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IOS Application Development on Design of Shear wall

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Abstract - *Shear force is a vertical element which opposes horizontal forces. In earthquake prone areas the framed buildings may get damaged or building may collapse. So in such cases if shear wall with proper design is considered, damages and collapse of building shall be avoided. In urban areas shear wall construction is more considered for speedy construction. After analysing building with shear wall, the shear wall has to be designed with proper shear and flexural reinforcement. This design work takes lots of time and it is complex too. To overcome this problem an IOS application is developed where single click can give all the design details. This gives precise result and takes very less time. In this paper for the developed application validation is done using a worked problem from text book. Also a 9 storey building is analysed using E-TABS and forces such as moments, shear force axial force are obtained then results are put on developed application and design results are obtained.*

Key Words: **Shear wall, lateral force, Flexural Strength, IOS Application, Reinforcement.**

1. INTRODUCTION

Shear wall is a vertical member which is capable of resisting horizontal forces. Shear walls is constructed to oppose the impacts of lateral load coming on the building. When there is cantilever action in the building shear walls are provided to counter such action in the building. When shear dividers are designed and constructed properly they are capable of resisting earthquake forces.

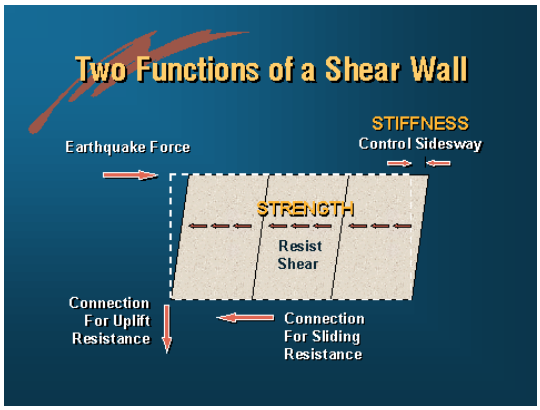

Fig 1.1 Shear wall functions

1.1 Advantages

- Shear wall offers huge strength and stiffness to the structure in this manner reducing injures to the structure
- Shear wall reduces the necessity of finishing trades
- Shear wall have excellent outlook.
- Shear wall have Very good seismic performance.
- Cost of construction of shear wall is less.
- Shear walls are effortless to construct.
- Shear walls have Greater power over accuracy.
- Shear walls have Greater power over workmanship.

1.2 Rising Significance of software Application.

The world is mumbling to the tune of portable applications where there is a response for everything no matter what with mobile phones. The mechanical headway by the distinctive Mobile App Development Companies prescribes that as an always expanding number of people are getting subject to versatile applications to fulfill such countless while advancing, life has ended up being so less requesting. The engaged market asks for up level of the applications and the new improved segments to give the best favored point of view to the end customer. Apple acknowledges a controlling foundation and is puts high on top of the enthusiasm for the Windows applications. It has moreover extended during the time because of the diverse new segments related to social displaying, amusements and media news, educating organization and the new structures focusing on the speed figure.

1.3 IOS, Swift Programming Language and X-code

iOS is the working system that keeps running on iPad, iPhone, and iPod touch gadgets. The working system deals with the gadget equipment and gives the innovations required to actualize local applications. Swift is a universally useful, multi-worldview, gathered programming dialect created by Apple Inc. for iOS, mac OS, watch OS, TV OS, and Linux. Swift is intended to work with Apple's Cocoa and Cocoa Touch structures and the expansive assortment of surviving Objective-C (ObjC) code composed for Apple items. Xcode is an incorporated improvement condition for macOS containing a suite of programming advancement

instruments created by Apple for creating programming for macOS, iOS, watchOS and tvOS.

2. ANALYTICAL WORK

Nine storied residential building located in Bangalore is analyzed using ETABS software. This building has shear wall at lift area.
The details and description of the building is given below:

Table -2.1: Detailing of Building

FLOORS	DETAILS
Ground Floor	Parking area
First to eighth Floor	Residential area
Terrace	Space for Staircase Head Room and Overhead tanks

	Description	Tower
a)	Structural System	Beam Slab system
b)	Slab thickness	150 mm
c)	Beams	200x375, 200x450, 200x600, 200x750
d)	Column size	200x600
e)	No. of slabs	Ground + 8 Upper Floors = 9 slabs
f)	No. of Floors	Ground + 8 Upper Floors + Head Rooms / Lift Machine Rooms
g)	Scope for future expansion	Nil

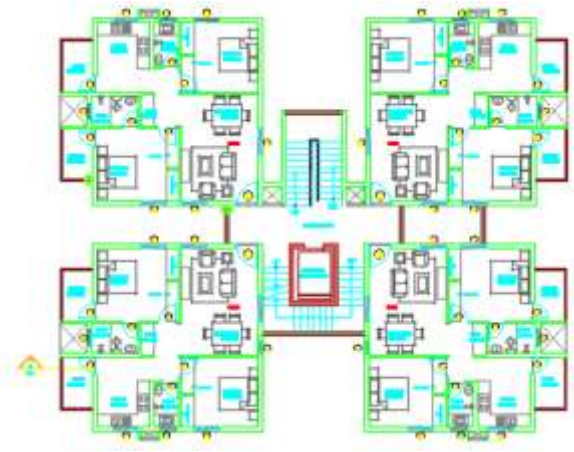

Fig 2.1 Plan of building

2.1 Load calculations of wall and slab

1. For 3.15m height wall, 200mm thick with 20mm plaster on both sides, considering 0.45 m average depth of beam
   = (3.15- 0.45) x 0.20 x 7.45+ (3.15 – 0.150) x 0.02 x 2 x 20.4 = 6.471 kN/m, Say 6.5 kN/m

2. For 150mm thick Slab
   Dead Load on Floor Slab:
   Self weight of slab = 0.150x25= 3.75 kN/m^2

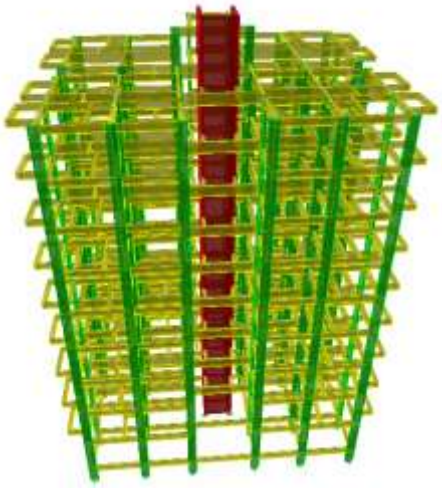

Fig 2.2 3D model of building

2.2 Programming work

IOS application is developed by means of XCODE in OSX software & coding & program work is done on design of shear wall in SWIFT programming language. Flow chart for application development is as shown in fig below.

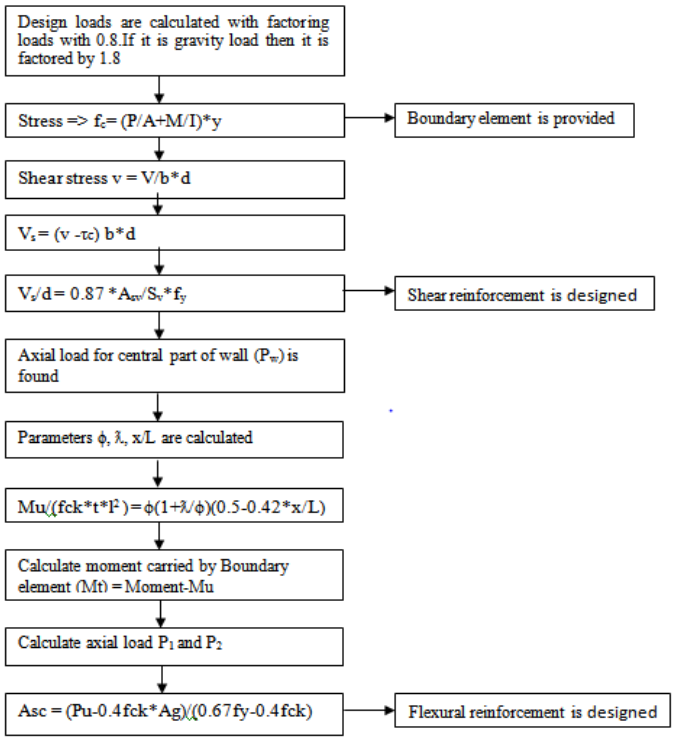

Fig 2.2 Flow chart of design of shear wall

3. DEVELOPMENT OF IOS APPLICATION

Before starting to develop the application flowchart for the design and GUI(graphical user interface) of application should be prepared . Then backend of the project can be taken up i.e programming work.

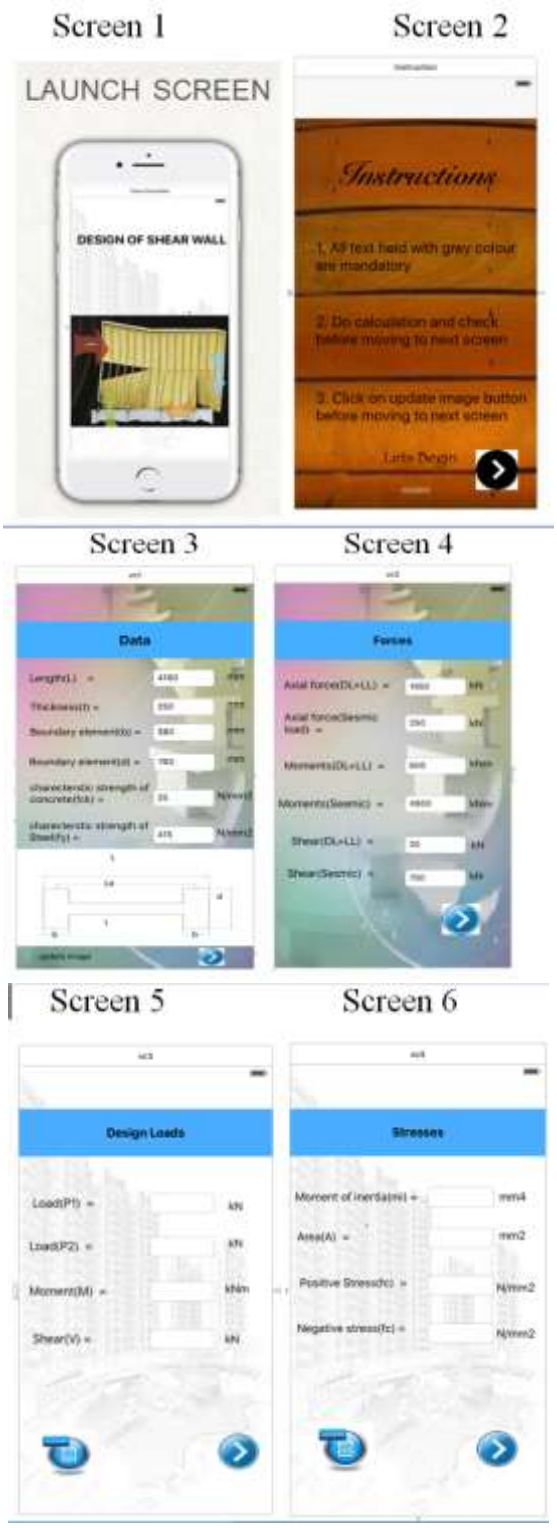

Fig 3.1 GUI of developed screens

3.1 Screens developed

1st screen gives is the launch screen to the application

2nd screen gives instructions about at application

3rd and 4th screen are basic data inputs about the shear wall

In 5th screen design loads are calculated

In 6th screen stresses are calculated, if stresses are more than 4 kN/mm2 boundary elements are provided

In 7th screen shear stress is calculated & thus the shear wall is designed for shear reinforcement.

In 8th screen moment carried by web of the wall, moment carried by boundary element and axial load is calculated.

In 9th screen for the calculated moment flexural reinforcement is designed

In 10th screen reinforcement around the opining in shear wall is designed.

3.2 Steps Involved in Developing Application

Select new project in X-code, select single view application, and select programming language as swift.

Create main storey board add view controllers by connecting push segue and adding up navigation controller will help in moving forward and back of view controllers.

Create coca touch class to write program for the particular view controller.

Fig 3.2 Coca touch class

4. RESULTS AND DISCUSSIONS

After analyzing the residential building axial forces moments & shear values are taken for different load cases. Application is developed and shear wall is designed.

Table -4.1: Forces in selected member

	Axial force(kN)	Moment (kNm)	Shear (kN)
DL+LL	1130	64	80
Seismic load	780	4160	830

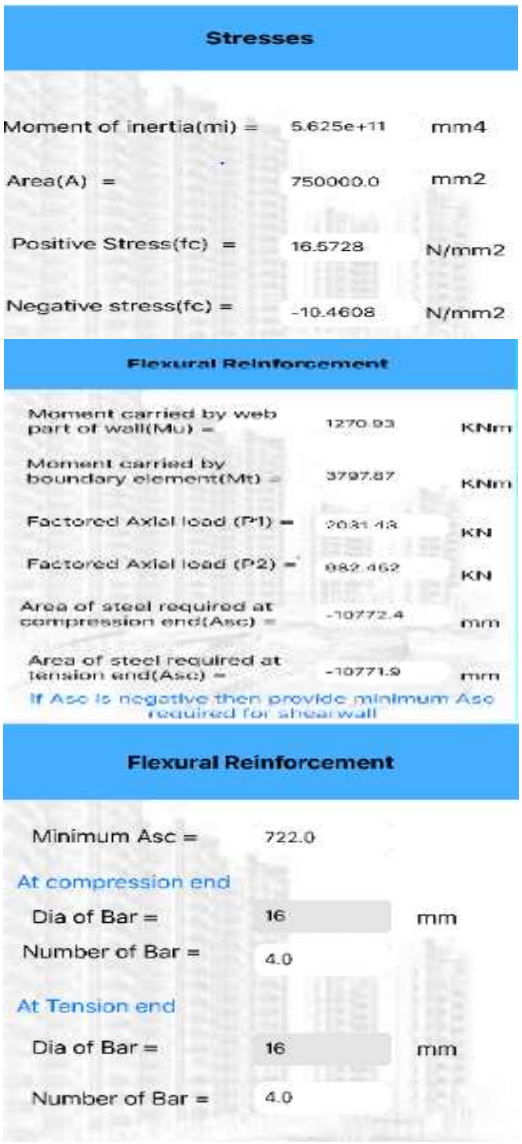

Fig 4.1 Results from Application

5. CONCLUSIONS

1. Application is developed in such a way that it calculates loads and stresses.
2. The developed application is very user friendly. Shear wall can be designed with minimum input.
3. Shear wall design application results are compared and validated with the worked example from vergis (2nd edition) text book
4. From various studies its proved that by providing boundary elements seismic performance if the building is increased

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