

'Innovative Construction Technologies and Thermal Comfort for Affordable Housing'

3S PREFAB TECHNOLOGY

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Preview

- About Precast in Housing
- Peculiarities of housing projects
- Prefab Technology
- Case Study LHP Projects
- Projects in Prefab way forward.
- Documentary





Selection - Innovative Construction Technologies



House – Permanent asset!! Major/Mass Housing projects

Peculiarities of Construction Projects -

- **Conformity** with Indian Codal provisions, Master Plan, NBC provisions, Environmental Clearance etc.
- Proven and Time tested technology, buildings to be durable for min. 50 years
- **Speedy execution**, modern/quality Construction material etc.
- Minimal supervisory control and maintenance

<u>Grey Areas – To be addressed while adopting Modern Technologies</u>

- Time Tested and Proven Construction Technology in Indian Geoclimatic Conditions
- Availability of Codal provisions
- Availability of Skilled manpower
- Performance evaluation and Certification
- Eligibility of executing agency





3S PREFAB Precast Columns, Beams, Slabs and Walls





Prefab Components





Column





Wall

72.8.1

Slabs

Loft



Staircase





Manufactured precast components are erected, aligned and connected using Self-Compacting Concrete of appropriate grade along with embedded reinforcement.





Prefab Structural configurations









Precast RCC shear wall.

Precast RCC column, core concreted using self-compacting concrete.

Precast RCC beams, top part concreted using self-compacting concrete.

Precast rebar lattice girder composite slabs, having topping reinforced concrete.









Standard sections









Lattice Girder Slabs









VERTICAL TIES DETAIL.

3-S PREFAB JOINT ENSURING MONOLITHIC, DUCTILE, DURABLE BEHAVIOR



3-S Prefab Jointing Method -Time Tested Proven Performance Evaluation & Certification By IIT Roorkee, CBRI Roorkee, IIT Bombay, Thapar University, Stanford University, TRFI Bangalore







Technical Validation



LAB, FIELD & TIME TESTED '3S' PREFAB BUILDING SYSTEM



Indian Institute of Technology, Bombay

FULL LOAD TEST

Findings

- Test observations for the behavior of the joints fully established the behavior in the elastic range with adequate safety margins.
- Absence of any separation cracks or any structural distress in the joints.
- The test gives indication about the adequacy of the bare portal to offer resistance to horizontal forces.





Stanford University, USA

TECHNOLOGY EVALUATION

Findings

- The type of material and the method of design and construction used by B.G. Shirke are similar to the projects in Europe and United States.
- The column joints (in design and detailing) are more than adequate to provide continuity, strength and ductility.
- The beam-column joints do provide the needed rigidity.





Indian Institute of Technology, Bombay

DYNAMIC LOAD TEST ON 3S JOINTS

Findings

- The results of various tests are comparable establishing the reproducibility.
- The ultimate load is on the higher side giving a load factor of more than 2.5
- The ductility ratio in terms of deflection is varying between 5.33 to 8.90 for various test
- The joints of the beam column connections have behaved as monolithic, as designed.





LAB, FIELD & TIME TESTED '3S' PREFAB BUILDING SYSTEM

<u>SHIRKE</u>



Civil Aid Techno Clinic (Formerly known as TRFI)

FULL SCALE LOAD TEST

Findings

- No distress feature in any of the joints.
- The assembly of Precast units tested is considered to be safe for resisting the loads they are designed for.





Structural Engineering Division CSIR - CBRI - Roorkee

FULL SCALE DYNAMIC LOAD TEST (ZONE IV)

Findings

- The structure responded in the elastic mode as recorded load values were not observed dropping as displacement progresses.
- Applied lateral cyclic load was almost 1.7 times of the weight of test structure.
- The diaphragm comprising of precast panels having 40mm thick nominally reinforced in-situ deck concrete was effective in cyclic lateral load transfer mechanism.
- The structural behavior under test loading suggests towards required ductility.
- The experimental results on 'Full-Scale Building Structure' establish the desired performance and behavior of 3-S prefab building system under all design load conditions including Seismic (Zone IV) for High Rise Buildings.





Structural Engineering Division CSIR - CBRI - Roorkee

FULL SCALE TEST ON CONNECTIONS

Findings

Satisfactory performance behavior of full scale testing subjected to reverse cyclic seismic loading (Zone IV) –

- 3S Precast Double wall connected to cast in situ foundation
- 3S Precast Solid wall connected to 3S Precast columns and Precast foundation
- 3S Beam-Column joint to test behaviour of headed anchor
- 3S Precast Double wall connected to 3S Solid precast wall and precast foundation
- Cast insitu wall connected with cast insitu columns



SEISMIC PERFORMANCE EVALUATION OF FULL-SCALE 3-S PREFAB BUILDING -AT MNIT JAIPUR (Jan2023)

- Reverse cyclic loading
- Evaluation of Joints and connections
- Seismic performance of 3 storey structure









ADVANTAGES OF PREFAB SYSTEM



FLEXIBILITY OF PREFAB TECHNOLOGY

Any shape and aesthetic.....

- ✓ Various climatic, seismic zones and rainfall areas
- \checkmark Buildings up to any number of stories
- ✓ Residential / Commercial Buildings
- \checkmark Any type of layout and plans of buildings
- \checkmark EWS / LIG / MIG / HIG housing
- ✓ Any type of alterations / additions in future.
- \checkmark Any aesthetic elevation and type of surface finish
- ✓ Concealed services (Plumbing /Electrical/ Sanitary)
- ✓ Energy efficient GREEN BUILDING Construction
- \checkmark Substitute for conventional system.
- ✓ Low maintenance buildings.
- ✓ Safe & durable structures



HOUSING PROJECT FOR MHADA, GHATKOPAR, MUMBAI



SHIRKE

HOUSING PROJECT FOR MHADA, MAZGAON, MUMBAI



HOUSING SCHEME FOR MHADA, VERSOVA, MUMBAI



Installed Daily Precast Component Production Capacity (Pan India)











Environmental sustainability of 3-S Prefab

- **Reduces Air Pollution** at Construction sites because of site activity is minimal to erection and jointing.
- Use of fully "Cured" and "Matured" components considerably reduces water consumption.
- High thermal insulation results in achieving energy efficiency
- Raw materials as well as energy requirement in manufacturing is considerably less.
- Production utilizes **fly-ash and GGBS** to a great extent.
- Manufacturing process is non-toxic and environmental friendly, no harmful emissions during production.
- No waste generated in the production process due to reuse of waste material.
- Water used for curing and making steam is **re-circulated** to minimize the water wastage.





- <u>Reduces wastages</u> considerably owing to better quality / process controls and repetitive task.
- Low workability mixes can be designed with lesser w/c ratio as well as lesser fine aggregate contents.
- Exact <u>concrete consumption</u> can be controlled.
- Very <u>minimal</u> requirement of <u>water for construction</u>.
- Non-generation of construction debris.
- Conservation of wooden material Elimination of use of timber / wooden scaffolding by use of pressed steel door windows & steel shuttering & scaffolding.
- Conservation of Natural resources- Optimum use of scarce natural resources like sand and aggregates.
- Conservation of cement and reinforcement: Substantial saving in quantity of cement & reinforcement steel, coarse & fine aggregates due to reduction in dead weight of structure.
- Environment friendly, Energy efficient GREEN BUILDING Construction.
- Safe & durable structure.











CONSTRUCTION OF 1152 (G+5) EWS HOUSES UNDER LIGHT HOUSE PROJECT (GHTC) - INDIA AT CHENNAI, TAMILNADU

WITH INDIGENOUS '3S PREFAB TECHNOLOGY'







Project Brief

Construction of G+5 Floor (1152 tenements)

at Perumbakkam, Dist-Kanchipuram Chennai

- ✓ Client MoHUA and Tamil Nadu Slum Clearance Board
- ✓ Construction Agency M/s. B G Shirke Construction Tech Pvt Ltd, Pune, India
- ✓ Type of Project A Design-Build-Turnkey Lumpsum Contract awarded as LHP Project
- ✓ Project Value Rs 120.01 Crs.
- ✓ Type of Structure 3S Precast RCC Framed Structure
- ✓ Seismic Zone Zone III as per IS:1893
- ✓ Weather Hot and Humid
- ✓ Geotechnical strata SBC Ranging from 25 T/SqMt
- ✓ Storey Configuration G+5
- ✓ Dwelling Unit types EWS Type
- ✓ Execution Period 12 Months
- ✓ Total No of Buildings 12 buildings as follows -



16 flats / floor 96 flats / building









LHP PROJECT Chennai

Precasting of Structural Components



1 1 1 1 11



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LHP PROJECT Chennai

Site Execution Photographs



Challenges in Execution

- Statutory Approvals
- Cyclone
- Covid Restrictions
- Construction Water Non Availability
- Absence tradesmen during festivities
- Extreme Hot/Humid weather conditions especially during summer













Project Progress Review by Hon'ble Prime Minister (03 May 2021)









LHP PROJECT Chennai

Photographs of Model





Progress of LHP as on February 20, 2022 DUs Blocks Progress









INAUGURATION OF LIGHT HOUSE PROJECT, CHENNAI, TAMIL NADU BY HON'BLE PRIME MINISTER





Re Tr

Narendra Modi 🥥 @narendramodi · May 25 Replying to @narendramodi The projects being inaugurated include:

Madurai-Theni railway gauge conversion project.

Third railway line between Tambaram-Chengalpattu.

2 natural gas pipelines.

Houses constructed as part of Light House Project, Chennai.





3.854 ♡ 13.6K _↑

26[™] MAY, 2022



Ministry of Housing and Urban Affairs ② @MoHUA_India · May 26 ···· Launched by the Hon'ble Prime Minister Narendra Modi, the Chennai LHP under the aegis of PMAY - U fulfills the dreams of 1152 beneficiaries. With a project cost of ₹116 cr, the LHP offers modern technology and materials, furthering the vision of #HousingforAll.



Narendra Modi and Housing For All





SOME PROJECTS EXECUTED IN 3S PREFAB SYSTEM




UNIQUE CAPABILITY – MASS HOUSING PROJECTS





CIDC Vishwakarma Award-2012

Best Project

Housing and Urban Development Category



INDIA'S **FIRST HIGH RISE PREFAB** HOUSING PROJECT



> 39 Towers of 25 Storeys
> ≈10,000 Flats

SHIRKE° G+14 CONSTRUCTION OF MIG & HIG TYPE FLATS AT SECTOR 36, **KHARGHAR NEW MUMBAI** CIDCO WE MAKE CITIES

TOTAL AREA : 16,66,000 SFT





B+S+18 STOREYED MASS HOUSING PROJECTS FOR BDA AT DODABANHALLI

TOTAL AREA : 7,53,000 SFT





S+7/10 Storeyed LIG & MIG Building Housing Project for Mhada at Solapur, Maharashtra



















Construction of 1500 Flats at Sholinganallur, Chennai

BUA - 15,97,652.50 Sft 26 Bldgs (HIG-8, MIG-15 & LIG-3)







MASS HOUSING LIG, MIG AND EWS HOUSING PROJECT FOR MHADA AT MHALUNGE, PUNE

S+7 STOREYED PROJECT FOR BANGALORE DEVELOPMENT AUTHORITY AT SHIRKE KENGERI BANGALORE







S+9 STOREYED PROJECT FOR BANGALORE DEVELOPMENT AUTHORITY AT KANIMINIKE, BANGALORE (PROJECT UNDER EXECUTION) (7.68 Lakh Sft BUA, 3BHK, 432 Flats)





P+S+14 Storeyed LIG, MIG & HIG Turnkey Lump sum project at Morwadi, Pimpri, Pune







G+4 EWS MASS HOUSING PROJECT



DDA, DELHI (ROHINI, NARELA & DWARKA) TOTAL AREA -64,92,900 SFT



Cluster of buildings having 60 houses completed within 3 months



DELHI - (ROHINI, NARELA & DWARKA)

S+14 STOREYED FLATS FOR THE CHATTERJEE GROUP (TCG), PUNE (5,64,000 Sq.Ft.) SHIRKE



<image>

S+7 STOREYED STAFF QUARTERS FOR AIRPORT AUTHORITY OF INDIA, DEVENHALLI BANGALORE (2,30,000 Sq.Ft.)







<u>SHIRKE</u>

Construction of Conference hall at Hon. Vice-President Residence, New Delhi

Executed in just 4 months inclusive of Planning, Designing, Construction and Finishes...



3S PREFAB SYSTEM – Way Forward...







PHASE I VIEWS

























OFFICE RECEPTION

OFFICE WAITING SPACE



OPEN OFFICE

OFFICE CABINS

Name Of ClientMumbai Housing And Area Dev (MHADB)Project LocationMumbaiTotal Sites1 Nos.Plot Area0.25 HaType of TenementsMIG(S+2P+Service Floor+25) Building Height- 97.37 M	velopment Authority
Project LocationMumbaiTotal Sites1 Nos.Plot Area0.25 HaType of TenementsMIG(S+2P+Service Floor+25) Building Height- 97.37 M	
Total Sites1 Nos.Plot Area0.25 HaType of TenementsMIG(S+2P+Service Floor+25) Building Height- 97.37 M	
Plot Area0.25 HaType of TenementsMIG(S+2P+Service Floor+25) Building Height- 97.37 M	
Type of Tenements : MIG(S+2P+Service Floor+25) Building Height- 97.37 M	
Total Tenements 72 Nos.	
Project Built-up Area : 0.18 Lac Sq.m	
Project Start & Completion : In Progress	
Project Cost . 70 Cr. Appx.	













Name Of Project

Name Of Client

- Project Location
- Total Sites
- Plot Area
- Type of Tenements
- Total Tenements
- Project Built-up Area
- Project Start & Completion
- Project Cost

- Pahadi Goregaon
- : Mumbai Housing And Area Development Board(MHADB)
- Mumbai
 1 Nos.
 7.03 Ha
 EWS(S+23),LIG(S+23) Bldg. Ht-69.98 M, MIG/HIG(S+3P+35) Bldg. Ht-119.98 M
 3015 Nos.
- 2.76 Lac Sq.m
- : In Progress
- 944.39 Cr. Appx.



<u>SHIRKE</u>







Name Of Project :	PMAY Khoni
Name Of Client	Konkan Housing Area Development Board (KHADB)
Project Location	Khoni, Kalyan
Total Sites :	1 Nos.
Plot Area :	17.1 На
Type of Tenements :	EWS(G+15),LIG(S+15) (5,060) (1,144)
Total Tenements :	6,204 Nos.
Project Built-up Area :	3.13 Lac Sq.m
Completion :	In Progress
Project Cost	881 Cr. Appx.







Name Of Project	:	PMAY Shirdon
Name Of Client	:	Konkan Housing Area Develo
Project Location	:	Shirdon, Kalyan
Total Sites	:	1 Nos.
Plot Area	:	39.36 Ha
Type of Tenements	:	EWS(G+7)/(S+15),LIG(S=15) (1,905)/(1,4518),(880)
Total Tenements	:	17,303 Nos.
Project Built-up Area	:	8.75 Lac Sq.m
Completion Date	:	In Progress
Project Cost	:	2326 Cr. Appx.





Name Of Project

Name Of Client
Project Location
Total Sites
Plot Area
Type of Tenements
Total Tenements
Project Built-up Area

Completion Date

Project Cost

PMAY Bhandarli

: Konkan Housing Area Development Board (KHADB)

:	:	Bhandarli, Kalyan
:	:	1 Nos.
:	:	5.2 Ha
:	:	EWS(G+15),LIG(S+15) (1,771) (88)
:	:	1,859 Nos.
:		91 K Sq.M
:		2023
:		290 Cr. Appx.















Name Of Project		
Name Of Client		
Project Location		
Total Sites		
Plot Area		
Type of Tenements		
Total Tenements		
Project Built-up Area		
Completion Date		
Project Cost		

:	DDA Projects-III
:	Delhi development Authority(DDA)
:	Narela Sub-city, North Delhi
:	2 Nos.
:	8.68 Ha
:	EWS(G+15)
	4,516 Nos.
:	3.02 Lac Sq.m
:	2017
:	934 Cr. Appx.







Name Of Project	:	DDA Projects-IV
Name Of Client	:	Delhi development Authority(DDA)
Project Location	:	Narela Sub-city, North Delhi
Total Sites	:	8 Nos.
Plot Area	:	46.45 Ha
Type of Tenements	:	EWS(2B+S+16) , 2BHK(2B+S+18) & 3B
Total Tenements	:	11,487 Nos.
Project Built-up Area		20.42 Lac Sq.m
Completion Date	:	2020
Project Cost	:	4813 Cr. Appx.



SHIRKE



















Name Of Project	:	DDA Projects-V
Name Of Client	:	Delhi development Authority(DDA)
Project Location	:	Dwarka, Delhi
Total Sites	:	1 Nos.
Plot Area	:	4.31 Ha
Type of Tenements	:	EWS, 1BHK & 2BHK,(2B+S+14) (1008), (316), (316)
Total Tenements	:	16,40 Nos
Project Built-up Area	:	1.51 Lac Sq.m
Completion Date	:	2020
Project Cost	:	362 Cr. Appx.










SHIRKE



Name Of Project	:	CIDCO, Valleyshilp, Kharghar
Name Of Client	:	City And Industrial Development Corporation
Project Location	:	Navi Mumbai
Total Sites	:	1 Nos.
Plot Area	:	6.45 Ha
Type of Tenements	:	MIG,HIG(G+14)Shop/Offices (802), (422), (150)
Total Tenements	:	1,224 Nos.
Project Built-up Area	:	1.94 Lac Sq.m
Completion Date	:	2016
Project Cost	:	556 Cr. Appx.



SHIRKE







SHIRKE



Name Of Project	:	<u>CIDCO, Swapnpurti, Kharghar</u>
Name Of Client	:	City And Industrial Development Corporation
Project Location	:	Navi Mumbai
Total Sites	:	1 Nos.
Plot Area	:	7.89 Ha
Type of Tenements	:	EWS, LIG (G+7/14) Shop (968), (2,622),(84)
Total Tenements	:	3,590 Nos.
Project Built-up Area	:	2.14 Lac Sq.M
Completion Date	:	2016
Project Cost	:	624 Cr. Appx.





3-S Prefab Technology





THANK YOU!

B.G. Shirke Construction Technology Pvt. Ltd.

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