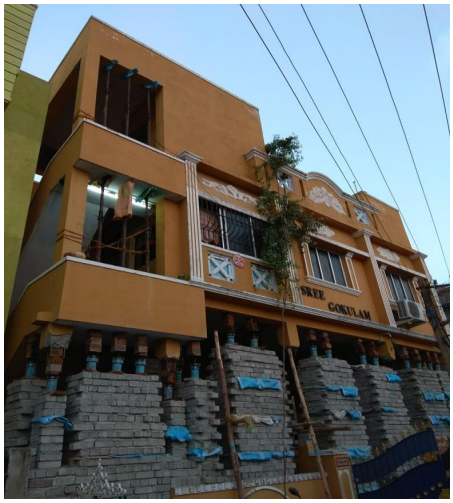
BMTPC PACS
PERFORMANCE APPRAISAL CERTIFICATION

BUILDING LIFTING TECHNIQUE

User should check the validity of the Certificate by contacting Member Secretary, BMBA at BMTPC or the Holder of this Certificate.

Name and Address of the Certificate Holder:
M/s Krishan Lal & Sons
502, Gali No. 1, Gandhi Nagar,
Jagadhri,
Yamuna Nagar, Haryana
Tel: 9729290026
Website: www.klsbuildinglifting.com

Performance Appraisal Certificate
PAC No.: **1071-S/2025**
Issue No.: **01**
Date of issue: **02/06/2025**



Building Materials & Technology Promotion Council
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Government of India
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PERFORMANCE APPRAISAL CERTIFICATE

FOR

Building Lifting Technique

ISSUED TO

M/s Krishan Lal & Sons

STATUS OF PAC No. 1071-S/2025

S. No.	Issue No.	Date of Issue	Date of Renewal	Amendment		Valid upto (Date)	Remarks	Signature of Authorized Signatory
				No.	Date			
	1	02/06/2025				01/06/2026		

CONTENTS

PART 1: CERTIFICATION

1.1 Certificate Holder: **M/s Krishan Lal & Sons**
502, Gali No. 1, Gandhi Nagar,
Jagadhri,
Yamuna Nagar, Haryana
Tel: 9729290026
E-mail: krishanlalsons.ynr@gmail.com
Website: www.klsbuildinglifting.com

1.2 Description of the System

1.2.1 Name of System - Building Lifting Technique

1.2.2 Brand Name – KLS Building Lifting

1.2.3 Brief Description

Building lifting is a specialized engineering technique /process used to elevate the entire building structure for purpose such as addressing flooding issues, foundation repairs, etc. The process involves a thorough assessment of building condition, followed by detailed planning, preparatory works such as disconnection of utilities, installation of temporary supports etc., prior to lifting. The Lifting operation is executed with the help of series of jacks, uniformly placed under load bearing members, which are operated simultaneously to ensure even and stable elevation of the entire building structure. Once the structure reaches the pre-decided height, the foundation is modified/ rebuilt, and the building can be securely lowered onto the new base.

The benefits of the technique include the following;

i. Lifting and repairing a building is more cost effective than constructing a new one, when considering the expenses associated with demolition, debris removal, and new construction materials**.** Elevating & maintaining existing structures is more environment friendly also.
ii. Lifting a building allows for the repair/replacement of old, damaged, or inadequate foundations, enhancing the building's overall stability and safety.
iii. Lifting of building can correct issues related to soil subsidence, where the ground beneath a structure has settled unevenly, affecting structural stability**.**
iv. Elevating a building can improve site drainage, reducing the risk of water pooling and related damage around the foundation.
v. Lifting buildings in flood-prone areas can prevent significant damage from rising water levels.

1.3 Assessment

1.3.1 Scope of Assessment

The scope of assessment included the conformance of lifting system for raising the existing building to the specific height while maintaining the line and level of the building & placing it to raised/repaired/modified foundation/ plinth.

1.3.2 Basis of Assessment

The Assessment of the building lifting technique is based on the following;

i. The experimental research work conducted by CSIR-CBRI Roorkee on building lifting technique of the Applicant in its premises, wherein a comprehensive assessment of various lifting parameters was carried out. With the objective of evaluating the technique's efficacy and safety, CSIR-CBRI Roorkee in its detailed Report (July, 2022) included assessment parameters such as evaluation of load difference, displacement, strain variation during the lifting process, the critical observations during important stages, and also the suggestive measures.
ii. The onsite visit of BMTPC Representative along with TAC member of one G+2 Building in Chennai.
iii. Quality Assurance System followed by the Applicant.

1.4 Uses of the system

The main uses of the system are in following conditions;

- The building's level is lower than that of the road, leading to rainwater entering the house.
- In buildings where the foundation has settled and the building is sinking into the ground.
- Houses /buildings where sewer backups are experienced.

1.4.1 Special Aspects of Use /Limitations

- In marshy land areas, the lifting of buildings is prohibited.
- Buildings situated near drains, sewers and ponds are not lifted to avoid potential dangers.
- Structures with high voltage electrical wires passing overhead are excluded from building lifting operations.
- Buildings experiencing water leakage from the RCC slab are ineligible for lifting
- Houses with stone tile roofs supported on joists, lacking RCC/RRB roofs, are unsafe for lifting and building lifting is prohibited in such cases.

1.5 Conditions of Certification

1.5.1 Technical Conditions

The building to be elevated using building lifting technique shall be scrutinized before lifting by competent structural engineer in accordance with various specifications. The lifting process shall be conducted by trained personnel, with technical support and supervision provided by qualified engineers.

1.6 Quality Assurance

The Certificate Holder shall implement & maintain a quality assurance system in accordance with the Scheme of Quality Assurance Plan (QAP) as per **Annex-1**. The certificate holder is suggested to make the QAP more comprehensive, by adhering to all/most of the suggestions provided by CBRI-Roorkee.

1.7 Handling of User Complaints

The Certificate holder shall provide quick redressal to consumer/user complaints which proved reasonable & genuine and within the conditions of warranty provided by it to customer.

The Certificate holder shall implement the procedure included in the QAP. As part of PACS Certification, it shall maintain data on such complaints with a view to assessing the complaint satisfaction and suitable preventive measures taken.

1.8 Certification

On the basis of the assessment given in Part-3 of this Certificate & subject to the conditions of certification, use & limitations set out in this Certificate and if selected, installed & maintained as set out in Part-1 & Part-2 of this Certificate, Building lifting technique is fit for use as set out in the Scope of Assessment.

PART 2: CERTIFICATE HOLDER'S TECHNICAL SPECIFICATIONS

2.1 General

The PAC holder shall use the System in accordance with the required specification & as per the relevant standards (Part-5).

2.2 Specifications of Raw materials

2.2.1 Raw material components

Table 1 List of raw materials/components used

S. No.	Raw Material/ Component	Source	Specification	If quality certified in any form
1.	Screw Jacks	Locally Available	Screw jacks are specially made for this building lifting work having a full stroke of 101 mm. Each revolution stands for a 1mm increment and a complete cycle stands for a 12 mm increment	Screw Jacks are taken from reputed Fabricator
2.	Channel section	Locally Available	Steel channel : 4 inch (100mm) X 2 inch (50mm) or Size depending on the Load	It is ensured that no deformation in Channel takes place & channels shall conform to relevant Indian Standard
3.	Wooden block (for Lifting Support)	Locally Available	Wooden block (120 mm x 120 mm)	Wooden block are based on kiker wood, which is strong & not affected by termite & Rain. The compressive strength of block are; Parallel to grain – 48.88 N/mm^2 Perpendicular to grain – 14.83 N/mm^2

2.3 Building Lifting Planning considerations

2.3.1 For lifting of building, its structural integrity and the ability to withstand lifting stresses are assessed by the material quality used in construction, type of the building, physical condition of the building, the age of the structure, etc**.** The various considerations in this regard, are as follows;

i. Study of the building with respect to its structural arrangements such as type and depth of foundations, plinth beams, column and wall layout, depth of water table, soil conditions etc.
ii. A minimum trench of 3 feet depth and 2 feet width is excavated around the building to expose the foundation, which may be increased as per the requirement of specific building/ soil conditions. The condition of the foundation is carefully assessed.
iii. A detailed plan is prepared, including jacking locations, required support in internal areas where substantial loads are coming, structural connection details after raising the structure, repairing methods, etc.
iv. Effective bonding/ toothing of all wall corners to be checked so as to ensure that walls act together during lifting and the possibility of any structural separation is avoided.
v. Uniform distribution of load carrying capacity is to be ensured for walls having differential loadings to avoid the development of any flexural cracks.

2.3.2 Considerations on the Part of Building owner for lifting of structures, are as follows:

i. The condition of the foundation must be carefully assessed. If it's cracked, it might need to be structurally fixed before the structure is raised.
ii. Hiring/ Consultation of a qualified Structural engineer for ascertain that the raising process will not degrade the house's structural integrity.
iii. Anticipation and planning for likely impact of structure raising on the neighbourhood.
iv. Any limit on the height restrictions set by the local authorities is to be confirmed.
v. Removal of the movable items such as furniture, stores and temporary construction before lifting process. Additionally all power, gas and electrical connections are not only shut off, but disconnected before jacking operation.

The building lifting process flow chart is given in **Annex-2.**

2.4 Building Lifting Methodology

2.4.1 Preliminary Stage of building lifting

The method involves lifting the building using jacks installed below ground level. This process requires specific excavation, levelling, and installation procedures to ensure the safety of the building during and after the lifting operation.

i. Excavation and Level Marking

The foundation is excavated to examine its details, in case no repairs are needed, further procedures are initiated. Initially, an excavation of 2½ feet wide and 2 feet deep near the building's walls is required. Level marks are placed every 2 feet at a height of 1 foot from the D.P.C. (Damp Proof Course) level, So that the building can be raised as per the existing level.

Fig. 1: Excavation of foundation

ii. Installation and Marking of jack

Jacks are installed at suitable intervals in slots made in the walls. They are positioned 6 inches below the D.P.C. and as per required spacing. Columns should be cut using diamond cutters to free the foundation from loads once supported by the jacks. Two planks of 1½ feet (450 mm) long and 6 inches (150 mm) wide are provided below each jack depending upon its bearing capacity. A piece of torn cloth 4 inches (100 mm) wide and 5 inches (125 mm) long is given on top of each jack.

iii. Markings placed in Jack

Twelve alternating red and white marks, with arrows and squares, are placed around each jack. This marking is to ensure the rotation begins until the white mark aligns with the downward arrow, and then continues until a red mark aligns, ensuring alternating marks above the arrow.

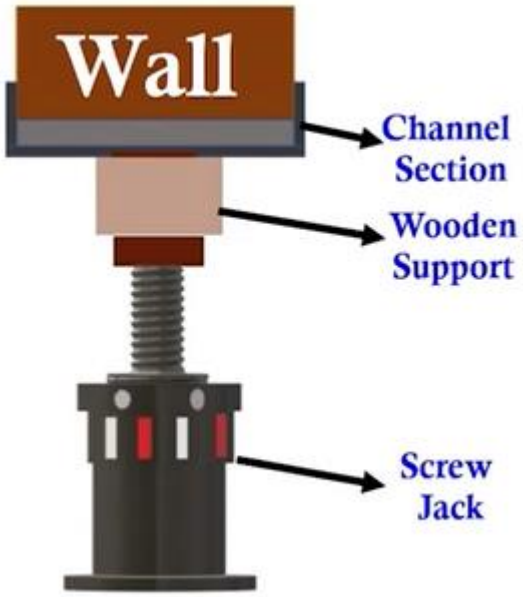


Fig. 2: Screw Jack Arrangements

iv. Iron Channel Fitting

The transverse support are provided to the slotted wall using channel sections and screw jacks. The primary screw jacks are removed after confirming that the entire load was transferred to the transverse support. An iron channel filled with cement mortar is installed below the raised wall, tightened with the primary screw jacks so that the entire load is transferred to the primary jacks. The transverse jacks are then removed, and the longitudinal channel sections are welded to ensure equal stress distribution. After this, with the help of level marks given in the building, the building is kept at the same level before jacking.

Fig. 3: Iron Channel Fitting

2.4.2 Initiation of lifting process

Lifting the Building

i. The process of uplifting a building below ground level begins with placing wooden blocks on top of each open jack and securing them. This is done for every jack installed in the building. After the wooden blocks are positioned, the building's level is checked and adjusted. Arrow marks are made on each jack, and the jacks are rotated as per the specified method, raising the building by 8 inches. The jacks must be operated simultaneously to raise the structure slowly, maintaining a minimal slope to avoid structural failure. Subsequently, another wooden block is placed on top of each jack, and the levelling process is repeated. The jacks are rotated again, lifting the building by an additional foot.

ii. Once the building is lifted by a foot, it is essential to fill the space below the jacks with brick work. The process of lifting the building continues incrementally by 2 feet, 3 feet, or 4 feet as required, following the same method of lifting it by 1 foot each time. After reaching the desired height, it is crucial to ensure the building is level before removing the iron channel installed between the wall and the jack. The channel is removed by performing the reverse operation used for its installation through cross channels.

iii. For the masonry work, some jacks are removed while others remain in the wall. The empty spaces left between the installed jacks are filled with brick work, leaving an inch of free space between the raised wall and the new wall below it. To fill the empty spaces, a wooden plank is placed in front of the empty space on one side of the wall, and a wooden mallet and hammer are used to compact the mortar from the other side. This ensures no empty space is left between the raised wall and the new wall.

iv. The jacks are removed the next day, and the empty spaces are filled with mortar. The same process is repeated for the one-inch empty space above. After this, the weight of the building is securely transferred to the new wall.

2.5 Skill Requirement at Site

All the workforce need to be trained of proper method of making slots in wall, operation of Jacks, construction of masonry etc. The lifting of building shall be carried out under the direct supervision of competent personnel of the Applicant only.

2.6 Inspection

Inspection of building lifting techniques shall be done at appropriate stages of the lifting process. During the lifting process, the structural stability of building, proper functioning of lifting equipment, shall be continuously supervised by qualified personnel of the Agency.

2.7 Guarantees/Warranties provided by the PAC holder to the customer

- PAC holder shall furnish various performance warranties as required/agreed for project specifications.
- The performance covered as warranties as per the submission of Applicant includes addressing the issues related to the foundation of the building, leaning of building after lifting, any cracks in the walls/joints of the building that appear after lifting, etc.. However, the Clients are advised to enter with the project specific agreements prior to the building lifting, as regards warranties provided by the Agency.

2.8 Responsibility

i. PAC holder is responsible for the entire operation of raising of building to the agreed height & placing it securely to modified/ rebuilt foundation, using jacks & various other accessories of standard quality & efficiency, and with deployment of its core trained workforce.
ii. The Agency shall ensure compliance with the measures suggested by CSIR-CBRI, Roorkee, as attached in the **Annex-3**.
iii. The various considerations & responsibilities on the Part of Building owner for lifting of building structures, has been detailed in Para 2.3.2 as above.

PART 3: BASIS OF ASSESSMENT & BRIEF DESCRIPTION OF ASSESSMENT PROCEDURE

3.1 Assessment

The assessment has been done as per the provisions of the standards listed in Part-5 of this Certificate.

3.2 Assessment of building lifting technique

An Experimental Research work was carried out on the Masonry Building Lifting at CSIR-CBRI Campus using a small loadbearing structure having a plinth area of 24.9 sq.m in the CBRI colony premises with support of M/s KLS building Lifting from Yamuna Nagar, Haryana. During the building lifting process, various parameters such as load differences, displacement, and strain variation were evaluated & CSIR-CBRI, Roorkee has prepared a Detailed Report (July, 2022) comprising of its various aspects. The critical observations during important stages of entire lifting operation are given as follows;

3.2.1 Critical Observations during lifting from the Instrumentation Used

i. Application of Load Cell

- The load cell was used inside the building between the jack and the existing wall to monitor load difference during the lifting process. Reaction force of the particular point was calculated and matched with the load cell value to monitor the force transfer during the lifting process.
- The typical sequence of screw jack operation and load cell placement is as shown in Figure **4**. The load cell recorded the reaction value that went minimum and maximum while the process of screwing the jacks was commenced. At the end of the process, the load value reached the estimated reaction force. Similar trend has been observed during the entire process with different initial reaction force.

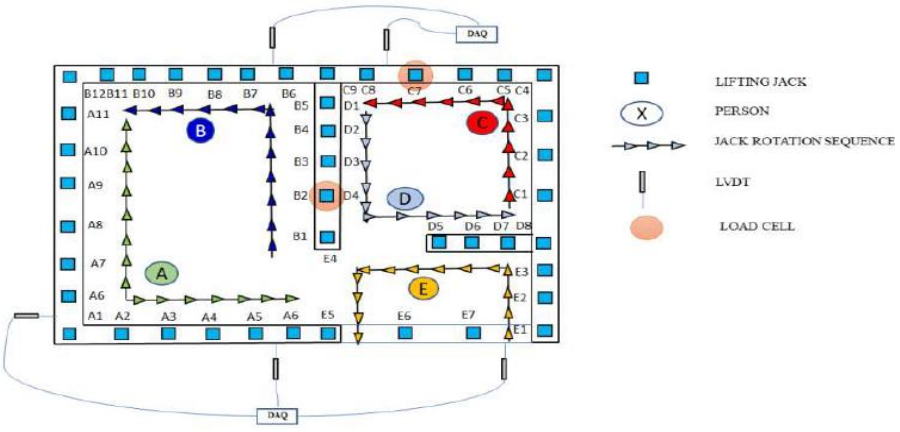


Fig. 4: Screw Jack Operating Sequence

ii. Application of Linear Variable Differential Transducers (LVDTs)

The two Linear Variable Differential Transducers (LVDT) were used at each corner to monitor the displacement during lifting operation. One complete cycle corresponded to 12 mm increment and the same has been confirmed using LVDT values. For five consecutive cycles, displacement data was recorded to check and verify the same. The cumulative displacement of 60 mm by the end of these cycles is recorded, which shows that the jack operation provides uniform movement, as in Figure 5.

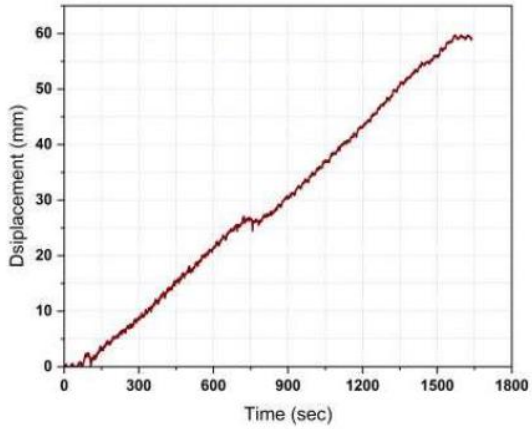


Fig. 5: LVDT Data for five consecutive cycles

iii. Application of Strain Gauge

Strain gauges were used in parallel and perpendicular to channel section to monitor the strain variation during lifting process. The recorded strain values were very minimal, ranging between 100-150 micro strain. The gradual increase in strain were observed without much difference. This shows the even distribution of load across the channel section during lifting process.

3.2.2 Critical Observations during Removal of Primary Channel Section using Transverse Supports to Construct Plinth Beams

Load cell and LVDTs were used at critical locations (wherever is necessary) of different sections, as shown in Figure **6** to monitor the force and displacement difference during unloading/ reloading and changing the support at primary positions.

Fig. 6: LVDT placements below the selected region of the wall

Load cells were used between the transverse channel and screw jacks while removing the primary channel section support to monitor the load variation in the transverse supports. Figure **7**

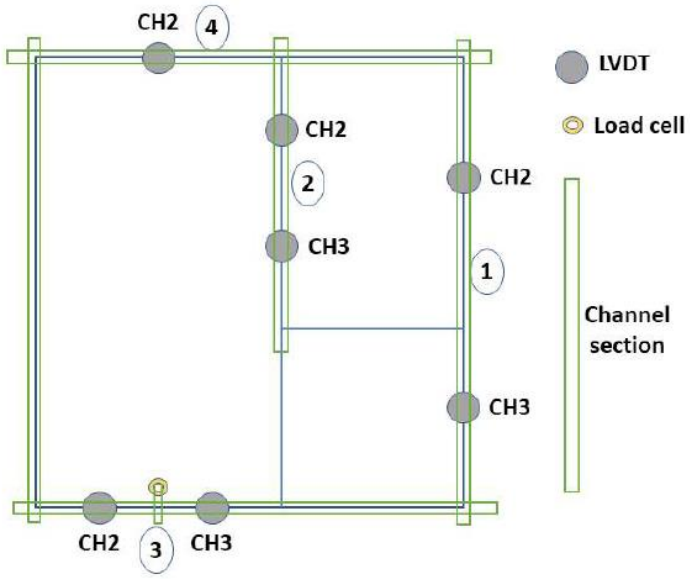


Fig. 7: Typical sequence details of primary support removal

- The load variation was less than 1kN while removing primary channel supports of particular section (Section 3)
- In section 4, the same load varies upto 6 kN with some disturbances during the removal of primary channel
- It manifests that the unloading and reloading process has certain amount of stress variation during the load transfer.

- It can be clearly understood from LVDT data that displacement variations were generally less than 1 mm in most of the cases during the unloading process, showing that the provided transverse supports effectively restrict displacement.
- It shows that the provided transverse supports very effectively restrict displacement.
- The difference in load and displacement during support removal shows that the proper measures to be taken to control such issues to avoid sudden failure.

This investigation shows that the unloading and reloading has certain influence in the stress transfer and has to be maintained properly throughout the lifting process.

3.2.3 Critical Observations during Interconnection of New and Existing Walls

After the successful completion of mortar filling work between new and existing wall, the building was left with transverse supports for seven days curing. The displacements were measured using LVDT fixed with the wall during the removal of transverse support to check the displacement if any during the release of supports. Figure **8** shows the sequence adopted during the measurement. The LVDT data shows that the maximum displacement observed is 0.5 mm and the minimum is 0.1 mm. It infers that the load transfer between the established connections is successful without any significant displacement/ settlement.

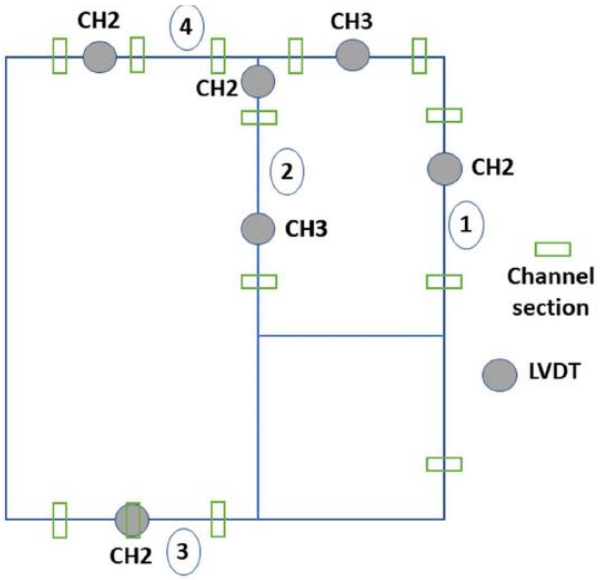


Fig. 8: Typical sequence details of transverse support removal (Final load transfer to new wall)

3.3 Test Report on Timber wood (Kikar wood)

Test Description: Mechanical Strength
Sample size: 155 x 120 x 100 mm
Date of test: 08/02/25

Table 2

S. No.	Test Parameters	Test Method	Test result (N/mm^2)
1	Compressive strength parallel to grain	IS:1708(Part 8) -1956	48.88
2	Compressive strength perpendicular to grain	IS:1708 (Part 9) -1956	14.83

3.4 Projects Executed

The list of building lifting projects already completed primarily in and around Chennai, has been provided by the Agency, as per the details below;

Table 3

S. No.	Name	Address	Month/ year	Building Area (Sqft)	Raise by (Ft.)
1.	Ramesh S/o Sivara Mamorhi	Prakasham, Devarpalli	Jun-2016	1800	4
2.	S. Thirumavkkarasu	House No. 128, Veeramani Street, Priyaar Nagar, Chennai- 600091	Aug-2016	2177	4.5
3.	S. Pandeli Ranga Reddy	Thirpuratkam, Kurnal Guntus Main Road, AP	Sep-2016	2000	5
4.	Badrinath Vathsala	H. No 2/1622, Veeramani Street, Madipakkam, Periyaar Nagar, Chennai-600091	Oct-2016	1500	4
5.	N. Saravanar	1st Street New Secretariat Colony Valachery Chennai	Nov-2016	1400	5
6.	M. Sundar Rajan	H. No. 11B, Ramasamy St. Sivaprakasam Nagar Pvzhjthivakkam	May-2017	1690	5
7.	B. Saradamani Devi	First Street, new Secretariat Colony Velacherry, Chennai-600042	May-2017	1850	5
8.	Rajash Murgan	Plot no. 63, Dr. Ambedkar Salai, Periyar Nagar Extn Madipakkam,	Jul-2017	1450	5

		Chennai-600091			
9.	S. Gulam Dastagir	Plot No. 4, Sankardas, 2nd Street Thivakkam,Chennai-600091	Aug-2017	1440	4
10.	V. HemuKumar	H.No 3 Lakshmi St. Perumal NagarBaroda Colony Madipakkam, Chennai-600091	Dec-2017	2200	5
11.	Varadarjan	Plot No 4039A, Vaigai St. Ram Nagar North, Chennai-600091	Dec-2017	1890	5
12.	T. Srinivasan	Plot 1483, D. No. 7, 3rd Street, North Ramnagar, Madipakkam, Chennai-600091	Jan-2018	2100	5
13.	S. Kannan	29 door No 7, Street, Kuber Nagar Extn, Madipakkam, Chennai-600091	Jan-2018	2700	5
14.	G. Radha Krishan	Plot No. 18,BalajiNagar, 1st Street Adambakkam, Chennai-600088	Apr-2018	1765	4
15.	A.K Dhashina Moorthy	Plot No. 18/161, Thillai Nagar Extn. Road	Jun-2018	2400	5
16.	R. Ramesh S/o V.Vijendra Guru	Plot No. 33, Sigamani Nagar, Madipakkam, Chennai-600091	Aug-2018	1280	4
17.	Jayaramnam	Plot No 12, D.no1762, Periyar Nagar Extn, Madipakkam	Jan-2019	1688	5
18.	N. Arappali	Plot No 2/1401, Periyar Nagar 3rd Street, Madipakkam	May-2019	1480	5
19.	Mrs. D. Dhanalakshmi W/o Dhandapani	No. 2/1624, Veermani Street Periyar Nagar, Madipakkam, Chennai-600091	Feb-2020	3600	5
20.	Mr. S Kumar	Plot No 131, 5th Cross Street, Kuberan, Nagar, Extn., Madipakkam, Chennai-600091	Sep-2021	1800	5
21.	Dr. Shantha Bharathan	House No. 2/362, 1st Main Road, Thilakar Avenue,Balaiah Garden, Madipakkam, Chennai-600091	Jan-2022	2800	5
22.	Mr. Periyasay Chidambarm	House No. 138B, 3rd Road Cross Street Kuubeean Nagar Extn. Madipakkam, Chennai-600091	May-2022	2200	5
23.	V. Sukumar	H.no 7, Vallakottai, Murgan Street, Rajamanikam Nagar, Keelkatai,Chennai-600017	April-2017	1877	4
24.	S. Anandavelu	Plot No. 2, Pavendhar, Bharathidasan, Street, Periyar Nagar Extn, Madipakkam, Chennai-600091	Feb-2024	1400	5
25.	D. Jayapal	Plot No. 15, StateBank Colony, Kumbakanam Town Thanjavur-612001	Feb-2024	2100	5

The photographs of the project executed by the agency is included in the **Annex-4**

3.5 Quality Assurance system followed by the certificate holder

3.6 Site Inspection

The onsite visit of BMTPC Representative was made along with TAC member of one G+2 Building in Chennai. In about 3 months period, the building was raised to a height of 6.5 ft, was almost near completion stage at the time of visit.

PART 4: STANDARD CONDITIONS

This certificate holder shall satisfy the following conditions:

1 The certificate holder shall continue to have the product reviewed by BMBA.

2 The product shall be continued to be manufactured according to and in compliance with the manufacturing specifications and quality assurance measures which applied at the time of issue or revalidation of this certificate. The Scheme of Quality Assurance separately approved shall be followed.

3 The quality of the product shall be maintained by the certificate holder.

4 The product user should install, use and maintain the product in accordance with the provisions in this Certificate.

5 This certificate does not cover uses of the product outside the scope of this appraisal.

6 The product is appraised against performance provisions contained in the standards listed in Part-V. Provisions of any subsequent revisions or provisions introduced after the date of the certificate do not apply.

7 Where reference is made in this Certificate to any Act of Parliament of India, Rules and Regulations made there under, statutes, specifications, codes of practice, standards etc. of the Bureau of Indian Standards or any other national standards body and the International Organization for Standardization (ISO), manufacturer's company standards, instruction/manual etc., it shall be construed as reference to such publications in the form in which they were in force on the date of grant of this Certificate (and indicated in Part V to this Certificate)

8 The certificate holder agrees to inform BMBA of their distributors / licensees whenever appointed by him and agrees to provide to BMBA a six monthly updated list thereof.

9 The certificate holder agrees to provide to BMBA feedback on the complaints received, the redressal provided, and the time taken to provide redressal on complaint to complaint basis as soon as redressal is provided. BMBA agrees to provide the certificate holder the user feedback received by it, if any.

10 If at any time during the validity period, PAC is unable to fulfill the conditions in his PAC, he should on his own initiative suspend using the PAC and notify Chairman, TAC the date from which he has suspended its use, the reason for suspension and the period by which he will be able to resume. He shall not resume without the prior permission of BMBA. He shall also inform, simultaneously, his agents, licensees, distributors, institutional, government, public sector buyers, other buyers and all those whom he has informed about his holding the PAC. He shall also inform all those who buy his product(s) during the period of suspension. He shall provide to BMBA at the earliest the list of who have been so informed by him.

11 In granting this Certificate, BMBA takes no position as to:

(a) The presence or absence of patent or similar rights relating to the product;

(b) The legal right of the Certificate holder to market, install or maintain the product;

(c) The nature of individual installations of the product, including methods of workmanship.

12 BMTPC and the Board of Agreement of BMTPC (BMBA) take no position relating to the holder of the Performance Appraisal Certificate (PACH) and the users of the Performance Appraisal Certificate (PAC) respecting the patent rights / copy rights

asserted relating to the product / system / design / method of installation etc. covered by this PAC. Considerations relating to patent / copy rights are beyond the scope of the Performance Appraisal Certification Scheme (PACS) under which this PAC has been issued. PACH and users of this PAC are expressly advised that determination of the Claim / validity of any such patent rights / copy rights and the risk of infringement of such rights are entirely the responsibility of PACH on the one hand and that of the users on the other.

13 It should be noted that any recommendations relating to the safe use of the product which are contained or referred to in this Certificate are the minimum standards required to be met with when the product is installed, used and maintained. They do not purport in any way to restate or cover all the requirements of related Acts such as the Factory Act, or of any other statutory or Common Law duties of care, or of any duty of care which exist at the date of this Certificate or in the future, nor is conformity with the provisions of this Certificate to be taken as satisfying the requirements of related Acts.

14 In granting this Certificate, BMTPC and BMBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the use of this product.

15 The certificate holder indemnifies BMBA, its officers and officials involved in this assessment against any consequences of actions taken in good faith including contents of this certificate. The responsibility fully rests with the certificate holder and user of the product.

16 The responsibility for conformity to conditions specified in this PAC lies with the manufacturer who is granted this PAC. The Board (BMBA) will only consider requests for modification or withdrawal of the PAC.

17 The PAC holder shall not use this certificate for legal defense in cases against him or for legal claims he may make from others.

Place: New Delhi
Date of issue 02.06.2025

Chairman TAC & for and on behalf of Member Secretary, BMBA

PART 5: LIST OF APPLICABLE STANDARDS AND CODES

IS 4552-1 (1993) (Reaff. 2003)	Automotive-Vehicles-Portable jacks For Automobiles
IS :2260-1981(Reaff. 2000)	Code of Practice for Preparation and Use of Masonry Mortars
IS 3954 (1991) (Reaff. 2006)	Hot Rolled Steel Channel Sections for General Engineering purposes Dimensions
IS 4169 (1988)	Method for calibration of force-proving instruments used for the verification of uniaxial testing machines
IS:1708 (Part 8, 9)-1956 (Reaff:2005)	Methods of Testing Of Small Clear Specimens of Timber

CERTIFICATION

In the opinion of Building Materials & Technology Promotion Council's Board of Agreement (BMBA), **Building Lifting Technique** is satisfactory if used as set out above in the text of the Certificate. This **Certificate PAC No. 1071-S/2025** is awarded to **M/s Krishan Lal & Sons, Yamuna Nagar, Haryana.**

The period of validity of this Certificate is for a period of one year i.e. from 02/06/2025 to 01/06/2026 as shown on Page 1 of this PAC.

This Certificate consists of a cover page and pages 1 to 32.

Dr. Shailesh Kr. Agrawal
Chairman, TAC
& Member Secretary, BMBA
Building Materials and Technology Promotion Council
Ministry of Housing and Urban Affairs, Govt. of India
Core 5A, 1st Floor, India Habitat Centre
Lodhi Road, New Delhi-110003

Embossing Seal of BMBA

On behalf of BMTPC Board of Agreement, Chairman, Technical Assessment Committee (TAC) of BMBA & Member Secretary, BMTPC Board of Agreement (BMBA) under Ministry of Housing and Urban Affairs, Government of India

Place: New Delhi, India
Date: 02nd June, 2025

PART 6: LIST OF ABBREVIATIONS

BMBA	Board of Agreement of BMTPC
BMTPC	Building Materials and Technology Promotion Council
CPWD	Central Public Works Department
ED	Executive Director of BMTPC
IO	Inspecting Officer
MS	Member Secretary of BBA
PAC	Performance Appraisal Certificate
PACH	PAC Holder
PACS	Performance Appraisal Certification Scheme
SQA	Scheme of Quality Assurance
TAC	Technical Assessment Committee (of BMBA)

PERFORMANCE APPRAISAL CERTIFICATION SCHEME - A BRIEF

Building Materials & Technology Promotion Council (BMTPC) was set up by the Government of India as a body under the Ministry of Housing &Urban Poverty Alleviation to serve as an apex body to provide inter-disciplinary platform to promote development and use of innovative building materials and technologies laying special emphasis on sustainable growth, environmental friendliness and protection, use of industrial, agricultural, mining and mineral wastes, cost saving, energy saving etc. without diminishing needs of safety, durability and comfort to the occupants of buildings using newly developed materials and technologies.

During the years Government, public and private sector organizations independently or under the aegis of BMTPC have developed several new materials and technologies. With liberalization of the economy several such materials and technologies are being imported.

However, benefits of such developments have not been realized in full measure as understandably the ultimate users are reluctant to put them to full use for want of information and data to enable them to make informed choice.

In order to help the user in this regard and derive the envisaged social and economic benefits the Ministry of Housing &Urban Poverty Alleviation has instituted a scheme called Performance Appraisal Certification Scheme (PACS) under which a Performance Appraisal Certificate (PAC) is issued covering new materials and technologies. PAC provides after due investigation, tests and assessments, amongst other things information to the user to make informed choice.

To make the PACS transparent and authentic it is administered through a Technical Assessment Committee (TAC) and the BMTPC Board of Agreement (BMBA) in which scientific, technological, academic, professional organizations and industry interests are represented.

The Government of India has vested the authority for the operation of the Scheme with BMTPC through Gazette Notification No. 1-16011/5/99 H-II in the Gazette of India No. 49 dated 4th December, 1999.

Builders and construction agencies in the Government, public and private sectors can help serve the economic, development and environmental causes for which the people and Government stand committed by giving preference to materials and technologies which have earned Performance Appraisal Certificates.

Further information on PACS can be obtained from the website: www.bmtpc.org

Annex-1

Quality Assurance Plan

I. Quality Assurance Plan (Raw Materials)

1) **Screw Hydraulic Jacks**

- Jacks shall be free from defects such as cracks, blow holes, etc.
- Detailed dimensional check and material check as per design specifications.
- Jacks to be loaded with a load of rated capacity and operated from the minimum to the maximum position and back.

2) **Wooden Blocks(Kicker Wood)**

- Inspection for cracks, knots, and deformations
- Moisture content analysis to ensure durability
- Compression testing for load endurance

3) Channel Sections

- Dimensional accuracy check
- Tensile and compressive strength testing

4) Cement Sand Mortar

- Ensure low water-cement ratio (< 0.35 or) for adequate binding, strength & durability
- Compression strength testing after curing

II. Quality Assurance Plan (Process)

1) **On-Site Inspection**
   - Inspect materials for visible defects (cracks, rust, deformations etc.).

2) **Post-Installation Testing**:
   - Ensure materials perform as expected during initial operations.
   - Monitor for any deviations from quality expectations.

III. Quality Assurance Plan (Safety)

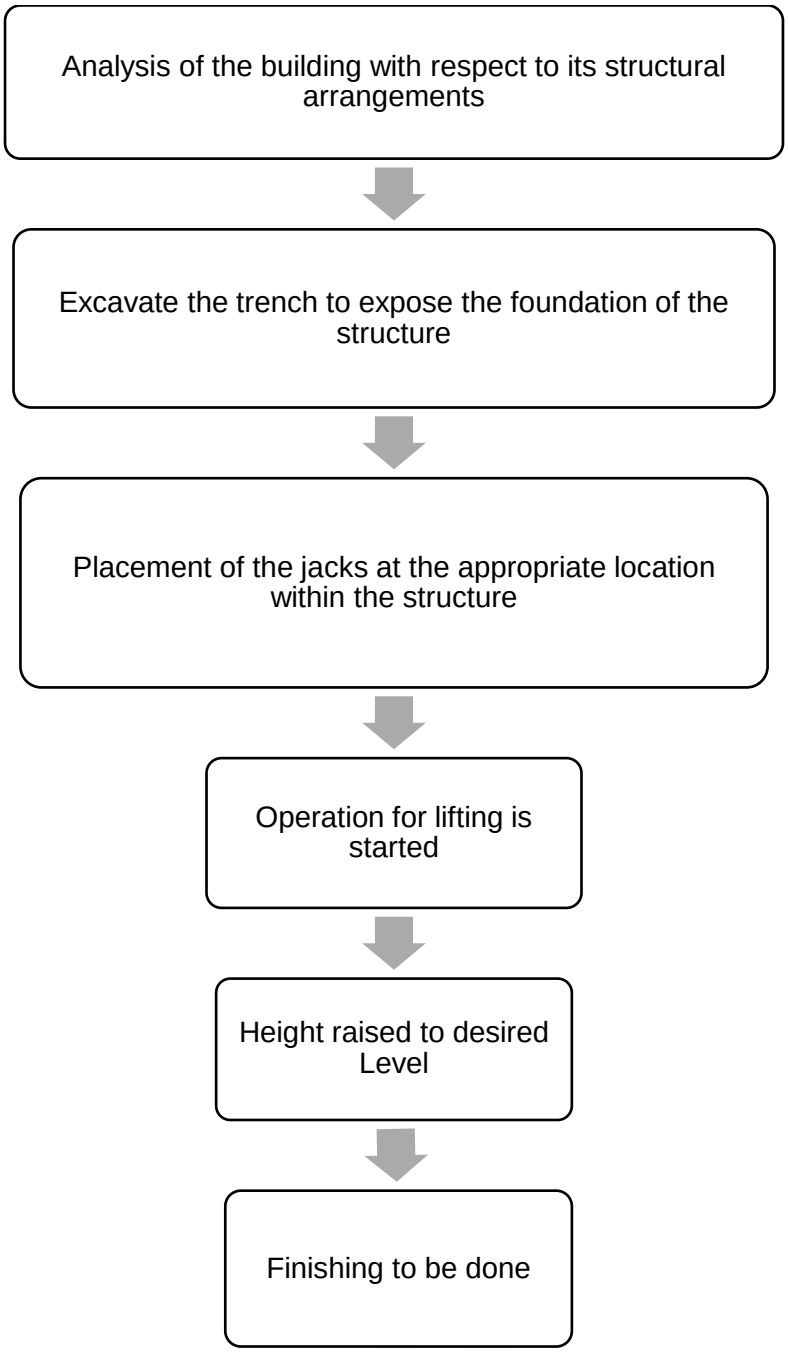
1) **Personnel Safety**:
   - All laborers and supervisors must wear safety gear (helmets, gloves, safety boots, safety hook & rope etc.).
   - Maintain a safe distance from the structure during lifting operations.

2) **Equipment Safety**
   - Conduct continuous inspections of jacks, channels, and supports during operations
   - Ensure backup mechanism is available in case of failure.

3) Site Safety
   - Establish a restricted area around the lifting site to prevent unauthorized access.

Annex-2

Flow Chart of Building Lifting Process



Annex-3

Measures Suggested by CSIR-CBRI, Roorkee

i. Detailed visual investigation of the structure has to be carried out which includes crack mapping if any, lintel details, plinth details and sub structure details including bearing capacity of soil prior to start the preliminary lifting process.

ii. Prior to initiate the preliminary process, Integration of building using external and internal bands made using weld mesh/other reinforcement with cement-sand mortar/micro concrete at ground, lintel and roof level has to be made to ensure the integrity of the structure during lifting process.

iii. Safety frames using steel sections to be used inside the building to safeguard the workers during lifting operation. Also it is suggested to ensure the safety helmet, safety hooks and ropes, and safety shoes for workers during the operation work.

iv. Channel section having width more than the wall or RCC beams has to be used in supporting the wall. All the channel section has to be integrated with proper welding around the channel sections (tension face and transverse face) properly. Inter connection of two different channel sections to be carried out using additional steel plates in all sides of the connections region to ensure proper stress transfer during lifting operation.

v. Load cell and LVDT at required locations with proper data acquisition systems have to be used in lifting process to maintain the uniform force transfer and vertical movement. This systematic method will ensure proper safety and also provide the stress transfer data to maintain the even stress distribution across the building to avoid any catastrophic.

vi. Each and every screw jack quality and its operation have to be checked properly prior to fixing at the required points. The interval between the screws jacks have to be decided based on the reaction force of the structure.

vii. Any suspended and unsupported sections in the buildings need to be supported properly prior to the lifting process.

viii. Continuous cracks mapping and understanding the same has to be ensured during lifting work to avoid disturbance in the force transfer. If crack growth continues, the lifting process should be stopped immediately and labourers to be evacuated at the earliest.

ix. The line of action between the new walls and existing walls has to be maintained properly to ensure proper load transfer.

x. Internal reinforcement for the masonry using non corrosive materials may be preferred to ensure proper integration of all walls and also to support even stress transfer.

xi. Proper safety measures including maintaining the load and position level during unloading/reloading process of primary and transverse supports has to be taken care to avoid loss of supports and unstable force transfer.

xii. The 25 mm gap size between the walls has to be reduced to standard mortar thickness. Instead of hammering, a fresh cast in situ concrete (using non-shrinkable concrete) beam can be preferred at the interface to ensure proper force transfer. The transverse supports to be removed after proper curing of intermediate level beams to ensure strength achievement. Also proper safety measures to be followed during transfer of forces to the newly constructed structure by removing the transverse supports.

These inferences and suggestions have been made based on the experimental study carried out in the CBRI premises using a single storey small masonry structure. This may not be valid for multi-storey or large scale structures.

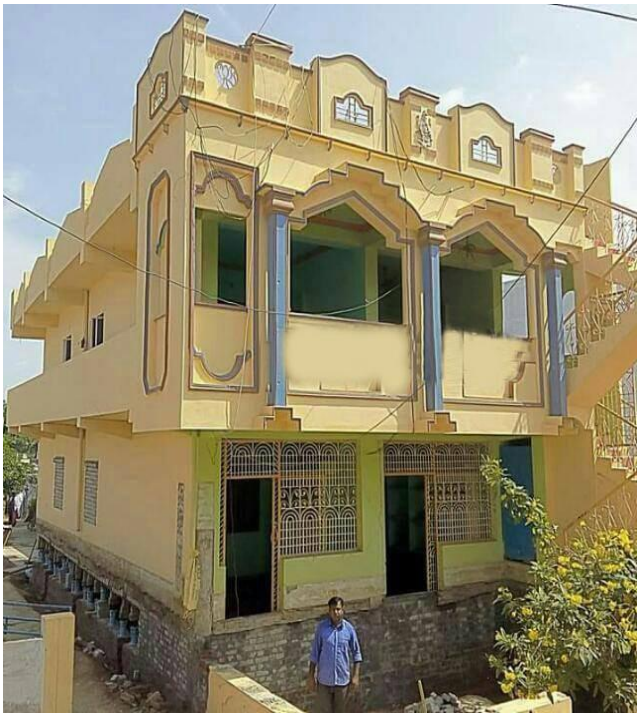
Annex-4

Photographs of the Projects

Madipakkam, Chennai

Madipakkam, Chennai

Madavakkam, Chennai



Parchoor, AP

Madipakkam, Chennai