iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 Issue: V Month of publication: May 2022

DOI: https://doi.org/10.22214/ijraset.2022.42318

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue V May 2022- Available at www.ijraset.com

Design and Construction of RCC Fencing Pole

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Abstract: Fencing poles are one of the most widespread manmade features on Earth, and they May out stretch roads by an order of magnitude. One of the most durable and Efficient RCC fencing poles is constructed with the help of concrete. Properly made Reinforced concrete pole .The essential requirements for the protection of Poles for general purposes, we conducted impact test on the protection of reinforced Concrete poles by changing the height of the post & it's position to decreases the effect of impact energy. Fences have eluded systematic study for so long for good reasons. Fencing has become more popular architecture in many disciplines, from ecology to computing. Fences are globally everywhere used & they are often discussions of evaluation. For designing a RCC pole one has to consider all the possible loading and see that the Structure is safe against all possible loading condition.
Keywords: RCC fencing pole, protection fence, impact energy, everywhere.

I. INTRODUCTION

A fence is a structure that encloses an area. Typically outdoors and usually constructed from pole that are connected by boards, wire, rails or netting. RCC fencing pole has higher strength, longer life, and the potential to span longer distances than steel poles are the key reason behind this tendency. These poles are more commercial design & more economical to build. These poles are basically used for covering and protecting our environment. RCC fencing pole are used to protect or divide property, to improve its appearance and give safety to environment.

II. OBJECTIVE

To prepare design calculation and Rate analysis for casting RCC fencing poles.

III. LITERATURE REVIEW

Jonal Medney (1982) A fiberglass pole suited for used in electric transmission systems & reinforced against flexural stress includes a plurality of reinforcing regions parametrically disposed & selectively placed there on.

The regions are integral with the pole & are formed of composite material that includes a plurality of pre stressed longitudinally disposed fibers & a bonding agent embedding the fibers & structurally joining the same to the pole. Thin invention relates to provide a composite structural element high dielectric properties, that is resistant to corrosive environmental properties, that is resistant to corrosive environmental agents.

Elizabeth Agate (1982) Construction of Building Fencing Regarding preparation of a structure that encloses an area, outdoors, connected by boards. Fences are also essential to permit grazing of pastures, down land, heaths and other semi-natural areas.

M. SzocinskiK. Darowicki (2016) 1 Auschwitz 2 Birkenau concentration & RCC fencing poles & exposure.

J. Paul Guyer. (2020) Construction of security fencing Determining & installation of security fencing.

IV. DESIGN AND CONSTRUCTION OF RCC FENCING POLE: THEORY

Fence is the interactions between fences, wildlife, ecosystems, and societal needs. They are manufactured in various forms as PSCC poles RCC fencing poles.

They are basically cement concrete poles which are some using steel wires to provide more structural strength. We do reinforced fencing pole because they have higher strength, longer life and the potential to span longer distances than steel poles are the key reasons behind this tendency.

A great variety of architectural shapes relatively low maintenance cost. RCC fencing poles are simple and easy to install used along with barbed and other weirs. Fencing poles are also used for protect and divide the property.

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V. FEATURES

1) Offered in various lengths and widths.
2) Easy & speedy to install.
3) Resistance to harsh weather.
4) More durable, our poles require very less maintenance.
5) Compact design and flawless finish are some of the attributes.

(Fig:-Fencing pole)

VI. EXPERIMENTAL METHOD

Types Of Test

1) Compressive strength test of cube.
2) Aggregate impact test.
3) Aggregate crushing value test.
4) Specific gravity of coarse aggregate.

A. *Compressive Strength Test of Cube*

A set of three concrete cubes were cast & tested is after 7, 14, &28 days for each mix proportion to determine the compressive strength. The test result of cubes is presented in a tabular form.

SAMPLE	7 DAYS	14 DAYS	28 DAYS
1	360 KN	420 KN	460 KN
2	210 KN	250 KN	280 KN
3	420 KN	430 KN	430 KN
4	250 KN	420 KN	450 KN
AVG	14 NN/MM2	17 N/MM2	20 N/MM2

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B. Impact Test

The toughness of rock means resistance to facture from impact or absence of brittleness. Aggregate impact test is done to assess to know the toughness of aggregate & mechanical degradation by the Aggregate Impact.

Characteristics	Value
Impact value (%)	15.20%

C. Aggregate Crushing Test

Evaluate the resistance to crushing under compressive load.

Characteristics	Value
Crushing value (%)	23.8%

D. Specific Gravity of Coarse Aggregate

This is to determine the specific gravity of given sample of coarse aggregates. Aggregate which are sometime used as in to in gradient, occupied nearly 70 to 75% volume of concrete, however it will well recognized & physical, chemical & thermal property of aggregates substantially influence properties and performance of concrete, one of the important physical property of coarse aggregate is determination of specific gravity.

Characteristics	Value
Specific gravity	2.6

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E. Manufacturing Process Of Rcc Fencing Pole

(Fig-(1)-CONCRETE MIX)

(Fig-(2)-PLACING, VIBRATING)

(Fig :-(3)-CASTING & CURING)

(Fig:- (4)- FINSHING OF FENCING POLE)

(Fig:- (5)- STORAGE OF THE FENCING POLE AFTER FINISHING CONSTRUCTION WORK)

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VII. DESIGN & ANALYSIS

1) *Given Data*

$L = 6' 8'' = 2.032$ m.

M_{20}, $f_{ck} = 20$ N/mm^2

$F_y = 250$ N/mm^2

2) *Find xumax / d*

For $f_y = 250$ N/mm^2

$\frac{Xumax}{d} = 0.53$

Calculate effective span by assuming 30cm bearing at the end.

Effective span = Clear span + Bearing

Effective Span = $l_{eff} = 2.032 + 0.3 = 2.332$ mt

3) *Assume overall dimensions of beam*

Width of beam = $b = \frac{\text{Effective Span}}{30} + 80$ mm

$b = \frac{2.332 \times 1000}{30} + 80 = 157.73$ mm

$b \cong 250$ mm

Overall Depth = $d_1 = 2b$

$d_1 = 2\times 160 = 500$ mm

Assume effective cover = 50 mm

Effective depth of beam = $d = d_1 - 50 = 500 - 50 = 450$mm

4) *Compute loads & bending moment*

I. Self-weight of beam = $W_d = b\times d_1\times 25 = 0.25\times 0.50\times 25 = 3.125$ KN/mt

II. Live Load = $W_l = 5$ KN/mt

Total working load = $W = 3.125 + 5 = 8.125$ KN/mm

Ultimate load = $W_u = 1.5 \times 8.125 = 12.187$ KN/mm

Ultimate Moment = $M_u = \frac{Wu\times l_{eff2}}{8} = \frac{12.187\times (2.332)^2}{8} = 8.29$ KN/mt $= 8.29 \times 10^6$ N-mm

5) *Find the limiting moment resistance of the section*

$M_{ulim} = 0.36\frac{xumax}{d}\left(1 - 0.42\,\frac{Xumax}{d}\right) bd^2f_{ck}$

$M_{ulim} = 0.148\ bd^2f_{ck}$

Mulim $= 0.148\times 250 \times (450)^2\times 20 = 149.85 \times 10^6$ N-mm.

6) *Compare the values of Mu & Mulim*

$M_u = 8.29 \times 10^6$ N-mm

$M_{ulim} = 149.85 \times 10^6$ N-mm

Since, $M_u < M_{ulim}$

7) *Calculate area of Tensile steel (Ast)*

$Mu = 0.87f_y\times A_{st}\times d\left(1 - \frac{Ast\times fy}{b\times d\times fck}\right)$

$5.45\times 106 = 0.87 \times 250 \times A_{st} \times 450\left(1 - \frac{Ast\times 250}{250\times 450\times 20}\right)$

$A_{st} = 56.03$ mm^2

8) Check for minimum steel

$\frac{Ast}{b\times d} = \frac{0.85}{fy}$

Take Ast = 56.03 mm^2

Provide 4mm dia bars

No of bars = $\frac{\frac{Ast}{\pi\times(4)^2}}{4} = \frac{\frac{56.03}{\pi\times(4)^2}}{4} = 4.45 \cong 5$

Provide 5 bars of 4mm diameter.

Ast Provided = $6\times\frac{\pi}{4}\times(5)^2 = 1178\ mm^2$

9) Check for Xu/d

$\frac{Xu}{d} = \frac{0.87\times fy\times Ast}{0.36\times fck\times b\times d}$

$\frac{Xu}{d} = \frac{0.87\times 250\times 1178}{0.36\times 20\times 250\times 450}$

$\frac{Xu}{d} = 0.31$

10) Check for shear

Maximum ultimate S.F = $\upsilon_u = \frac{Wu\times leff}{2}$

$\upsilon_u = \frac{12.19\times 2.332}{2}$ = 14.21 KN = 1421 N

Nominal Shear stress = $\tau_{vu} = \frac{\tau vu}{b\times d}$ N/mm^2

$\tau_{vu} = \frac{1421}{250\times 450} = 0.12\ N/mm^2$

Percentage of steel = P = $\frac{100\times Ast}{b\times d}$

P = $\frac{100\times 1178}{250\times 450} = 0.62\ N/mm^2$

11) Compare between τvu & τc

$\tau_{vu} = 0.12\ N/mm^2$

$\tau_c = 0.62\ N/mm^2$

Since $\tau_{vu} > \tau_c$

$\frac{Asv}{b\times Sv} = \frac{0.4}{0.87\ fy}$

Provide 2 legged 2mm dia stirrups.

$A_{sv} = 2\times\frac{\pi}{4}\times(2)^2 = 6.28\ mm^2 = \frac{Asv}{bsv} = \frac{0.4}{0.87\ fy} = \frac{6.28}{160\times sv} \geq \frac{0.4}{0.87\times 250}$ = Sv $\leq$ 21.34 mm.

VIII. CONCLUSION

RCC fencing pole are simple & easy to install. Used along with barbed & other wires. They protect any territory from unauthorized entry.

Fencing poles are lasting & durable & extremely tolerable to sun & rain. It also a great way to add safety, security & privacy.

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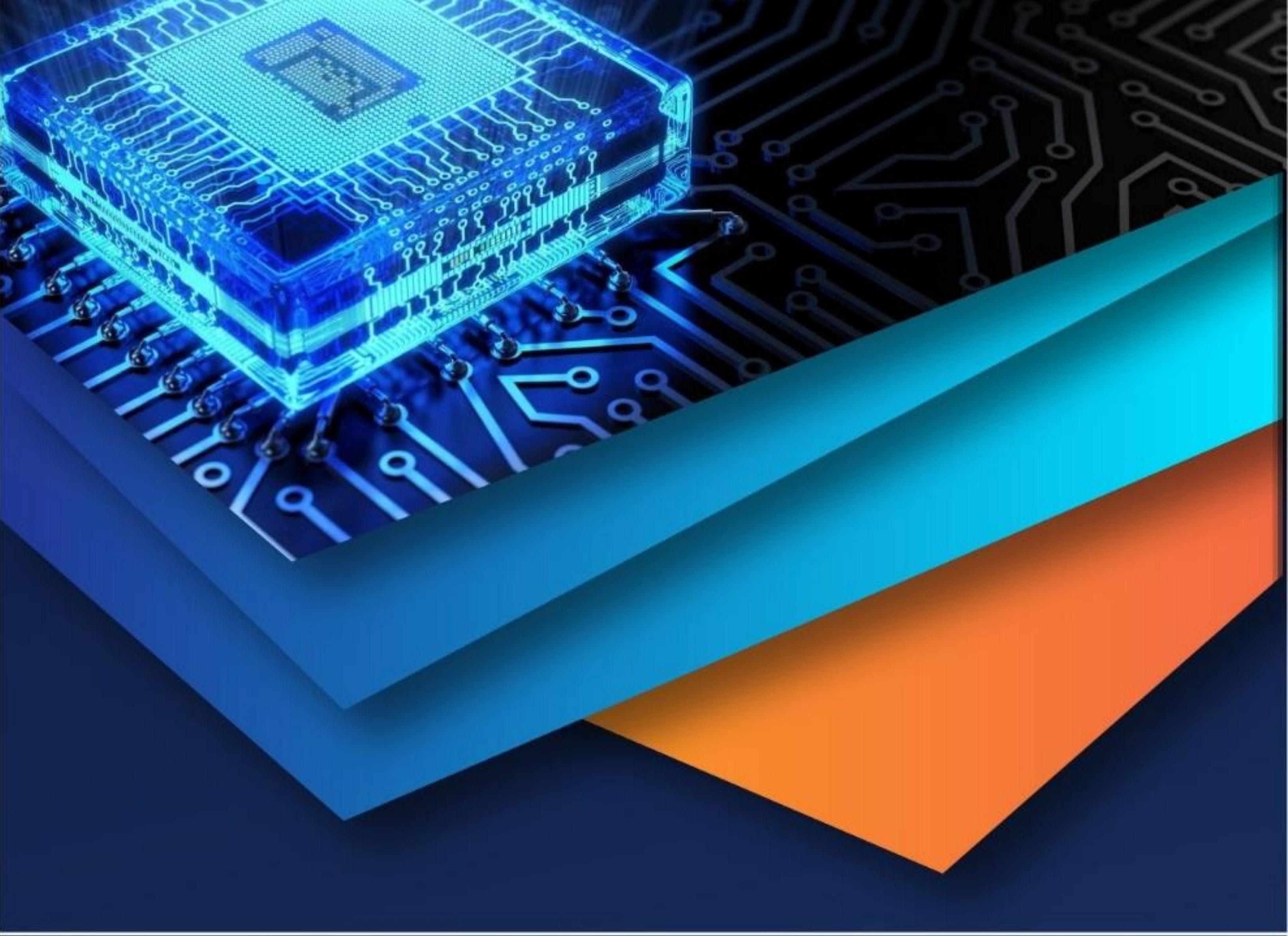

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