© 2020 IJSRST | Volume 5 | Issue 7 | Print ISSN : 2395-6011 | Online ISSN: 2395-602X

4th National Conference on Advances in Engineering and Applied Science
Organized by : Anjuman College of Engineering and Technology (ACET) Nagpur, Maharashtra, India, In association with
International Journal of Scientific Research in Science and Technology

Reduction of Moisture Content of Moulding Sand in Pit Moulding through French Drain

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ABSTRACT

This paper gives the idea about application of French Drain in C.P foundry. It faces several problems like surface finish, quality of sand, shrinkage, blow holes but the major issue was the rising level of ground water during rainy season, due to which the workers could not make mould cavity in pit. In C.P foundry, pit moulding is done and for that they need to dig the ground surface 1ft below the ground surface but since the ground water level increases during rainy season it is difficult to perform the intended work, so we proposed French drain with the help of which we can reduce the ground water level.

Keywords : French Drain, Pit Moulding, Ground Water Level.

I. INTRODUCTION

Condition of C.P foundry during rainy season is very devastating because the work (pit moulding) is stalled until the ground level water goes below 3ft. and they face huge loss of production during that time. So in order to prevent the loss, they started using mud pump to remove the water from ground. This costs them large electricity bills and leads to extra loss and wastage of time as well. We observed the condition and came up with the idea of French drain. A French drain is used to remove water from ground surface. it is a pit line with gravel. Gravitaionl force is used to make these linings work. they are built sloped down from the area from which water is to be drawn. excess water from surface can be passed through drain and directed outside. it is used to prevent the ground water from damaging the house or structure. it can also be installed around garden. drains are built under the surface of ground and are not visible from view. It is used for extracting extra water from ground surface. we can understand the idea behind French drain and how it works. imagine shallow drainage system. It is a simple way to keep the area dry and it is great foundation for design of waterproof basement. high level of moisture in ground area can crack or damage the work area. for a firm owner it is important to keep the work area dry.

II. METHODOLOGY

We first dug a trench, & laid in the filter fabric, Then put in the perforated pipe with the holes point down with the sleeve on it. Then laid some gravel onto that pipe and then overlapped the fabric and put more gravels on top.

Step1:
Ground marked for underground utilities. Lay out and dig the trench. about 18'' wide and 36'' deep to

start. Depth adjustments for proper slope will be made later.

Step2:

Set the proper slope on the trench 1/8" per ft. is ideal. In our case, We only had 4 inches of fall from the back starting of drain to end (open space) which is 200 ft. it was enough.

Step3:

Put down layer of silt fabric. This fabric will wrap around pipe and gravel. Leave the top open and then lay the base layer of gravel on which the pipe will rest maintaining the proper slope.

Step4:

Installed the corrugated pipe and covered it with gravel.

Step5:

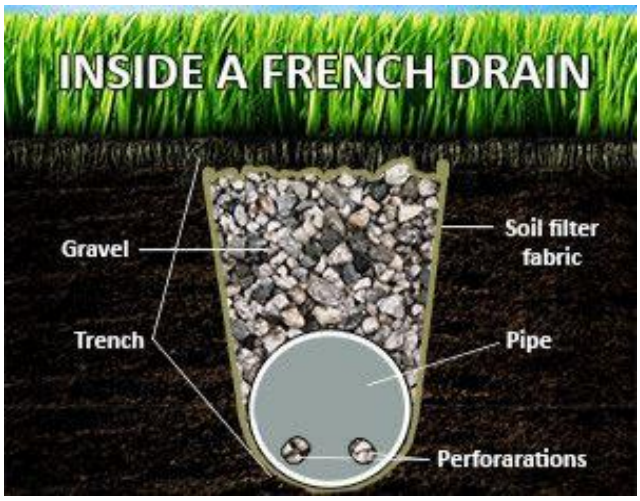
Fold the silt fabric over the pipe and gravel and cover with more gravel.

Step6:

Installed a clean out at the end of each pipe section opposite the drain end of the pipe. The clean out will allow air into the pipe so water can flow and allows access for cleaning when necessary.

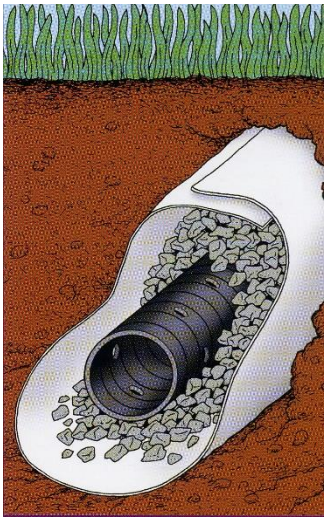
It is basically a gradually increasing depth of long drain which takes the ground water to desired place and away from the work area. The drain system has perforated pipes inside it. The pipes have small holes on them, so that water from ground can enter into the pipe. But along with water some soil, clay or mud can also enter the holes and block the holes of the pipe. To prevent the blocking of holes we need to surround the pipe with filter fabric mat, this mat is a special type of mat. Only water can pass through this and no any other clay or mud particles. The third material is the gravels of medium size. Here we can save the cost of gravels by using the slag material from the foundry itself.

III. MATERIALS



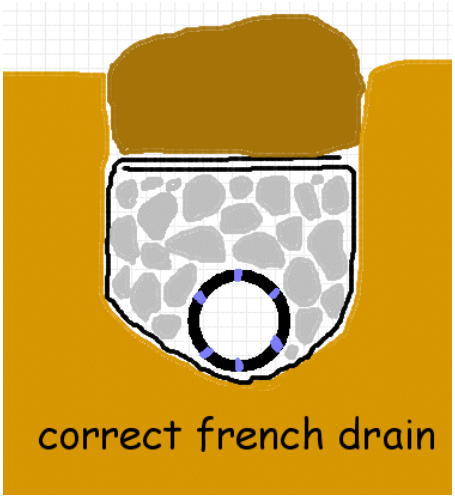
Soil Filter Fabric

During construction of a typical “French Drain”, maintaining the separation of coarse, granular backfill material such as gravel, and the native soils like sand, clay or topsoil, is of utmost importance to assure proper soil permeability and to assuring the long-term performance of the drainage system. Soil Separator is also commonly used during the construction of septic weeping beds. We are using wired mat to reduce cost.



Pipe:

Pipe we are using corrugated plastic pipe, It is ideal for storm sewer systems, such as underground retention/detention systems as it has the structural strength and watertight joint systems to control runoff quantity and rates of release. And it is also durable upto 100 years.



Drain Sleeve:

Drain-Sleeve filter fabrics are specifically designed to cover perforated pipes that are being used in underground drainage systems to prevent fine silts and sandy soils from entering into and eventually clogging the drain tile.

Gravels:

French drain gravel should be washed three quarter inch minimum and as large as 1 ½ " crushed stone. The upper 12 inches above the pipe shall be filled with native soil, to avoid having crushed stone over the perforated pipe that could damage the pipe. We are using Slag coming out from Cupola Furnace instead of Pea gravels, Rock, etc.

In figure: Slag (waste output from Cupola Furnace which we are using in place of gravels)

IV. ANALYSIS

Expenditures	Quantity	Cost (in INR)	Duration	Total Cost (in INR)
Excavator with expenses	1	5000/ day	2 days	10000
Soil Filter Fabric	(40x2.5) meter	400/ (1 x 2.5) Sq.m	-	16000
Corrugated Pipe	50 meter x 1ft dia	100/meter	-	5000
Drain Sleeve	(40x1) meter	150/ (1x1) Sq.m	-	6000
Labour	2	350/day	7 days	4900
Total:				**41900 Rs.**

V. RESULT

We suggest them French Drain for the problem of ground water level. By implementing this method, they can do castings in rainy seasons too. As per their records they do the production of around 360 tons per 4 months.

It means that 33% of their production will increase as casting is also being continue in rainy season and it will cost them only 41900Rs.

VI. CONCLUSION

Rise in ground water level is major issue which costs loss of production of 360 tons per 4 months and to prevent this loss from high ground water level, It is mandatory to remove the ground water level. There are some solutions like using mud pump to remove water from ground surface but it consumes more electric energy. There is another solution which is 'French drain'. This French drain system is a simple system which does not require electric power or heavy mechanical devices. And to prevent the loss of production of 360 tons, We introduced this 'French drain' system to C.P. foundry.

VII. ACKNOWLEDGEMENT

This research paper is made possible through the help and support from everyone. It would not have been possible without the exceptional support of our guide Prof. Huzaifa Fidvi.

VIII. REFERENCES

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