

Presentation on

“Construction Materials & Solutions ”

Lighter/Faster/Easier

Construction Materials

Fly Ash Bricks

Rectangular Pavers

Uni Pavers

Precast Kerb Stones

Precast Retaining wall

Light Weight Aggregate (LWA)

JGRS (Jindal Global Road Stabilizer) for Road & Highway
Construction

Construction Solutions

Expanded Polystyrene Sheet (EPS) Panel in Building
Construction

Speed Floor System in Building Construction

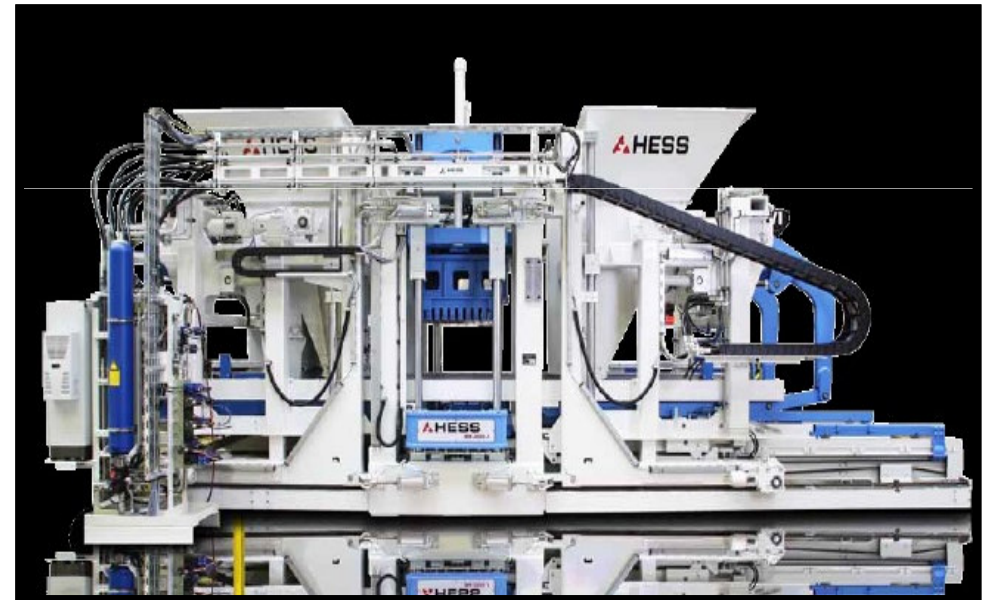
Light gauge steel structures (LGS)

Fly Ash Bricks

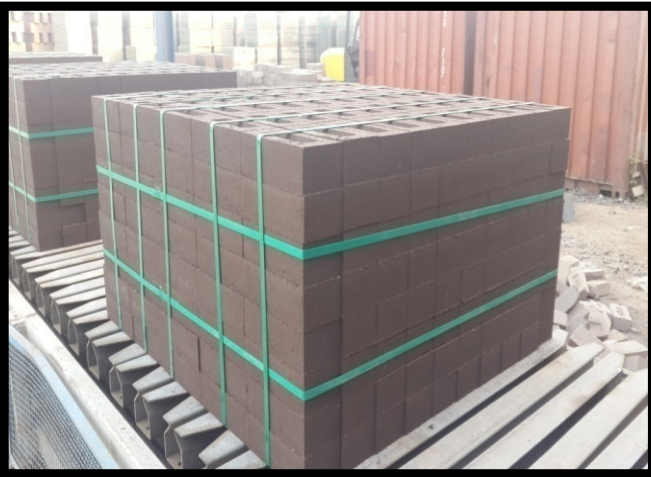


**Brick Plant-Angul
(Odisha)**

***Fly ash Brick Plant
:Product
Making Machine***



Product Specification



Bricks (230×110×75 mm)



Rectangular Pavers (200×100×100 mm)



Uni Pavers (225×110×100 mm)



Bricks (230×110×100 mm)



Retaining Wall Block (584.2×457.2×203.2 mm)



Kerb Stones (600×200×350mm)

Comparison between Fly Ash Bricks Vs Normal Red/Clay Bricks

Sr.No	Properties	Ash Bricks	Normal Red/Clay Bricks
1	Basic Raw Material	Fly Ash & Cement	Clay
2	Size & Quality	Uniform (Factory made)	Uneven
3	Mortar Requirement	Less	More
4	Plastering	Less	More
5	Compressive Strength	More than 100 Kg/cm ²	Less
6	Environment Friendly	Yes	No
7	Standard	1S:12894-2002	1S:3495(PT1)1976

Light Weight Aggregate (LWA)& Light Weight Aggregate Concrete (LWAC)

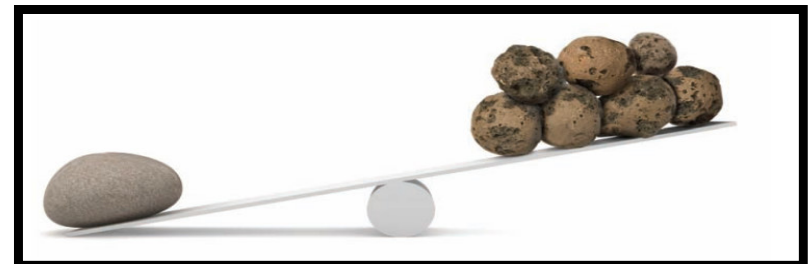


Light Weight Aggregate Plant



What is Light Weight Aggregate (LWA)

- Lightweight aggregate is a type of coarse aggregate that is used in the production of lightweight concrete products such as concrete block, structural concrete, and precast concrete.
- The lightweight aggregates intended for use in structural concrete in which prime considerations are reducing the density while maintaining the compressive strength of the concrete.
- Raw materials at the mixing stages are fly ash (85- 90%), coal (8- 10 %) and binding agent (1-2%). All ingredients are mixed with water.
- Sintering temperature 900-1300°C



Ref as per ASTM C 330 & IS 456 codes- Light Weight Aggregate

IS 456 : 2000

Portland cements provided uniform blending with cement is ensured.

5.3 Aggregates

Aggregates shall comply with the requirements of IS 383. As far as possible preference shall be given to natural aggregates.

5.3.1 Other types of aggregates such as slag and crushed overburnt brick or tile, which may be found suitable with regard to strength, durability of concrete and freedom from harmful effects may be used for plain concrete members, but such aggregates should not contain more than 0.5 percent of sulphates as SO_3 and should not absorb more than 10 percent of their own mass of water.

5.3.2 Heavy weight aggregates or light weight aggregates such as bloated clay aggregates and sintered fly ash aggregates may also be used provided the engineer-in-charge is satisfied with the data on the properties of concrete made with them.

NOTE—Some of the provisions of the code would require modification when these aggregates are used; specialist literature may be consulted for guidance.



Designation: C 330 – 99

Standard Specification for Lightweight Aggregates for Structural Concrete¹

This standard is issued under the fixed designation C 330; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers lightweight aggregates intended for use in structural concrete in which prime considerations are reducing the density while maintaining the compressive strength of the concrete. Procedures covered in this specification are not intended for job control of concrete.

1.2 The values stated in SI units are to be regarded as the standard. The values shown in parentheses are for information purposes only.

1.2.1 With regard to other units of measure, the values stated in inch-pound units are to be regarded as standard.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

- C 142 Test Method for Clay Lumps and Friable Particles in Aggregates²
- C 151 Test Method for Autoclave Expansion of Portland Cement³
- C 157 Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete²
- C 192 Practice for Making and Curing Concrete Test Specimens in the Laboratory²
- C 496 Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens²
- C 567 Test Method for Unit Weight of Structural Lightweight Concrete²
- C 641 Test Method for Staining Materials in Lightweight Concrete Aggregates²
- C 666 Test Method for Resistance of Concrete to Rapid Freezing and Thawing²



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PRODUCT CERTIFICATE

This is to certify that the sintered fly ash light weight aggregates can be used in the development of structural grade concretes in place of conventional granite aggregates up to M35 having split tensile strength values less than 2.5 MPa and modulus of elasticity less than 25 GPa.



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भुवनेश्वर/Bhubaneswar-751013, ओडिशा

LWA Physical Properties

Properties	Sintered LWA	Normal stone chips
Density	800-880 kg/m ³	1550 kg/m ³
Water Absorption	15-20%	0.5-2.0%
Shape	Rounded	angular
Source	Fly ash	Natural (quarried)



Design Comparison Between LWAC & Normal Concrete for High rise Building

Type of concrete	Levels	Column (mm)	Outer Beam (mm)	Inner Beam (mm)	Sub Beam (mm)	Slab (mm)
Normal Concrete (NC)	2-3	700x700	300X700	350X700	250X500	130
	4+	600X600	300X700	350X700	250X500	130
LWAC	2-3	650X650	250X700	300X700	250X450	120
	4+	550X550	250X700	300X700	250X450	120

Load Type	NC	LWAC	Results
Live Load	408.985	408.985	1
Dead Load	6568.071	5314.000	-19.3%
Total Load	6995.002	5772.984	-18.2%

Comparison Between LWC & Normal Concrete

Comparison Results

Item	Built up area (Sq.m)	Concrete Usage (cu.m)
NC :M30	5021	1771.87
LWAC:M30	5021	1495.95

Using LWAC will save 15.6% of the concrete quantity compare to using normal aggregate concrete for the same building.

Advantages of Light Weight Aggregate

- Overall Dead load reduction of structure using LWA is weight comparative to Normal concrete without compromising the structural integrity.
- The reduced dead load results in significant savings
 - ✓ cost saving of foundations / substructures.
 - ✓ Reduction in the sizes of columns ~ will facilitate more carpet area.
 - ✓ Reduction in sizes of beams and slabs ~ will increase head room clearance.
 - ✓ Reduce the overall volume of concrete.
 - ✓ Cost saving of formwork and scaffolding.
 - ✓ The benefit can be significant if industrial waste products are used to manufacture LWA, to resolve the problem of use the waste product and ensure the good environmentally free .
 - ✓ Purity of aggregate: Machine-made

Application

- Precast components
- Structural concrete (Reduce structural wt.)
- Pavements and Bridge deck slab (Internal curing)
- Suitable for marine environments
- Insulation fill (Low conductivity)
- Extension of existing structure
- Internal Curing for Concrete using LWA
- Mass Concrete
- Geotechnical Applications
- Horticultural Uses & Storm water Treatment

LWA Uses in Plant

- 42000 MT, LWA uses in JSPL Angul Project.
- Approx 1 lacs cu.m concrete uses till date.
- Used in Industrial building, Residential Buildings, Machinery Foundation and etc.





Insitu concrete strength



Chilled water Rebound hammer test conducted for in-situ compressive strength.

Grade of concrete : M-25

Results: 30.00,33.00,29.00,32.00 MPa



Decanter Raft Rebound hammer test conducted for in-situ compressive strength.

Grade of concrete : M-30

**Results:
38.00,34.00,30.00,39.00,36.00 MPa**

Insitu Concrete Strength



**Rebound hammer test conducted
for in-situ compressive strength.**

Grade of concrete : M-25

**Results: 32.00,36.00,33.00,32.00
MPa**



**Rebound hammer test conducted
for in-situ compressive strength.**

Grade of concrete : M-10

Results: 14.00,13.00 MPa

Perspective Customer

- Green Global modulus Pvt ltd, Chandikhol (Odisha)
- RKD Constructions, Bhubaneswar
- KLG Ecolite, Kolkata
- Aditya birla institute of science & technology, Mumbai.

Reinforced EPS Rapid Housing Technology



EPS Technology

A FASTER & SIMPLER WAY OF CONSTRUCTION

EPS Technology

EPS abbreviated by **Expanded Polystyrene**

It is a system for construction of buildings up to four storeys, i.e., G+3 using **reinforced concrete load bearing wall and roof panels**



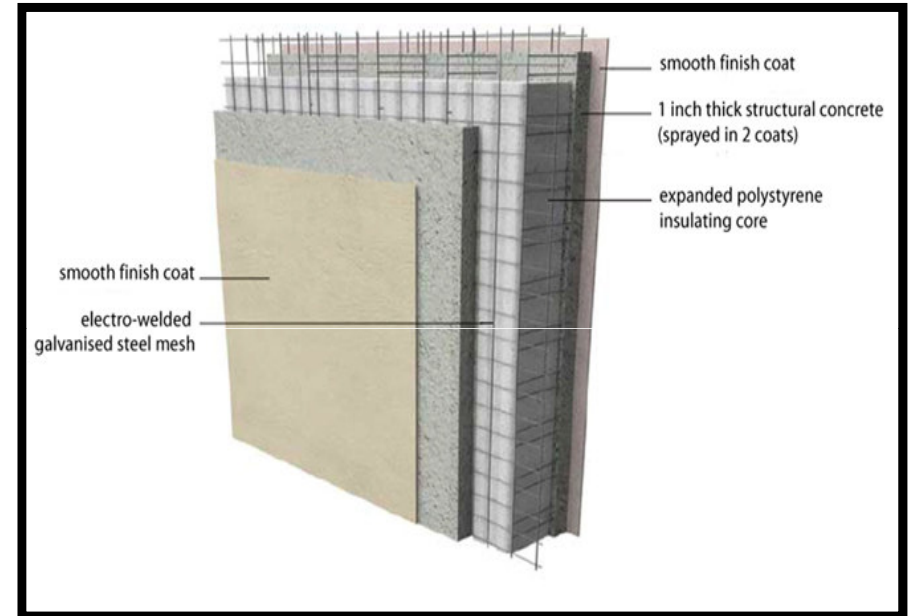
What is Reinforced EPS (Expanded Polystyrene) System ?

EPS System

A light weight structural system which can be used as load bearing walls in low-rise building and as partitions in high-rise RCC and steel frame buildings.

Components of System

- Factory produced panel of undulated (wave shape) polystyrene
- Covered on both sides by an interconnected electro-welded zinc coated mesh
- The panels are assembled on site and concreted/shotcreted in situ to realize the different elements of the system



Easy & Faster to Install

Significant reduction in Construction period

- ❖ 100M2 Built surface requires-2 days with 5 workers.
- ❖ Roof concrete pouring + shotcrete plastering: 10 days with 5 workers
- ❖ Finishing: 10 days with 4 workers.



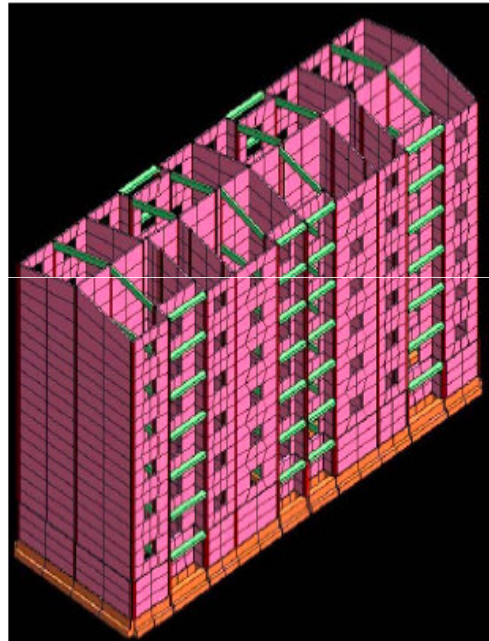
**Time Savings results In reduction of
Indirect Costs & Finance Cost**

EPS Technology – Why..?

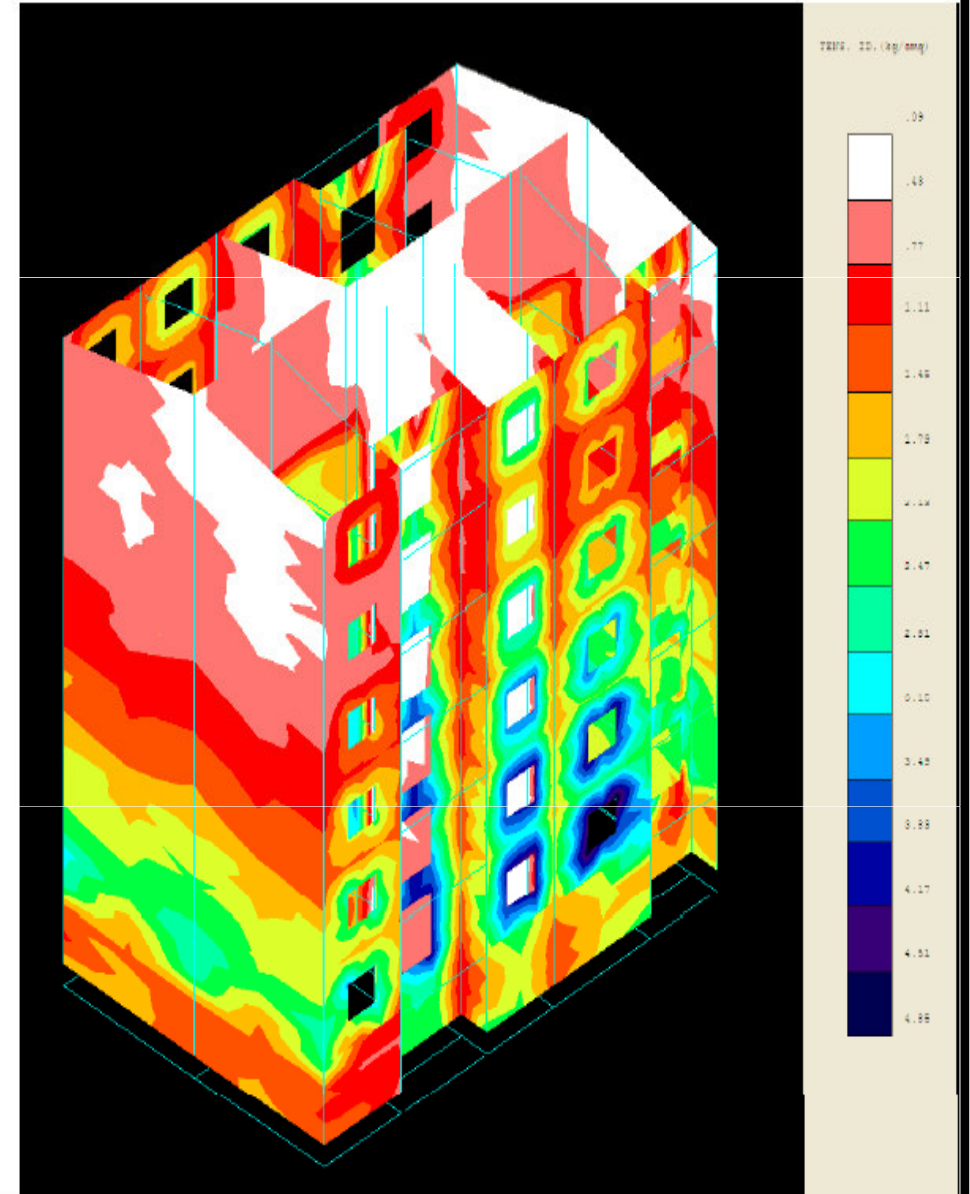
Fire, Thermal & Seismic Resistant

❖ Could resist to 122km/h missile and 306km/h hurricane.

❖ No Visible Cracks & Damage to Structure when Exposed to Seismic effect unlike Conventional Brick Wall



EARTHQUAKE AND STORM
STRUCTURE RESISTANT



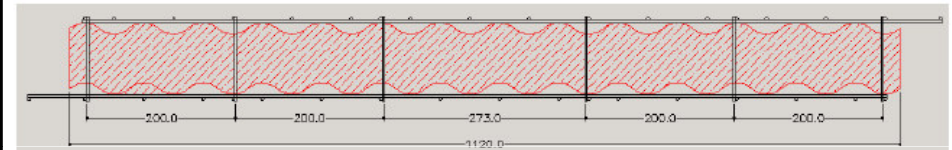
Noise Proof

❖ Ensures Privacy

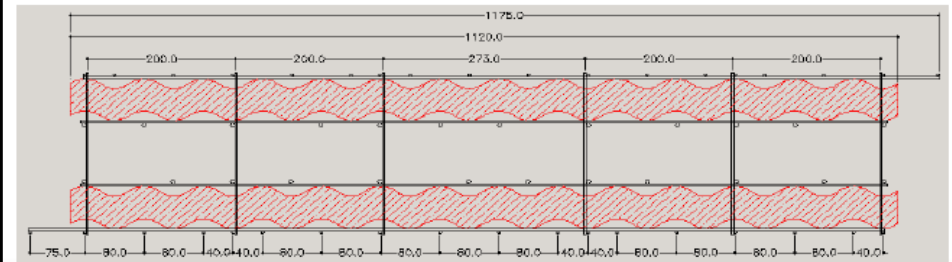
❖ Best Acoustic Damper



Single Panel PCS08



Double Panel PCD14



Green Building Concept

- ❖ **Eco- Friendly Concept**
- ❖ **Provides high Thermal insulation , thereby avoiding Air conditioning in Low cost housing.**
- ❖ **For Air Conditioned Housing it reduces Power consumption.**
- ❖ **Minimize the Usage of Natural Resource viz., Clay Bricks, Stone aggregate etc.**



Aesthetic Look

❖ **Plain Wall Finishes**

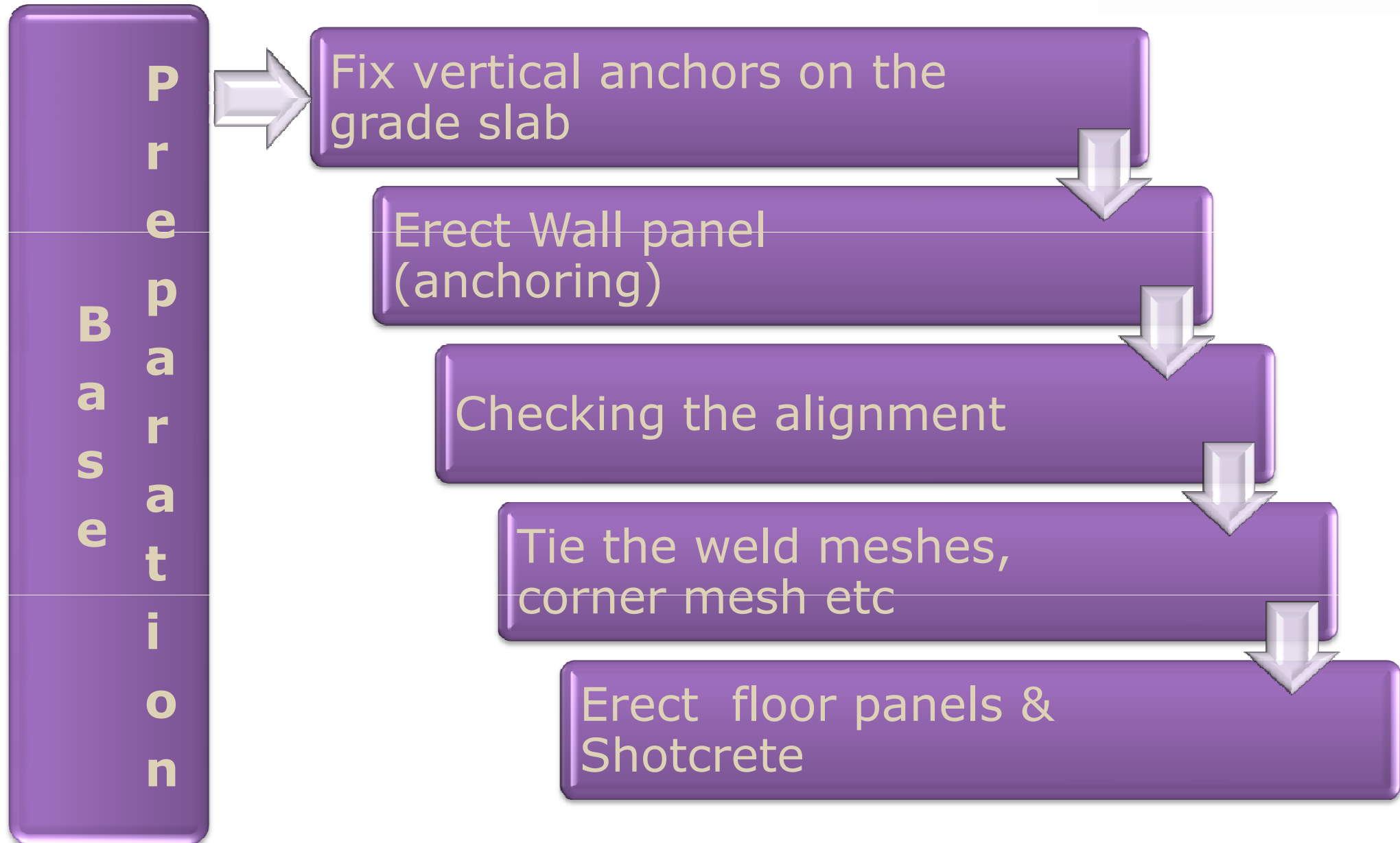


Applications

Panels can be assembled on site and in situ poured concrete (double panel, floors, stairs) and **shotcreted concrete** (single panel) to realise the different elements of the system like

- ❖ Vertical structural walls
- ❖ Horizontal structural elements
- ❖ Cladding element
- ❖ Internal walls

Construction Sequence



Wall Panel Erection



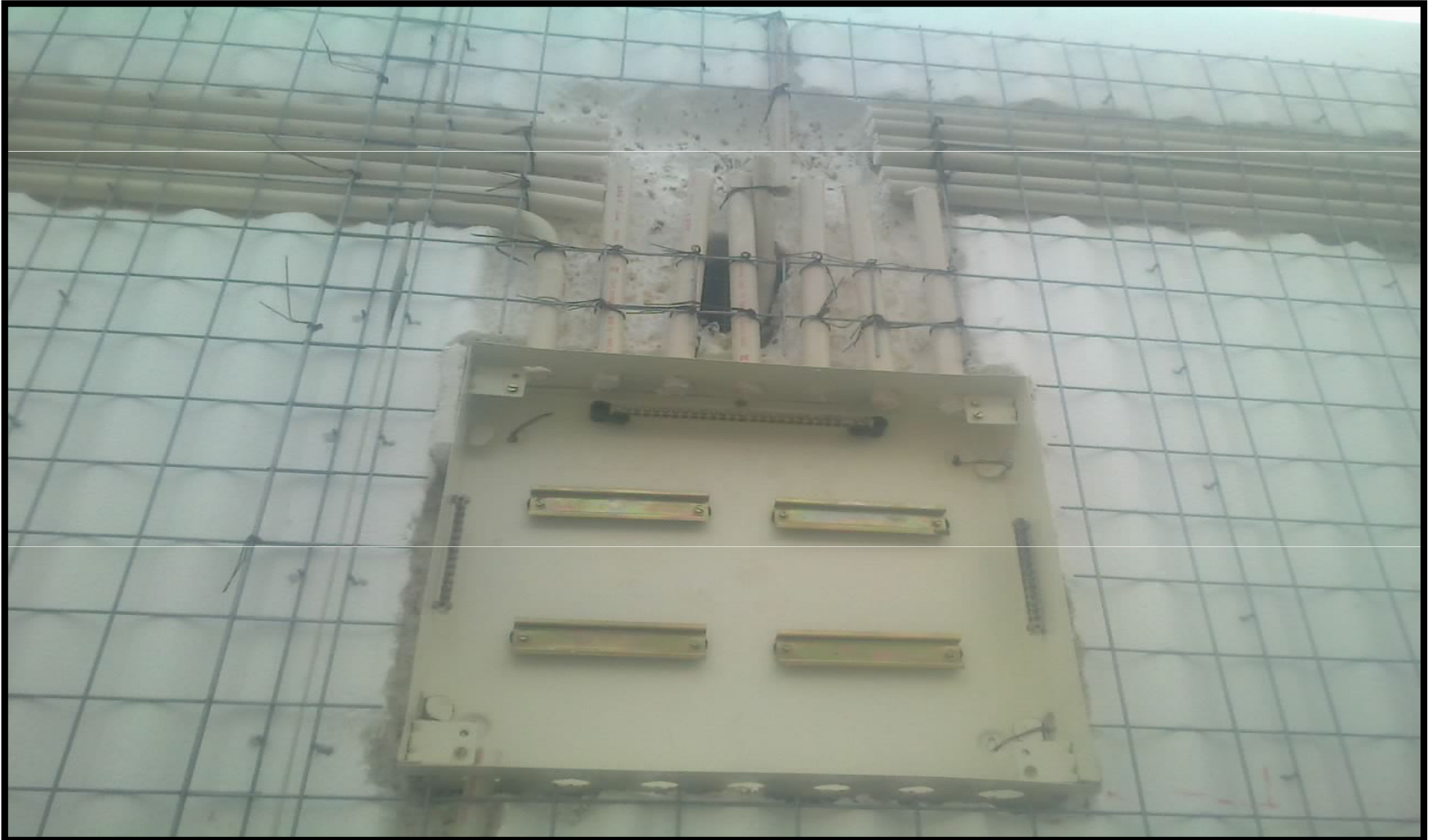
Slab Panel Erection



PANEL & COLUMN JUNCTION



Electrical Conduiting



EPS Technology - Shotcreting

Shotcreting involves placing a mix of 1:3 (Cement, Sand and crusher dust) cement mortar to create a structural wall.

Shotcreting is being done using pumps at pressure of 2kg/cm²

To ensure the structural behaviour of the panels, min 35mm thick shotcreting is done on the panels.

To save on plastering costs, the shotcreting is done in 2 layers, the 1st layer being a rough layer and 2nd layer as a finishing layer.



JINDAL
PANTHER

EPS Technology - Shotcreting



Shotcrete



G + 11 PROJECT



Finished view.....



Finished view.....



Finished view.....



Projects Completed and Ongoing

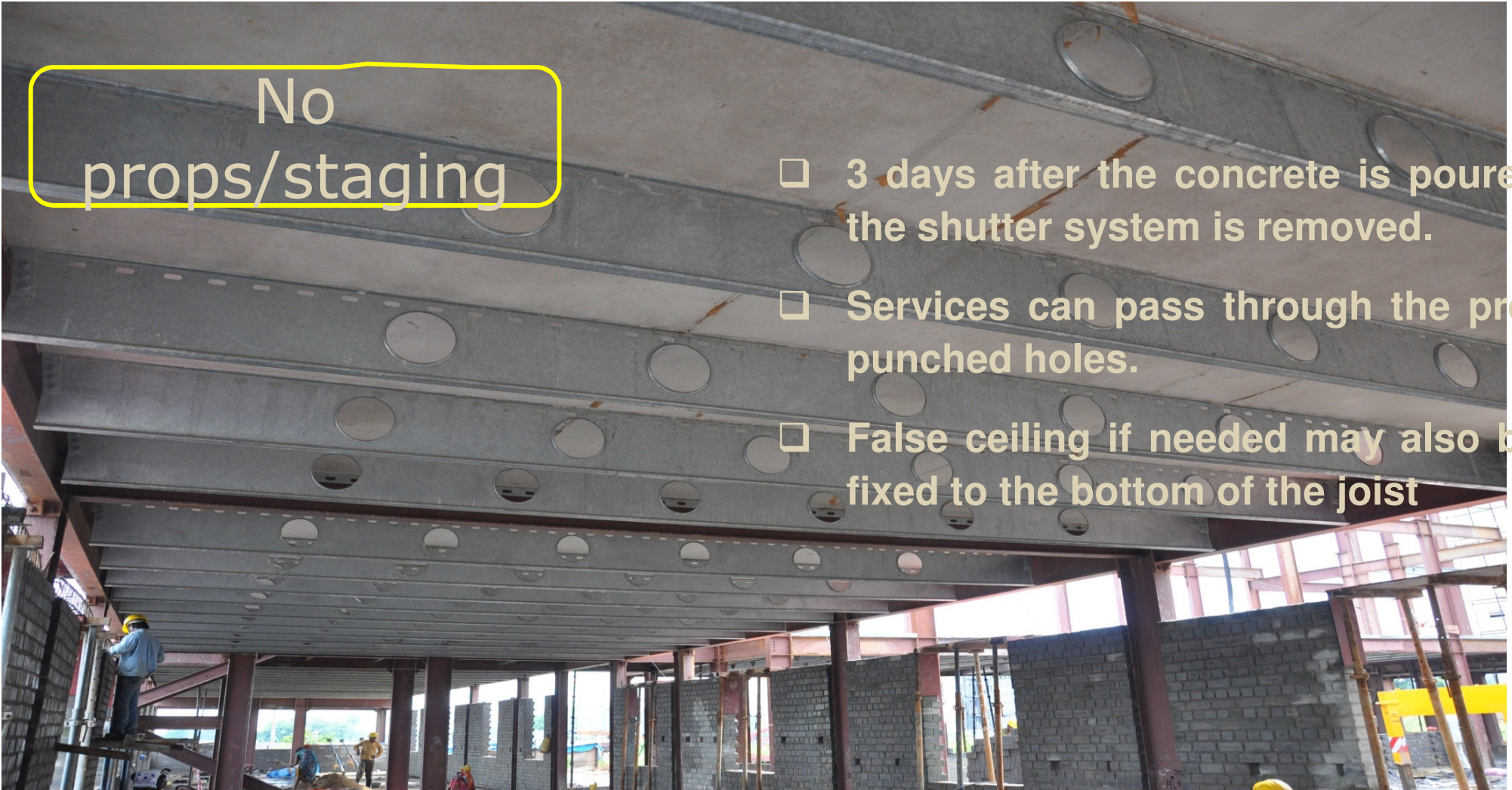
Projects Status

Sl no	Name of Project	No. of Floors	Built up Area per unit	Total Area	No. of Flats	Duration	Status
1	G Type-Quarter (Blocks- 5 nos)	G +2	801 ft ²	9615 ft ²	12X5 60 nos	6 months	Completed
2	F Type (Blocks-15 nos)	G+2	1100 ft ²	99000 ft ²	90 nos	9 months	Completed
3	G Type	G+11	801 ft ²	615168 ft ²	768 nos	18 months	4 Blocks Completed & Remaining in Progress

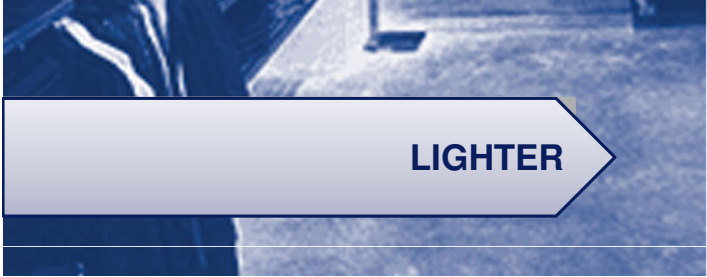
Speed floor System is a unique and innovative suspended concrete flooring system combining a light gauge roll formed steel joist compositely with an insitu concrete topping to form a material efficient and cost effective concrete floor.

No
props/staging

- ☐ 3 days after the concrete is poured the shutter system is removed.
- ☐ Services can pass through the pre-punched holes.
- ☐ False ceiling if needed may also be fixed to the bottom of the joist



Summary



LIGHTER



FASTER



EASIER

- ☐ No Propping/No Staging
- ☐ Speed of erection
- ☐ Cost effective
- ☐ Weight saving through structural components
- ☐ Lightweight, requiring less craneage than other systems
- ☐ Easily accommodates services
- ☐ Meets fire and acoustic requirements
- ☐ Flexible in its application

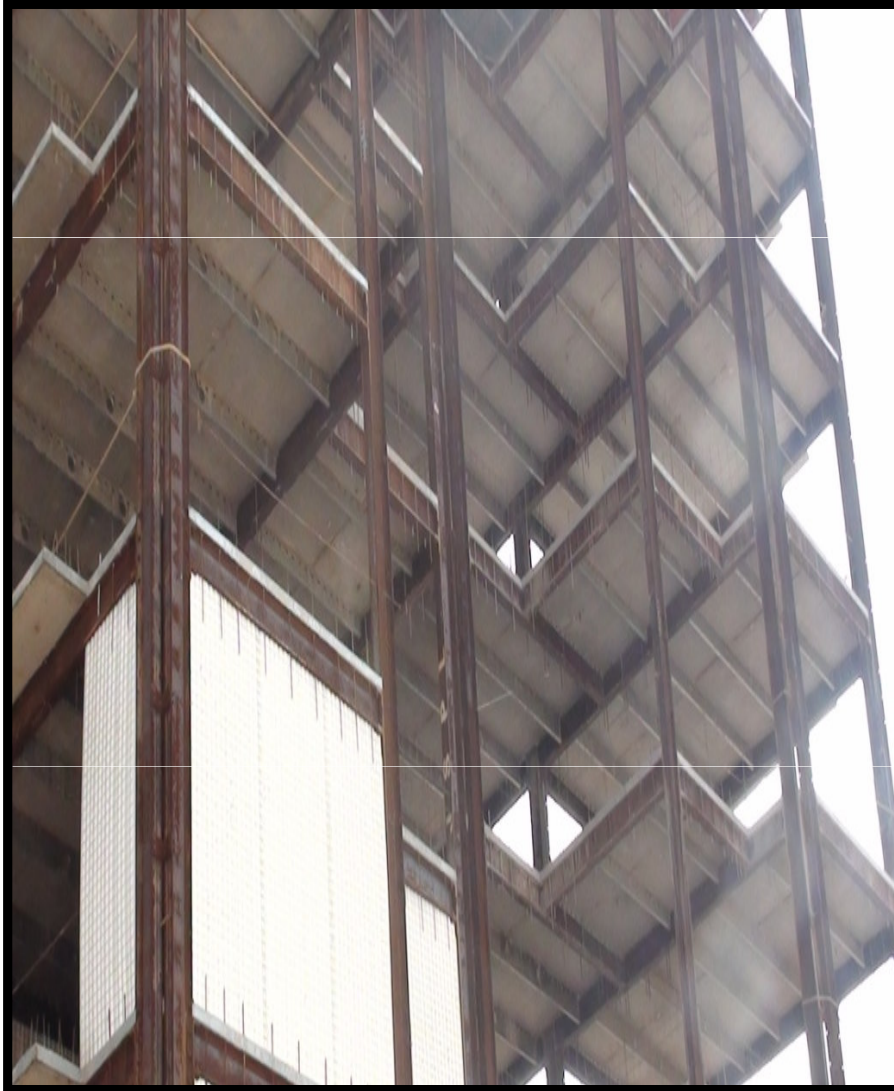
Speedfloor Advantages



SPEEDFLOOR SLAB IN G+11 TOWER



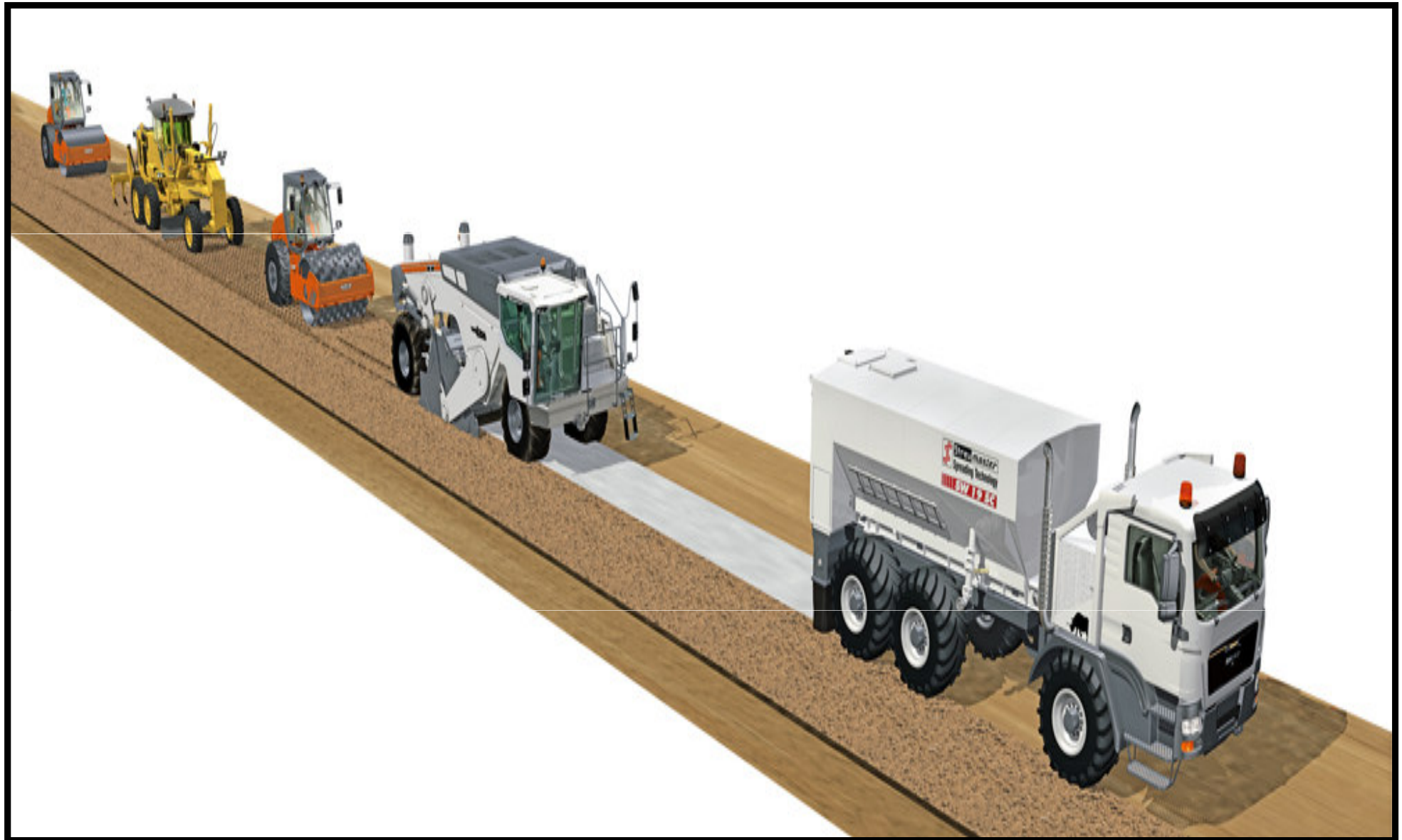
SPEEDFLOOR SLAB IN G+11 TOWER

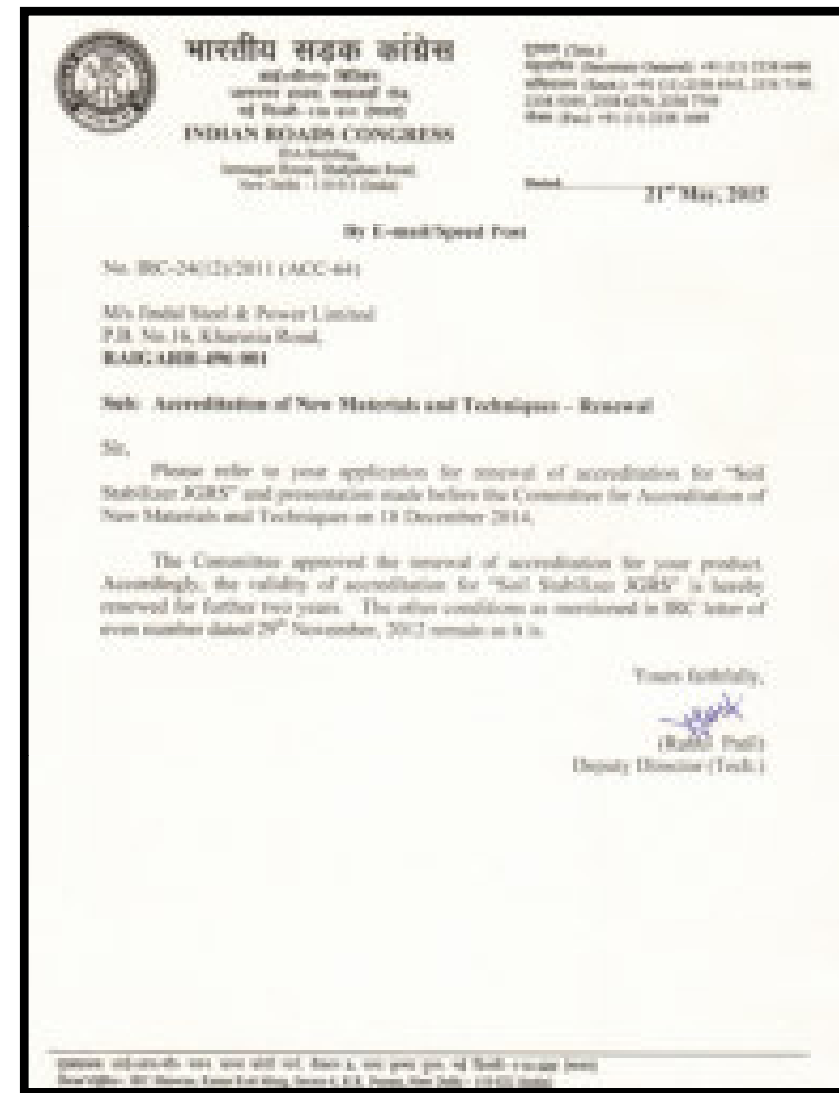


SPEEDFLOOR SLAB IN G+11 TOWER



JGRS (Jindal Global Road Stabilizer)







G+11 TOWER Sailable Features

A.	Name of the Project	G+11 Steel residential tower	
B.	No. of towers	9 Nos	
C.	Engineering consultant	Geodesic Mumbai	
D.	Total Built-up area	908340 sft	
E.	Adopted Technology		
1	Speed floor		
2	Thermal efficient wall panels (EPS)		
F.	Major Scope of work		
1	Structural works	6,948 MT	
2	Concrete works	14,868 cum	
3	Wall panel area	1,44,450 sqm	
4	Flooring	73,818 sqm	

FOUNDATION WORKS FOR G+11 TOWER



FOUNDATION WORKS FOR G+11 TOWER



FOUNDATION WORKS FOR G+11 TOWER



STRUCTURAL FRAME ERECTION





**JINDAL
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SPEEDFLOOR SLAB IN G+11 TOWER



(Shuttering arrangement)





**JINDAL
PANTHER**

SPEEDFLOOR SLAB IN G+11 TOWER







SPEEDFLOOR SLAB IN G+11 TOWER **Followed by wall Paneling Works**



PANEL ERECTION WORKS



Anchoring arrangement for Panels



Anchoring arrangement for Panels



Conduit Work Before ShotCreting



Conduit Work Before ShotCreting



PANEL ERECTION WORKS in Different Floors



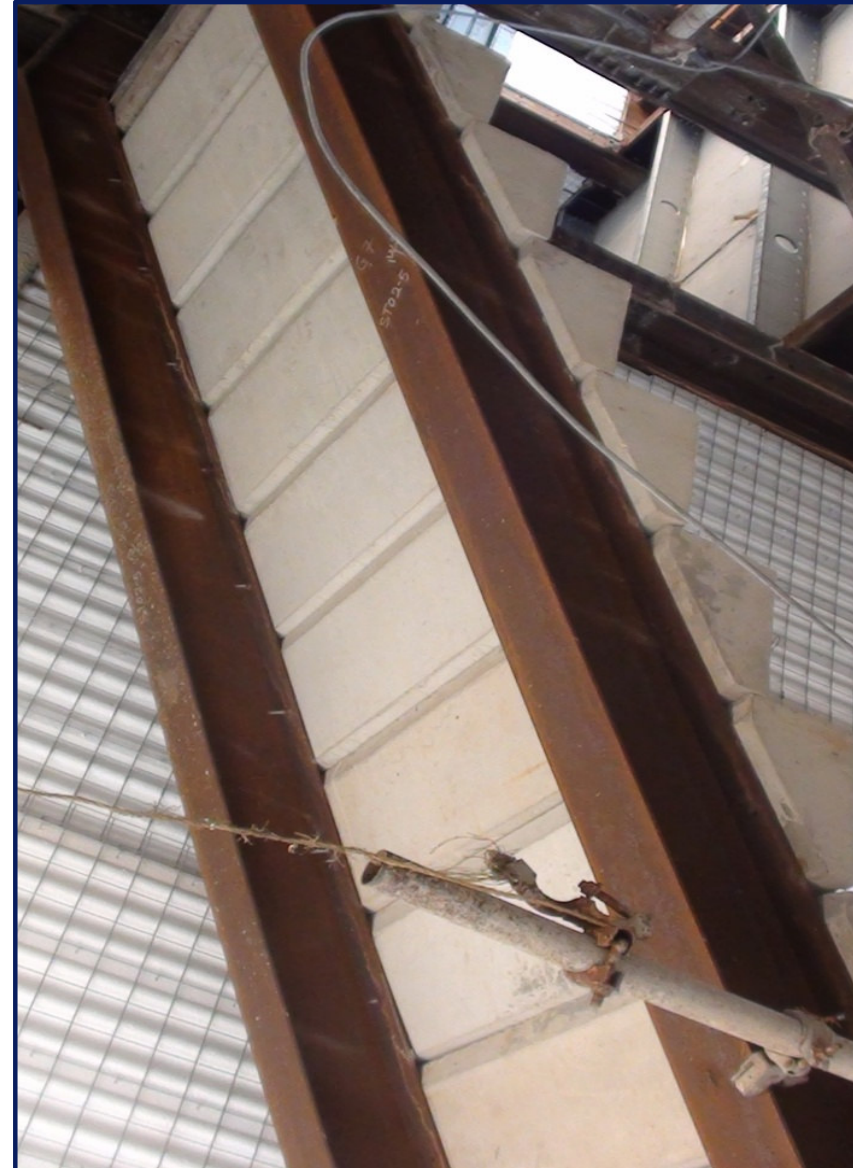
Shot-Creting work



EPS panel followed by ShotCreting work



Precast Steps for Staircase



ShotCreting & Plastering work



PANEL ERECTION WORKS in Different Blocks



2 Blocks with Different Phases of Construction



G+11 Finished View



G+11 Finished View



G+11 Finished View



Light Gauge Structure (LGS)

Water Free ! Aggregate Free ! Cement Free ! Construction
Innovative technology
Time saving with respect to RCC Construction



About LGS

Light Gauge Structures (LGS) are galvanized cold-formed steel sections for speedy low rise building construction.

- Light Gauge Structures & Environment Friendly
- Faster construction of buildings with high precision.
- 70 mm to 300 mm thickness sections are produced by automated roll forming lines.
- Load bearing wall system in low-rise building
- As partitions in high-rise RCC & steel frame buildings.

Advantage of LGS

- Water Free
- Aggregate Free
- Cement Free construction
- Reduces labour dependency
- Longer building life
- Fire, Earthquake and Wind resistant as per design and location

Application of LGS

- Modular and Industrial Buildings
- Low cost Houses
- Residential Buildings
- Labour Camps
- Multi Storey Residential Apartments
- Hospitals
- Schools

Product specifications	
No of profiles	5 U and 5 C
Profile Size	Studs/joist (90, 100, 150, 200 mm) Track/rim (96, 106, 156, 207, 258 mm)
Flange	41, 50.8, 63.5 mm
Gauge Range	0.7 mm to 2 mm

Design parameter	
Load	IS 875:1987
Seismic load	IS 1893:2002
Structure design	BS5950:1998



Manufacturing of LGS sections



LGS section being assembled to form a panel



LGS sections/panels being loaded



LGS sections being transported



1

Architectural and structural design



2

Foundation



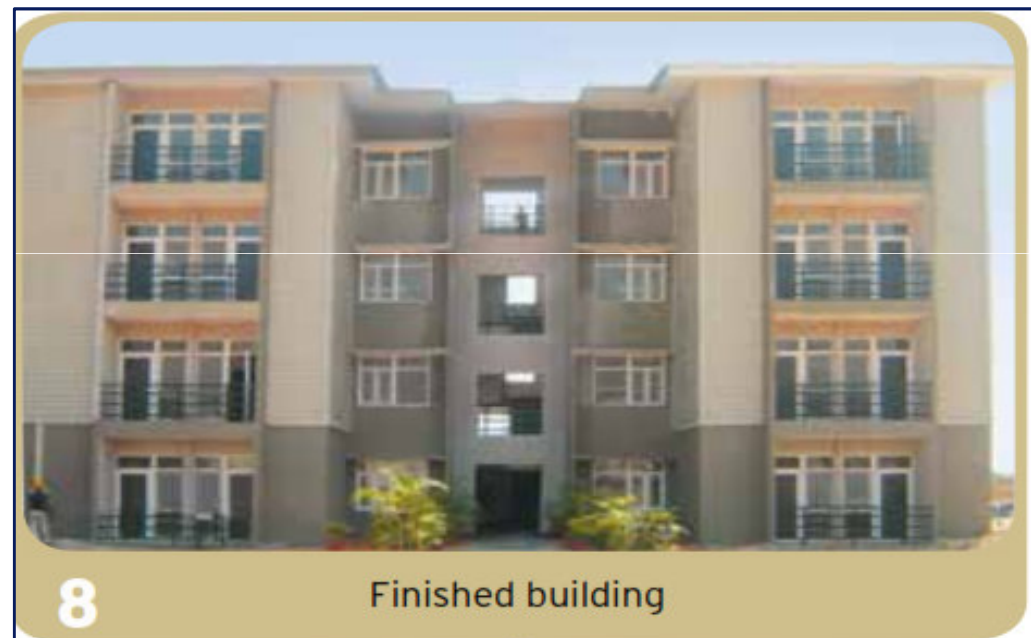
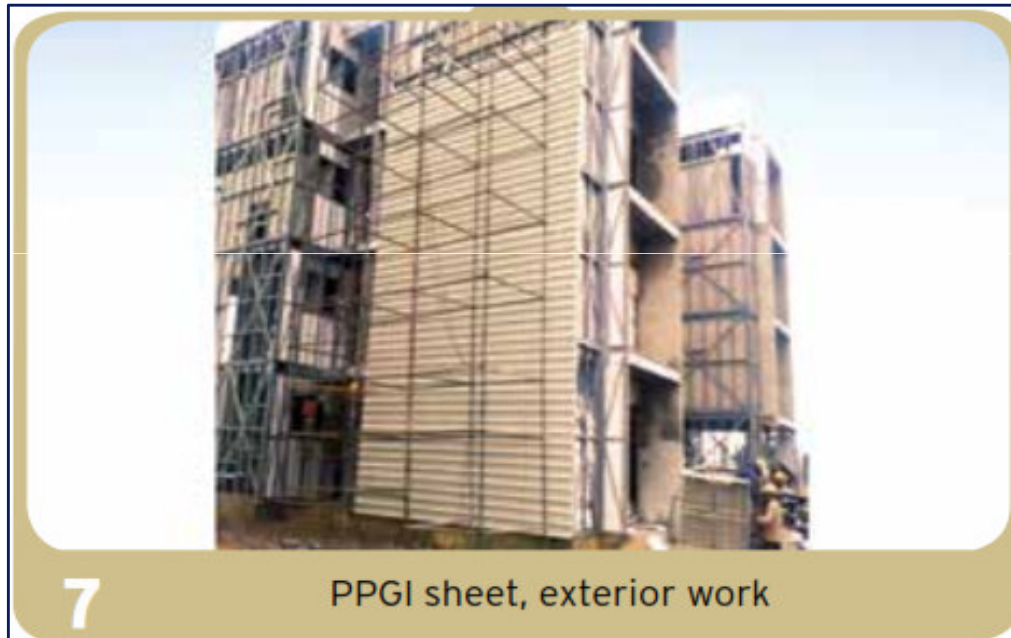
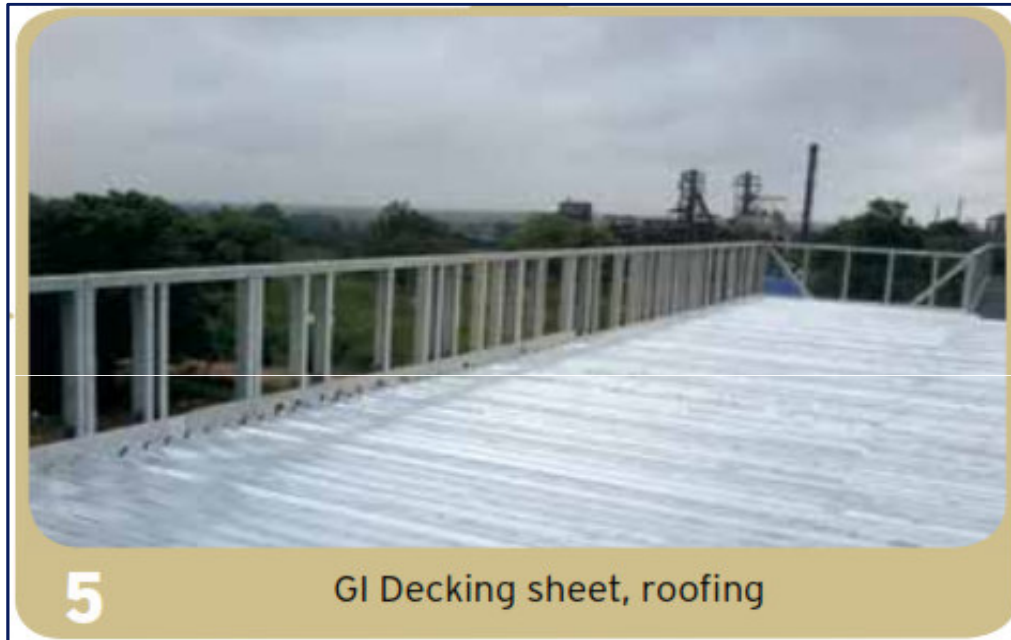
3

Foundation with LGS panels



4

LGS panels skeleton view





Stable, Hyderabad



GMR, Chamba



JSPL Residential Township, Raigarh

Other Products

- **Rails (High speed Rails / Crane rails)**
- **Universal Beams (UB)**
- **Universal column sections (UC)**
- **Parallel flange beams up to 900 mm depth**
- **Plates up to 5 M width**
- **Structural steel section available : 250/ 350 / 450 /
550 Grade steel**
- **Welded TMT wire mesh**

