ask for plan # 324.5-1).

The first modification was made in February 1974 and to date the farmer has experienced no further problems.

It is strongly recommended that this type of ground matting be utilized in all new parlour installations. These specifications have been well proven for 10 years and it is recommended that contractors do not relax these standards.

Also note that the Provincial Electrical Inspector requires a permit to be taken out and inspections will be provided for installations of equi-potential grids in milking parlours.

MILKING PARLOUR GROUNDING METHOD



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NOTES

1. Bond No.4 copper ground wire to 2" x 2" x 9 gauge galv. wire mesh in concrete floor at 3 ft. intervals - maximum.

2. All steel posts, gate posts, support posts, feeder brackets etc. to be bonded to No.4 copper ground wire.

3. Angle iron grate supports for floor drains to be bonded at both ends of parlour and both sides of grate.

4. Ground loop on floor of pit to be connected to ground loop on cow platform floor in no less than 6 locations.

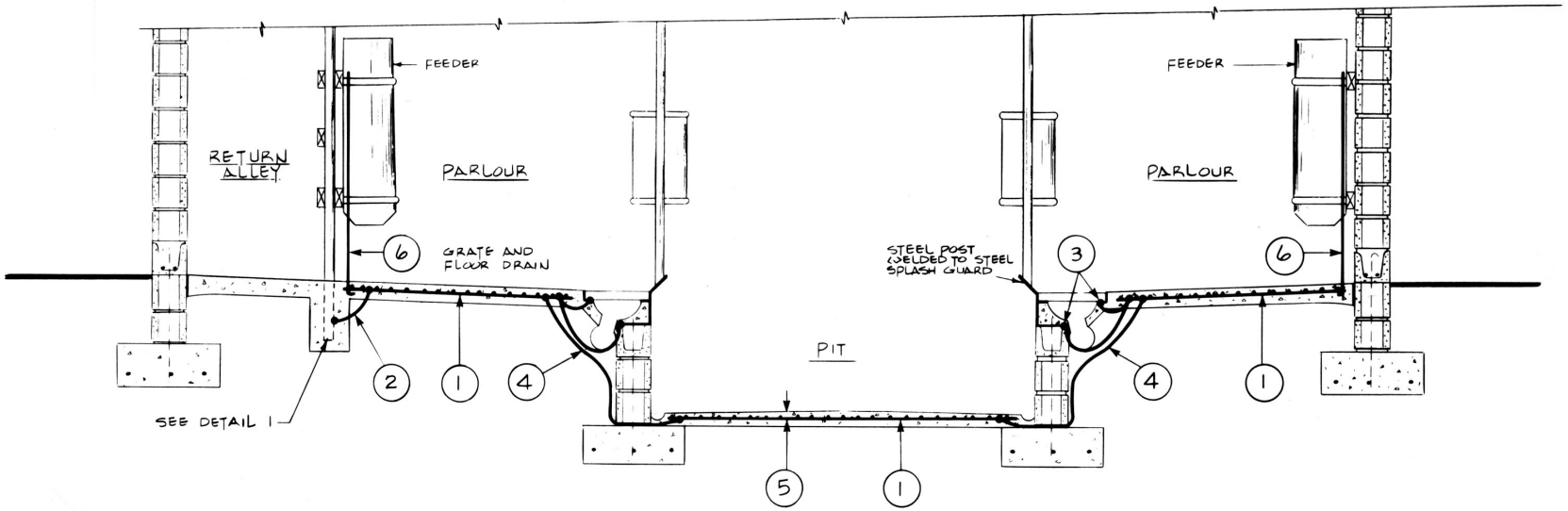
5. For new floors, galv. wire mesh to have a maximum concrete cover of 1 1/2". (For grounding an existing parlour, a 2" layer of concrete over existing floor is adequate. Use a high strength (3500 psi) mix with no calcium. Use 20-24 oz/yd. of high early pozzolith where quick setting is desired.)

6. 1/4" round steel rod welded to feeder extends down to galv. wire mesh. Clamp 1/4" rod, mesh and No.4 copper ground wire together. Install 2 rods per side of parlour provided that all feeders are interconnected by metal parts.

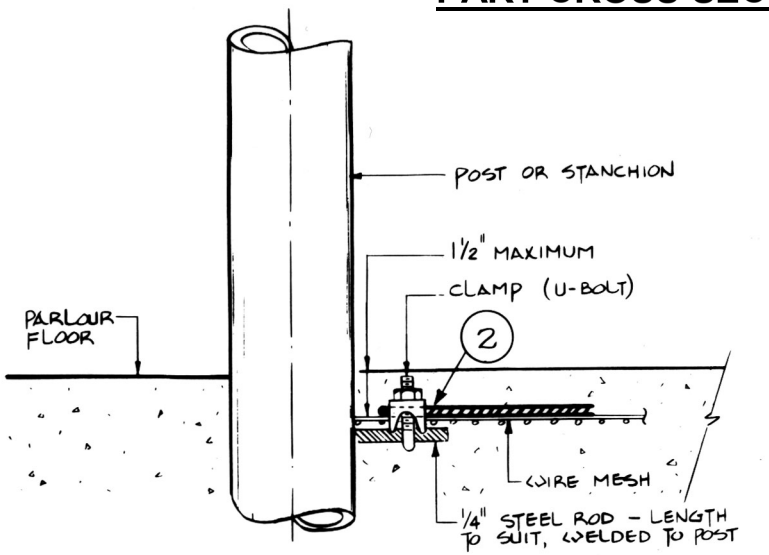
This plan has been developed to provide an easily understood method of grounding milking parlours to eliminate “tingle” or stray voltages which occur in some areas.

The plan is a “cut-away” view showing where and how the grounding matting and cable should be placed.

This drawing is not intended to show structural, mechanical, or architectural details. It should only be used for milking parlour grounding details.



PART CROSS SECTION – MILKING PARLOUR GROUNDING



WIRE MESH, GROUND ROD AND ¼" STEEL ROD ALL CLAMPED TO ENSURE CIRCUIT CONTINUITY.

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DETAIL 1