The by high density polyethylene hollow 8 conclusion

The result identified that 1m3 of concrete replacedby high density polyethylene hollow 8 Conclusion• Life span of buildings islonger• Changes are much lesscostly• Buildings are moreflexible• Subsequent work(installations) are simplified• Transportation costs areheavily reduced• Manual mounting ofreinforcement meshes on the building site is avoided• Savings in materials(slabs, pillars, fundaments) are substantial (up to 50%)7. 6 EconomicSavings• Transportation of materialsis reduced considerably – lower costs and environmental improvement7. 5 Transportation• Less emission -exhaust gases from production and transport, especially CO2. • Less energyconsumption – both in production, transport and carrying out.

• Savings inmaterials – up to 50 % – 1 kg of plastic replaces more than 100 kg of concrete. 7. 4 Environmental Improvement• Moisture - Condensation-safe construction.• Earthquake -Safety will benefit significantly alone from the weight reduction.• Fire – Fireproofconstruction.

7. 3 Safety• Less storagespace• Easier and moresimple erection• Less work in situ; employment of unskilled labour• Higher qualitythrough automated production of prefabricated units7. 2 Production & Carrying Out• No beams or ribs under the ceiling.

• Fewer columns• Larger span• Increased strength• Reduced weight7. 1 SuperiorStatics7 AdvantagesTable 3: ComparisonBetween Bubbledeck And Conventional Concrete Slab % of concretereplaced = 27% = 26. 9% ? 27%Quantity ofconcrete saved in model slab is 8.

0748 -5. 90= 2. 1698m3 % of concrete replaced = (2. 1698/8. 0748)*100Concrete saving iscalculated by comparing the equation = (2)-(1)6. 3 Comparison

Amount of concretein convectional slab is 2. 340+1.

944+3. 7908= 8. 0748m3.... (2)Slab portion is2(3. 9*2. 7*0. 18) = 3.

7908m3Beam iny-direction is 4(2. 7*03*0. 45) = 1. 944m3Beam inx-direction is 3(4.

5*0. 3*0. 450) = 2. 430m36. 2 Convectional slabAmount of concretein bubble deck slab is 8.

505-2. 6= 5. 905 m³.... (1)Amount of concretereplaced by bubbles is (?*4*0. 270^3) /24*250 = 2.

6m³Size of model slab= 6. 3*4. 5*0. 3= 8.

505 m³6. 1 BubbleDeck Slab6 CostComparisons Figure 20: Bubble Deck ModelFig 20 shows the model of recycled highdensity polyethylene hollow sphere bubble deck slab Figure 19: Provision of Top Reinforcement Meshes The placing of top reinforcement on thestructure and is shown in fig 19 Figure 18: Arrangements of Recycled HDPE Hollow Sphere The recycled balls are placed on the top ofthe bottom reinforcement with clear cover and is shown in fig 18Figure 17: Column Reinforcement The column reinforcements are provided in thestructure and is shown in the fig 17Figure 16: Slab Model Bottom Reinforcement The model is done by using scaled dimensionsas shown above and bottom reinforcement also shown in fig 16

Member Design Dimension (mm) Scale Model Dimension (mm) Slab Lx =

4500 LY = 6300 1: 15 Lx= 300 Ly= 420 t= 20 Column Size= 450*450 L= 2000 1: 15 Size= 30*30 L= 200 Table 2: Model DimensionsTheinitial step is making column and slabs using acrylic sheets with 3mmthickness. The dimensions of column and slab are shown in Table 2. 5 Model Making Figure 15: Section BB of ModelFig 15 of section BB passesthrough the slab and column portion. It represents the sectional view of slabincluding column reinforcement details Figure 14: Section AA of Model Fig 14 of sectionAA passes through the slab portion only. It represents the sectional view ofthe slab including diagonal girder and bubbles. 4. 2 CrossSection of Bubble Deck ModelFigure 13: Plan View of ModelThe fig 13 ofplan view shows the arrangement of bottom reinforcement meshes with bubbles, column reinforcements and diagonal girder edge positioning 4.

1 Plan of Bubble Deck Model4 DrawingsFigure 12: Concrete Slab Surface FinishingFinally concrete surface finished with finishing tools. There is nofurther work required, the slab is complete unless requirement for exposedsoffit. The surface finishing is shown in fig 12Figure 11: Concrete Vibration After concreting, vibration is provided for bottom and top concretesetting.

Removing air content from the slab. Because of the little spacebetween spheres, it is used a thin vibrator. The surface of the poured concretein leveled with a metallic profile. The vibration process is shown in fig 11Figure 10: Slab ConcretingConcrete provided over theslab by pumping. Concrete is poured in between the ball gaps. Immediately afterpouring, the surface of the concrete is cleaned with under pressure water toremove the dust and to moister the surface.

Especially in times of hightemperatures the surface of the precast element is kept wet to ensure theneeded adherence. When the geometry of the connections of the partiallyprefabricated elements are not rigorously followed according to the design theconcreting is adjusted with fluid mortar or with a thin layer of silicon pumpedat the bottom part of the connection. In order to adjust the connections oneshould never use expanded foams that may lead to reducing the thickness of theconcrete layer and therefore to reducing the durability of the reinforcementand the fire resistance. Self-compacting concrete can be poured into forms, flow around congested areas of reinforcement and into tight sections, allow airto escape and resist segregation, without the standard consolidation efforts. The concreting process is shown in fig 10.

3. 6 ConcretingFigure 9: Fixing Partially ManufacturedBubble Deck SlabFixingis the process of positioning and joining the semi manufactured slab. After fixing, concrete is provided over theslab.

The following fig 9 shows fixing partially manufactured bubble deck slab. 3. 5 Fixing of slab componentsFigure 8: Transportation of Precast Bubble Deck SlabPartial precast concreteelements. They have the bottom part made of precast concrete and theconnections between elements and the over concreting are cast in place. Thefigure 7 and 8 shows that transportation of partially manufactured deck slabs.

3. 4. 2 Version BFigure 7: Transportation of Precast Bubble Deck Slab Reinforcement modules in which thespheres are placed to produce the gaps and if the case, tubes for HVAC(electrical, heating, etc.), modules that are to

be placed in formworks. Theplates are cast in place. 3. 4. 1Version ASemi manufactured slabtransported through truck or crane.

The BubbleDeck slab gaps elements can bedelivered in the following versions: 3. 4 Transportation Figure 6: Provision of Top Reinforcement• Placing of thepolystyrene spheres between the meshes according to plans. The fig 6 shows theprovision of top reinforcement as below• Fixing smallboxes or pieces of polystyrene on reinforcement meshes for marking the positionof the walls or the columns andinstallations.• Placing thepipelines, cables and element of electric fittings if the case• Making thereinforcement meshes. After placing the balls, top reinforcement meshes are provided on thetop of the sphere. It positioning the ball and also act as a cover for theballs. Thetwo mashes are connected after placing the spheres into places in order toforma rigid shell.

In order to achieve the reinforcement modules for BubbleDeckslabs with gaps. The following operations must take place: 3. 4 Provision ofTop Reinforcement Figure 5: Location of HollowSpheresThe hollow sphere is placedin between the reinforcement instead of concrete. Bottom reinforcement anddiagonal girders keep the bubbles in position. Diagonal girders fixed betweenthe top and bottom reinforcement. During the final positioning of the slab elementsit is checked if the displaying of the spheres is according to the plans.

Alsoit is checked the reinforcement in the over concreting areas. The transversalreinforcement bars must be embedded in the adjacent slab elements. Partiallyprecast made elements are designed and realized so that

the buildingconfiguration is maintained. They are delivered with pieces of polystyreneincluded that mark the position of the walls or the columns. The location ofsphere is shown in fig 5Location of HollowSphere