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THE WATER HAULER'S BULLETIN

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CONCRETE SIDEBOARDS

How do you increase the capacity of a ten year old unreinforced concrete slip-form lined canal? This was the problem facing the Taber Irrigation District on their Big Bend Main Canal. The 4.81 m^3/s (170 cfs) capacity canal was built to service approximately 11,000 assessed acres (4451 hectares), however, the district proposed to enlarge the canal to 7.08 m^3/s (250 cfs) to service 16,457 acres (6660 hectares).

First thoughts were to twin the channel, however, costs were prohibitive (estimated $485,000.00). The existing concrete channel is in fairly good condition and can be expected to last another twenty years or more. Kent Bullock, the District's Engineer, proposed to enlarge the capacity of the canal by adding 400 mm of concrete freeboard to the existing concrete lining. Here's how they went about it.

Using forms, much like those used for curbs and sidewalks, crews set up the 200 lineal metres of form, tied in three #10 reinforcing bars, and completed pouring the 25 MPa concrete by late afternoon. The next morning, the forms are stripped and the whole procedure starts over.

The top of the existing concrete section was not sand blasted, for a good bond was not wanted for the fear of breaking the older section further down the slope. To prevent seepage between the new and old concrete surfaces, a joint will be cut and filled with pressurized mastic material.

Cost for raising both sides of the 2,425 lineal metre canal was $130,000.00. Kent Bullock is "real pleased".

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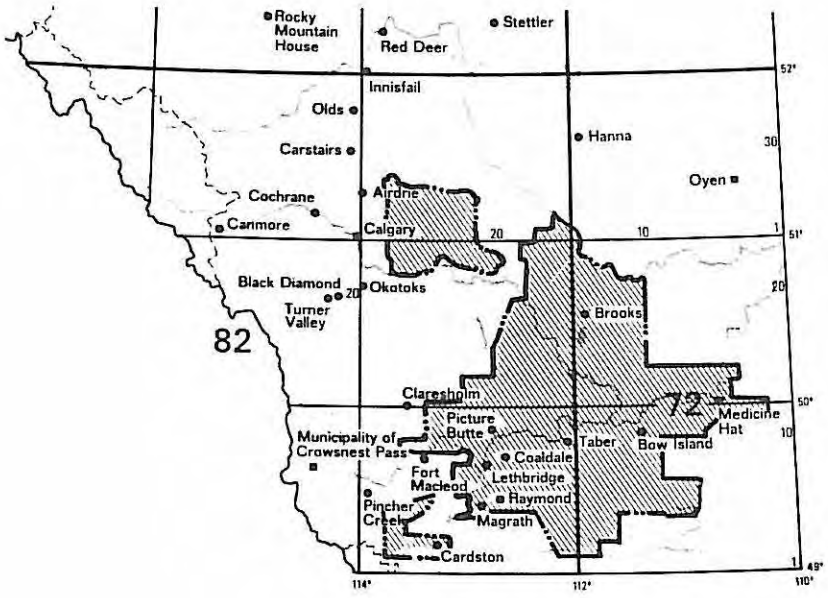
PHOTOGRAMMETRIC TOPOGRAPHIC MAPPING

The Project Planning Branch of the Resource Planning Division at the Agriculture Center in Lethbridge now has available for public and private use an in-house "data bank" from which one metre ($\frac{1}{2}$ metre machine interpolated) contour mapping can be produced using photogrammetric methods and techniques. The entire project area was divided into thirty-nine individual blocks based on the ground control survey configuration, then each block was aerial triangulated separately and all the blocks photogrammetrically tied together. The areas covered by the data bank were the irrigated areas within the irrigation districts, as well as, some adjacent areas of potential irrigation development, some 30,720 square kilometres (12,000 square miles) or 8,000,000 acres (3,237,425 hectares).



The data bank features a Users Manual outlining the capabilities and results that can be achieved from the data for mapping purposes. The Users Manual will be available to clients in the fall.

The Technical Services Section of the Project Planning Branch offers assistance to users relative to the Users Manual, as well as, the overall mapping program. The data bank components are available for use at no charge, however, a reproducible copy of any mapping produced from the data bank is required by Alberta Agriculture.

For further information relative to this program please contact Mr. A. L. Potvin at 381-5170.

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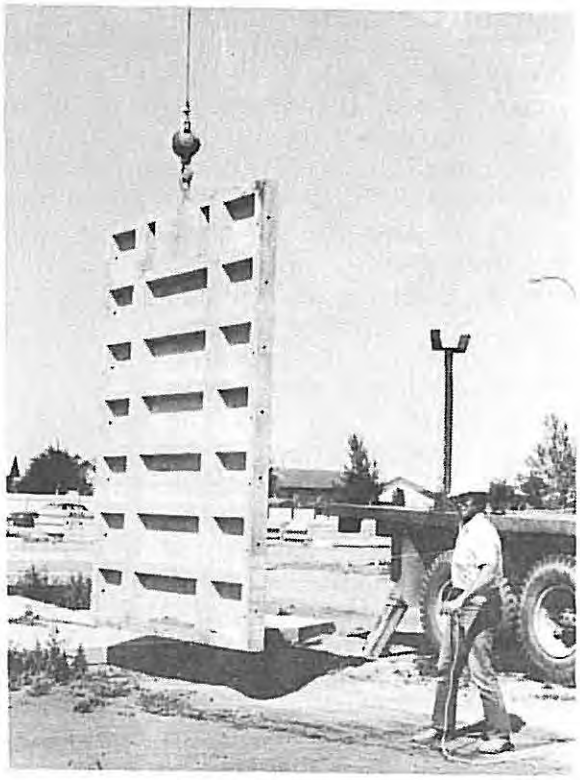
CONSOLIDATED INTRODUCES NEW LIFTING SYSTEM

When lifting and placing heavy precast concrete panels there is always a need for extra caution. The Consolidated Concrete Plant in Lethbridge has just recently introduced the Burke's Rapid-Lift inserts into their precast concrete panels for faster safer handling and erection. Gone is the need for a spreader bar.

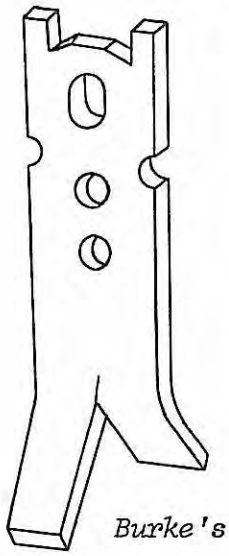
Burke's Erection Anchor, incidentally made in Texas, is specially designed for horizontal to vertical edge pulls and the shear rotation of thin-walled units. Two steel protrusions on the differently shaped head provide added protection against spalling. These protrusions hug the two sides of the ring clutch to give it support when it is being pulled laterally. Therefore, lateral lifting forces are transmitted directly to the edges of the anchor and not to the concrete. The body of this anchor is fully integrated for secure support, spall free rotation, and full reinforcement.

The lifting unit consists of a heavy shackle and a ring clutch mechanism with a semitoroidal bolt. Unintentional release is impossible while the ring is under load.



Ed Yantz of Consolidated states "the Burke anchor will provide us with a 5:1 safety factor". Weight of this panel is 2015 kg.

Good news is that Consolidated feels this far safer lifting system will not add any additional cost to the purchase price of their precast products. However, a one time four hundred dollar expenditure (at their dealer cost) will be required to purchase a set of three lifting clutches. Consolidated is also contemplating renting them out at a nominal fee.



Burke's Spread Anchor

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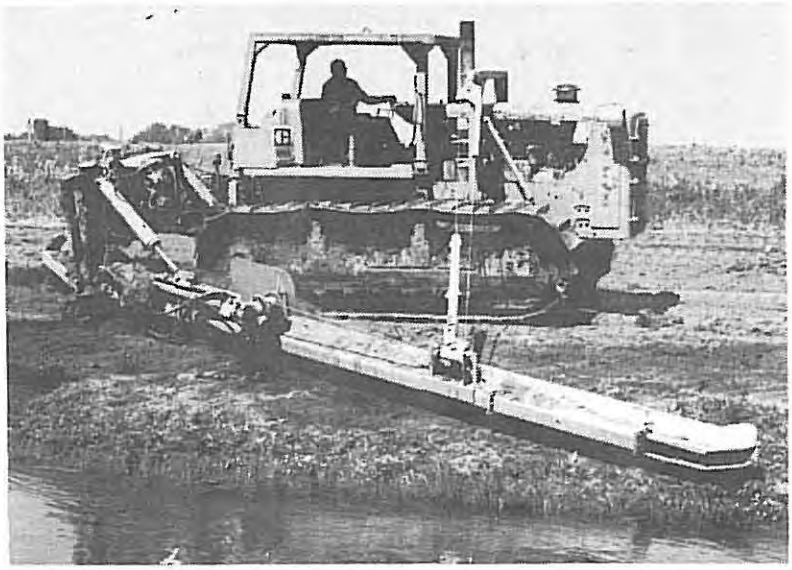
IRRIGATION CANAL SIDE SLOPE REHABILITATION

The Western Irrigation District (W.I.D.) is presently experimenting with a new type of machine used to rehabilitate deteriorated slopes on irrigation canals. Canal slopes that are overgrown with grass and willows are a continual maintenance problem in the W.I.D. This new machine, made by Towner, is owned by Top Notch Construction Ltd. of Calgary and may be a partial answer to W.I.D.'s removal of vegetation on canal slopes. It consists of a blade similar to a grader blade that attaches to the back end of a D8H "Cat" dozer. The blade is very versatile and may be moved up, down, in and out to conform to almost any canal slope. When using this equipment the "Cat" moves along the top inside edge of the canal bank while the blade extends down the slope to the toe of the bed. The material is bladed up the slope into a windrow on top of the canal bank and spread out to further build the bank. Depending on how dense the grass and brush are on the slope determines how many passes you have to make with the machine to obtain a well graded, clean slope. The W.I.D. found that on the average four passes had to be made. A plus for this machine is the fact that it may be used while water is running in the canal as the blade can be retracted to skim along the water line.



The blade can extend out to 10 metres.

The W.I.D. is satisfied with the work done by Top Notch with their Towner so far and feels the cost is justified. It is able to do approximately 1.0 km per day of slope rehabilitation. The cost of rehabilitating the inside slopes and levelling the bank is approximately $1,000.00 per kilometre.

For more information contact D. Holwegner or Alan Winters, W.I.D. at 934-3542.

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FINANCIAL ASSISTANCE FOR NEW IRRIGATION LANDS

P.F.R.A. has been involved in on-farm water projects in Alberta for more than forty years now. Part of this development work has involved irrigation projects. Particularly in recent years, P.F.R.A.'s participation has been in assisting private irrigation scheme development by individual farmers outside of organized irrigation districts.

Part of this assistance included financial grants towards the capital cost of project development and, as of April 1, 1985, this latter funding has now been extended to individual project developments within organized irrigation districts. There are, of course, a few qualifiers which should be highlighted here:

(1) Assistance is provided only to those costs associated with the development of new irrigated acres.
(2) "New" irrigated acres are defined as those "acres to be irrigated" which are new to the irrigation district assessment role.
(3) Minimum area to be added is 5 acres (2 hectares).
(4) Only bona fide farmers or ranchers may apply.
(5) Verification of "new acres added" will be required in writing from the appropriate irrigation district.
(6) Financial assistance will be provided on the basis of one-third of the eligible costs or specified unit prices (whichever is less) for that portion of materials and equipment associated with the new area development, to a maximum of $2,200.00 per project.
(7) Eligible costs include earthwork, rock, sand, gravel, concrete, culverts, water control structures, aluminum or PVC pipe, sprinkler equipment, pumps, motors or any other approved material or equipment.
(8) Applicants are required to present invoices for materials or services which are to be included as eligible costs for purposes of calculating contributions.

As there will undoubtedly be many situations where it is questionable if and what portion of the project will qualify, a potential applicant is best advised that each situation will be looked at individually. For further information or details please contact Wally Chinn at 223-9614 or P.F.R.A. directly at 526-2429 (Medicine Hat) or 327-4340 (Lethbridge).

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IS CATHODIC PROTECTION THE ANSWER?

Failure from corrosion after only two years? Yes, it has happened in the L.N.I.D. to one of their metal pipe reducers between two diameters of concrete pipe. Corrosion, everyone's enemy, begins the minute something is put in the ground. Two districts, the L.N.I.D. and the S.M.R.I.D., recognize the problem and have jointly teamed together to fund and have it studied in their districts.

There are those of us who say corrosion is oxidation, others say electrolysis, still others will say it is chemical attack. However, before engineers can combat corrosion effectively, they must have a good working knowledge of what they are fighting. Know your enemy! Jointly they have hired Caproco Corrosion Prevention Ltd. of Calgary to:

(1) Evaluate present irrigation structures for corrosion potential.
(2) Evaluate corrosion prevention systems and recommend the most economical means of obtaining protection for their irrigation structures.
(3) Recommend possible design modifications for proposed irrigation works.

Results of the study will be forthcoming in the Fall or Winter Edition of the Water Hauler's.

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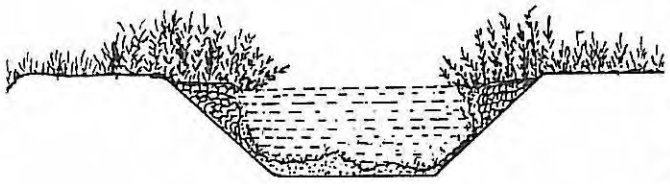
MANAGEMENT OF REED CANARYGRASS ON DITCH BANKS

Reed canarygrass is known as a high yielding hay and pasture grass well suited to moist or waterlogged soil conditions. This affinity for wet soils has allowed it to become naturally established in low lying areas and along streams and creeks throughout Alberta. Reed canarygrass has also become established on the inside slopes of many irrigation and drainage ditches. In these areas it is a problem.

Reed canarygrass is a tall (up to 2 m) leafy perennial grass that spreads by seed and by rhizomes (underground stems). It thrives along the water edge where the soil is continually moist, and is able to spread up and down the slope, as water levels fluctuate. Stems, leaves and rhizomes trap silt as water moves by, creating more living space for itself inside the canal. The tall stems also lodge into the water, slowing flow velocity and causing further silt deposition, hence even more suitable living space. This cycle of silt deposition and reed canarygrass spread continues until ditch cleaning operations become necessary to restore carrying capacity.

Loss of carrying capacity, impedence of flow (by as much as 70% in small ditches), access restriction, and concealment of ditches and bank faults are reasons for management of reed canarygrass growth in irrigation and drainage ditches. Mowing the affected ditch banks temporarily solves some of these problems and can prevent spread by seed, but is not always possible due to access difficulties. Mowing also encourages lateral growth by underground portions of the plant. Non-selective soil residual herbicides such as diuron, have been tried with limited success, however, these materials leave the ditch bank denuded for several years and subject to breakdown from erosion. Also, rehabilitation of a treated ditch could result in movement of herbicide contaminated soil to other areas where problems might occur.



A schematic cross-sectional view of an irrigation canal showing how reed canarygrass begins to interfere with water flow.

An ideal solution to a reed canarygrass problem would be to eliminate the offending vegetation and replace it with more desirable species, such as low growing grasses. The desirable species would serve to prevent erosion and reinvasion by either reed canarygrass or broadleaf weeds such as Canada Thistle. This has been the focus of a number of studies carried out in the northwestern United States by the U.S. Department of Agriculture. Based on this U.S. research, Alberta Environment's Pesticide Chemicals Branch (Pollution Control Division, Environmental Protection Services) and Hardy Associates (1978) Ltd. (Environmental Division) with cooperation from the Eastern Irrigation District, applied various techniques to ditches in the Brooks area.

In fall 1983, ditches with well established stands of reed canarygrass were divided into test plots. Different plots of reed canarygrass were treated in late August, mid September, and early October to varying rates of glyphosate (Roundup Ⓡ) and dalapon (Basfapon Ⓡ). In late October, plots were seeded to a mixture of Sodar streambank wheatgrass, Boreal creeping red fescue and common redtop (8:2:1). Seeded grasses were broadcast to prepared plots (mowed to 6 inch stubble and cleared) and unprepared plots, and worked in with harrows.

With the understanding that the reed canarygrass would grow from seed and that there might be some regrowth from plants not entirely killed by fall treatments, follow-up spraying was undertaken in spring 1984. Low rate applications of both glyphosate and amitrole-T (Amitrol-T Ⓡ) were made a number of weeks after reed canarygrass emergence.

Both redtop and creeping red fescue were known to be resistant to these rates of application while seedling reed canarygrass would be susceptible.

Test plots were evaluated visually during the summer of 1984, and a detailed analysis of the results was undertaken in September. The following information was obtained from analysis of the test plots as they existed in September, about one year after the initial treatments were made.

- glyphosate was most effective as a fall treatment when applied in late August, providing a 55% decrease in the stand.
- dalapon was equally as effective when applied in late August, mid September or early October, but provided only a 20% reduction in the stand.
- glyphosate applied in August and October provided better control of reed canarygrass than dalapon applied at any time, while glyphosate applied in September was equally as effective as dalapon.
- spring follow-up treatments are necessary to reduce reed canarygrass stands to significant levels.
- of the methods studied, best results (approximately 93% reduction in growth of reed canarygrass) were obtained by late August treatment with glyphosate at 2 kg/ha, followed the next spring with treatment by glyphosate at 1.1 kg/ha.
- glyphosate was superior to amitrole for use as a spring follow-up treatment.
- establishment of seeded species was poor, probably due to drought conditions present in 1984.
- seeded species that grew were resistant to both amitrole and glyphosate spring treatments.

Untreated reach of lateral.
Reed Canarygrass has almost completely restricted water movement.

This approach to reed canarygrass management shows promise as a long term solution to the problem. Further studies are planned for 1985/86 to re-evaluate desirable grass establishment.

It should be noted, that Roundup is currently licensed for use in dewatered drainage ditches, while Basfapon may be used in both drainage and irrigation ditches.

More detailed information on reed canarygrass management may be obtained from Rob Burland, Alberta Environment in Lethbridge (381-5511).

® Roundup is a trademark of Monsanto Company.
® Basfapon is a trademark of BASF A.G.
® Amitrol-T is a trademark of Union Carbide Agricultural Products Company.

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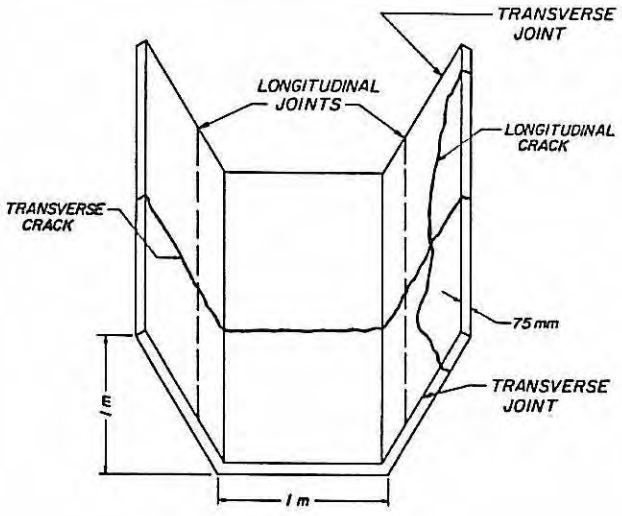
1985 SUMMARY OF CRACKING IN WIRE MESH REINFORCED CONCRETE SLIP-FORM LINED CANALS

The annual inventory of cracking taking place in wire mesh reinforced concrete slip-form lining was completed last April on 35.4 km of laterals in 5 irrigation districts of southern Alberta.

When compared to the 1984 inventory and excluding the 31.5% of new laterals, which are crack free, there was an increase from 300 to 352 transverse cracks and an increase in longitudinal cracks from 180 m to 350 m in the laterals that have run water.

Of the 35.4 km of lining, 31.5% are new laterals constructed in the fall of 1984 and spring of 1985; 8.5% have run water for 1 season; 44% for 2 seasons and 16% for 3 seasons or more.



X-SECTION OF CONCRETE LINED DITCH

The total cracking, less than 2%, is still a very small percentage of the overall reinforced lining installed as the chart below shows:

Cracking	Uncracked	Up to 5 mm	5 mm to 40 mm	Over 40 mm
Overall	98.89%	0.86%	0.25%	--
Transverse	99.33%	0.63%	0.04%	--
Longitudinal	99.56%	0.23%	0.21%	--

Facts derived from the 1985 Inventory on 35.4 km of lining:

(1) 1.98% of the canals have cracking or approximately 1 crack measured every 50 lineal metres.
(2) 0.99% of the canals have transverse cracking or approximately 1 crack every 100 lineal metres.
(3) 0.99% of the canals have longitudinal cracking.

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WATER HAULER'S MARKS FIFTH ANNIVERSARY

This the 20th issue of The Water Hauler's Bulletin marks its Fifth Anniversary. We would like to take this opportunity to thank all those who have contributed either articles or ideas. It is hoped that the past 20 issues have resulted in improved efficiency and reduced costs for the rehabilitation and operating of the irrigation systems of Alberta.

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THE WATER HAULER'S BULLETIN

Designed to provide the operation and management personnel of Irrigation Districts with items of interest in their line of work. Comments are welcome. Please contact Duncan Lloyd at 381-5164, Lethbridge.

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