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Steel Tie Layer of Stress-Strain Behavior of Concrete under Axial Load Limit

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ABSTRACT:

What tangible benefits will be severely limited as a result of their behavior also seems fragile. Concrete is limited because of the very complexity and ambiguity unnecessary with concrete structures, earthquake resistant design of the circumference. Is no longer sufficient to ensure payment of closely spaced rectangular stirrups established the need for concrete restrictions. Tri-axial confinement of the state, the latter has failed to increase the strength of concrete and strain, as well as a significant increase, beam stress creates tensions in the region. It is a large individual information inelastic limit the levels of seismic energy distracting serious ground when the structure is to allow the movement is known to support. To ensure the structural integrity of the bridge, and the symptoms and not the column is associated with side trips to the displacement of the plastic hinge structure will not be tolerated. Develop adequate rotation capacity of concrete, more steel to the need, or the need for additional imprisonment. It is noticeable that steel cement shell to provide such additional imprisonment. The purpose of this investigation was above normal concrete ties to study the effects of collateral as well as steel, cement shell confinement. In this study, M30 grade concrete cylinder gap in relation to the use of varying degrees 150mm 300mm diameter and height of the load and Iron (GI) is transferred to the wired network level.

I.INTRODUCTION:

This is the power of the mechanical properties of concrete at a reasonable cost in the power and provides a number of advantages, because today, it is more and more concrete structures with high resistance to create. The most common HSC leading to high stiffness, coefficient of factors, including greater flexibility, it is desirable for a number of columns used in the high-rise buildings and large lateral loads are reduced under the influence; 2) the use of column free space on the smallest increase across the sector;

Due to the shrinkage of the concrete and the organization 4) weight less broadcast axial shortening 3) reduction. GCSE is still relatively undiscovered resources, and many of the problems associated with its use have revealed their fragile nature. This exceeds the peak load and more brittle nature of concrete is the examination failed because of a sudden. Elastic deformation of the earthquake reinforced concrete columns and large wind load time is essential to the overall strength and stability of the structure. The concrete core of the column is made of a high school diploma through the prison growth can be achieved.

Reinforced concrete columns plays an important role in enhancing the relations of power and suppleness. Under axial loading, the column direction of the lateral pressure resistance of the basic concrete barrier and are working toward the relationship. Axial load increases, the longitudinal direction of the bar parallel to the first crack in the corner of the column section is published. Bounced off the longitudinal bars, and concrete cover spalls and about it begins to empty. Columns show the ability to carry the load more limited spell. For axial load exceeds the limit, and the longitudinal rods are linked to buckle and open relationship.

II.OBJECT AND SCOPE OF INVESTIGATION:

The objective of present investigation is to develop analytical stress-strain curves for the reinforced concrete prisms confined with rectilinear ties. In order to determine the moment-curvature behavior of a reinforced concrete section, a stress-strain relationship of reinforcing steel and concrete is required. The stress-strain relationship of steel can easily be found from the direct tension test, whereas for a confined concrete, obtaining the stress strain behavior is quite complex. As confinement enhances both strength and ductility of concrete, use of code specified stress-strain relation for unconfined concrete would lead to very inaccurate prediction of moment-curvature behavior.

For the prediction of stress-strain relation of concrete confined with lateral ties, many confinement models based on experimental investigation have been reported in the literature during last three decades. Thus, study of applicability of such models in predicting moment-curvature relationship is a timely concern. In the present investigation five recent confinement models reported in the last decade (1995 to 2005) were selected for the study. The selected models were compared for their ability to predict the actual stress-strain behavior of confined concrete. The present investigation was thus carried out by the analytical prediction of the stress-strain behavior of the concrete confined with lateral ties. The models that were used in this investigation are:

Daniel Cusson and Patrick Paultre (Cusson model) (1995)
G. Rajesh Kumar and A. Kamasundara Rao (GRK model) (1998)
Salim Razvi and Murat Saatciglu (Razvi model) (1999)
P.Mendis, R. Pendyala and S. Setunge (Mendis model) (2000)
Frederic Legeron and Patrick Paultre (Legeron model) (2003)

From the Stress-Strain curves developed using the models mentioned above, the value of peak stress, corresponding strain, and strain at 85% of peak stress in the ascending and descending portions are presented.

III.Mix Design:
A.Mixing

Mix the concrete either by hand.

B. HAND MIXING:

(i)Mix the cement and fine aggregate on a water tight none-absorbent platform until the mixture is thoroughly blended and is of uniform color.

(ii)Add the coarse aggregate and mix with cement and fine aggregate until the coarse aggregate is uniformly distributed throughout the batch

(iii)Add water and mix it until the concrete appears to be homogeneous and of the desired consistency

C. SAMPLING:

(i)Clean the mounds and apply oil
(ii) Fill the concrete in the molds in layers approximately 5cm thick
(iii) Compact each layer with not less than 35strokes per layer using a tamping rod (steel bar 16mm diameter and 60cm long, bullet pointed at lower end)
(iv) Level the top surface and smoothen it with a trowel

IV.PROCEDURE FOR MIX DESIGN:
A.Test Data For Material:

Aggregate Type : Crushed

B.Specific Gravity:

Cement : 3.15
Coarse Aggregate : 2.67
Fine Aggregate : 2.62

C.Water Absorption:

Coarse Aggregate : 0.5%
Fine Aggregate : 1.0 %

V.MIX DESIGN:

Take percentage of total aggregates = 36%Sand content as Select Water Cement Ratio = 0.43 for concrete grade M35 (From I.S. 10262- 1982)
Select Water Content = 172
(From IS: 10262 for 20 mm nominal size of aggregates Maximum Water Content = 186Kg/M3)
Hence, Cement Content= 172 / 0.43 = 400 Kg / M3
Formula for Mix Proportion of Fine and Coarse Aggregate:
1000(1-a0) = {(Cement Content / Sp. Gr. Of Cement) + Water Content +(Fa / Sp. Gr.* Pf)}
1000(1-a0) = {(Cement Content / Sp. Gr. Of Cement) + Water Content +Ca / Sp. Gr.* Pc)}
Where Ca = Coarse Aggregate Content
Fa = Fine Aggregate Content
Pf = Sand Content as percentage of total Aggregates = 0.36
Pc = Coarse Aggregate Content as percentage of total Aggregate. = 0.64

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a0 = Percentage air content in concrete (As per IS :10262 for 20 mm nominal size of
aggregates air content is 2 %) = 0.02
Hence, 1000(1-0.02) = {(400 /3.15) + 172 +(Fa / 2.62 x 0.36)}
Fa = 642 Kg/ Cum
As the sand is of Zone II no adjustment is required for sand.
Sand Content = 642 Kg/ Cum
1000(1-0.02) = {(400 /3.15) + 172 +(Ca / 2.67 x 0.64)}
Hence, Ca = 1165 Kg/ Cum
From combined gradation of Coarse aggregates it has been found out that the proportion of 53:47 of 20 mm & 10 mm aggregates produces the best gradation as per IS: 383.
Hence, 20 mm Aggregates = 619 Kg
And 10 mm Aggregates = 546 Kg

To obtain slump in the range of 150-190 mm water reducing admixture brand SP430 from Forsook with a dose of 0.3 % by weight of Cement shall be used. Hence the Mix Proportion becomes:

TABLE: Mix Proportions

Cement	W/C	Water	Sand	20MM	10MM
400	0.43	172	635	619	564
1	0.43	0.43	1.6	1.547	1.35

Volume of the cylinder V= hr^2

VI.Casting:

Cylinders of 150mm diameter and 300mm height are casted by varying ferrocement layers and keeping tie spacing constant. Required size of wire mesh was cut first and then wrapped around the columns with an overlapping of 75 mm in the lateral direction. Thereafter, all the specimens were plastered with rich mix mortar of mixing ratio of 1:2 (cement: sand) by weight. rior surfaces.
1.Plain cylinder M30 grade
2.Ties 4 + M30 grade
3.2 Layers + 4 Ties + M30 grade
4.3 Layers + 4 Ties + M30 grade
5.4 Layers + 4 Ties + M30 grade

Fig (1) Concrete cylinder test mould & Cement Concrete cylinder .

VII.Curing:

The test specimens are stored in moist air for 24hours and after this period the specimens are marked and removed from the molds and kept submerged in clear fresh water until taken out prior to test. The cubes and cylinders are kept in curing tank for 28 days.

Fig (2) Curing of concrete cylinder

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VIII.Testing:

(3) Hydraulic Compressing Testing Machine

are capped with plaster of Paris before testing to provide a smooth loading surface, to avoid any stress concentration during the application of load. A Hydraulic compressing testing machine of 2000 KN capacity is used for testing the cylinder under axial compression. All columns are tested under monotonically increasing small eccentric load applied at the top of the specimen until failure. Eccentricity of loading in this study was kept constant for both the benchmark and the jacketed specimens and it was taken as 25mm from the centre point of the specimen. The cylinder are tested under strain rate control, 0.1 mm/min. The same type of test set up followed for studying the stress – strain behaviour of ties based; fibres based, Ferro cement based specimens which is adopted for Plain self-compacting concrete specimens.

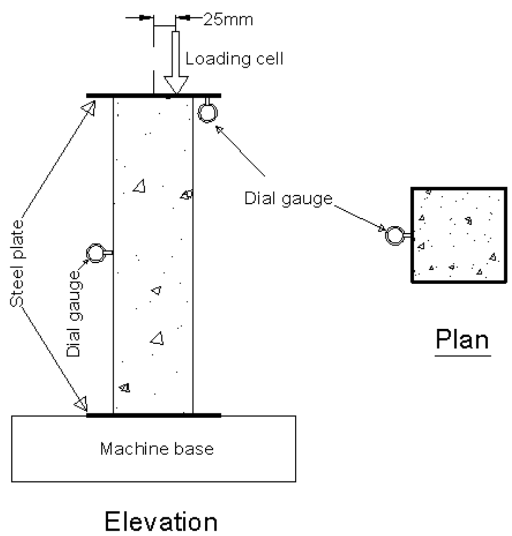

Fig (4) Testing Setup Dial Gauge Position

IX.CONCLUSIONS AND SCOPE FOR FURTHER WORK:

From the analytical study of different models for the high strength concrete confined with ties the following conclusions may be drawn:The peak strength, corresponding strain and ductility increases with the increase in the level of confinement. As the confinement level increases, the enhancement of peak strength, corresponding strain and ductility factor decreases with the increase in the strength of concrete. The analytical behaviour of the ascending portion, predicted by all the five models, is found to be similar. There is a need to identify and include few additional parameters in the expression of confinement index, to predict the stress-strain behaviour satisfactorily.

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