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Design of popup sprinkler system at Nzove playground-Rwanda

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Abstract

This study was bounded to the design of pop-up sprinkler irrigation system in **PLAYING GROUND PITCH**. The topic was based on problem occur during sunny period of the year, most of the plants are negatively affected by intensive sun rays especially various crops. When it comes to the way of solving the problem, different irrigation methods are all allocated to crops saving while landscape beauty is looked down upon to stay suffering and dry. So my objective is to provide landscape beautification such as gardens, playing grounds and lawns should not be neglected. During warm periods, gardens and lawns need irrigation in order to stay alive and maintain aesthetic views, play grounds need to be irrigated so that the grasses stay green and allow its use to be completed very well. On that playground they use traditional systems that is not suitable due to that football players may destroy them while they are in training inside the grounds pitch.the climatic condition is also unfavorable that why in summer time, there is a high risk of plants to die, that is why pop-up sprinkler system was the solution.

Keywords: playground, irrigation, popup sprinkler

1 Background

The first lawn sprinkler US patent was registered to J. Lessler of Buffalo, New York in 1871, which was activated with the help of gardening hose. Sprinklers helped both homeowners and farmers alike, keeping both front lawns and fields of crops green and healthy. In 1932, a fruit farmer, Orton Englehardt, invented the impact sprinkler.

This large sprinkler distributes an even amount of water over a wide area.

The lawn sprinkler is just as popular today as it was back then the only difference being we have access to greater technology! As the awareness of water conservation grows, water efficient technology is being implemented and more customers are concerned with creating water-efficient layouts for their lawn sprinklers. This in turn minimizes the amount of water wasted and maximizes sprinkler effectiveness. (splinklers, 2019).

NZOVE GROUND PICTH is

located in NZOVE cell, KANYINYA sector in district of

NYARUGENGE found in KIGALI CAPITAL CITY of RWANDA this pitch is precisely positioned nearer

Streets rue KN173, this great structure is located to coordinates of LOT :1.9695^{0}S and LONG : 30.0550 ^{0}E. and is where skol beer brewery located and also official launched on 29th September 2017. And Its cost is hundred million Rwandan francs (100000000frw).

The Kanyinya Sector is the northern most sector of the District. It is very well connected with the CDB areas by major roads. The national

2 METHODS

For getting reach to expected results there is a need of different means to be adopted scientifically to sort out all significant outlines that can help in continuous accomplishment of proposed solutions of this study that means this will concern

With types of data collected, methods and tools to be used to analyze them Some of the information needed to be covered in this design of pop-up sprinkler for irrigating grasses pitch that must be completely seemingly with areas concerns to be carried with this study are :

- Sunshine and temperature
- Wind pressure,
- Rainfall (precipitation),
- Soil infiltration rate,
- Crop evapotranspiration (ETo),
- Soil characteristics (like soil texture : sandy loamy)

System pressure requirement Discharge

The consultation of Rwanda meteorological station which is located in Kigali city at Gitega sector was made and was contribute to the accuracy of this work as It has enough data of different seasons.

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3 RESULTS

In this Study, the researcher intends to set irrigation system that will be the solution to the problem occur during sunny period of the year and to keep this play ground green every time.

So, the irrigation system was designed to operate 30 pop-ups That are herded on a half of these pop ups their performances pose to be done in a period of 3 hours to irrigate middle part of the pitch and minimal power

Consumption That strictly demoted to106kw and the left side wards heads

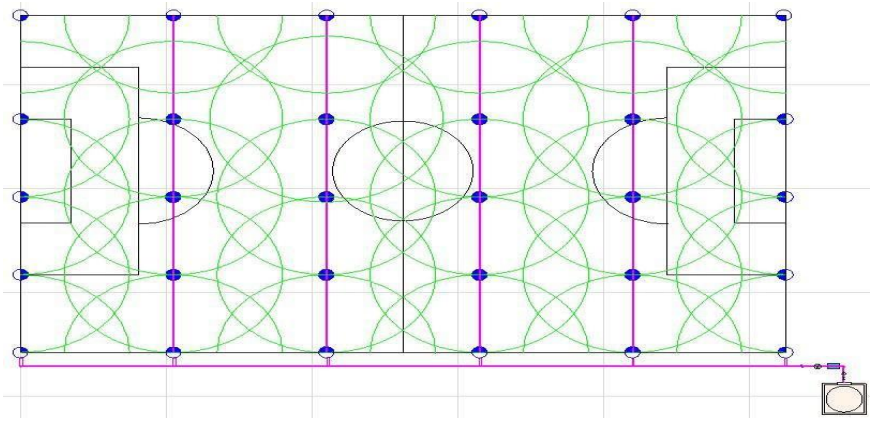
Start to irrigate after this period for complete satisfaction of grasses water requirement, all these meant to irrigate in a least sunshine hours (morning time and evening time) for deduction of unwise intense evapotranspiration.

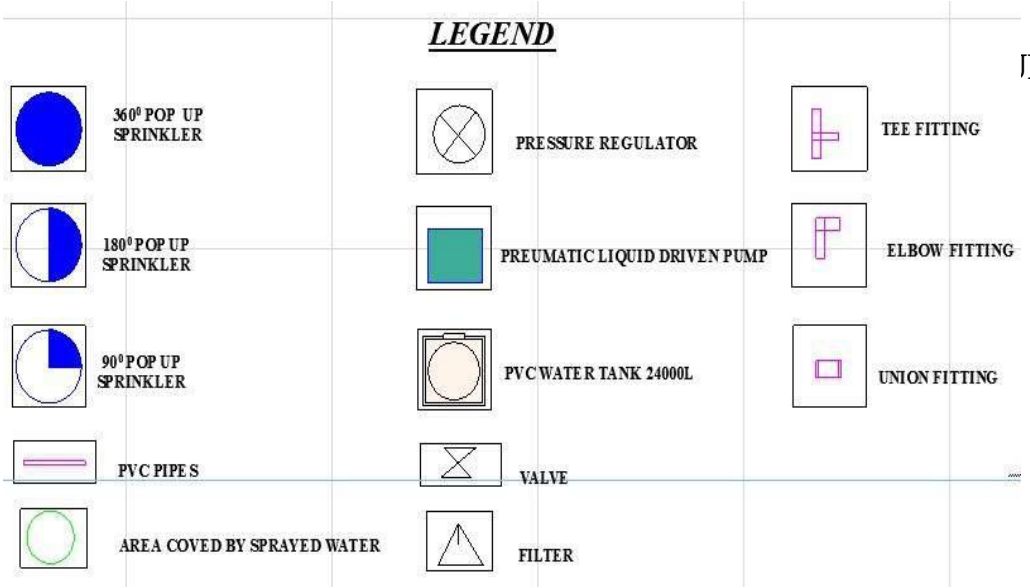
Note that for special case the system can be opened in half time break period during match for maintaining confortability and reduce slickness of grasses in playground.

The system lay-out

Following all the previous steps, the layout of the system came to be as following:

- Number of sprinkler heads:30 sprayers
- sprayers Irrigated surface: (105*70) m^2 sprayers
- sprayers Irrigated surface: (105*70)





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4 DISCUSSION

in this research, researcher tried three main bodies used in irrigation by sprinkler systems: pop up sprinklers, Drip emitters, Bubblers Here the researcher selected the popup sprinkler because popup sprinklers have a piston that "pops" the sprinkler head up from the ground when it is time to water. Because there a time playground need to be watering before being used. Then, when the timer shuts off the lawn sprinkler, the pop-up heads go back underground. Pop-up sprinklers for front and backyards protect people from tripping over them and from players running into them. They come with rotors, rotary nozzles and spray heads.

5 CONCLUSION

According to the findings within this work which is going to be shown below for a reminder, and the intended aim at the beginning, pop-up sprinkler irrigation is ideal for irrigating the sport fields. The following are the findings.

-Pressure at the bottom of the tank is 0.2 bars,

-While the system pressure requirement is 76.11 bars.

-The number of sprinklers used is thirty (30)

-Sprinkler pressure requirement : (2.1*30) bars

Pump capacity That was used : 80bars

-From the scientific analysis of results carried out in the Previous chapters, It is conclusive That design of pop-up

Irrigation system of Nzove playground-Rwanda was successfully accomplished.Moreover, theoretical proceedings taken crucial part as references for designing successfully irrigable recreational place and also had revealed positive approval of adopting this automated permanent pop-up irrigation system as It is last longer and perform effectively irrigation Works in a pitch as It is recommended by FIFA.

6 LIST OF ABBREVIATION

IST Institut Superieur de Technologies
FAO Food and Agriculture Organization

IWE Irrigation and Water Engineering

MINAGRI Ministry of Agriculture and Animal Resources

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Authors' contributions

STA conceptualize the idea and implementation.

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