

How Texas Club Eliminated Storm-Water Damage

By W. T. ALLIGER, M. E.

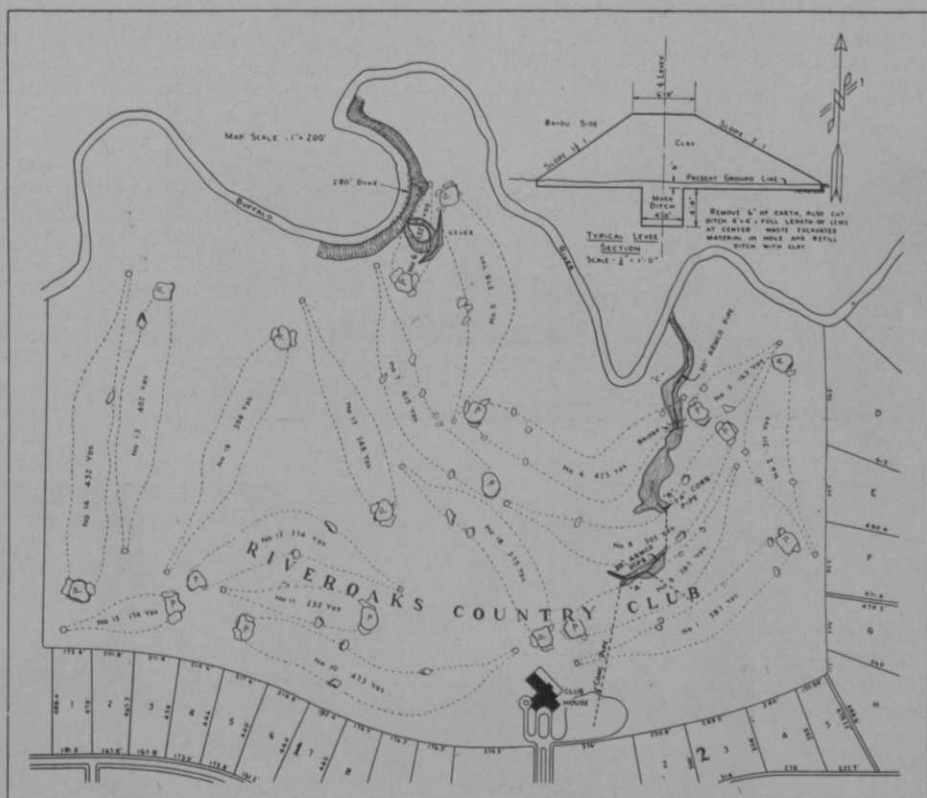
THE problem of adequately meeting the drainage situation on the golf course while safeguarding the natural beauty of the grounds is common to many clubs throughout the country.

The River Oaks C. C. (Houston, Texas) faced the necessity for a new drainage system for its course when it was found that an open gully into which a 24-in. drain emptied was eroding three fairways and threatening the supports of a wooden bridge. The storm water, after running through the gully which flanked the eighth and ninth fairways near the club-

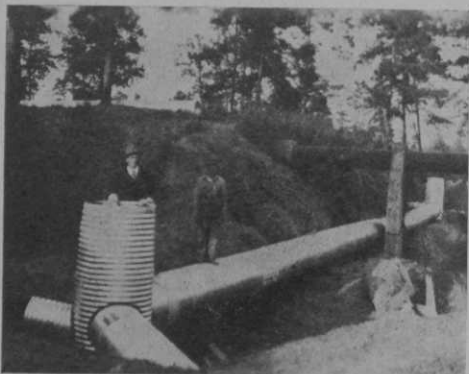
house, passed by pipe under the eighth fairway to pour into another open ditch which crossed the fourth fairway and carried the water to the Buffalo river bordering the grounds.

Water had been cutting away the sides of fairways eight and nine, and had caused the toe of the bank in front of the fourth tee to cave in. It was also undermining the bridge which spans the depression from the third green to the fourth tee.

In determining what steps should be taken to remedy these conditions it was borne in mind that the new system must



Map of the River Oaks C. C., showing location of various improvements to the drainage system.



John Maguire, greenkeeper, behind one of the corrugated iron catchbasins. The lightweight, flexible construction lowered the final cost of installation.

care for the 24-inch drain and surface storm water and, at the same time constitute an improvement from the standpoint of beauty.

The final plan, which was carried out with very satisfactory results, called for

a storm drainage system fitted with catchbasins for taking care of the surface water, and the filling in of the open gullies. Because of the ease and economy with which it could be installed and its durability record which insures a low cost per year of service, Armco corrugated iron pipe with catchbasins fabricated from the same material was chosen as the drainage structure.

The improvement program was divided into three units labeled as A, B and C on the map for identification.

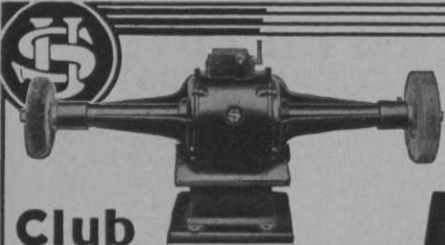
Work was started at the gully A by providing for the surface storm water and the water from the already existing drains which had this gully as an outlet. This was accomplished in the following manner: At the upper end of the gully 72 ft. of 18-in. pipe and 14 ft. of 24-in. pipe which connects a line of the old system with the new, empty into a corrugated catchbasin. The outlet of this catchbasin consists of 115 ft. of 30-in. pipe emptying into a second catchbasin near the center of the gully which also serves as an outlet for



Before: Pipe in place and backfill in progress.

After: Backfill is completed. Note improved appearance.





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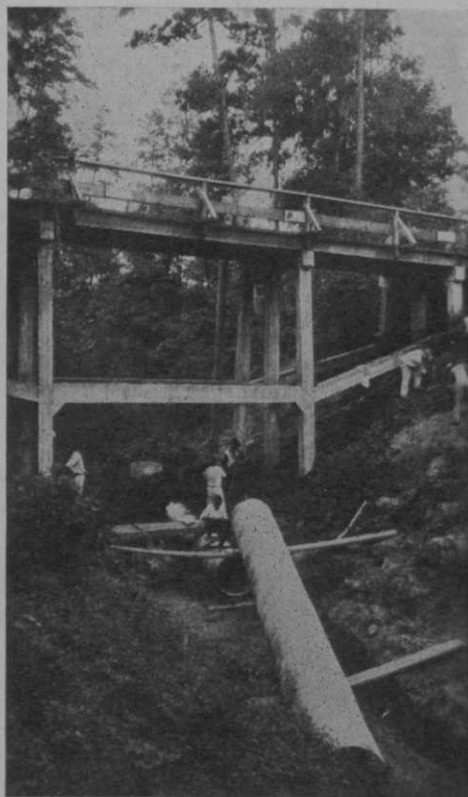
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57 ft. of 15-in. pipe connecting the old drain under fairway No. 9 with the new system. This second catchbasin has as its outlet 104 ft. of 30-in. pipe which empties into the existing drain under fairway No. 8.

By supporting the long continuous sections of the pipe at places on temporary props it was possible to place the entire system before starting the backfill which was carried to the top of the catchbasins. In this manner this unsightly gully, made



This line of 30-inch pipe protected bridge piers from undermining. Riser which forms outlet for the stilling pool shown in the background.

especially obnoxious by its proximity to the clubhouse, was made to harmonize with the otherwise beautiful surroundings of the course.

At location B, 78 ft. of 24-in. pipe was installed to improve the drainage on the lower side of fairway No. 8. This particular installation also served to stop the erosion which had started to undermine a bulkhead at this point.

The third installation of corrugated pipe was made at location C where 320 ft. of 30-in. with vertical inlets to care for surface water was installed. This line begins a short distance above the bridge mentioned above and corrected the erosion tendencies that threatened its supports and continues to a point well below the lower limits of the course. The upstream inlet



Installation at lower side of fairway No. 8 which stopped undermining of a bulkhead at this point.

was built 5 ft. above the stream bed in order to form a stilling pool and raise the gully floor by silt deposits. Provisions have been made to raise the height of this inlet as the gully fills up. By this method, the level of the open stream between the fourth and eighth fairways will be gradually raised to that of the surrounding terrain. The purpose of extending this line below the limits of the course was primarily to prevent erosion and the lower end was left uncovered.

By choosing a drainage structure adaptable to the conditions at hand these improvements were quickly and economically effected. The green-committee and other club members are well pleased.

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