

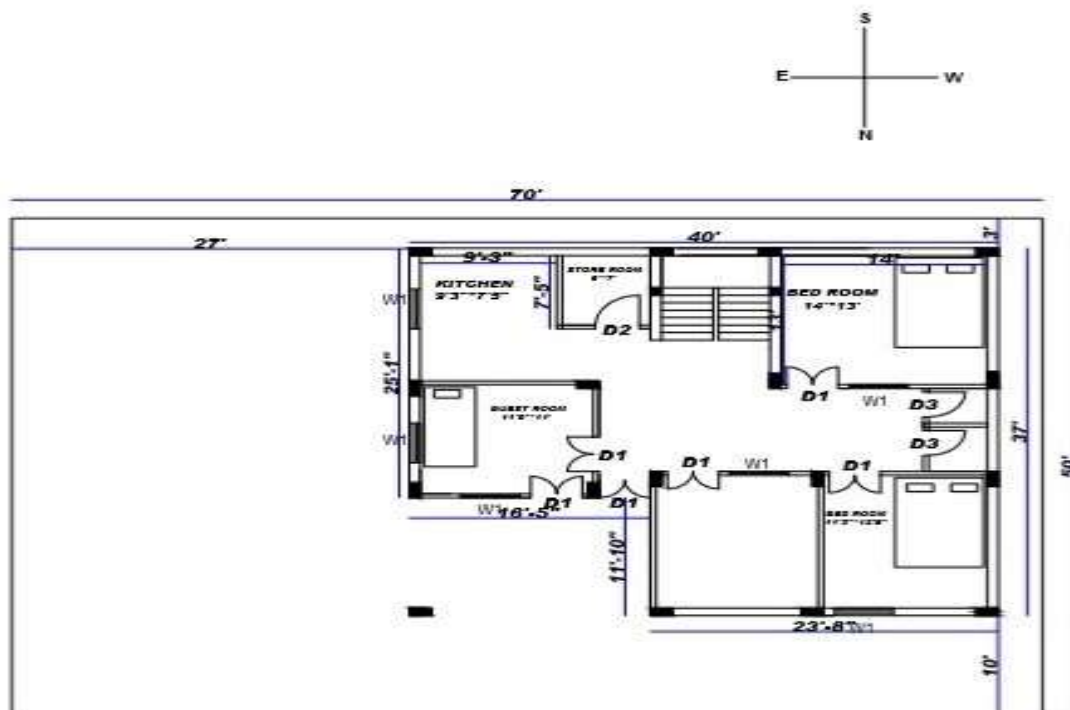
DESIGN MULTI STORY ENERGY EFFICIENT BUILDING

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Abstract- Due to the change in climatic condition the release of greenhouse gases mainly carbon dioxide and chloro floro carbon increases , which affect the environment. Mainly the INDIA and CHINA both are the greatest country in the world from the point of view of population is more so greenhouse gases more .Day by day energy uses increase but energy source is limited. So need of minimum use of artificial energy and maximum use of natural energy. In this we reduce the release of Carbon Dy Oxide and Chloro floro Carbon and make the environment free from pollution.

Keyword-Climate change, energy source, reuse of water, climate condition effect, Natural gases

INTRODUCTION- The energy efficient building mainly works Temperature control, Reuse of water and Solar energy. As we all expected that about 40% of energy consumption is consumed by building and remaining 60% energy used in commercial institutional road school etc .so we will have to reduce this major consumption of energy to make INDIA more economical and pollution free .World studies have acknowledged, buildings were responsible for 7.85Gt, or 33% of all energy-related CO₂ emissions worldwide (Price et al., 2006) and these emissions are expected to grow to 11Gt (B2 scenario) or 15.6Gt (A1B scenario) by 2030. More important than the greenness of each and every material is the way that the parts work together to become wonderful, healthy spaces that offer humans contact with the natural environment while not over-using resources. In this building mainly uses three Software AUTOCAD for plan layout 3DS MAX for Elevation and StaddPro Use for Analysis the



Door	
D1	6''*3'6''
D2	6''*3'
D3	6''*2'6''
Window	
W1	4''*4'

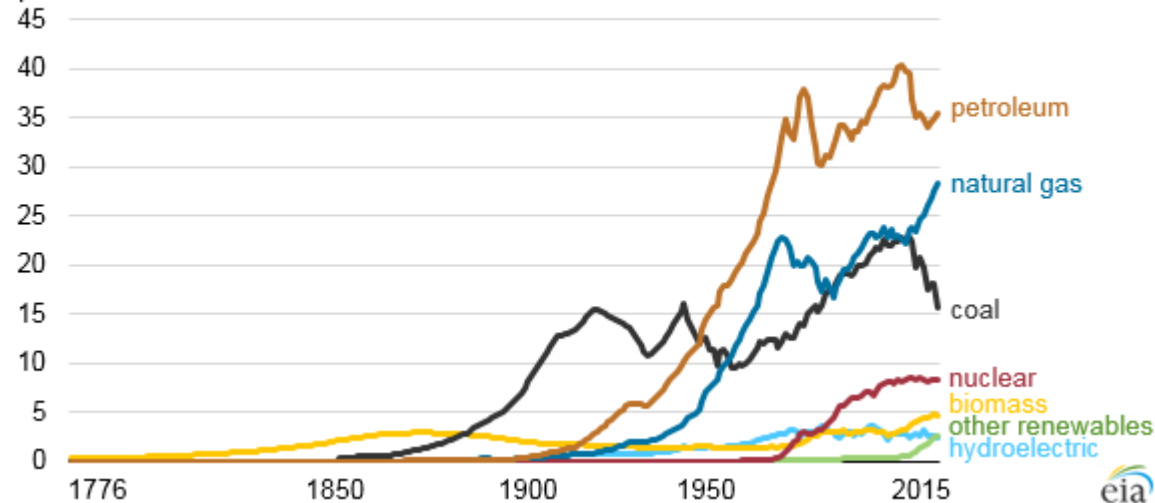
Structure.



INDIAN URBAN POPULATION AND ENERGY CONSUMPTION-The global urban population is expected to grow from 47% of the total in 2000 to 70% in 2050. The energy consumption depend on building size, lighting and weather condition .L.E.D light is low consumption of electricity so we use L.E.D light .from fig is clear that the consumption of energy was very less in 18th century because due to source of natural energy .So we are using maximum natural resources in green building . the consumption of energy 1776 to 2015 show in fig

Energy consumption in the United States (1776-2015)

quadrillion Btu



OBJECTIVE- The technique of green building maximizes the use of efficient construction materials and practices; boosts the use of natural sources and sinks in the building's surroundings; minimizes the energy usage to run itself; uses highly proficient equipment for the indoor area; uses highly proficient methods for water and waste management. The indoor equipment includes lighting, air-conditioning and all other needed equipment.

Concept of energy efficient building-We have to conserve the environment as much as possible energy sources is limited to generate the electricity main source is coal but coal is the limited so we use solar energy for electricity. Day by day water level is decrease so green building use the recycle water for gardening and vehicle cleaning The waste material like waste vegetable paper food etc is decompose and after that it is used as Fertilizer in gardening

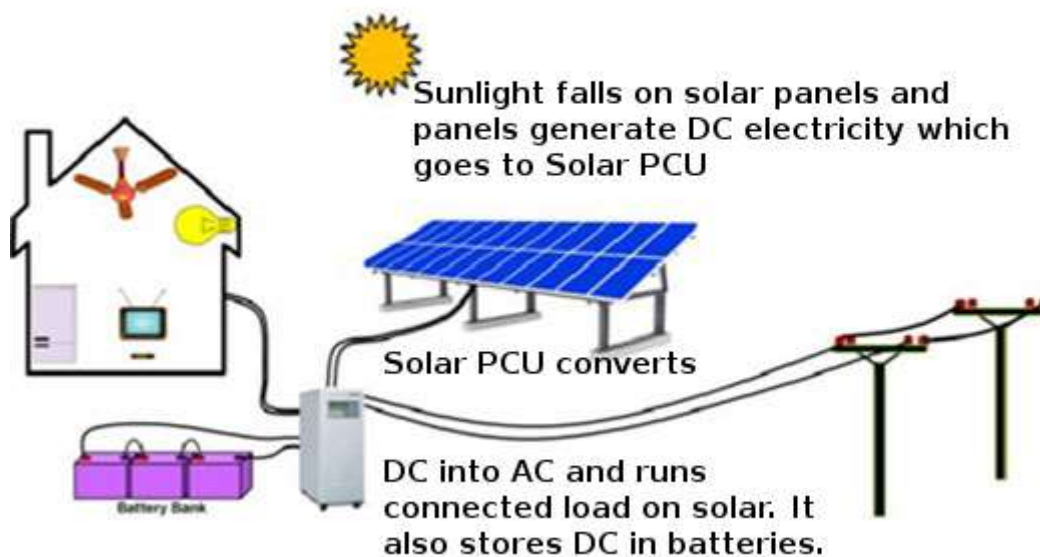
Energy source-The many source of the energy are - nuclear energy, fossil energy -- like oil, coal and natural gas -- and renewable sources like wind, solar, geothermal and hydropower. The above energy sources are converted into electricity, and energy source, which flows through power lines and other transmission infrastructure to your home and business. Fossil energy sources, including oil, coal and natural gas, are non-renewable resources that formed when prehistoric plants and animals died and were gradually buried by layers of rock.

Solar panel-Solar panels are sun light energy convert to into electricity. They are called "solar" panels because most of the time, the most useful source of light available is the Sun, called Sol by astronomers.



Figure from NASA's Jet Propulsion Laboratory Deep Space One Web Site: <http://nmp.jpl.nasa.gov/ds1/>

Solar PV Systems(Off Grid)



Off-Grid solar diagram with battery

The complete Detail, Size, Watt, Volt, Working, Technical Specification and Cost of 1kW 2kW 5kW and 10kW Off Grid Solar Power Plants is as below:

1kW System Specifications

Parameters	Capacity
1. Total PV Module	1 Kw
2. PV module capacity	250 kwp

3.No. of Panels	4 nos.
4 Solar PCU/Inverter	1 KW
5 Batteries (150 Ah X 12 V)	2 Nos.
6 Space required	8 sq meter
7. Supporting Structure	GI Chanel

WATER LOSSES –In this energy building reduce the water losses like rainfall, filter the bathroom water and reuse for toilet, and treat the sewage treatment

- (A) **Rainfall** –The rainfall water store in a tank .This water is used for bathing house washing etc
 (B) **Sewage treatment**-sewage treatment is a process in which remove the contaminate from waste water the green building mainly three process filtration screening and primary sedimentation .

Wall- In this building to construct the wall we have used the Tharmacol in between the wall. It maintain the temperature 3to 4 degree for absorbing the Heat And Cold.

Flooring-The Property of tiles to reduce the temperature .In flooring it reduces from 1 to 2 degree of room temperature

Gardening– In gardening different type of trees are planted but most of the NEEM trees are Planted .Which helps to provide a sufficient amount of Oxygen .

Energy efficient building in india-Majority of energy consumption in buildings occurs for HVAC, lighting pumping, etc, Higher the energy consumption greater the opportunities for energy efficiency Energy conservation and efficiency are the buzz words these days but developed countries have left the developing world far behind. GRIHA is the organisation give the rating system 5star 4star 3star green building.

If this is built inefficiently, we will be locking-in this inefficiency The projections for energy demand in 2032 imply a fourfold increase in requirements. Achieving doesn't cost you much, but offers a lot many advantages, in terms of energy savings as well as environment protection.

Green building of rating system- GRIHA is the department of rating system .It give the rating after the full fill rules and regulation of green building. The Green rating for Integrated Habitat Assessment (GRIHA) is the National Rating System of India. It has been conceived by The Energy and Resources Institute (TERI) and developed jointly with the Ministry of New and Renewable Energy, India. It is a design evaluation system for green building and is intended for all kinds of buildings across every climatic zone in India. According to a 2008 news report in the Indian Express, Mumbai had registered 30 green building projects, at the time the highest among Indian cities. Thanks to the gradual spread of awareness about eco-friendly constructions, there has been a considerable rise in the number of registered green buildings in India. According to 2008 IGBC data, there are 315 green buildings in India, of which 250 are commercial properties.

Result-

* **STAAD.Pro V8i SELECTseries4** *

* **Version 20.07.09.31** *

* **Proprietary Program of** * * **Bentley Systems, Inc.** *

* **Date= APR 4, 2018** *

* Time= 17:21:52 *

* *

* USER ID: *

PROBLEM STATISTICS

NUMBER OF JOINTS 139 NUMBER OF MEMBERS 235

NUMBER OF PLATES 0 NUMBER OF SOLIDS 0

NUMBER OF SURFACES 0 NUMBER OF SUPPORTS 19

SOLVER USED IS THE OUT-OF-CORE BASIC SOLVER

ORIGINAL/FINAL BAND-WIDTH= 24/ 18/ 102 DOF TOTAL PRIMARY LOAD CASES = 2, TOTAL DEGREES OF FREEDOM = 720

SIZE OF STIFFNESS MATRIX = 74 DOUBLE KILO-WORDS REQRD/AVAIL. DISK SPACE = 13.1/88358.2 MB

***** CONCRETE TAKE OFF *****

(FOR BEAMS, COLUMNS AND PLATES DESIGNED ABOVE)

NOTE: CONCRETE QUANTITY REPRESENTS VOLUME OF CONCRETE IN BEAMS, COLUMNS, AND PLATES DESIGNED ABOVE.

REINFORCING STEEL QUANTITY REPRESENTS REINFORCING STEEL IN BEAMS AND COLUMNS DESIGNED ABOVE.

REINFORCING STEEL IN PLATES IS NOT INCLUDED IN THE REPORTED QUANTITY.

TOTAL VOLUME OF CONCRETE = 56.3 CU.METER

BAR DIA	WEIGHT
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(in mm)	(in New)
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8	15250
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10	5504
12	14715
16	10673
20	5849
25	6401
32	3868

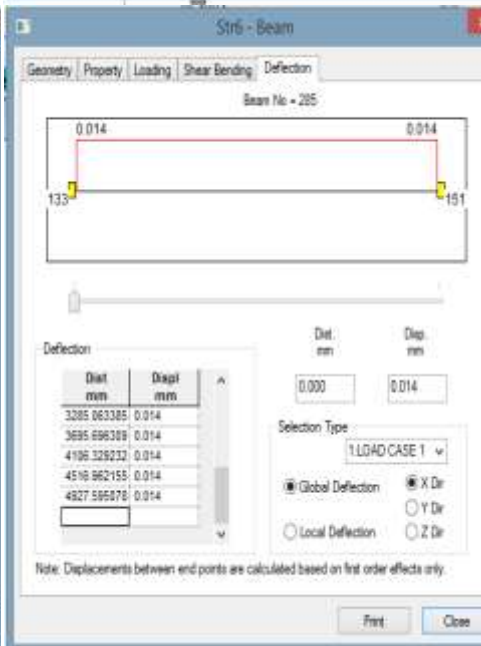
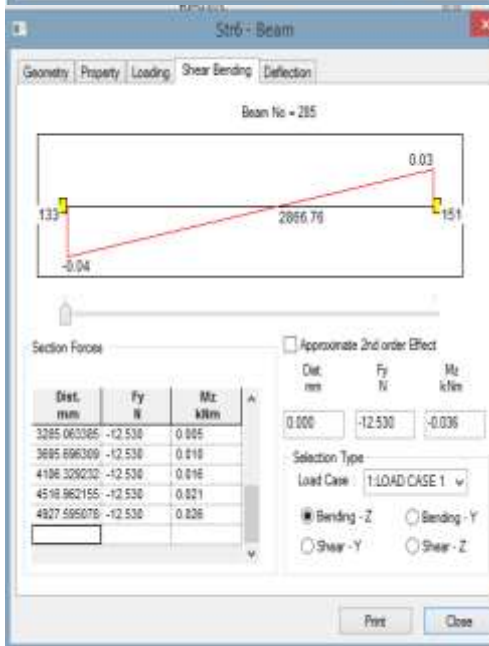
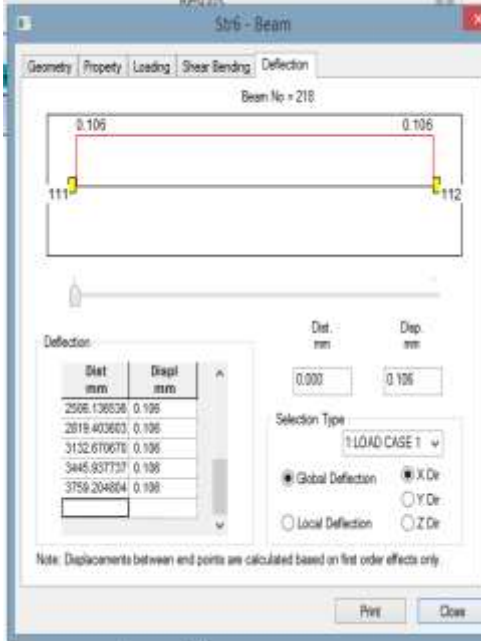
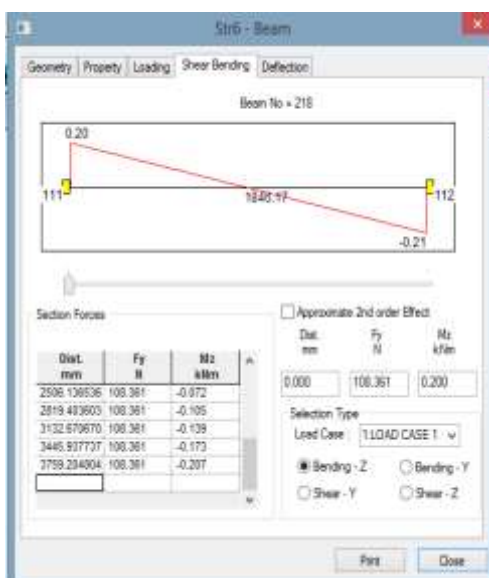
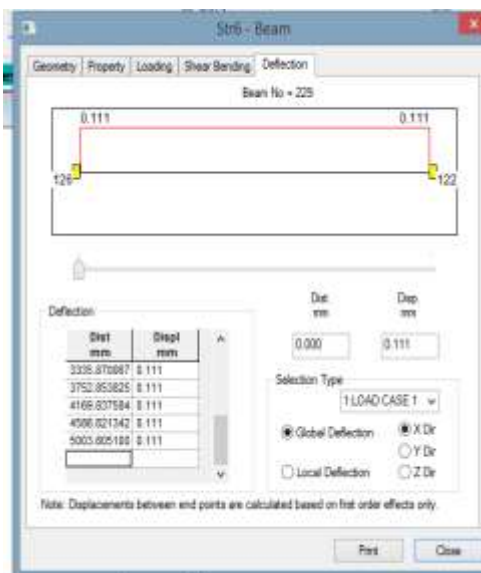
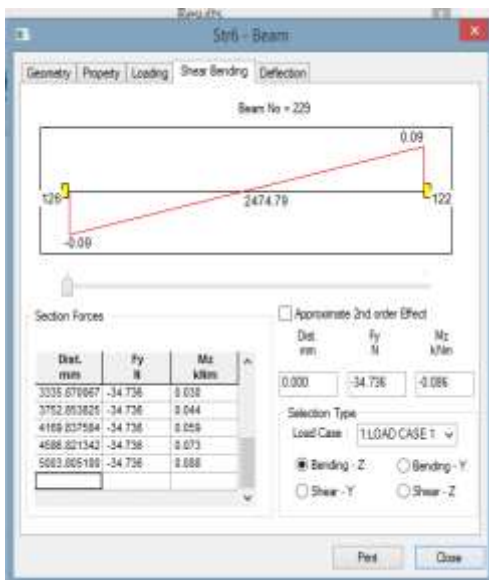
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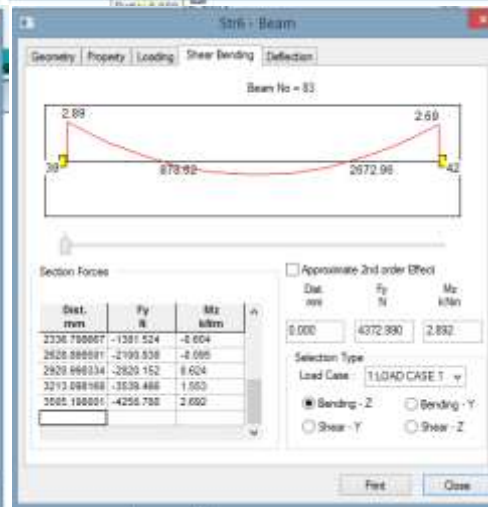
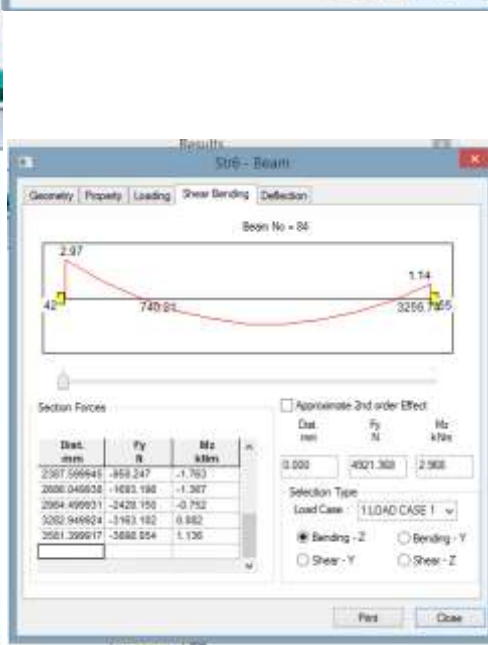
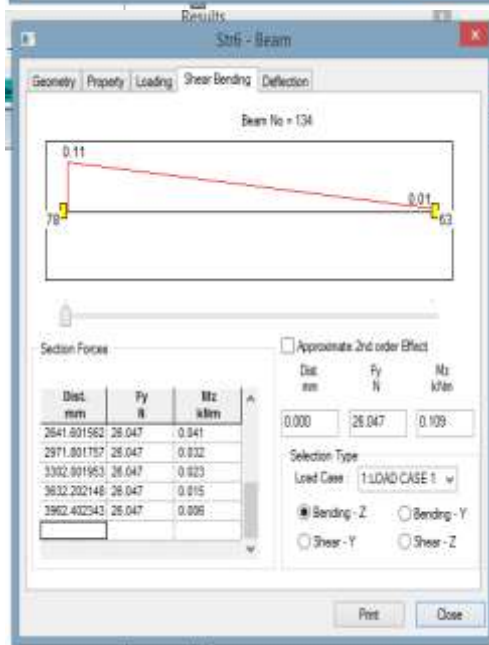
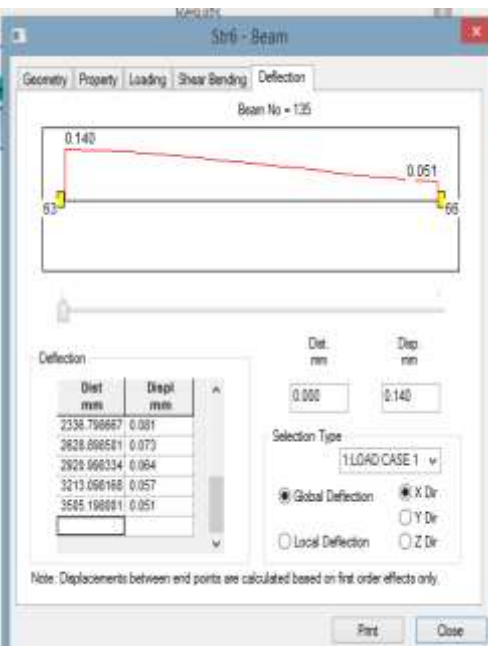
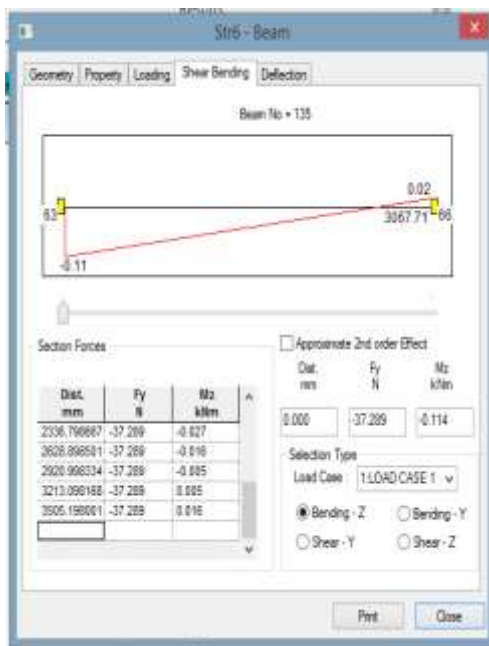
153. FINISH

***** END OF THE STAAD.Pro RUN *****

**** DATE= APR 4,2018 TIME= 17:21:57 ****









Calculation for the brick sand cement and steel

Requirement of Brick Sand And Cement for wall

One brick size=23.5*11.5*7 =1891.75 cubic cm=0.00189 cubic m

One brick with mortar=24.5*12.5*8 =.00245cubic m

The total wall one floor=47.12

Number of brick use in 47.12 cubic meter=47.12/.00245=19232.65 Approx 19233

Volume covered by brick=19233*0.0189=36.34cubic meter

Volume covered by mortar=47.12-36.34=10.78cubic m (wet volume)

We know that dry volume is increase 33%

Volume covered by mortar=10.78*1.33=14.3374(dry volume)

The Ratio is used (1:4)

The Total cement Required in 14.3374 cubic m

(14.3374*1)*5=2.86

The cement density=1440

$$2.86*1440=4118.4/50=82.36$$

Approx=83 Bag cement required

Sand required in 14.3374 cubic m

$$(14.374*4)/5=11.46*35.314=405$$

Approx400 cubic feet sand required

Requirement of Concrete For Slab

Slab is 516*426*4 inch

The Total Area of the slab is 14.40 cubic m(wet volume)

The Dry volume of the slab is 22.33 cubic m

M15 concrete is used (1:2:4)

Requirement of cement=22.33*1/7=3.19cubic m

$$=3.19*1440=3636.6/50=73 \text{ Bag cement required}$$

Requirement of sand =22.33*2/7=6.38 cubic m

$$=6.38*35.3147=225.30\text{cubic feet}$$

Requirement of Aggregate=22.34*4/7=12.7657 cubic m

$$12.7657*35.70=455.71 \text{ cubic feet}$$

Requirement of steel

Main Bar -4757feet

Distribution bar-944feet

We know that formula – $d^2/162*\text{length}$

Main bar- $12*12/162*1450.4=1289\text{kg}$

Distribution Bar- $8*8/162*944=372.89\text{kg}$

Total steelrequirement-1661.89kg

Total cost of Steel=1661.86*51=84756Rs

Requirement of concrete and steel for footing

The total concrete-11.26+44.92=55.92

Steel-1661+373+1241=3275kg

We use M15 (1:2:4)

Total cement required

$$55.92 \times 1/7 = 7.988 = 230 \text{ Bag} = 230 \times 210 = 48314 \text{Rs}$$

Total Sand required

$$55.92 \times 2/7 = 15.97 = 570.384 \times 55 = 31371 \text{Rs}$$

Total Aggregate

$$55.92 \times 4/7 = 31.954 \times 35.70 = 1140.768$$

798000Rs

$$\text{Total Rs} = 48314 + 31371 + 798000 = 877685 \text{Rs}$$

$$\text{Total Steel} = 3275 \times 51 = 167025 \text{Rs}$$

Requirement Concrete and Steel for Column and Beam

$$\text{Total weight of Bar} = 62258 \times 51 = 317518$$

$$\text{Total volume of Concrete} = 56.3 \text{ cumtr}$$

We use of M15(1:2:4)

$$\text{Cement } 56.3 \times 1/7 = 8.042 = 231.63 \text{ bag} = 232 \text{ bag}$$

$$232 \times 210 = 48720 \text{Rs}$$

$$\text{Sand } 56.3 \times 2/7 = 16.085$$

$$16.085 \times 35.70 = 575 \text{ cubic feet}$$

$$575 \times 90 = 51750 \text{Rs}$$

$$\text{Aggregate } 56.3 \times 4/7 = 32.17 \times 35.70 = 1148.52 = 1150 \times 70 = 80500 \text{Rs}$$

Requirement of Brick Sand And Cement for septic tank and water tank

The total 10.38 cubic metre septic tank and water tank

$$\text{One brick size} = 23.5 \times 11.5 \times 7 = 1891.75 \text{ cubic c} = 0.00189 \text{ cubic m}$$

$$\text{One brick with mortar} = 24.5 \times 12.5 \times 8 = .00245 \text{ cubic m}$$

$$\text{Number of brick use in 10.38 cubic meter} = 10.38 / .00245 = 4237.96 \text{ Approx } 4240 \text{ brick}$$

$$\text{Volume covered by brick} = 4240 \times 0.00189 = 8.0136 \text{ cubic meter}$$

$$\text{Volume covered by mortar} = 10.38 - 8.013 = 2.3664 \text{ cubic m (wet volume)}$$

We know that dry volume is increase 33%

Volume covered by mortar= $2.3664 \times 1.33 = 3.1447$ (dry volume)

The Ratio is used (1:4)

The Total cement Required in 3.1447 cubic m

$(3.1447 \times 1) \times 5 = .0629$

The cement density=1440

$.0629 \times 1440 = 906.42 / 50 = 18.12$

Approx=19 Bag cement required

Sand required in 3.1447 cubic m

$(3.1447 \times 4) / 5 = 2.515 \times 35.314 = 89.81$

Approx 100 cubic feet sand required

Brick= $4240 \times 6 = 25440$ Rs

Cement= $19 \times 210 = 3990$ Rs

Sand= $100 \times 90 = 9000$ Rs

The total requirement wall water tank and septic tank slab

Brick- $100405 \times 6 = 602430$ Rs

Cement- $1261 \times 210 = 264810$ Rs

Sand- $4372 \times 90 = 393462$ Rs

Aggregate- $4565 \times 70 = 319550$ Rs

Steel- $73842 \times 51 = 3765964$ Rs

The total cost of the structure=5107887.95Rs

Add 10% variation= $5107887.95 + 510788.795 = 5618676$ Rs

Conclusion- The energy efficient building makes the whole environment free from pollution and makes fresh air which is breathed by every person with ease and it makes the people healthy. In this building we collect the all garbage make it fertile and we use this in cultivation .The electricity is full fill by the solar panel Also in this we reuse the water of rainfall in washing, lawning and in water closet, these safes the water. Main thing in this the use of natural energy, this makes the country economical because it is found that the much energy wastes in houses. Total Cost of Five Floor is $5 \times 168825 = 844125$ Rs for brick work. The total cost of slab 761065Rs

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