Ajmera Realty & Infra India Limited

Regd. Office: "Citi Mall", 2nd Floor, Link Road, Andheri (West), Mumbai 400 053
Tel.: +91-22-6698 4000 • Email: investors@ajmera.com • Website: www.ajmera.com
CIN NO. L27104 MH 1985 PLC035659

Built on Trust

Date – July 2023

To,
Ministry of Environment, Forest and Climate Change,
Regional Office (WCZ), round floor, East Wing
New secretariate bldg. Civil Lines,
Nagpur 440001

Subject – Submission of June 2023 Six Monthly Compliance report for Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai ,Maharashtra by M/S Ajmera Realty & Infra India Ltd.

Reference – EC Letter No. SIA/MH/MIS/59140/2020
Dated - 26/02/2022.

Respected Sir,
With Respect to above mentioned subject and as per the Condition stated in Environmental Clearance letter we would like to Submit the June 2023 Six Monthly Compliance Report after receipt of Environmental Clearance for above mentioned site.

Hereby we are enclosing Datasheet along with annexure in format along with above mentioned Enclosures.

Ajmera Realty Infra India Ltd. Mumbai

Thanking You ,
Yours Sincerely
M/S Ajmera Realty & Infra India Ltd.

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CIN NO. L27104 MH 1985 PLC035659

Built on Trust

Date – July 2023

To,
State Level Environment Impact Assessment Authority Maharashtra,
Environmental Department
New Administration Building,
15th floor, Mantralaya, Mumbai
Maharashtra

Subject – Submission of June 2023 Six Monthly Compliance report for Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai ,Maharashtra by M/S Ajmera Realty & Infra India Ltd.

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CIN NO. L27104 MH 1985 PLC035659

Built on Trust

Date – July 2023

To
SRO Mumbai
Kalpataru Point 1st floor.
Opp. PVR Theatre, Sion
Mumbai -400022, Maharashtra

Subject – Submission of June 2023 Six Monthly Compliance report for Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai ,Maharashtra by M/S Ajmera Realty & Infra India Ltd.

Reference – EC Letter No. SIA/MH/MIS/59140/2020
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Ajmera Realty Infra India Ltd. Mumbai

Thanking You ,
Yours Sincerely
M/S Ajmera Realty & Infra India Ltd.

SIX MONTHLY COMPLIANCE REPORT

(October 2022 to March 2023)

ENVIRONMENTAL CLEARANCE: - SIA/MH/MIS/59140/2020

Dated - 26/02/2022.

PROJECT: 8(b) Townships and Area Development projects.

LOCATION:- CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai ,Maharashtra

PROPONENT: M/s. Ajmera Realty & Infra India Ltd

Site Photograph-Google Image

Monitoring the Implementation of Environmental Safeguards

Ministry of Environment & Forests

Regional Office (W), Nagpur

Data Sheet- June 2023

Project Details

Sr. No.	Particulars	Details
1.	Project type : River valley/ mining/ Industry/Thermal /Nuclear/other (specify)	8(b) Townships and Area Development projects.
2.	Name of the Project	Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai ,Maharashtra by M/S Ajmera Realty & Infra India Ltd.
3.	Clearance letter(s)/OM and Date	EC Letter No. SIA/MH/MIS/59140/2020 Dated - 26/02/2022
4.	Location	CTS no. 1/A1, 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai ,Maharashtra
a.	District	Mumbai
b.	State	Maharashtra
c.	Latitude / Longitude	Latitude: 19°13'9.66"N Longitude: 72°52'45.58"E
5.	**Address of correspondence**	
	a) Address of concerned Project Chief Executive (with pin code & telephone / telex / fax numbers)	CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Vadala (E) Mumbai Maharashtra Mr. Sunil Shah No. - 9987632208
	b) Address of Executive Project Engineer /Manager (with pin code /fax numbers)	Same as above
6.	**Salient features**	
	a) of the Project	Building Configuration - Building No. 1: B+S+G+8P+30 Building No. 2: B+S+G+5P+34 Building No. 3:3B+ S/G+ 8P+Edeck+35 Floors Building No. 6: (Wing A,B,C,D) : S+22 & S+1
	b) of the Environmental Management Plan	Details of Environmental Management Plan is attached as Annexure I
7.	Break-up of the project area	

	a) submergence area : forest & non forest	Not applicable
	b) Others	Total Plot area: 111732.32 sqm Total Construction Area: 3,02,906 sqm FSI area: 1,41,724.75 sqm Non-FSI area: 1,61,182.15 sqm
8.	Break-up of the project affected population with enumeration of those losing houses/dwelling unit only agricultural land only, both dwelling units & agricultural land & landless laborers	-
	a) SC, ST / Adivasis	Not applicable
	b) Others (Please indicate whether these figures are based on any scientific and systematic survey carried out or only provisional figures, if a survey carried out gives details and years of survey)	Not applicable
9.	Financial details:	
	a) Project cost as originally planned and subsequent revised estimates and the year of price reference	Rs.54 Cr was the overall project cost used and approx.38 **Cr.** cost was utilised till date.
	b)Allocation made for environmental management plans with item wise and year wise break-up	Capital: -233 Lakhs OM – 38 Lakhs
	c)Benefit cost ratio/Internal rated of Return and the year of assessment	-
	d) Whether (c) includes the cost of environmental management as shown in the above	-
	e) Actual expenditure incurred on the environmental management plans so far	185.34 lakhs. of total EMP cost has been used till date
10.	Forest land requirement	No Forest Land Required NA
	a) The status of approval for diversion of forest land for non-forestry use	-
	b) The status of clearing felling	--
	c) The status of compensatory	-
	d) afforestation, if any	-

	e) Comments on the viability & sustainability of compensatory afforestation programme in the light of actual field experience so far	-
11.	The status of clear felling in non-forest area (such as submergence area of reservoir, approach rods), if any with quantitative information	-
12.	Status of construction	Annexure Attached Building No1 – Construction Completed. Building No 2 – Construction Completed. Building No 3 – Tower A: B2 Floor Slab Reinforcement and Slab Decking Wip. Tower B: B3 Floor Slab Blockwork and Plaster Work Is In Progress Building 6 – Wing A, B, C& D A&B – Piling Work In progress. C & D – Wing Constructed till S + 22 floors. Internal painting and paver Blocks work is in process.
	a) Date commencement (Actual and/or planned)	December 2020
	b) Date of completion (Actual and/or planned)	October 2023
13.	Reasons for the delay if the project is yet to start	Not applicable
14.	Dates of site visits	-
	a) The dates on which the project was monitored by the Regional office on previous occasions, if any	--
	b) Date of site visit for this monitoring report	--
15.	Details of correspondence with project authorities for obtaining action plans / information on status of compliance to safeguards other than the routine letters for logistic support for site visits. (The first monitoring report may contain the details of all	--

	the letters issued so far, but the later reports may cover only the letters issued subsequently)	

Photographs showing the construction status


2023/07/13 10:55


2023/07/13 10:51

	Conditions	**Reply / Compliance**
	PP to submit IOD/IOA/Concession Document/Plan Approval or any other form of documents as applicable clarifying its conformity with local planning rules and provisions thereunder as per the circular dated 30.01.2014 issued by the Environment Department, Govt. of Maharashtra.	Approval Layout / IOD will be submitted. Attached as Annexure
	2. PP to obtain following NOCs as per revised plan: a)Water Supply, b) Sewer Connection, c) Tree NOC, d) CFO NOC, e) Civil Aviation NOC	Noted. Required annexures Will be attached as Annexure.
	PP to submit certified six-monthly compliance report of earlier EC from Regional Office, MOEF&CC, Nagpur.	Six Monthly report Will be submitted time to time to Respective Authorities.
	PP to submit architect certificate of comparative statement mentioning components approved and components constructed as per earlier EC.	Architect Certificate Attached as Annexure 2
	PP to reduce the discharge of treated sewage to 35%. PP to submit NOC from concern authority for use of excess treated water in nearby Garden reservation/ Construction.	Noted and will be compiled.
	PP to submit a plan showing internal storm water drain up to final disposal point along with drawings sowing dimensions.	SWD – Layout – Attached as annexure.
	PP to submit basement ventilation plan with air cleaning system. PP to submit ECBC report study.	ECBC report will be attached as Annexure.
	PP to submit carbon footprint report. B. SEIAA Conditions-	Noted. Carbon Footprint Report will be attached as Annexure.
	PP to keep open space unpaved so as to ensure permeability of water. However, whenever paving is deemed necessary, PP to provide grass pavers of suitable types & strength to increase the water permeable area as well as to allow effective fire tender movement.	EC Identification No. - EC22B039MH133375 File No. - SIA/MH/MIS/59140/2020 Date of Issue EC - 26/02/2022
	PP to achieve at least 5% of total energy requirement from solar/other renewable sources.	Noted. Will be Compiled.

	PP Shall comply with Standard EC conditions mentioned in the Office Memorandum issued by MoEF&CC vide F.No.22-34/2018-IA.III dt.04.01.2019. 4. SEIAA after deliberation decided to grant EC for FSI 141724.75 m2, Non-FSI- 161182.15 m2, Total BUA- 302906.9 m2. (Plan approval- P-5219/2020/(1A/1 And Other)/M/W W/ANIK W/337/2/Amend dated 29.12.2021).	Noted.
	General Conditions: Construction Phase:-	
	The solid waste generated should be properly collected and segregated. Dry/inert solid waste should be disposed of to the approved sites for land filling after recovering recyclable material.	The waste generated during construction will be disposed with all necessary Safety measure and specific care will be taken so that it should not harm the vicinity.
	Disposal of muck, Construction spoils, including bituminous material during construction phase should not create any adverse effect on the neighboring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in the approved sites with the approval of competent authority	Noted.
	Any hazardous waste generated during construction phase should be disposed of as per applicable rules and norms with necessary approvals of the Maharashtra Pollution Control Board.	Noted.
	Adequate drinking water and sanitary facilities should be provided for construction workers at the site. Provision should be made for mobile toilets. The safe disposal of wastewater and solid wastes generated during the construction phase should be ensured.	Arrangements will be made on site for Construction workers also provision of mobile toilets will be made. The safe disposal of wastewater and solid wastes generated during construction phase will be taken care of.
	Arrangement shall be made that waste water and storm water do not get mixed.	Noted.
	Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other best practices.	Noted.
	The ground water level and its quality should	No Ground water will be used during construction/ Operation.

	be monitored regularly in consultation with Ground Water Authority.	
VIII.	Permission to draw ground water for construction of basement if any shall be obtained from the competent Authority prior to construction/operation of the project.	Noted.
	Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.	Noted.
	The Energy Conservation Building code shall be strictly adhered to.	Noted.
	All the topsoil excavated during construction activities should be stored for use in horticulture/landscape development within the project site.	The topsoil excavated during construction activities will be stored and used for use in horticulture / landscape development within the project site.
	Additional soil for levelling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved.	Noted.
	Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.	Soil and ground water monitoring reports will be Attached as Annexure.
	PP to strictly adhere to all the conditions mentioned in Maharashtra (Urban Areas) Protection and Preservation of Trees Act, 1975, as amended during the validity of Environment Clearance.	Noted.
	The diesel generator sets to be used during construction phase should be low Sulphur diesel type and should conform to Environments (Protection) Rules prescribed for air and noise emission standards.	Noted.
	PP to strictly adhere to all the conditions mentioned in Maharashtra (Urban Areas) Protection and Preservation of Trees Act, 1975 as amended during the validity of Environment Clearance,	Noted.
	Vehicles hired for transportation of Raw material shall strictly comply the emission	Noted.

	norms prescribed by Ministry of Road Transport & Highways Department. The vehicle shall be adequately covered to avoid spillage/leakages.	
	Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/MPCB.	Ambient Noise & Air Monitoring Reports will be attached as Annexure.
	Diesel power generating sets proposed as source of backup power for elevators and common area illumination during construction phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use low sulphur diesel is preferred. The location of the DG sets may be decided with in consultation with Maharashtra Pollution Control Board.	Noted.
	Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings by a separate environment cell /designated person.	Noted and will be compiled.
B)	Operation phase:-	
	The solid waste generated should be properly collected and segregated.	Noted and will be compiled.
	Wet waste should be treated by Organic Waste Converter and treated waste (manure) should be utilized in the existing premises for gardening. And, no wet garbage will be disposed outside the premises.	Organic Waste will be used on site to process the wet waste and processed manure will be used for Gardening. And no waste will be disposed outside the premises.
	Dry/inert solid waste should be disposed of to the approved sites for land filling after recovering recyclable material.	Solid waste will be disposed at approved landfilling sites only.
II	E-waste shall be disposed through Authorized vendor as per E-waste (Management and	E-waste will be handed over to Authorized Vendor to dispose.

	Handling) Rules, 2016.	
III	The installation of the Sewage Treatment Plant (STP) should be certified by an independent expert and a report in this regard should be submitted to the MPCB and Environment department before the project is commissioned for operation. Treated effluent emanating from STP shall be recycled/ reused to the maximum extent possible. Treatment of 100% grey water by decentralized treatment should be done. Necessary measures should be made to mitigate the odour problem from STP.	Noted.
	PP to give 100% treatment to sewage /Liquid waste and explore the possibility to recycle at least 50% of water, Local authority should ensure this	Noted.
	IV. Project proponent shall ensure completion of STP, MSW disposal facility, green belt development prior to occupation of the buildings. As agreed during the SELAA meeting, PP to explore possibility of utilizing excess treated water in the adjacent area for gardening before discharging it into sewer line No physical occupation or allotment will be given unless all above said environmental infrastructure is installed and made functional including water requirement.	Noted.
	V. The Occupancy Certificate shall be issued by the Local Planning Authority to the project only after ensuring sustained availability of drinking water, connectivity of sewer line to the project site and proper disposal of treated water as per environmental norms	Noted
	VI Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.	Noted.
VII	PP to provide adequate electric charging points for electric vehicles (EVs).	Noted
VIII	Green Belt Development shall be carried out considering CPCB guidelines including selection of plant species and in consultation	Green Belt Area proposed to be Developed is – 19889.24 Sq.m & It

	with the local DFO/Agriculture Dept.	will be carried out as per CPCB guidelines.
IX.	A separate environment management cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.	Noted.
X.	Separate funds shall be allocated for implementation of environmental protection measures/EMP along with item-wise breaks-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes.	Separate Funds are allocated for EMP. Capital Cost – 233 Lakhs & O&M:- 38 Lakhs.
XI	. The project management shall advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in the Marathi language of the local concerned within seven days of issue of this letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the Maharashtra Pollution Control Board and may also be seen at Website at http://parivesh.nic.in-	Noted. News Paper Advertisement will be attached as Annexure.
XII	Project management should submit half yearly compliance reports in respect of the stipulated prior environment clearance terms and conditions in hard & soft copies to the MPCB & this department, on 1st June & 1st December of each calendar year.	Noted.
XIII	A copy of the clearance letter shall be sent by proponent to the concerned Municipal Corporation and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	Noted.
XIV	The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same SPM, RSPM. SO2, NOx (ambient levels as well as	Noted

	stack emissions) or critical sector parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	
C)	General EC Conditions: -	
	I. PP has to strictly abide by the conditions stipulated by SEAC & SELAA.	No Construction was started on site before obtaining Environmental Clearance.
	IL. If applicable Consent for Establishment" shall be obtained from Maharashtra Pollution Control Board under Air and Water Act and a copy shall be submitted to the Environment department before start of any construction work at the site.	Noted. MPCB – Consent to Establish. UAN No. - 0000095280/CE-2102000430 Dated - 08-Feb-21
	III. Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the project proponent if it was found that construction of the project has been started without obtaining environmental clearance.	Noted.
	IV. The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.	Noted and will be compiled.
	V. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.	The Environmental Statement Form V for Each Financial Year will be submitted.
	VI. No further Expansion or modifications, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the SEIAA. In case of	Noted.

	deviations or alterations in the project proposal from those submitted to SEIAA for clearance, a fresh reference shall be made to the SEIAA as applicable to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.	

Annexure For Bhakti Park – Bldg. 6 Wing C & D

Sr.No	Annexure Name
1	EC letter
2	Consent to Establish
3	IOD / Approval Layout
4	Architect Certificate
5	Air Cleaning System
6	SWD layout & Completion Certificate
7	Drainage Layout & Completion Certificate
8	Carbon Foot Print Report.
9	ECBC Report
10	Monitoring Report

ENVIRONMENTAL CLEARANCE

PARIVESH

(Pro-Active and Responsive Facilitation by Interactive, and Virtuous Environmental Single-Window Hub)

Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment Authority(SEIAA), Maharashtra)

To,

The DGM Project
AJMERA REALTY & INFRA INDIA LTD
2nd Floor, Citi Mall, Link Road, Andheri west, Mumbai -400053

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the SEIAA vide proposal number SIA/MH/MIS/59140/2020 dated 16 Dec 2020. The particulars of the environmental clearance granted to the project are as below.

1.	**EC Identification No.**	**EC22B039MH133375**
2.	**File No.**	SIA/MH/MIS/59140/2020
3.	**Project Type**	Expansion
4.	**Category**	B1
5.	**Project/Activity including Schedule No.**	8(b) Townships and Area Development projects.
6.	**Name of Project**	Expansion and Modification of Residential Project- "Bhakti Park"
7.	**Name of Company/Organization**	AJMERA REALTY & INFRA INDIA LTD
8.	**Location of Project**	Maharashtra
9.	**TOR Date**	01 Jul 2020

The project details along with terms and conditions are appended herewith from page no 2 onwards.

Date: 26/02/2022

(e-signed)
Manisha Patankar Mhaiskar
Member Secretary
SEIAA - (Maharashtra)

Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH.Please quote identification number in all future correspondence.

This is a computer generated cover page.

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY

No. SIA/MH/MIS/59140/2020
Environment & Climate
Change Department
Room No. 217, 2nd Floor,
Mantralaya, Mumbai- 400032.

To
M/s Ajmera Realty & Infra India Limited,
CTS No. 1A/1,1A/2,1A/3,1A/6 of village Anik,
Chembur (M-ward), Wadala (E), Mumbai

Subject : Environmental Clearance for construction project proposed expansion & modification of residential project Bhakti Park at CTS No. 1A/1,1A/2,1A/3,1A/6 of village Anik, Chembur (M-ward), Wadala (E), Mumbai, Maharashtra by M/s Ajmera Realty & Infra India Limited.

Reference : Application no. SIA/MH/MIS/59140/2020

This has reference to your communication on the above mentioned subject. The proposal was considered by the SEAC-2 in its 158th meeting under screening category 8 (b) as per EIA Notification, 2006 and recommend to SEIAA. Proposal then considered in 236th (Day-4) meeting of State Level Environment Impact Assessment Authority (SEIAA).

2. Brief Information of the project submitted by you is as below:-

Sr. No.	Description	Details
1.	Plot Area (sq.m.)	1,11,732.32
2.	FSI Area (sq.m.)	1,41,016.31
3.	Non-FSI (sq.m.)	1,61,890.59
4.	Proposed built-up area (FSI + Non FSI) (sq.m.)	3,02,906.90
5.	Building Configuration	Constructed Building 1: B+S+G+8P+30 Constructed Building 2: B+S+G+5P+34 Proposed Building 3: 3B+S/G+8P+Edeck+35 floors Proposed Building 6 (Wing A, B, C, D): S + 22 and S + 1
6.	No. of Tenements & Shops	Residential Flats: 1210 no's
7.	Total Population	6210 nos.
8.	Total Water Requirements CMD	1001 KLD
9.	Sewage Generation CMD	784 KLD

<table>
<tr><td>10.</td><td>STP Capacity & Technology</td><td>940 KLD (Combined Capacity of 3 STP's)
Based on MBBR Technology</td></tr>
<tr><td>11.</td><td>STP Location</td><td>Flush to Ground</td></tr>
<tr><td>12.</td><td>Total Solid Waste Quantities</td><td>Biodegradable Waste: 1825 kg/day
Non-Biodegradable Waste: 1210 kg/day</td></tr>
<tr><td>13.</td><td>R.G. Area in sq.m.</td><td>Required RG: 19,883.05 Sq.m
Proposed RG: 19,889.24 Sq.m</td></tr>
<tr><td>14.</td><td>Power requirement</td><td>During Operation Phase:
Demand Load: 11.7 MW</td></tr>
<tr><td>15.</td><td>Energy Efficiency</td><td>
<table>
<tr><th colspan="5">Energy Saving Calculation</th></tr>
<tr><th>S.No.</th><th>Building Name</th><th>Solar power generation (kwp)</th><th>Annual Saving unit in Percentage %</th><th>Renewable Energy Saving unit in Percentage %</th></tr>
<tr><td>1</td><td>1A & 1B</td><td>28.35</td><td>16.8</td><td>5%</td></tr>
<tr><td>2</td><td>2A & 2B</td><td>32.97</td><td>15.6</td><td>5%</td></tr>
<tr><td>3</td><td>3A & 3B</td><td>31.5</td><td>16.1</td><td>5%</td></tr>
<tr><td>4</td><td>EWS</td><td>32.55</td><td>24.9</td><td>5%</td></tr>
<tr><td colspan="2">Total</td><td>125.37</td><td>18.4</td><td>5%</td></tr>
</table>
Energy Saving Measures
<table>
<tr><td>A</td><td>By using LED Light In Common Area</td></tr>
<tr><td>B</td><td>VFD For Lifts</td></tr>
<tr><td>C</td><td>Highly efficient pump for Plumbing and STP Pumps</td></tr>
<tr><td>D</td><td>External Lighting will be on Solar lighting system</td></tr>
<tr><td>E</td><td>In Residential area Using combination of T5 along with BEE rated 3 Star equipment's like Fan, AC, Gyser & other equipment. (Over all Savings)</td></tr>
</table>
</td></tr>
<tr><td>17.</td><td>D.G. set capacity</td><td>2 nos x 1000 kVA, 2x630 KVA and 2 nos x 380 kVA</td></tr>
<tr><td>18.</td><td>Parking 4W & 2W</td><td>Required Parking: 2130 Nos.
Proposed Parking: 2325 Nos.</td></tr>
<tr><td>19.</td><td>Rain Water harvesting scheme</td><td>Building 3: 140 cum (2-day storage)
Building 6: 65 cum (2-day storage)</td></tr>
<tr><td>20.</td><td>Project Cost in (Cr.)</td><td>54 Crores</td></tr>
<tr><td>21.</td><td>EMP Cost</td><td>Capital: 233 Lakhs
OM: 38 Lakhs</td></tr>
<tr><td>22.</td><td>CER Details with justification if any....</td><td>CER Cost- 0.54 Crores (Brownfield Project)</td></tr>
</table>

The comparative statement regarding project details sanctioned in earlier EC and present proposal is as follows:

S. No.	Components	As per EC dated 10th Nov 2020	Proposed Expansion & Modification
1.	Plot Area (sq.m.)	**1,11,732.32**	**1,11,732.32**
2.	FSI Area (sq.m.)	1,66,915.16	1,41,016.31
3.	Non-FSI (sq.m.)	1,65,151.84	1,61,890.59
4.	Proposed built-up area (FSI + Non FSI)(sq.m.)	3,32,067.0	3,02,906.90
5.	Building Configuration	Building 1: B+S+G+8P+30 Building 2: B+S+G+5P+34 Building 3: B +S+G+3P+16 Building 4: B +S+G+3P+16 Building 5: B +S+G+3P+16 Building 6: S/G+22	Constructed Building 1: B+S+G+8P+30 Constructed Building 2: B+S+G+5P+34 Proposed Building 3: 3B+S/G+8P+Edeck+35 floors Proposed Building 6 (Wing A, B, C, D): S + 22 and S + 1
6.	No. of Tenements & Shops	Residential Flats: 1264 no's	Residential Flats: 1210 no's
7.	Total Population	6302 No's	6210 No's
8.	Total Water Requirements CMD	1084 KLD	1001 KLD
9.	Sewage Generation CMD	952 KLD	784 KLD
10.	STP Capacity & Technology	1260 KLD	940 KLD (Combined Capacity of 3 STP's) Based on MBBR Technology
11.	Total Solid Waste Quantities	Biodegradable Waste: 2355 kg/day Non-Biodegradable Waste: 1569 kg/day	Biodegradable Waste: 1825 kg/day Non-Biodegradable Waste: 1210 kg/day
12.	R.G. Area in sq.m.	Required RG: 19,883.05 Sq.m Proposed RG: 19,889.24 Sq.m	Required RG: 19,883.05 Sq.m Proposed RG: 19,889.24 Sq.m
13.	Power requirement	During Operation Phase: Demand Load: 22.0 MW	During Operation Phase: Demand Load: 11.7 MW

14.	Energy Efficiency		

S.No.	Energy Saving Measures	Saving %
1	Energy Saving with usage of LED for common lighting	0.324 of total energy requirement
2	Energy saving with usage of LED for internal lighting	7.8% of total energy requirement
3	Solar Panels	0.123 % of total energy requirement
4	Energy saving with energy efficient motors and pumps and lifts	5% of total energy requirement
5	Energy saving with the efficient building material and design	5% of total energy requirement

Energy Saving Calculation

S. No.	Building Name	Solar power generation (kwp)	Annual Saving unit in Percentage %	Renewable Energy Saving unit in Percentage %
1	1A & 1B	28.35	16.8	5%
2	2A & 2B	32.97	15.6	5%
3	3A & 3B	31.5	16.1	5%
4	EWS	32.55	24.9	5%
Total		**125.37**	**18.4**	**5%**

Energy Saving Measures

A	By using LED Light In Common Area
B	VFD For Lifts
C	Highly efficient pump for Plumbing and STP Pumps
D	External Lighting will be on Solar lighting system
E	In Residential area Using combination of T5 along with BEE rated 3 Star equipment's like Fan, AC, Gyser & other equipment. (Over all Savings)

15.	D.G. set capacity	Total 5000 kVA for 5 buildings EWS - 500 kVA	2 nos. x 1000 kVA, 2x630 KVA and 2 nos. x 380 kVA
16.	Parking 4W & 2W	Proposed: 2503 No's (4W)	Proposed: 2325 Nos. (4W)
17.	Rainwater harvesting scheme	RWH tanks 5 nos. of 50 cum for 5 buildings 1 no. of 45 cum for EWS	Building3:140 um (2-day storage) Building 6:65 cum (2-day storage)
18.	EMP Cost	Capital: 261 Lakhs OM: 35 Lakhs	Capital: 233 Lakhs OM: 38 Lakhs

3. Proposal is an expansion of existing construction project. Project had received earlier EC vide letter No. SEAC2011/CR.26/TC-2, Dated 21/03/2013 for plot area of 1,11,732.32 Sq.Mtrs. , total built up area of 3,32,067.00 Sq.Mtrs.(FSI- 1,40,289.00 Sq.Mrs. & Non-FSI-1,91,778.00 Sq.Mtrs.). Proposal has been considered by SEIAA in its 236th (Day-4) meeting and decided to accord Environment Clearance to the said project under the provisions of Environment Impact Assessment Notification, 2006 subject to implantation of following terms and conditions-

Specific Conditions:

A. SEAC Conditions-

1. PP to submit IOD/IOA/Concession Document/Plan Approval or any other form of documents as applicable clarifying its conformity with local planning rules and provisions thereunder as per the circular dated 30.01.2014 issued by the Environment Department, Govt. of Maharashtra.
2. PP to obtain following NOCs as per revised plan:
   a)Water Supply, b) Sewer Connection, c) Tree NOC, d) CFO NOC, e) Civil Aviation NOC.
3. PP to submit certified six-monthly compliance report of earlier EC from Regional Office, MOEF&CC, Nagpur.
4. PP to submit architect certificate of comparative statement mentioning components approved and components constructed as per earlier EC.
5. PP to reduce the discharge of treated sewage to 35%. PP to submit NOC from concern authority for use of excess treated water in nearby Garden reservation/ Construction.
6. PP to submit a plan showing internal storm water drain up to final disposal point along with drawings showing dimensions.
7. PP to submit basement ventilation plan with air cleaning system. PP to submit ECBC report study.
8. PP to submit carbon foot print report.

B. SEIAA Conditions-

1. PP to keep open space unpaved so as to ensure permeability of water. However, whenever paving is deemed necessary, PP to provide grass pavers of suitable types & strength to increase the water permeable area as well as to allow effective fire tender movement.
2. PP to achieve at least 5% of total energy requirement from solar/other renewable sources.
3. PP Shall comply with Standard EC conditions mentioned in the Office Memorandum issued by MoEF& CC vide F.No.22-34/2018-IA.III dt.04.01.2019.
4. SEIAA after deliberation decided to grant EC for – FSI- 141724.75 m2, Non-FSI-161182.15 m2, Total BUA- 302906.9 m2. (Plan approval- P-5219/2020/(1A/1 And Other)/M/W Ward/ANIK W/337/2/Amend dated 29.12.2021).

General Conditions:

a) Construction Phase :-

I. The solid waste generated should be properly collected and segregated. Dry/inert solid waste should be disposed of to the approved sites for land filling after recovering recyclable material.

II. Disposal of muck, Construction spoils, including bituminous material during construction phase should not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in the approved sites with the approval of competent authority.

III. Any hazardous waste generated during construction phase should be disposed of as per applicable rules and norms with necessary approvals of the Maharashtra Pollution Control Board.

IV. Adequate drinking water and sanitary facilities should be provided for construction workers at the site. Provision should be made for mobile toilets. The safe disposal of wastewater and solid wastes generated during the construction phase should be ensured.

V. Arrangement shall be made that waste water and storm water do not get mixed.

VI. Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other best practices.

VII. The ground water level and its quality should be monitored regularly in consultation with Ground Water Authority.

VIII. Permission to draw ground water for construction of basement if any shall be obtained from the competent Authority prior to construction/operation of the project.

IX. Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure reducing devices or sensor based control.

X. The Energy Conservation Building code shall be strictly adhered to.

XI. All the topsoil excavated during construction activities should be stored for use in horticulture / landscape development within the project site.

XII. Additional soil for levelling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved.

XIII. Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.

XIV. PP to strictly adhere to all the conditions mentioned in Maharashtra (Urban Areas) Protection and Preservation of Trees Act, 1975 as amended during the validity of Environment Clearance.

XV. The diesel generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environments (Protection) Rules prescribed for air and noise emission standards.

XVI. PP to strictly adhere to all the conditions mentioned in Maharashtra (Urban Areas) Protection and Preservation of Trees Act, 1975 as amended during the validity of Environment Clearance.

XVII. Vehicles hired for transportation of Raw material shall strictly comply the emission norms prescribed by Ministry of Road Transport & Highways Department. The vehicle shall be adequately covered to avoid spillage/leakages.

XVIII. Ambient noise levels should conform to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the

stipulated standards by CPCB/MPCB.

XIX. Diesel power generating sets proposed as source of backup power for elevators and common area illumination during construction phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use low sulphur diesel is preferred. The location of the DG sets may be decided with in consultation with Maharashtra Pollution Control Board.

XX. Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings by a separate environment cell /designated person.

B) Operation phase:-

I. a) The solid waste generated should be properly collected and segregated. b) Wet waste should be treated by Organic Waste Converter and treated waste (manure) should be utilized in the existing premises for gardening. And, no wet garbage will be disposed outside the premises. c) Dry/inert solid waste should be disposed of to the approved sites for land filling after recovering recyclable material.

II. E-waste shall be disposed through Authorized vendor as per E-waste (Management and Handling) Rules, 2016.

III. a) The installation of the Sewage Treatment Plant (STP) should be certified by an independent expert and a report in this regard should be submitted to the MPCB and Environment department before the project is commissioned for operation. Treated effluent emanating from STP shall be recycled/ reused to the maximum extent possible. Treatment of 100% grey water by decentralized treatment should be done. Necessary measures should be made to mitigate the odour problem from STP. b) PP to give100 % treatment to sewage /Liquid waste and explore the possibility to recycle at least 50 % of water, Local authority should ensure this.

IV. Project proponent shall ensure completion of STP, MSW disposal facility, green belt development prior to occupation of the buildings. As agreed during the SEIAA meeting, PP to explore possibility of utilizing excess treated water in the adjacent area for gardening before discharging it into sewer line No physical occupation or allotment will be given unless all above said environmental infrastructure is installed and made functional including water requirement.

V. The Occupancy Certificate shall be issued by the Local Planning Authority to the project only after ensuring sustained availability of drinking water, connectivity of sewer line to the project site and proper disposal of treated water as per environmental norms.

VI. Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.

VII. PP to provide adequate electric charging points for electric vehicles (EVs).

VIII. Green Belt Development shall be carried out considering CPCB guidelines including selection of plant species and in consultation with the local DFO/ Agriculture Dept.

IX. A separate environment management cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.

X. Separate funds shall be allocated for implementation of environmental protection measures/EMP along with item-wise breaks-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes.

XI. The project management shall advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in the Marathi language of the local concerned within seven days of issue of this letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the Maharashtra Pollution Control Board and may also be seen at Website at http://parivesh.nic.in

XII. Project management should submit half yearly compliance reports in respect of the stipulated prior environment clearance terms and conditions in hard & soft copies to the MPCB & this department, on 1st June & 1st December of each calendar year.

XIII. A copy of the clearance letter shall be sent by proponent to the concerned Municipal Corporation and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.

XIV. The proponent shall upload the status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM. SO2, NOx (ambient levels as well as stack emissions) or critical sector parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

C) General EC Conditions:-

I. PP has to strictly abide by the conditions stipulated by SEAC& SEIAA.

II. If applicable Consent for Establishment" shall be obtained from Maharashtra Pollution Control Board under Air and Water Act and a copy shall be submitted to the Environment department before start of any construction work at the site.

III. Under the provisions of Environment (Protection) Act, 1986, legal action shall be initiated against the project proponent if it was found that construction of the project has been started without obtaining environmental clearance.

IV. The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB.

V. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.

VI. No further Expansion or modifications, other than mentioned in the EIA Notification, 2006 and its amendments, shall be carried out without prior approval of the SEIAA. In case of deviations or alterations in the project proposal from those submitted to SEIAA for clearance, a fresh reference shall be made to the SEIAA as applicable to

assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.

VII. This environmental clearance is issued subject to obtaining NOC from Forestry & Wild life angle including clearance from the standing committee of the National Board for Wild life as if applicable & this environment clearance does not necessarily implies that Forestry & Wild life clearance granted to the project which will be considered separately on merit.

4. The environmental clearance is being issued without prejudice to the action initiated under EP Act or any court case pending in the court of law and it does not mean that project proponent has not violated any environmental laws in the past and whatever decision under EP Act or of the Hon'ble court will be binding on the project proponent. Hence this clearance does not give immunity to the project proponent in the case filed against him, if any or action initiated under EP Act.

5. This Environment Clearance is issued purely from an environment point of view without prejudice to any court cases and all other applicable permissions/ NOCs shall be obtained before starting proposed work at site.

6. In case of submission of false document and non-compliance of stipulated conditions, Authority/ Environment Department will revoke or suspend the Environment clearance without any intimation and initiate appropriate legal action under Environmental Protection Act, 1986.

7. Validity of Environment Clearance: The environmental clearance accorded shall be valid as per EIA Notification, 2006, amended from time to time.

8. The above stipulations would be enforced among others under the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and rules there under, Hazardous Wastes (Management and Handling) Rules, 1989 and its amendments, the public Liability Insurance Act, 1991 and its amendments.

9. Any appeal against this Environment clearance shall lie with the National Green Tribunal (Western Zone Bench, Pune), New Administrative Building, 1st Floor, D-Wing, Opposite Council Hall, Pune, if preferred, within 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

Manisha Patankar-Mhaiskar
(Member Secretary, SEIAA) 18/2/2022

Copy to:

1. Chairman, SEIAA, Mumbai.
2. Secretary, MoEF & CC, IA- Division MOEF & CC
3. Member Secretary, Maharashtra Pollution Control Board, Mumbai.
4. Regional Office MoEF & CC, Nagpur
5. District Collector, Mumbai City.
6. Commissioner, Municipal Corporation of Greater Mumbai
7. Regional Officer, Maharashtra Pollution Control Board, Mumbai.

Signature Not Verified
Digitally signed by Manisha Patankar Mhaiskar
Member Secretary
Date: 2/26/2022 1:21:34 PM

Annexure-III

MAHARASHTRA POLLUTION CONTROL BOARD

Phone : 4010437/4020781 /4037124/4035273
Fax : 24044532/4024068 /4023516
Email : enquiry@mpcb.gov.in
Visit At : http://mpcb.gov.in

Kalpataru Point, 3rd & 4th floor, Sion- Matunga Scheme Road No. 8, Opp. Cine Planet Cinema, Near Sion Circle, Sion (E), Mumbai - 400 022

Consent order No: Format1.0/BO/CAC-cell/ EIC-MU-5567 -14/E/CAC-6366
Date-07/7/2014

To,
Mr. Jayat Shah,
M/s. Anik Development Corporation
A division of Ajmera realty & Infra India ltd.,
"Citi Mall', 2nd Floor, Link road,
Andheri(W), Mumbai-53.

Subject: Consent to Establish for building construction project in ORANGE category.
Ref : 1. Minutes of 5th CAC meeting of 2014-15 held on 29 .5 .2014.

Your application CE1402000035
Dated: 15.11.2013
For: Consent to Establish for building construction project
under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 & under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981 and Authorization under Rule 5 of the Hazardous Wastes (M, H & T M) Rules 2008 is considered and the consent is hereby granted subject to the following terms and conditions and as detailed in the schedule I, II ,III & IV annexed to this order:

1. The consent to establish is granted for a period up to commissioning of the project or 5 years whichever is earlier.

2. The proposed capital investment of the project is Rs. 450 Crs. (As per CA certificate submitted by industry)

3. The Consent to Establish is valid for construction of proposed development of Residential Project of M/s. Anik Development Corporation, at CTS no. 1A/1,1A/2,1A/3, 1A/6 of vill Anik, Chembur (M-Ward), Wadala(E), Mumbai on total plot area of 1,11,732.32 sq.mtrs, and total construction built up area(FSI+NonFSI) 3,32,067 sq. mtrs. as per construction commencement certificate issued by local body.

4. Conditions under Water (P&CP), 1974 Act for discharge of effluent:

Sr. no.	Description	Permitted quantity of discharge (CMD)	Standards to be achieved	Disposal
1.	Trade effluent	NIL	NA	NA
2.	Domestic effluent	887	As per Schedule – I	Recycle & excess discharge into municipal sewer

5. Conditions under Air (P& CP) Act, 1981 for air emissions:

Sr. no.	Description of stack / source	Number of Stack	Standards to be achieved
1.	DG set (5 x 1000 KVA)	5 each	As per Schedule -II

6. **Conditions under Municipal Solid Waste (Management and Handling) Rule,2000:**

Sr. no.	Type Of Waste	Quantity & UoM	Treatment	Disposal
1	Wet garbage	1.71 T/Day	Organic Waste Convertor	Use as manure
2	Dry garbage	2.57 T/Day	Segregate and Handed over MCGM	--
3	STP Sludge	0.2 T/Day		Use as manure

7. **Conditions under Hazardous Waste (MH & TM) Rules, 2008 for treatment and disposal of hazardous waste:**

Sr. No.	Type Of Waste	Category	Quantity	UOM	Treatment	Disposal
1.	There shall be no generation of Hz waste					

8. **The Board reserves the right to review, amend, suspend, revoke etc. this consent and the same shall be binding on the industry.**
9. **This consent should not be construed as exemption from obtaining necessary NOC/permission from any other Government authorities.**
10. **PP shall submit the affidavit by 17.7.2014 in the prescribed format regarding the compliance of conditions of EC/ CRZ clearance and C to E.**
11. **PP shall submit Board Resolution from company Board, towards starting of construction work without obtaining consent to establish from the MPC Board thus violated the provisions of Environmental Laws and in future, they will not do such violations and BG of Rs. 2 lakh by 17.7.2014 towards submission of Board resolution by 1.8.2014.**
12. **The applicant shall comply with the conditions stipulated in Environmental Clearance granted by GoM vide no. SEAC-2011/CR.26/TC.2 dated 21.3.2013 and CRZ clearance granted by MCZMA, GoM vide no. CRZ 2012/CR18/TC-2 dated 26.12.2012.**

For and on behalf of the
Maharashtra Pollution Control Board

(Rajeev Kumar Mital, IAS)
Member Secretary

Received Consent fee of –

Sr. No.	Amount(Rs.)	DD. No.	Date	Drawn On
1.	450100/-	053852	14.6.2011	Kotak Mahindra Bank Ltd.
2.	1509900	053853	14.6.2011	Kotak Mahindra Bank Ltd.
3.	1960000	010388	23.11.2011	Kotak Mahindra Bank Ltd.

Balance fees of Rs. 3019900/- (3920000-900100) with the Board shall be considered during next application for consent in future.

Copy to:

1. **Regional Officer -Mumbai and Sub-Regional Officer-Mumbai-I MPCB, Mumbai. They are directed to ensure the compliance of the consent conditions.**
2. **Chief Accounts Officer, MPCB, Mumbai.**
3. **CC/CAC desk- for record & website updation purposes.**

Schedule-I

Terms & conditions for compliance of Water Pollution Control:

1) A] As per your application, you have proposed to install extended aeration based Sewage Treatment Plant (STP) with the total design capacity of 890 CMD.

   B] The Applicant shall operate the effluent treatment plant (STP) to treat the sewage so as to achieve the following standards prescribed by the Board or under EP Act, 1986 and Rules made there under from time to time, whichever is stringent.

Sr No.	Parameters	Standards prescribed by Board
		Limiting Concentration in mg/l, except for pH
01	BOD (3 days 27oC)	30
02	Suspended Solids	50
03	COD	100
04	Residual Chlorine	1ppm

   C) The treated effluent shall be 60% recycled for secondary purposes such as toilet flushing, air conditioning, firefighting, gardening etc. and remaining shall be discharged to municipal sewer.

   D] Project proponent shall operate STP for five years from the date of obtaining occupation certificate.

2) The Board reserves its rights to review plans, specifications or other data relating to plant setup for the treatment of waterworks for the purification thereof & the system for the disposal of sewage or trade effluent or in connection with the grant of any consent conditions. The Applicant shall obtain prior consent of the Board to take steps to establish the unit or establish any treatment and disposal system or and extension or addition thereto.

3) The industry shall ensure replacement of pollution control system or its parts after expiry of its expected life as defined by manufacturer so as to ensure the compliance of standards and safety of the operation thereof.

4) In case, the water consumption of the project is not covered under the water consumption of local body, in that situation, the project proponent shall submit the CESS Returns in the prescribed format given under the provision of Water (Prevention & Control of Pollution) Cess Act, 1977 and Rules made thereunder for various category of water consumption.

   In case the water consumption is duly assessed under the quantity of water consumption of local body, the project proponent shall submit certificate to that effect from the concern local body with the request not to assess CESS on their water consumption, being already assessed on the water consumption of local body.

Sr. no.	Purpose for water consumed	Water consumption quantity (CMD)
1.	Industrial Cooling, spraying in mine pits or boiler feed	00
2.	Domestic purpose	1269
3.	Processing whereby water gets polluted & pollutants are easily biodegradable	00
4.	Processing whereby water gets polluted & pollutants are not easily biodegradable and are toxic	00

Schedule-II

Terms & conditions for compliance of Air Pollution Control:

1. As per your application, you have proposed to install the Air pollution control (APC)system and also proposed to erect following stack (s) and to observe the following fuel pattern-

Sr. No.	Stack Attached To	APC System	Height in Mtrs.	Type of Fuel	Quantity & UoM	S %	SO_2 Kg/Day
01.	D.G.Set 5x 1000 KVA	Acoustic Enclosure	6.3 * each	HSD		1.0	

* Above roof of the building in which it is installed.

2. The applicant shall operate and maintain above mentioned air pollution control system, so as to achieve the level of pollutants to the following standards:

Particulate matter	Not to exceed	150 mg/Nm^3.

3. The Applicant shall obtain necessary prior permission for providing additional control equipment with necessary specifications and operation thereof or alteration or replacemenalteration well before its life come to an end or erection of new pollution control equipment.
4. The Board reserves its rights to vary all or any of the condition in the consent, if due to any technological improvement or otherwise such variation (including the change of any control equipment, other in whole or in part is necessary).

Schedule-III
Details of Bank Guarantees

Sr. No.	Consent (C to E/O/R)	Amt of BG Imposed	Submission Period	Purpose of BG	Compliance Period	Validity Date
1	Consent to Establish	Rs. 10 lakh	15 days from the date of issue of consent	Towards compliance of consent conditions and EC conditons	Upto Commissioning of the unit	Five years
2	Consent to Establish	Rs. 2 lakh	15 days from date of issue of consent	Towards submission of Board Resolution by 30.6.2014	One month from date of issue of consent	Upto submission of Board Resolution

Schedule-IV

Conditions during construction phase

a	During construction phase, applicant shall provide temporary sewage disposal and MSW facility for staff and worker quarters.
b	During construction phase, the ambient air and noise quality should be closely monitored to achieve Ambient Air Quality Standards and Noise by the project proponent through MoEF approved laboratory.
c	Noise generating activity shall be carried out during day time only.

General Conditions:

1) The applicant shall provide facility for collection of environmental samples and samples of trade and sewage effluents, air emissions and hazardous waste to the Board staff at the terminal or designated points and shall pay to the Board for the services rendered in this behalf.
2) Industry should monitor effluent quality, stack emissions and ambient air quality monthly/quarterly.
3) The applicant shall provide ports in the chimney/(s) and facilities such as ladder, platform etc. for monitoring the air emissions and the same shall be open for inspection to/and for use of the Board's Staff. The chimney(s) vents attached to various sources of emission shall be designated by numbers such as S-1, S-2, etc. and these shall be painted/ displayed to facilitate identification.
4) Whenever due to any accident or other unforeseen act or even, such emissions occur or is apprehended to occur in excess of standards laid down, such information shall be forthwith Reported to Board, concerned Police Station, office of Directorate of Health Services, Department of Explosives, Inspectorate of Factories and Local Body. In case of failure of pollution control equipments, the production process connected to it shall be stopped.
5) The applicant shall provide an alternate electric power source sufficient to operate all pollution control facilities installed to maintain compliance with the terms and conditions of the consent. In the absence, the applicant shall stop, reduce or otherwise, control production to abide by terms and conditions of this consent.
6) The firm shall submit to this office, the 30th day of September every year , the Environmental Statement Report for the financial year ending 31st March in the prescribed Form-V as per the provisions of rule 14 of the Environment (Protection) (Second Amendment) Rules, 1992.
7) The industry shall comply with the Hazardous Waste (M,H & TM) Rules, 2008 and submit the Annual Returns as per Rule 5(6) & 22(2) of Hazarsous Waste (M,H & TM) Rules, 2008 for the preceding year April to March in Form-IV by 30th June of every year.
8) An inspection book shall be opened and made available to the Board's officers during their visit to the applicant.
9) **The applicant shall obtain Consent to Operate from Maharashtra Pollution Control Board before actual commencement of the Unit/ Activity.**
10) Industry shall strictly comply with the Water (P&CP) Act, 1974, Air (P&CP) Act,1981 and Environmental Protection Act,1986 and industry specific standard under EP Rules 1986 which are available on MPCB website(www.mpcb.gov.in).
11) The industry shall constitute an Environmental cell with qualified staff/personnel/agency to see the day to day compliance of consent condition towards Environment Protection.
12) The applicant shall install a separate meter showing the consumption of energy for operation of domestic and industrial effluent treatment plants and air pollution

control system. A register showing consumption of chemicals used for treatment shall be maintained.

13) Conditions for D.G. Set
   a) Noise from the D.G. Set should be controlled by providing an acoustic enclosure or by treating the room acoustically.
   b) Industry should provide acoustic enclosure for control of noise. The acoustic enclosure/ acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on higher side. A suitable exhaust muffler with insertion loss of 25 dB (A) shall also be provided. The measurement of insertion loss will be done at different points at 0.5 meters from acoustic enclosure/room and then average.
   c) Industry should make efforts to bring down noise level due to DG set, outside industrial premises, within ambient noise requirements by proper sitting and control measures.
   d) Installation of DG Set must be strictly in compliance with recommendations of DG Set manufacturer.
   e) A proper routine and preventive maintenance procedure for DG set should be set and followed in consultation with the DG manufacturer which would help to prevent noise levels of DG set from deteriorating with use
   f) D.G. Set shall be operated only in case of power failure.
   g) The applicant should not cause any nuisance in the surrounding area due to operation of D.G. Set.
   h) The applicant shall comply with the notification of MoEF dated 17.05.2002 regarding noise limit for generator sets run with diesel
14) The industry should not cause any nuisance in surrounding area.
15) The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standard in respect of noise to less than 75 dB (A) during day time and 70 dB (A) during night time. Day time is reckoned in between 6 a.m. and 10 p.m. and night time is reckoned between 10 p.m. and 6 a.m.
16) The applicant shall maintain good housekeeping.
17) The applicant shall bring minimum 33% of the available open land under green coverage/ plantation. The applicant shall submit a statement on available open plot area, number of trees surviving as on 31st March of the year and number of trees planted by September end, with the Environment Statement.
18) The non-hazardous solid waste arising in the factory premises, sweepings, etc. be disposed of scientifically so as not to cause any nuisance / pollution. The applicant shall take necessary permissions from civic authorities for disposal of solid waste.
19) The applicant shall not change or alter the quantity, quality, the rate of discharge, temperature or the mode of the effluent/emissions or hazardous wastes or control equipments provided for without previous written permission of the Board. The industry will not carry out any activity, for which this consent has not been granted/without prior consent of the Board.
20) The industry shall ensure that fugitive emissions from the activity are controlled so as to maintain clean and safe environment in and around the factory premises.
21) The industry shall submit official e-mail address and any change will be duly informed to the MPCB.
22) The industry shall achieve the National Ambient Air Quality standards prescribed vide Government of India, Notification dt. 16.11.2009 as amended.

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MAHARASHTRA POLLUTION CONTROL BOARD

Tel: 24010706/24010437
Fax: 24023516
Website: http://mpcb.gov.in
Email: cac-cell@mpcb.gov.in

Kalpataru Point, 2nd and 4th floor, Opp. Cine Planet Cinema, Near Sion Circle, Sion (E), Mumbai-400022

No:- Format1.0/CAC-CELL/UAN No.0000095280/CE - 2102000430 **Date:** 08/02/2021

To,
Anik Development Corporation (A division of Ajmera Realty & Infra India Ltd) "Bhakti Park" At. CTS No. 1A/1, 1A/2, 1A/3, 1A/6 of Village Anik, Chembur (M-Ward), Wadala (E), Mumbai.

Sub: Revalidation of Consent to Establish and Expansion in existing Housing project under L.S.I Red Category

Ref:
1. Environment Clearance accorded by Env. Dept GoM vide letter SEAC.2011/CR-26/TC-2 dtd. 21/03/2013.
2. Consent to Establish accorded by the Board vide letter Format 1.0/BO/CAC-Cell/EIC-MU-5567-14/E/CAC-6366 dtd. 07/07/2014.
3. Environment Clearance for expansion and Modification in existing project accorded by Env. Dept, GoM vide letter No. SEIAA-EC-0000002343 dtd. 10/11/2020.
4. Minutes of Consent Appriasal Committee meeting held on 30/12/2020.

Your application NO. MPCB-CONSENT-0000095280

For: Grant of Revalidation of Consent to Establish and Expansion under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 & under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981 and Authorization / Renewal of Authorization under Rule 6 of the Hazardous & Other Wastes (Management & Transboundry Movement) Rules 2016 is considered and the consent is hereby granted subject to the following terms and conditions and as detailed in the schedule I,II,III & IV annexed to this order:

1. **The Revalidation of Consent to Establish is granted for a period upto commissioning of project or up to 5 year whichever is earlier.**
2. **The capital investment of the project is Rs.891.06 Crs. (As per undertaking submitted by pp).**
3. **The Revalidation of Consent to Establish and Expansion is valid for Housing project named as Anik Development Corporation (A division of Ajmera Realty & Infra India Ltd) "Bhakti Park" At. CTS No. 1A/1, 1A/2, 1A/3, 1A/6 of Village Anik, Chembur (M-Ward), Wadala (E), Mumbai. on Total Plot Area of 1,11,732.32 SqMtrs for Construction BUA of 3,12,440.30 SqMtrs as per EC granted dated 10/11/2020 including utilities and services**

Sr.No	Permission Obtained	Plot Area (SqMtr)	BUA (SqMtr)
1	EC- dtd. 21/03/2013	111732.32	332067.00
2	C to E- dtd. 07/07/2014	111732.32	332067.00
3	EC for Expansion- dtd. 10/11/2020	111732.32	312440.30

4. **Conditions under Water (P&CP), 1974 Act for discharge of effluent:**

Sr No	Description	Permitted (in CMD)	Standards to	Disposal
1.	Trade effluent	Nil	Nil	Nil

Sr No	Description	Permitted	Standards to	Disposal
2.	Domestic effluent	887	As per Schedule - I	The treated effluent shall be 60% recycled for secondary purposes and remaining shall be connected to the sewerage system provided by local body

5. **Conditions under Air (P& CP) Act, 1981 for air emissions:**

Stack No.	Description of stack / source	Number of Stack	Standards to be achieved
S-1 to S-5	DG Sets 1000 kVA x 5	05	As per Schedule -II

6. **Conditions under Solid Waste Rules, 2016:**

Sr No	Type Of Waste	Quantity & UoM	Treatment	Disposal
1	Bio-degradable Waste	2355 Kg/Day	OWC followed by composting facility	Used as Manure.
2	Non-biodegradable Waste	1569 Kg/Day	Segregation	By Sale to Auth. Vendor.
3	STP Sludge	97 Kg/Day	SDB	Used as Manure.

7. **Conditions under Hazardous & Other Wastes (M & T M) Rules 2016 for treatment and disposal of hazardous waste:**

Sr No	Category No.	Quantity	UoM	Treatment	Disposal
1	5.1 Used /spent oil	100	Ltr/A	Stored in drum	By Sale to Auth. reprocesser

8 This Board reserves the right to review, amend, suspend, revoke etc. this consent and the same shall be binding on the industry.

9 This consent should not be construed as exemption from obtaining necessary NOC/permission from any other Government agencies.

10 PP shall provide STP to achieve treated domestic effluent standard for the parameter BOD-10 mg/lit.

11 The treated effluent shall be 60% recycled for secondary purposes such as toilet flushing, air-conditioning, cooling tower make up, firefighting etc. and remaining shall be utilized on land for gardening and/ or connected to local body sewer line with water metering system.

12 PP shall install organic waste digester along with composting facility/bio-digester (biogas) for the treatment of biodegradable garbage.

13 PP shall submit BG of Rs. 25 Lakh towards compliance of EC and Consent to Establish conditions.

For and on behalf of the
Maharashtra Pollution Control Board.

(Ashok Shingare IAS),
Member Secretary

Received Consent fee of -

Sr.No	Amount(Rs.)	Transaction/DR.No.	Date	Transaction Type
1	1638120.00	MPCB-DR-2100	08/10/2020	RTGS

Copy to:

1. Regional Officer, MPCB, Mumbai and Sub-Regional Officer, MPCB, Mumbai II
   - They are directed to ensure the compliance of the consent conditions.
2. Chief Accounts Officer, MPCB,Sion, Mumbai

SCHEDULE-I

Terms & conditions for compliance of Water Pollution Control:

1) A] As per your application, you have proposed to provide MBBR based Sewage Treatment Plants (STPs) of combined capacity **1260 CMD for treatment of domestic effluent of 887 CMD.**

B] The Applicant shall operate the sewage treatment plant (STP) to treat the sewage so as to achieve the following standards prescribed by the Board or under EP Act, 1986 and Rules made there under from time to time, whichever is stringent.

Sr. No.	Parameters	Standards prescribed by Board
		Limiting Concentration in mg/l, except for pH
1.	pH	5.5-9.0
2.	Bio-Checimal Oxygen Demand (BOD)	10
3.	Chemical Oxygen Demand (COD)	50
4.	Nitrogen Total	10
5.	Phosphorus-Total(For Discharge into Ponds,Lakes)	1.0
6.	Fecal Coliform (FC) (Most Probable)	Desirable-100 Permissible-230

C] The treated effluent shall be 60% recycled for secondary purposes such as toilet flushing, air-conditioning, cooling tower make up, firefighting etc. and remaining shall be utilized on land for gardening and/ or connected to local body sewer line with water metering system.

2) The Board reserves its rights to review plans, specifications or other data relating to plant setup for the treatment of waterworks for the purification thereof & the system for the disposal of sewage or trade effluent or in connection with the grant of any consent conditions. The Applicant shall obtain prior consent of the Board to take steps to establish the unit or establish any treatment and disposal system or and extension or addition thereto.

3) The industry shall ensure replacement of pollution control system or its parts after expiry of its expected life as defined by manufacturer so as to ensure the compliance of standards and safety of the operation thereof.

4) **The Applicant shall comply with the provisions of the Water (Prevention & Control of Pollution) Act,1974 and as amended, and other provisions as contained in the said act.**

Sr. No.	Purpose for water consumed	Water consumption quantity (CMD)
1.	Industrial Cooling, spraying in mine pits or boiler feed	0.00
2.	Domestic purpose	1269.00
3.	Processing whereby water gets polluted & pollutants are easily biodegradable	0.00
4.	Processing whereby water gets polluted & pollutants are not easily biodegradable and are toxic	0.00

5) The Applicant shall provide Specific Water Pollution control system as per the conditions of EP Act, 1986 and rule made there under from time to time.

SCHEDULE-II

Terms & conditions for compliance of Air Pollution Control:

1) **As per your application, you have proposed to provide the Air pollution control (APC)system and also proposed to erect following stack (s) and to observe the following fuel pattern-**

Stack No.	Stack Attached To	APC System	Height in Mtrs.	Type of Fuel	Quantity & UoM
S-1 to S-5	DG Sets 1000 kVA x 5	Acoustic Enclosure, selective catalytic reduction/ Air filter	6.32	HSD	1157 Ltr/Hr

2) The applicant shall operate and maintain above mentioned air pollution control system, so as to achieve the level of pollutants to the following standards.

Total Particular matter	Not to exceed	150 mg/Nm3

3) The Applicant shall obtain necessary prior permission for providing additional control equipment with necessary specifications and operation thereof or alteration or replacemenalteration well before its life come to an end or erection of new pollution control equipment.

4) The Board reserves its rights to vary all or any of the condition in the consent, if due to any technological improvement or otherwise such variation (including the change of any control equipment, other in whole or in part is necessary).

5) **Conditions for utilities like Kitchen, Eating Places, Canteens:-**

a) The kitchen shall be provided with exhaust system chimney with oil catcher connected to chimney through ducting.

b) The toilet shall be provided with exhaust system connected to chimney through ducting.

c) The air conditioner shall be vibration proof and the noise shall not exceed 68 dB(A).

d) The exhaust hot air from A.C. shall be attached to Chimney at least 5 mtrs. higher than the nearest tallest building through ducting and shall discharge into open air in such a way that no nuisance is caused to neighbors.

SCHEDULE-III
Details of Bank Guarantees:

Sr. No.	Consent(C2E/C2O/C2R)	Amt of BG Imposed	Submission Period	Purpose of BG	Compliance Period	Validity Date
1	Revalidation of Consent to Establish and expansion	25 Lakh	15 days	Towards Compliance of EC & C to E conditions.	Commissioning of the project or 5 years whichever is earlier.	Commissioning of the project or 5 years whichever is earlier.

** The above Bank Guarantee(s) shall be submitted by the applicant in favour of Regional Officer at the respective Regional Office within 15 days of the date of issue of Consent.
 # Existing BG obtained for above purpose if any may be extended for period of validity as above.

BG Forfeiture History

Srno.	Consent (C2E/C2O/C2R)	Amount of BG imposed	Submission Period	Purpose of BG	Amount of BG Forfeiture	Reason of BG Forfeiture
NA						

BG Return details

Srno.	Consent (C2E/C2O/C2R)	BG imposed	Purpose of BG	Amount of BG Returned
NA				

SCHEDULE-IV

Conditions during construction phase

A	During construction phase, applicant shall provide temporary sewage and MSW treatment and disposal facility for the staff and worker quarters.
B	During construction phase, the ambient air and noise quality shall be maintained and should be closely monitored through MoEF approved laboratory.
C	Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.

General Conditions:

1 The applicant shall provide facility for collection of samples of sewage effluents, air emissions and hazardous waste to the Board staff at the terminal or designated points and shall pay to the Board for the services rendered in this behalf.

2 The firm shall strictly comply with the Water (P&CP) Act, 1974, Air (P&CP) Act,1981 and Environmental Protection Act 1986 and Solid Waste Management Rule 2016, Noise (Pollution and Control) Rules, 2000 and E-Waste (Management & Handling Rule 2011.

3 Drainage system shall be provided for collection of sewage effluents. Terminal manholes shall be provided at the end of the collection system with arrangement for measuring the flow. No sewage shall be admitted in the pipes/sewers downstream of the terminal manholes. No sewage shall find its way other than in designed and provided collection system.

4 Vehicles hired for bringing construction material to the site should be in good condition and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.

5 Conditions for D.G. Set

a) Noise from the D.G. Set should be controlled by providing an acoustic enclosure or by treating the room acoustically.

b) Industry should provide acoustic enclosure for control of noise. The acoustic enclosure/ acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on higher side. A suitable exhaust muffler with insertion loss of 25 dB (A) shall also be provided. The measurement of insertion loss will be done at different points at 0.5 meters from acoustic enclosure/room and then average.

c) Industry should make efforts to bring down noise level due to DG set, outside industrial premises, within ambient noise requirements by proper sitting and control measures.

d) Installation of DG Set must be strictly in compliance with recommendations of DG Set manufacturer.

e) A proper routine and preventive maintenance procedure for DG set should be set and followed in consultation with the DG manufacturer which would help to prevent noise levels of DG set from deteriorating with use.

f) D.G. Set shall be operated only in case of power failure.

g) The applicant should not cause any nuisance in the surrounding area due to operation of D.G. Set.

h) The applicant shall comply with the notification of MoEFCC, India on Environment (Protection) second Amendment Rules vide GSR 371(E) dated 17.05.2002 and its amendments regarding noise limit for generator sets run with diesel.

6 Solid Waste – The applicant shall provide onsite municipal solid waste processing system & shall comply with Solid Waste Management Rule 2016 & E-Waste (M & H) Rule 2011.

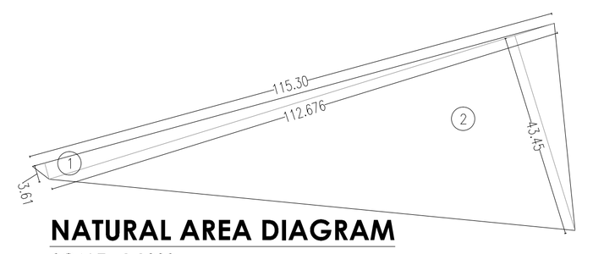
7 Affidavit undertaking in respect of no change in the status of consent conditions and compliance of the consent conditions the draft can be downloaded from the official web site of the MPCB.

8 Applicant shall submit official e-mail address and any change will be duly informed to the MPCB.

9 The treated sewage shall be disinfected using suitable disinfection method.

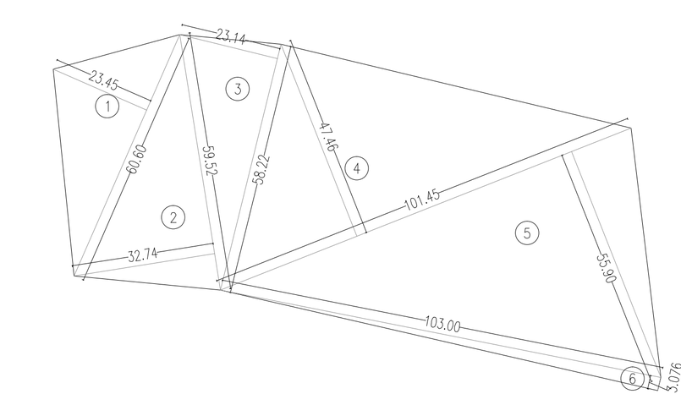
10 The firm shall submit to this office, the 30th day of September every year, the environment statement report for the financial year ending 31st march in the prescribed Form-V as per the provision of rule 14 of the Environmental (Protection) Second Amended rule 1992.

11 The applicant shall obtain Consent to Operate from Maharashtra Pollution Control Board before commissioning of the project.



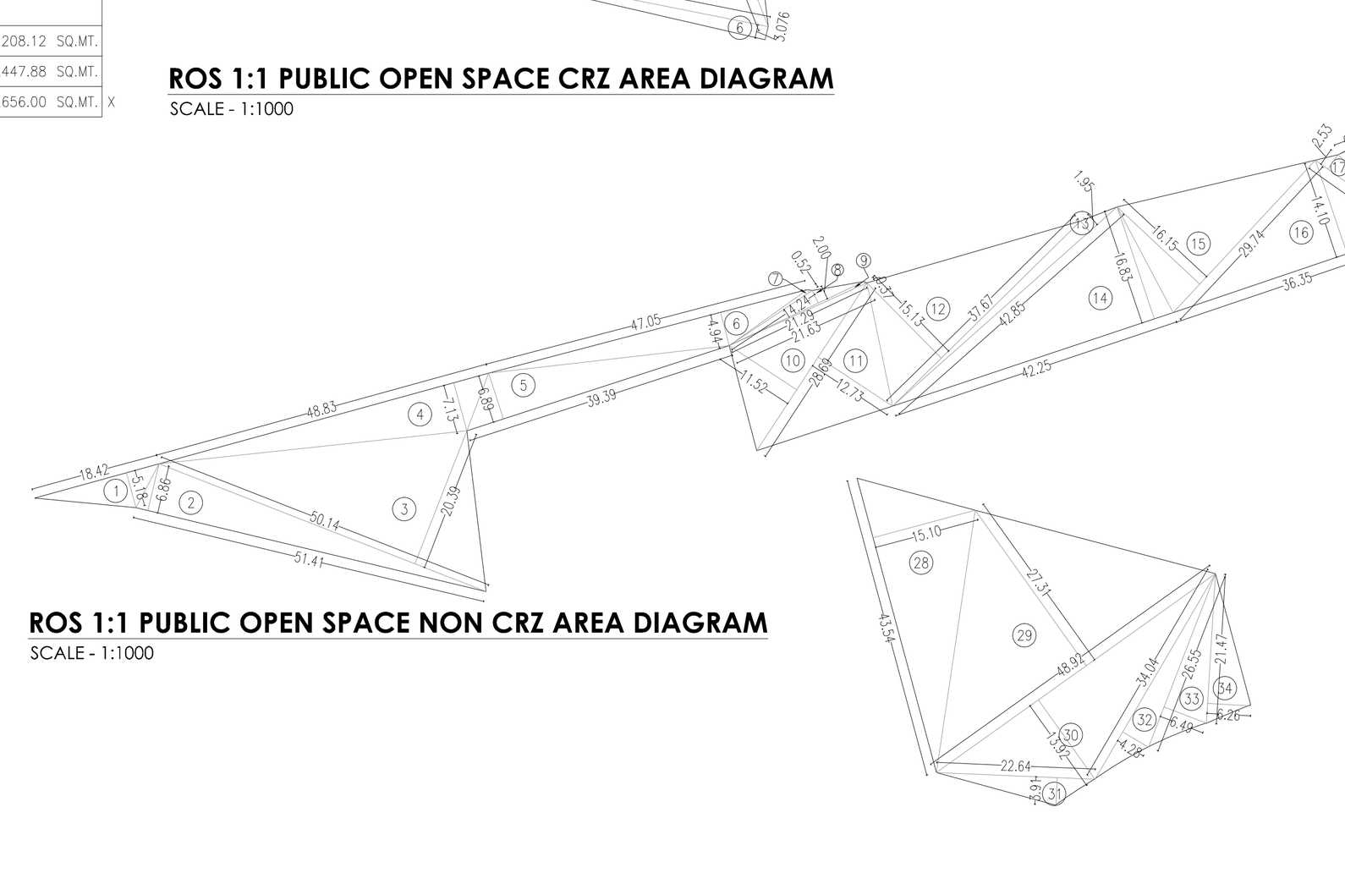
NATURAL AREA DIAGRAM
SCALE - 1:1000

NATURAL AREA CALCULATION				
1	1/2 X 115.30 X 3.61 X 1NO	=	208.12 SQ.MT.	
2	1/2 X 112.676 X 43.45 X 1NO	=	2447.88 SQ.MT.	
	TOTAL ADDITION	=	2656.00 SQ.MT.	X



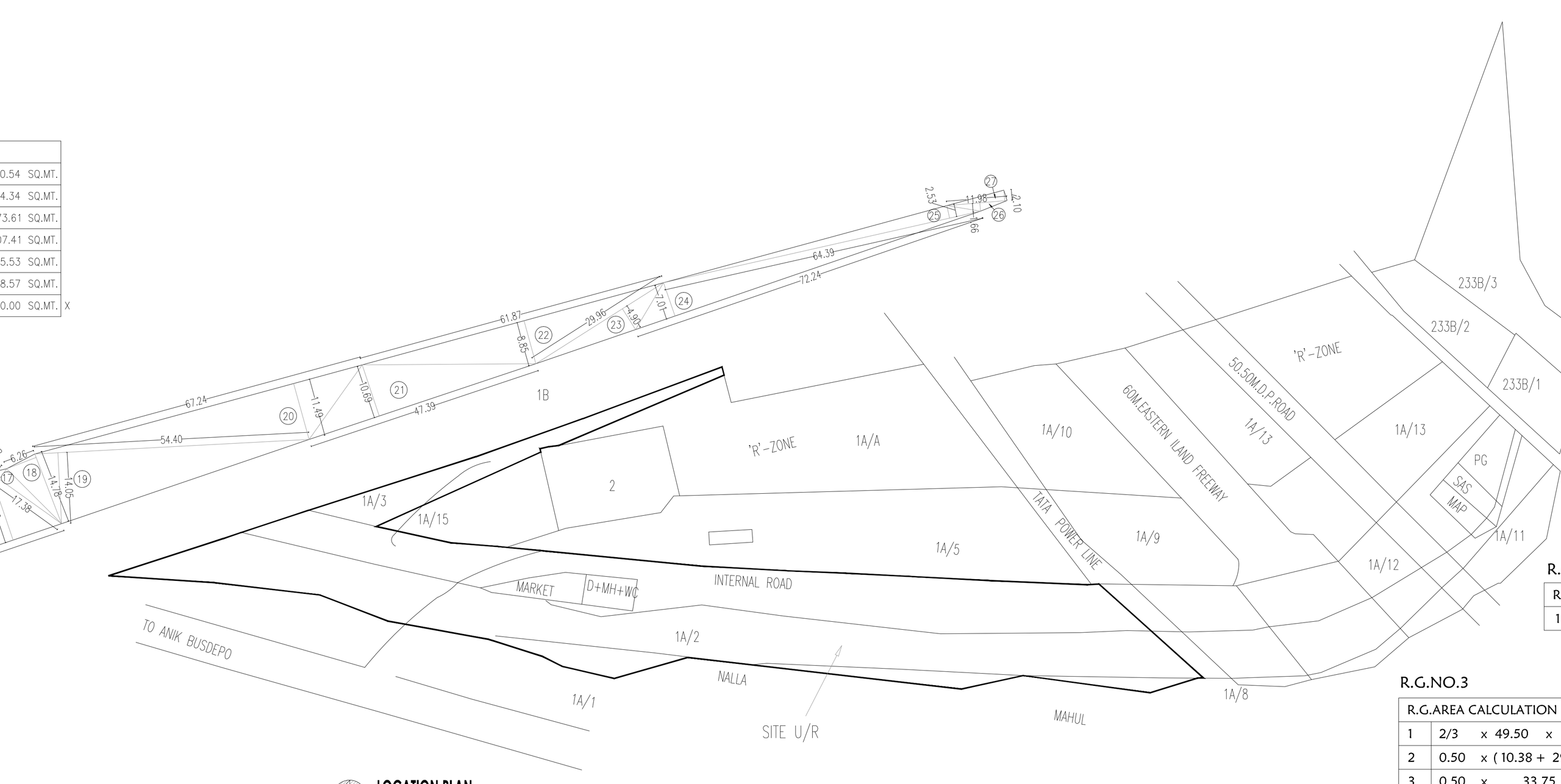
ROS 1:1 PUBLIC OPEN SPACE CRZ AREA DIAGRAM
SCALE - 1:1000

ROS 1:1 PUBLIC OPEN SPACE CRZ AREA CALCULATION				
1	1/2 X 60.60 X 23.45 X 1NO	=	710.54 SQ.MT.	
2	1/2 X 59.52 X 32.74 X 1NO	=	974.34 SQ.MT.	
3	1/2 X 58.22 X 23.14 X 1NO	=	673.61 SQ.MT.	
4	1/2 X 101.45 X 47.46 X 1NO	=	2407.41 SQ.MT.	
5	1/2 X 101.45 X 55.90 X 1NO	=	2835.53 SQ.MT.	
6	1/2 X 103.10 X 3.076 X 1NO	=	158.57 SQ.MT.	
	TOTAL ADDITION	=	7760.00 SQ.MT.	X

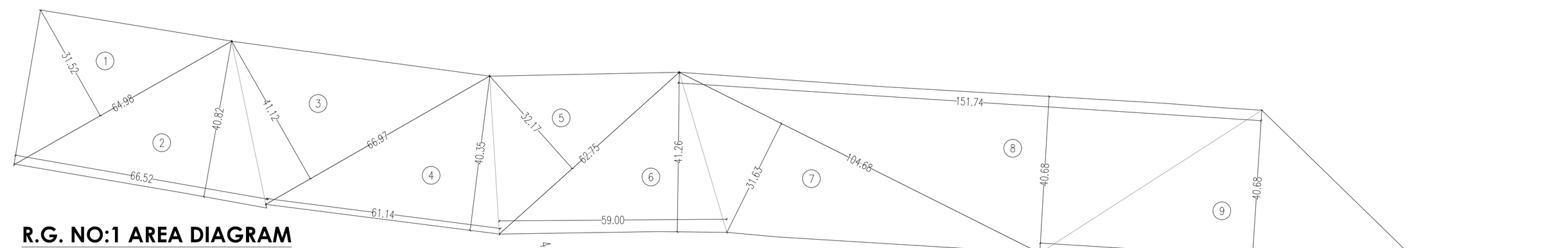


ROS 1:1 PUBLIC OPEN SPACE NON CRZ AREA DIAGRAM
SCALE - 1:1000

ROS 1:1 PUBLIC OPEN SPACE NON CRZ AREA CALCULATION				
1	1/2 X 18.42 X 5.18 X 1NO	=	47.71 SQ.MT.	
2	1/2 X 51.41 X 6.86 X 1NO	=	176.34 SQ.MT.	
3	1/2 X 50.14 X 20.39 X 1NO	=	511.18 SQ.MT.	
4	1/2 X 48.83 X 7.13 X 1NO	=	174.08 SQ.MT.	
5	1/2 X 39.39 X 6.89 X 1NO	=	135.70 SQ.MT.	
6	1/2 X 47.05 X 4.94 X 1NO	=	116.21 SQ.MT.	
7	1/2 X 14.24 X 0.52 X 1NO	=	3.70 SQ.MT.	
8	1/2 X 21.29 X 2.00 X 1NO	=	21.29 SQ.MT.	
9	1/2 X 21.63 X 0.37 X 1NO	=	4.00 SQ.MT.	
10	1/2 X 28.69 X 11.52 X 1NO	=	165.25 SQ.MT.	
11	1/2 X 28.69 X 12.73 X 1NO	=	182.61 SQ.MT.	
12	1/2 X 37.67 X 15.13 X 1NO	=	284.97 SQ.MT.	
13	1/2 X 42.85 X 1.95 X 1NO	=	41.78 SQ.MT.	
14	1/2 X 42.25 X 16.83 X 1NO	=	355.53 SQ.MT.	
15	1/2 X 29.74 X 16.15 X 1NO	=	240.15 SQ.MT.	
16	1/2 X 36.35 X 14.10 X 1NO	=	256.27 SQ.MT.	
17	1/2 X 17.38 X 2.53 X 1NO	=	21.99 SQ.MT.	
18	1/2 X 14.78 X 6.26 X 1NO	=	46.26 SQ.MT.	
19	1/2 X 54.40 X 14.05 X 1NO	=	382.16 SQ.MT.	
20	1/2 X 67.24 X 11.49 X 1NO	=	386.29 SQ.MT.	
21	1/2 X 47.39 X 10.69 X 1NO	=	253.30 SQ.MT.	
22	1/2 X 61.87 X 8.85 X 1NO	=	273.77 SQ.MT.	
23	1/2 X 29.96 X 4.90 X 1NO	=	73.40 SQ.MT.	
24	1/2 X 72.24 X 7.01 X 1NO	=	253.20 SQ.MT.	
25	1/2 X 64.39 X 2.53 X 1NO	=	81.45 SQ.MT.	
26	1/2 X 11.98 X 1.66 X 1NO	=	9.94 SQ.MT.	
27	1/2 X 11.98 X 2.10 X 1NO	=	12.58 SQ.MT.	
28	1/2 X 43.54 X 15.10 X 1NO	=	328.73 SQ.MT.	
29	1/2 X 48.92 X 27.31 X 1NO	=	668.00 SQ.MT.	
30	1/2 X 48.92 X 13.92 X 1NO	=	340.48 SQ.MT.	
31	1/2 X 22.64 X 3.91 X 1NO	=	44.26 SQ.MT.	
32	1/2 X 34.04 X 4.28 X 1NO	=	72.85 SQ.MT.	
33	1/2 X 26.55 X 6.49 X 1NO	=	86.15 SQ.MT.	
34	1/2 X 21.46 X 6.26 X 1NO	=	67.17 SQ.MT.	
	TOTAL ADDITION	=	6118.75 SQ.MT.	X



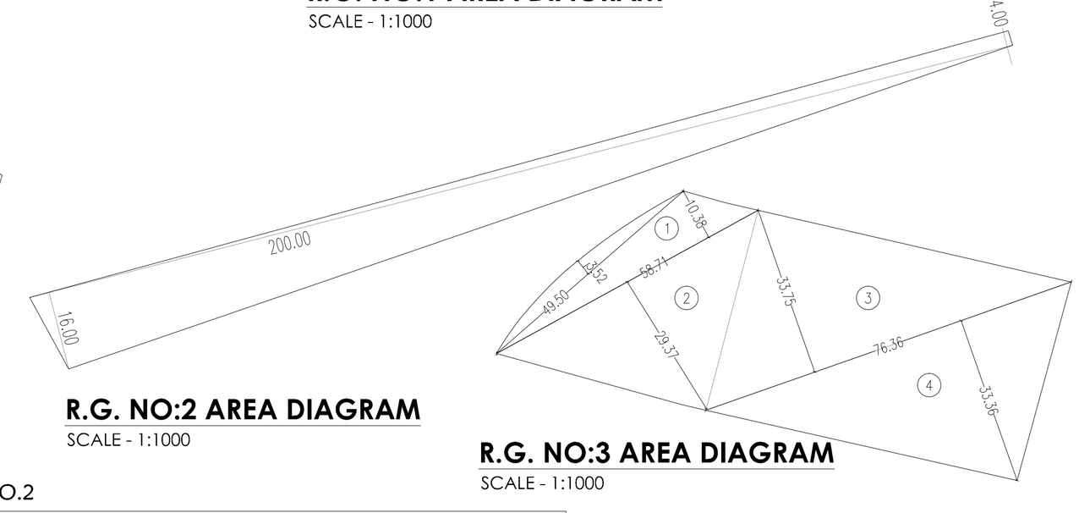
LOCATION PLAN
SCALE - 1:4000



R.G. NO:1 AREA DIAGRAM
SCALE - 1:1000

R.G.NO.1

R.G AREA CALCULATION			
1	0.50 X 64.98 X 31.52 X 1NO	=	1024.08 SQ.MT.
2	0.50 X 66.52 X 40.82 X 1NO	=	1357.67 SQ.MT.
3	0.50 X 41.12 X 66.97 X 1NO	=	1376.90 SQ.MT.
4	0.50 X 61.14 X 40.35 X 1NO	=	1233.50 SQ.MT.
5	0.50 X 32.17 X 62.75 X 1NO	=	1009.33 SQ.MT.
6	0.50 X 59.00 X 41.26 X 1NO	=	1217.17 SQ.MT.
7	0.50 X 104.68 X 31.63 X 1NO	=	1655.51 SQ.MT.
8	0.50 X 151.74 X 40.68 X 1NO	=	3086.39 SQ.MT.
9	0.50 X 102.45 X 40.68 X 1NO	=	2083.83 SQ.MT.
	TOTAL ADDITION	=	14044.38 SQ.MT.



R.G. NO:2 AREA DIAGRAM
SCALE - 1:1000

R.G.NO.2

R.G.AREA CALCULATION	
1	0.50 x (4.00 x 16.00) x 200.00 1x 1 = 2000.00 SQ.MT.

R.G. NO:3 AREA DIAGRAM
SCALE - 1:1000

R.G.NO.3

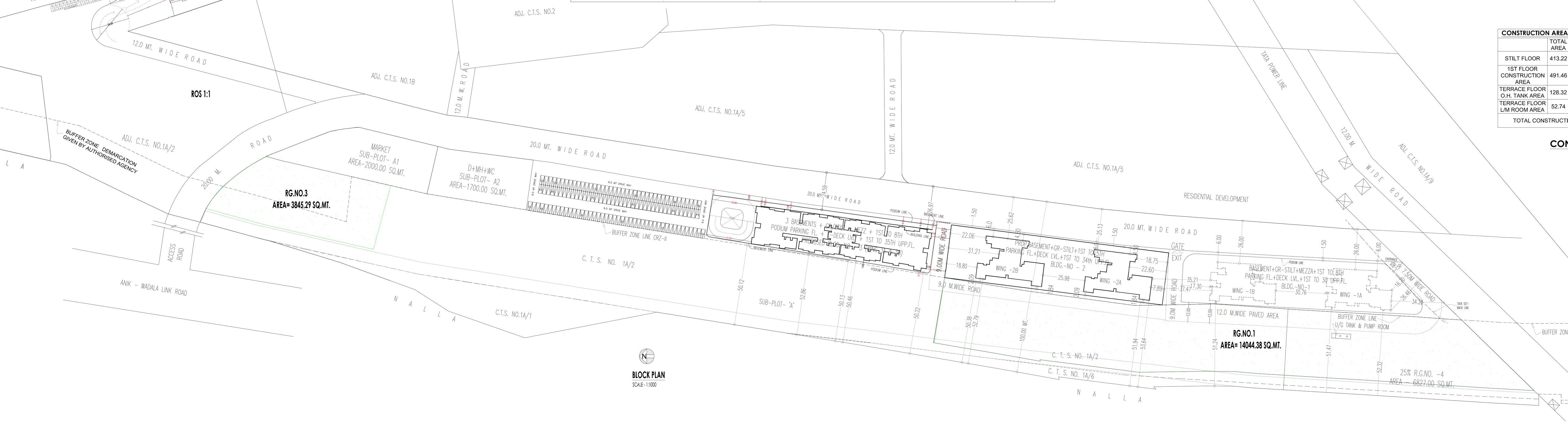
R.G.AREA CALCULATION				
1	2/3 x 49.50 x 3.52 x 1	=	116.16	SQ.MT.
2	0.50 x (10.38 + 29.37) x 58.71	=	1166.86	SQ.MT.
3	0.50 x 33.75 x 76.36	=	1288.58	SQ.MT.
4	0.50 x 33.36 x 76.36	=	1273.69	SQ.MT.
TOTAL AREA		=	3845.29	SQ.MT.

25% R.G.AREA CALCULATION

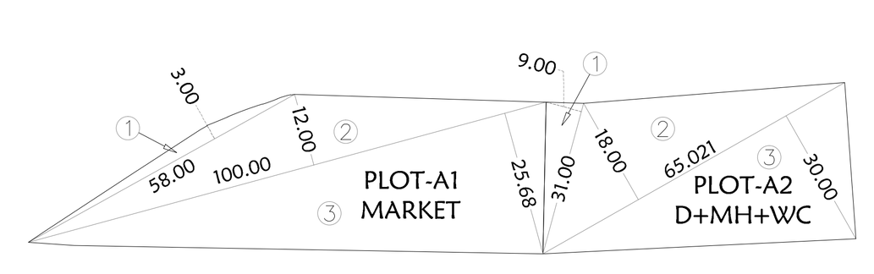
R.G. REQUIRED 25% OF 75832.20 SQ.MT.(AS APPROVED LAYOUT)	18958.05 SQ.MT.
MARKET/D+MH/WC (2000+1700X25%)	925.00 SQ.MT.
TOTAL R.G. RED	19883.05 SQ.MT.
PROPOSED RG.NO.1+2+3 (14044.38+2000.00+3845.29)	19889.67 SQ.MT.

PROPOSED BUA {AS THE CASE MAY BE WITH /WITHOUT BUA AS PER 2(C)}			
BLDG.NO.	COMMERCIAL AREA	RESIDENTIAL AREA	TOTAL AREA
BLDG.NO.-01 U/NO. CHE/ES/0510/M/337(NEW)	440.14	28316.01	28756.15 SQ.MT.
BLDG.NO.-02 U/NO. CHE/ES/1175/M/W/337(NEW)	905.96	35785.55	36691.51 SQ.MT.
BLDG.NO.-03 U/NO. P-5219/2020/(1A/A AND OTHER) / M/W WARD / ANIK - W/337	385.06	33514.01	33899.07 SQ.MT.
BLDG.NO.-06 U/NO. CHE/ES/3635/M/337(NEW) U/R	- - -	8087.59	8087.59 SQ.MT.
TOTAL	1731.16	105703.16	107434.32 SQ.MT.

PROPOSED FUNGIBLE AREA STATEMENT			
BLDG.NO.	COMMERCIAL AREA	RESIDENTIAL AREA	TOTAL FUNGIBAL AREA NOW PROPOSED RESI.+COMM
BLDG.NO.-01 U/NO. CHE/ES/0510/M/337(NEW)	440.14 x 20% = 88.03 sq.mt.	28316.01 x 35% = 9910.60 SQ.MT.	9998.63 Sq.mt
BLDG.NO.-02 U/NO. CHE/ES/1175/M/W/337(NEW)	PERM 905.96/1.35X35%=234.88 PROP-NIL	Perm 40792.85-(1.35 x 35% =10575.92 = 4101.34)	4101.34 Sq.mt
BLDG.NO.-03 U/NO. P-5219/2020/(1A/A AND OTHER) / M/W WARD / ANIK - W/337	385.06 x 35% = 134.77 sq.mt. U/R	Perm 54430.39-519.83 Comm.=53910.56/1.35 x 35% = 13976.81 (earlier approved 13902.65+6493.90)=20396.55	20531.32 Sq.mt
BLDG.NO.-06 U/NO. CHE/ES/3635/M/337(NEW) U/R	NIL		
TOTAL AREA	222.80 sq.mt	9998.63+4101.34+20531.32 = 34463.33 SQ.MT.	34631.29 Sq.mt



BLOCK PLAN
SCALE - 1:1000



PLOT AREA DIAGRAM
SCALE - 1:1000

PLOT-A1 (MARKET RESERVATION)

ADDITION				
1	2/3 x 58.00 x 3.00 x 1	=	116.00	SQ.MT.
2	0.50 x 100.00 x 12.00 x 1	=	600.00	-"-
3	0.50 x 100.00 x 25.68 x 1	=	1284.00	-"-
TOTAL AREA		=	2000.00	SQ.MT.

PLOT-A2 (D+MH+WC RESERVATION)

1	0.50 x 31.00 x 9.00 x 1	=	139.50	SQ.MT.
2	0.50 x (18.00 + 30.00)x 65.021 x 1	=	1560.50	-"-
TOTAL AREA		=	1700.00	SQ.MT.

B.U.A. SUMMARY						
FLOOR	B.U.A. WING A	B.U.A. WING B	B.U.A. WING C	B.U.A. WING D	TENEMENTS PROPOSED	
1ST	242.62	242.62	176.72	176.72	20	NOS.
2ND	0.00	0.00	176.72	176.72	8	NOS.
3RD	0.00	0.00	176.72	176.72	8	NOS.
4TH	0.00	0.00	176.72	176.72	8	NOS.
5TH	0.00	0.00	176.72	176.72	8	NOS.
6TH	0.00	0.00	176.72	176.72	8	NOS.
7TH	0.00	0.00	176.72	176.72	8	NOS.
8TH	0.00	0.00	131.71	131.71	6	NOS.
9TH	0.00	0.00	176.72	176.72	7	NOS.
10TH	0.00	0.00	176.72	176.72	8	NOS.
11TH	0.00	0.00	176.72	176.72	8	NOS.
12TH	0.00	0.00	177.26	176.72	6	NOS.
13TH	0.00	0.00	176.72	176.72	8	NOS.
14TH	0.00	0.00	176.72	176.72	8	NOS.
15TH	0.00	0.00	131.71	131.71	6	NOS.
16TH	0.00	0.00	176.72	176.72	8	NOS.
17TH	0.00	0.00	176.72	176.72	8	NOS.
18TH	0.00	0.00	176.72	176.72	7	NOS.
19TH	0.00	0.00	176.72	176.72	8	NOS.
20TH	0.00	0.00	176.72	177.26	7	NOS.
21ST	0.00	0.00	176.72	176.72	8	NOS.
22ND	0.00	0.00	176.72	177.26	7	NOS.
TOTAL	242.62	242.62	3798.36	3798.90	178	NOS.
TOTAL BUILT UP AREA				8082.50	SQ.MT.	
VOID BETWEEN BLDG (C & D WING) AND PARKING TOWER (COUNTED IN FSI) 0.51 X 6.65 X 1.5				5.09	SQ.MT.	
TOTAL BUILT UP AREA				8087.59	SQ.MT.	

STAIRCASE AND LIFT LOBBY CALCULATION								
FLOOR	WING A (COUNTED IN FSI)		WING B (COUNTED IN FSI)		WING C		WING D	
1ST	0.000	SQ.MT.	0.000	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
2ND	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
3RD	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
4TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
5TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
6TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
7TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
8TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
9TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
10TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
11TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
12TH	0.00	SQ.MT.	0.00	SQ.MT.	46.45	SQ.MT.	47.00	SQ.MT.
13TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
14TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
15TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
16TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
17TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
18TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
19TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
20TH	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	46.45	SQ.MT.
21ST	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	47.00	SQ.MT.
22ND	0.00	SQ.MT.	0.00	SQ.MT.	47.00	SQ.MT.	46.45	SQ.MT.
TOTAL	0.00	SQ.MT.	0.00	SQ.MT.	1033.45	SQ.MT.	1032.90	SQ.MT.
TOTAL OF ALL STAIRCASE, LIFT LOBBY AREA (WING A,B,C & D)							2066.35	SQ.MT.

CONSTRUCTION AREA STATEMENT (WING A-B)			
	TOTAL AREA	NO. OF FLOORS	CONSTRUCTION AREA
STILT FLOOR	413.22	1	413.22 SQ.MT.
1ST FLOOR CONSTRUCTION AREA	491.46	1	491.46 SQ.MT.
TERRACE FLOOR O.H. TANK AREA	128.32	1	128.32 SQ.MT.
TERRACE FLOOR L/M ROOM AREA	52.74	1	52.74 SQ.MT.
TOTAL CONSTRUCTION AREA			1085.74 SQ.MT.

CONSTRUCTION AREA STATEMENT (WING C-D)			
	TOTAL AREA	NO. OF FLOORS	CONSTRUCTION AREA
STILT FLOOR	401.74	1	401.74 SQ.MT.
PER FLOOR CONSTRUCTION AREA(1ST TO 7TH, 9TH TO 14TH & 22ND)	447.43	20	8948.60 SQ.MT.
REFUGE FLOOR (9TH & 15TH)	452.81	2	905.62 SQ.MT.
TERRACE FLOOR O.H. TANK AREA	66.98	1	66.98 SQ.MT.
TERRACE FLOOR L/M ROOM AREA	53.06	1	53.06 SQ.MT.
TOTAL CONSTRUCTION AREA			10376.00 SQ.MT.

CONSTRUCTION AREA STATEMENT (WING A-B & C-D)

TOTAL CONSTRUCTION AREA (X+Y)	11461.74 SQ.MT.
SAY	11462 SQ.MT.

FORM-I

A	DESCRIPTION	AREA IN SQ. MTRS.
I.	AREA STATEMENT	
1	TOTAL PLOT AREA AS COLLECTOR SUB DIVISION ORDER	111732.20
1A	a) NATURALLY SUBDIVIDED PLOT WEST SIDE OF EXISTING ROAD	- - -
	b) AREA UNDER DISPUTED LAND	- - -
	c) ANY RESERVATION (MARKET 2000.00 +1700.00(D+MH+WC) = 3700.00)	3700.00
	d) __% AMENITY SPACE AS PER DCR 56/57(SUB PLOT_)	- - -
	e) AREA UNDER R- ZONE (PRIVATE FOREST)	3100.00
	f) ROS 1:1 PUBLIC OPEN SPACE	13878.75
	g) NATURAL AREA	2656.00
	h) TOTAL (a+b+c+d+e)	23334.75
2	DEDUCTIONS FOR.	- - -
	(A) For Reservation/Road Area	- - -
	(a) Less 18.30 m. wide Existing D.P.Raod	- - -
	(b) Area under d.p. roads	- - -
	(c) Area under 'C' zone & R.E. 1.1	- - -
	(d) less area under R.O.S. 1.5	- - -
	Reservation area to be handed over as per AR (Regulation No 17)	- - -
	(B) For Amenity area	- - -
	(a) Area of amenity plot/plots to be handed over as per DCR 14(A)	- - -
	(b) Area of amenity plot/plots to be handed over as per DCR 14(B)	- - -
	(c) Area of amenity plot/plots to be handed over as per DCR 35 (abeyance)	- - -
	(C) Deductions for Existing BUA to be retained if any/ Land component of Existing BUA	- - -
	/Existing BUA as per Regulation under which the development was allowed.	- - -
3	Total deductions:	23334.75
4	Balance area of plot 1(A)(c) - 3	88397.45
5	Plot area under Development after areas to be handed over to MCGM / Appropriate	- - -
	Now considering the plot area for sub divided plot H & I (As per Dev. Permission)	- - -
	Authority as per Sr. No. 4 above	- - -
6	Zonal (basic) FSI (0.50 or 0.75 or 1 or 1.33)	ONE
7	Built up Area as per Zonal(basic) FSI (5 * 6)	88397.45
	(In case of Mill land Permissible BUA kept in abeyance)	- - -
8	Built up equal to area of land handed over as per Regulation 30(A)	- - -
	(i)As per 2(A) and 2(B) except 2(A)(c) (ii) above with in cap of "Admissible	- - -
	TDR" as column 6 of	- - -
	Table -12 on remaining /balance plot.) free of fsi	- - -
	(ii) in case of 2(A)(c) (ii) permissible over and above permissible BUA on	- - -
	remaining / balance plot.	- - -
9	Built up Area In lieu of Cost of construction of built up amenity to be handed	- - -
	over (within the limit of permissible BUA on remaining plot)	- - -
10	Built up area due to "Additional FSI on Payment of Premium" as per	- - -
	Table No.12 of Regulation No 30(A) on remaining/ balance plot.	- - -
	ADD. FSI O.33 AS PER NOTIFICATION NO. TPB NO. 4308/776/CR-127/2008 UD-11 DT-/24/10/2010 / PREMIUM AMOUNT OF RS/- 4,76,37,500 TO MCGM UNDER PAID RECEIPT/SAP DOC NO. 1002318496 DT-27/10/2015 & RS - 4,76,37,500/- PAID TO STATE GOVT. (RBI) UNDER RECEIPT NO. 6113007006 DT- 29/10/2015 — AREA PURCHASED & USED 9250.00 SQ.MT. (A) (88397.45sq.mt. x 50 %) = 44198.73sq.mt. (-) 9250.00sq.mt. = 34948.73sq.mt. 44198.73sq.mt. (-) 11800.00 sq.mt. = 32398.73 sq.mt. Already purchased 9250.00 + 2550.00 To be purchased)= 11800.00 sq.mt for Bldg.no.6	44198.73
11	Built up area due to admissible "TDR" as per Table No 12 of Regulation No	- - -
	30(A) and 32 on remaining / balance plot.	- - -
	88397.45 X 0.90 ON ROAD WIDTH TDR = 79557.70 SQ.MT.	
11a	if handed over build able reservation within 24 months 100% incentive	- - -
12	Permissible Built up Area {as the case may be with /without BUA as per 2(c)}	132596.18
13	PROPOSED BUA {AS THE CASE MAY BE WITH /WITHOUT BUA AS PER 2(C)} BLDG.NO. / COMMERCIAL AREA / RESIDENTIAL AREA / TOTAL AREA BLDG.NO.-01 U/NO. CHE/ES/0510/M/337(NEW) 440.14 28316.01 28756.15 SQ.MT. BLDG.NO.-02 U/NO. CHE/ES/1175/M/W/337(NEW) 905.96 35785.55 36691.51 SQ.MT. BLDG.NO.-03 U/R 385.06 33514.01 33899.07 SQ.MT. BLDG.NO.-06 U/NO. CHE/ES/3635/M/337(NEW) U/R - - - 8087.59 8087.59 SQ.MT.	107434.32
14	TDR generated if any as per regulation 30 (A) and 32.	- - -
15	FUNGIBLE COMPENSATORY AREA AS PER REGULATION NO 31(3)	- - -
	a) i)Permissible Fungible Compensatory area for Rehab component without ii) Fungible Compensatory area availed for Rehab component without charging premium.	- - -
	b) i) Permissible Fungible Compensatory area by charging premium for Resi. BLDG. NO. 1 - 28316.01 x 35% = 9910.60 SQ.MT. BLDG. NO. 2 - Perm 40945.56-905.96 Comm.=40039.60/1.35= 29658.96 x 35% = 10380.64 SQ.MT.(Utilised. = 4101.34 SQ.MT BLDG. NO. 3 - = 20396.55 SQ.MT. BLDG. NO. 6 - U/R NIL =34408.49 SQ.MT.	34408.49
	ii) Fungible Compensatory area availed on payment of premium for commercial	- - -
	BLDG. NO. 1 - 440.14 x 20% = 88.03 sq.mt. BLDG. NO. 2 -perm.905.96/1.35 = 671.08 x 35% = 234.88 sq.mt.(Poposed=Nil) BLDG. NO. 3 - 385.06 x 35% = 134.77 sq.mt. U/R	222.80
16	Total Built up Area proposed (13 +15)	142065.61
17	FSI consumed on Net Plot [13/ 4]	1.22
II	OTHER REQUIREMENTS	- - -
	(A) Reservation/Designation	- - -
	a) Name of Reservation	- - -
	b) Area of Reservation affecting the plot	- - -
	c) Area of Reservation land to be handed/handed over as per Regulation No.17	- - -
	d) Built up area of Amenity to be handed over as per Regulation No.17	- - -
	e) Area/Built up Area of Designation	- - -
	(B) Plot area/Built up Amenity to be Handed Over as per Regulation No	- - -
	(i) 14(A)	- - -
	(ii) 14(B)	- - -
	(iii) 15	- - -
	(C)Requirement of Recreational Open Space in Layout/Plot as per Regulation No.27	- - -
	(D) TENEMENT STATEMENT	- - -
	(i) Proposed built up area (13 above)	142065.61
	(ii) Less deduction of Non-residential area (Shop etc.)(528.17 + 905.96+519.83)	1953.96
	(iii) Area available for tenements [(i) minus (ii).]	140116.74
	(iv) Tenements permissible (Density of tenements/hectare)	
	(v) a)TENEMENT PERMISSIBLE	6305 Nos.
	(v) b)Total number of Tenements proposed on the plot BLDG. NO.1, 2, 3 & 6 (224+262+540+178)	1204 NOS
	(E) PARKING STATEMENT	
	(i) _Parking required by Regulations for. - Car	STATEMENT REFER
	Scooter/Motor cycle	
	Outsiders (visitors)	
	(ii) Covered garage permissible	
	(iii) Covered garages proposed	
	Car	
	Scooter/Motor cycle	
	Outsider (Visitors)	
	(iv) Total parking provided	
	(D) Transport Vehicles Parking	
	(i) Spaces for transport vehicles parking required by Regulations	
	(ii) Total No. of transport vehicles parking spaces provided	

PARKING STATEMENT (RESIDENTIAL) Wing ' A & B '			
AREA	PARK. REQD.	No. OF FLATS	REQUIRED PARKINGS
UPTO 45.00 SQ.MT	1 FOR 4 FLATS	12 Nos.	3.00
45.00 TO 60.00 SQ.MT	1 FOR 2 FLATS	-	-
60.00 TO 90.00 SQ.MT	1 FOR 1 FLATS	-	-
ABOVETO 90.00 SQ.MT	1 FOR 0.50 FLATS	-	-
TOTAL		12 Nos.	3.00 Nos.
10 % FOR VISITORS PARKING			0.30 Nos.
TOTAL PARKING REQUIRED FOR WING A & B			3.30 Nos.
SAY			4.00 Nos. - X

PROPOSED PARKING			
FLOORS	SMALL CARS	BIG CARS	TOTAL CARS
TOWER PARKING	41	53	94 NOS
SURFACE PARKING	35	45	80 NOS
STILT PARKING	13	0	13 NOS
TOTAL PARKING	89	98	187 NOS

PARKING STATEMENT- FOR WING C& D (G+22)
(as per DCPR 44 Table No.21, Sr.No. 1(i)(a & b) with the option of owner/developer may provide one parking for each tenement)

CARPET AREA	NUMBER OF FLATS	PARKING BY RULE	PARKING REQUIRED
<45.00 SQ.MT.	160	160 X 1 = 160 NOS.	160
45.00 TO 60.00 SQ.MT.	00		00
60.00 TO 90.00 SQ.MT.	6	1 FOR 1 FLAT	06
> 90.00 SQ.MT.	00	2 FOR 1 FLAT	00
TOTAL			166 NOS.
ADD. 10% VISITOR'S PARKING			166* 10% = 16.6 (SAY 17)
TOTAL REQUIRED PARKING FOR WING C & D			183 NOS. - Y
TOTAL REQUIRED PARKING (X+Y)			187 NOS.
TOTAL PARKING PROPOSED			187 NOS.

FORM-II

01/06

CONTENTS OF SHEET

BLOCK PLAN, LOCATION PLAN,
PARKING STATEMENT & BUILT UP AREA STATEMENT

STAMP OF APPROVAL OF PLANS

THIS CANCELS APPROVAL TO THE PREVIOUS PLANS SANCTIONED UNDER NO. CHE/ES/3635/M/337 (NEW). dt. 12.08.2021

APPROVED SUBJECT TO THE CONDITIONS MENTIONED IN THUS OFFICE LETTER NO. CHE/ES/3635/M/337 (NEW).

Bajirao Lahu Patil

Digitally signed by Bajirao Lahu Patil
DN: c=IN, o=Personal, 2.5.4.20=3965a1d9b42a19c66c56b95ca66522949267533b25aeac6b7a585a4df5c00989, postalCode=400071, st=Maharashtra, serialNumber=9b8eace453ea4a8e7db1d40fff07af0a64b246c6f2b423604b30bc97a2c102e3, cn=Bajirao Lahu Patil
Date: 2022.06.16 14:58:39 +05'30'

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-I

PRASAD CHAND RAKANT GOSAVI

S.E.(B.P.) M-I

Nanasaheb Ramsing Kenjale

A.E.(B.P.) M

REVISION

CERTIFICATE OF AREA

Certified that I have surveyed the plot under reference on 12.08.2010 and that the dimensions of the sides, etc. of the plot stated on the plan are as measured on site and the area so worked out is* 111732.20 squaremeters and tallies with the area stated in the document of ownership/Town Planning Scheme records.

Hiren S. Thakker

Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:26:43 +05'30'

Signature of Licensed Surveyor/Architect/Engineer/Structural Engineer/Supervisor or Architect

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO.6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera Digitally signed by Manoj Ishwarlal Ajmera DN: c=IN, o=Personal, 2.5.4.20=53163f8040c149e2a9bed59204bbe2e99d25a1f6fb7149578c7913b1446efd2f, postalCode=400077, st=Maharashtra, serialNumber=c07510bb49235b661d5cdc9029ece2c90bbd1ef98ce5bb4f902d19a58fe772f4, cn=Manoj Ishwarlal Ajmera Date: 2022.06.09 17:04:36 +05'30'

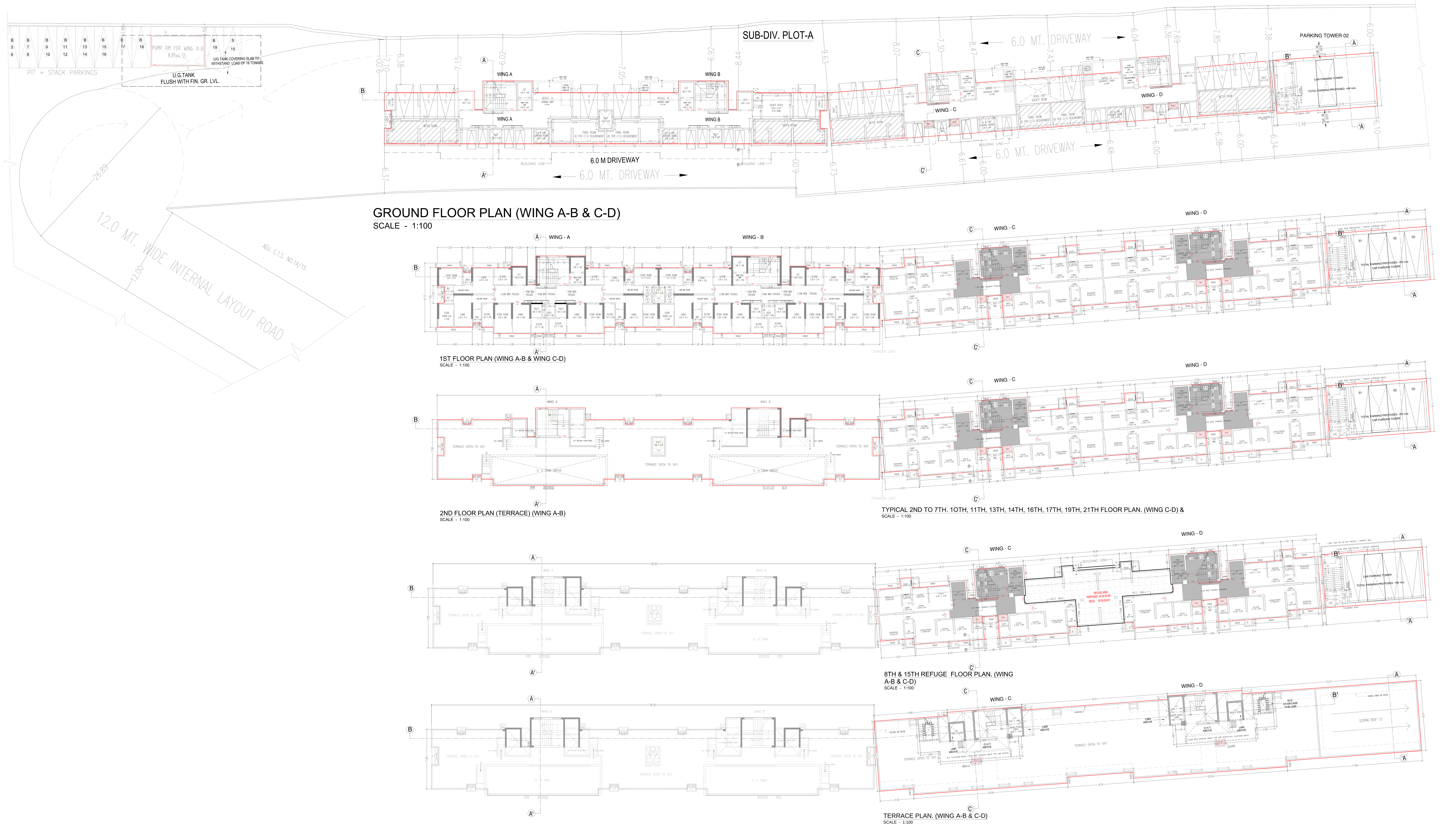
DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
AME-01	9-Jun-22	AS SHOWN		GOKUL J.	RAKESH JOSHI

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

Hiren S. Thakker

Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:27:11 +05'30'

SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 27 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.



FORM-II

CONTENTS OF SHEET

STILT FLOOR PLAN.
TYPICAL 2ND TO 7TH. 1OTH, 11TH, 13TH, 14TH, 16TH, 17TH, 19TH, 21TH FLOOR PLAN. (WING C-D) & 1ST FLOOR PLAN (WING A-B
8TH & 15TH REFUGE FLOOR PLAN & TERRACE PLAN. (WING - C-D)

STAMP OF APPROVAL OF PLANS

THIS CANCELS APPROVAL TO THE PREVIOUS PLANS SANCTIONED UNDER NO.CHE/ES/3635/M/337 (NEW). DATED : 12/08/2021

APPROVED SUBJECT TO THE CONDITIONS MENTIONED IN THUS OFFICE LETTER NO. CHE/ES/3635/M/337 (NEW).

Bajirao Lahu Patil

Digitally signed by Bajirao Lahu Patil
DN: c=IN, o=Personal, 2.5.4.20=3965a1d9b42a19c66c56b95ca66522949267533b25aeac6b7a585a4df5c00989, postalCode=400071, st=Maharashtra, serialNumber=9b8eace453ea4a8e7db1d40fff07af0a64b246c6f2b423604b30bc97a2c102e3, cn=Bajirao Lahu Patil
Date: 2022.06.16 14:59:22 +05'30'

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-I

PRASAD CHANDRAKANT GOSAVI

S.E.(B.P.) M-I

Nanasaheb Ramsing Kenjale

A.E.(B.P.) M

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO.6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera

DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
MU/02	09-06-2022	AS SHOWN		GOKUL J.	RAKESH JOSHI

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

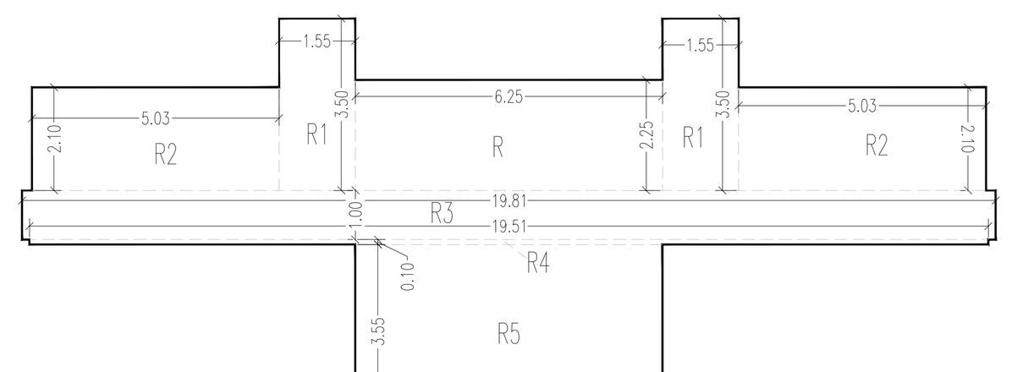
Hiren S. Thakker

Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:27:32 +05'30'

SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 27 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.

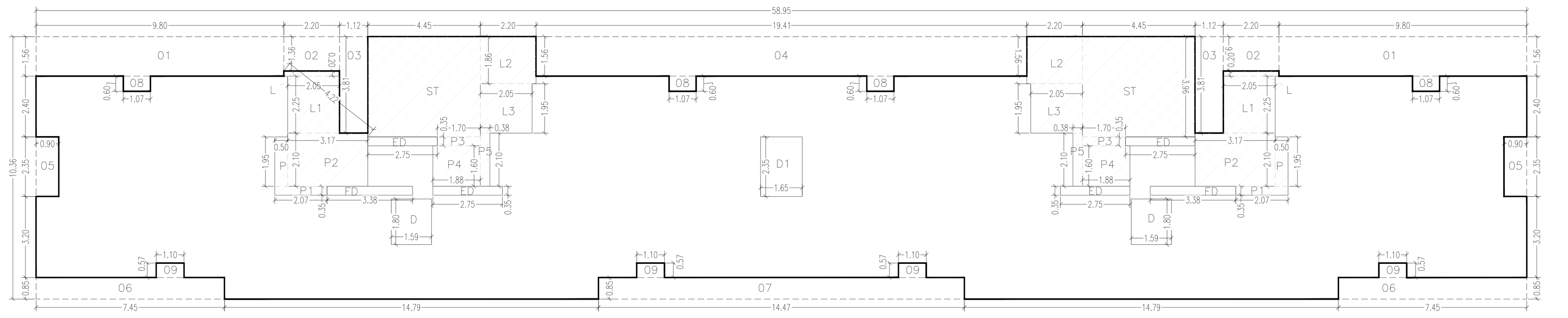
BUILT UP AREA CALCULATION FOR 1ST FLOOR (WING A & B)								
1ST FLOOR (WING A& B)							IN SQ.M	
A	58.950	X	10.36	X	1	=	610.72	
TOTAL ADDITION						=	610.72	A
DEDUCTION								
1	9.80	X	1.56	X	2	=	30.58	
2	2.20	X	1.36	X	2	=	5.98	
3	1.12	X	3.81	X	2	=	8.53	
4	19.41	X	1.56	X	1	=	30.28	
5	0.90	X	2.35	X	2	=	4.23	
6	7.45	X	0.85	X	2	=	12.67	
7	14.470	X	0.85	X	1	=	12.30	
8	1.07	X	0.60	X	4	=	2.57	
9	1.100	X	0.57	X	4	=	2.51	
D	1.800	X	1.59	X	2	=	5.72	
D1	1.65	X	2.35	X	1	=	3.88	
ED	2.75	X	0.35	X	4	=	3.85	
FD	3.38	X	0.35	X	2	=	2.37	
TOTAL X						=	125.46	X
STAIRCASE,LIFT PASSAGE AREA (WING A&B)								
ST	4.45	X	3.96	X	2	=	35.24	
L	2.20	X	0.20	X	2	=	0.88	
L1	2.05	X	2.25	X	2	=	9.23	
L2	2.20	X	1.86	X	2	=	8.18	
L3	2.05	X	1.95	X	2	=	8.00	
P	0.50	X	1.95	X	2	=	1.95	
P1	2.07	X	0.35	X	2	=	1.46	
P2	3.17	X	2.10	X	2	=	13.31	
P3	1.70	X	0.35	X	2	=	1.19	
P4	1.88	X	1.60	X	2	=	6.02	
P5	0.38	X	2.10	X	2	=	1.60	
TOTAL						=	87.05	Y
TOTAL DEDUCTION AREA (A-X-Y)							398.21	
ADD. STAIRCASE, LIFT & LIFT LOBBY AREA (COUNTED IN FSI)							87.05	
NET BUILTUP AREA PER FLOOR							485.24	
BUILT UP AREA PER WING = 485.24/2 =242.62							242.62	

BUILT UP AREA CALCULATION FOR TYPICAL FLOOR (WING C & D)								
1ST TO 7TH, 10TH, 11TH, 13TH, 14TH, 17TH, 19TH & 21ST FLR.							SQ.M	
A	58.950	X	9.41	X	1	=	554.72	A
TOTAL ADDITION						=	554.72	
DEDUCTION								
1	3.20	X	1.71	X	2	=	10.94	
2	1.55	X	0.46	X	4	=	2.85	
3	5.05	X	1.86	X	2	=	18.79	
4	2.20	X	1.36	X	2	=	5.98	
5	1.12	X	3.81	X	2	=	8.53	
6	5.03	X	1.86	X	2	=	18.71	
7	6.250	X	1.71	X	1	=	10.69	
8	8.790	X	0.80	X	1	=	7.03	
9	1.99	X	3.00	X	2	=	11.94	
10	4.52	X	0.80	X	2	=	7.23	
ED	1.35	X	0.85	X	2	=	2.30	
FD	1.35	X	0.85	X	2	=	2.30	
TOTAL X						=	107.29	X
STAIRCASE,LIFT PASSAGE AREA (WING C & D)								
ST	4.65	X	3.96	X	2	=	36.83	
L	2.20	X	0.50	X	2	=	2.20	
L1	2.05	X	2.10	X	2	=	8.61	
L2	2.00	X	1.86	X	2	=	7.44	
L3	1.85	X	2.10	X	2	=	7.77	
P	1.12	X	0.15	X	2	=	0.34	
P1	3.40	X	1.25	X	2	=	8.50	
P2	3.92	X	1.05	X	2	=	8.23	
P3	2.30	X	0.45	X	2	=	2.07	
P4	2.61	X	2.30	X	2	=	12.01	
TOTAL						=	93.99	Y
TOTAL DEDUCTION AREA							201.28	Z
TOTAL BUILT UP AREA (A-Z)							353.44	1
BUILT UP AREA PER WING = 353.44/2							176.72	

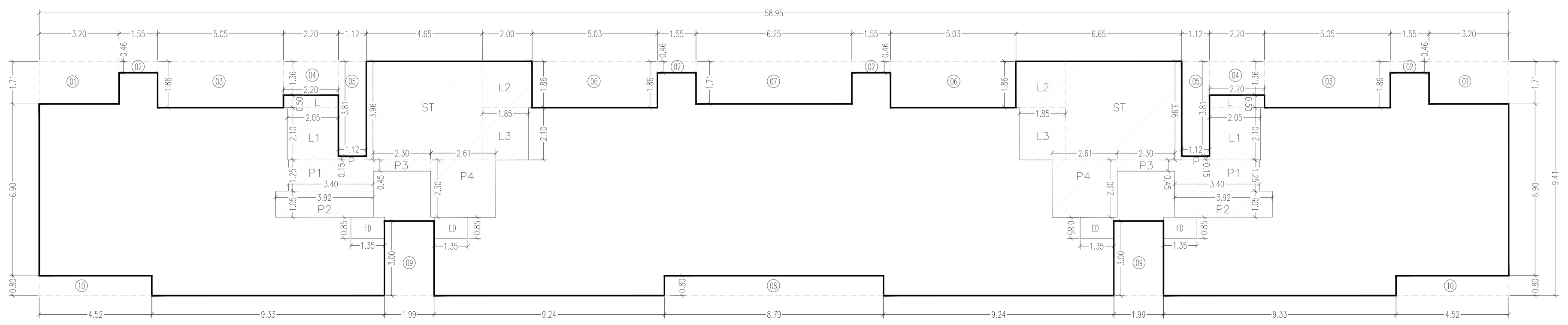


LINE DIAGRAM OF REFUGE AREA (TO BE DEDUCTED FOR REFUGE FLOOR BUILT-UP AREA CALCULATION) (8TH TO 15TH) (WING C-D) FLOOR
SCALE - 1:100

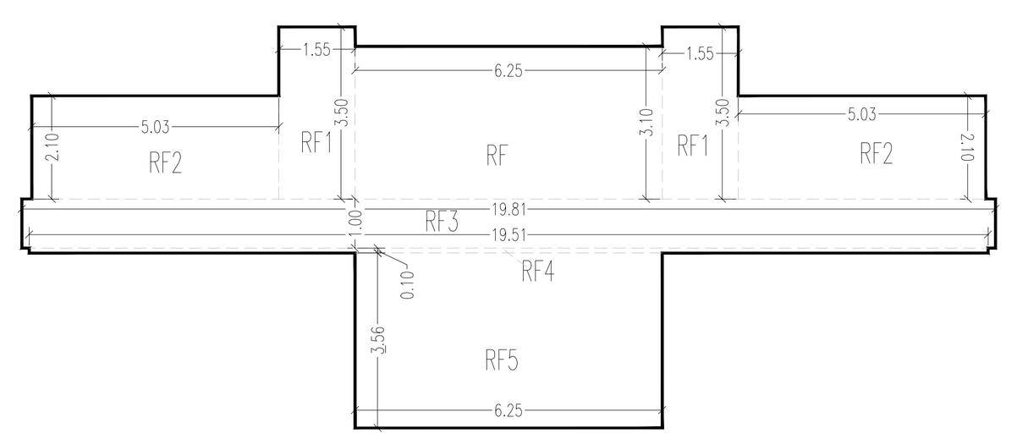
BUILT UP AREA CALCULATION FOR REFUGE FLOOR (WING C & D)								
8TH & 15TH FLOOR							SQ.M	
AREA TAKEN SAME AS TYPICAL FLOOR						=	353.44	A
DEDUCTIONS								
R	6.25	X	2.25	X	1	=	14.06	
R1	1.55	X	3.50	X	2	=	10.85	
R2	5.03	X	2.10	X	2	=	21.13	
R3	19.81	X	1.00	X	1	=	19.81	
R4	19.51	X	0.10	X	1	=	1.95	
R5	6.26	X	3.55	X	1	=	22.22	
TOTAL						=	90.02	
TOTAL DEDUCTION AREA							90.02	R
TOTAL BUILT UP AREA (A-R)							263.42	1



LINE DIAGRAM FIRST FLOOR PLAN. (WING- A-B)
SCALE - 1:100



LINE DIAGRAM TYPICAL FLOOR PLAN. (WING- C -D)
1ST TO 7TH, 10TH, 11TH, 13TH, 14TH, 16TH, 17TH, 19TH & 21ST FLOOR PLAN
SCALE - 1:100



LINE DIAGRAM OF PROPOSED REFUGE AREA (8TH & 15TH) (WING C - D) FLOOR
SCALE - 1:100

PROPOSED REFUGE AREA (WING C & D)								
8TH & 15TH FLOOR							SQ.M	
RF	6.25	X	3.10	X	1	=	19.38	
RF1	1.55	X	3.50	X	2	=	10.85	
RF2	5.03	X	2.10	X	2	=	21.13	
RF3	19.81	X	1.00	X	1	=	19.81	
RF4	19.51	X	0.10	X	1	=	1.95	
RF5	6.26	X	3.56	X	1	=	22.29	
TOTAL						=	95.38	
TOTAL DEDUCTION AREA							95.38	Z

REFUGE AREA STATEMENT FOR 8TH & 15TH FLOOR (WING C & D)						
REFUGE FLR.	263.42	X	1	=	263.42	SQ.M
TYPICAL FLR.	353.44	X	6	=	2120.64	SQ.M
TOTAL				=	2384.06	SQ.M
TOTAL REFUGE AREA REQUIRED 4% OF 2384.06					95.36	Z
TOTAL AREA PROPOSED					95.38	SQ.M
EXCESS AREA COUNT IN TO FSI					0.02	SQ.M

FORM-II 03/06

CONTENTS OF SHEET

LINE DIAGRAM & BUILT-UP AREA STATEMENT

STAMP OF APPROVAL OF PLANS

THIS CANCELS APPROVAL TO THE PREVIOUS PLANS SANCTIONED UNDER NO. CHE/ES/3635/M/337 (NEW). DATED : 12/08/2021

APPROVED SUBJECT TO THE CONDITIONS MENTIONED IN THUS OFFICE LETTER NO. CHE/ES/3635/M/337 (NEW).

Bajirao Lahu Patil
Digitally signed by Bajirao Lahu Patil
DN: c=IN, o=Personal, 2.5.4.20=3965a1d9b42a19c66c56b95ca66522949267533b25aeac6b7a585a4df5c00989, postalCode=400071, st=Maharashtra, serialNumber=9b8eace453ea4a8e7db1d40fff07af0a64b246c6f2b423604b30bc97a2c102e3, cn=Bajirao Lahu Patil
Date: 2022.06.16 14:59:38 +05'30'

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-I

PRASAD CHAND RAKANT GOSAVI
S.E.(B.P.) M-I

Nanasaheb Ramsing Kenjale
A.E.(B.P.) M

REVISION

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO. 6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

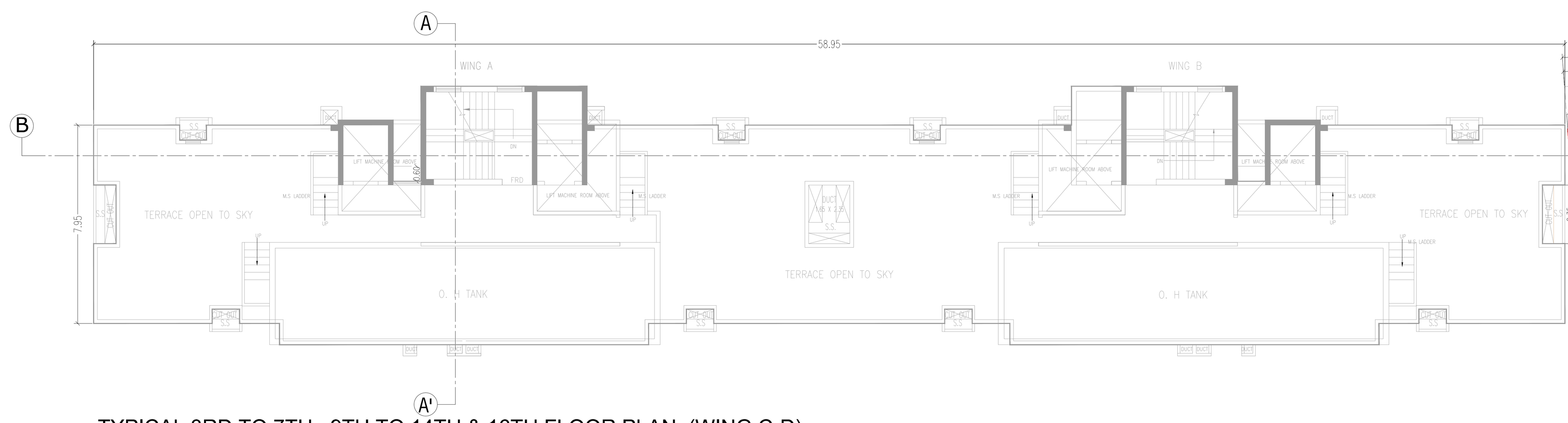
NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera (Digitally signed by Manoj Ishwarlal Ajmera, Date: 2022.06.09 17:06:06 +05'30')

DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
AME-03	9-Jun-22	AS SHOWN		GOKUL J.	RAKESH JOSHI

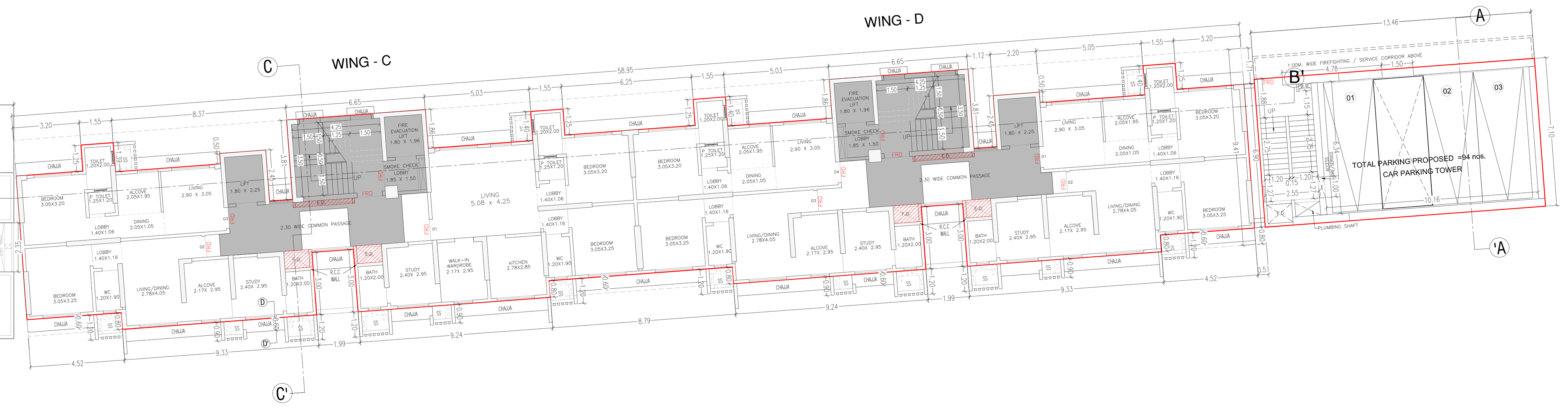
NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

Hiren S. Thakker
Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:27:53 +05'30'

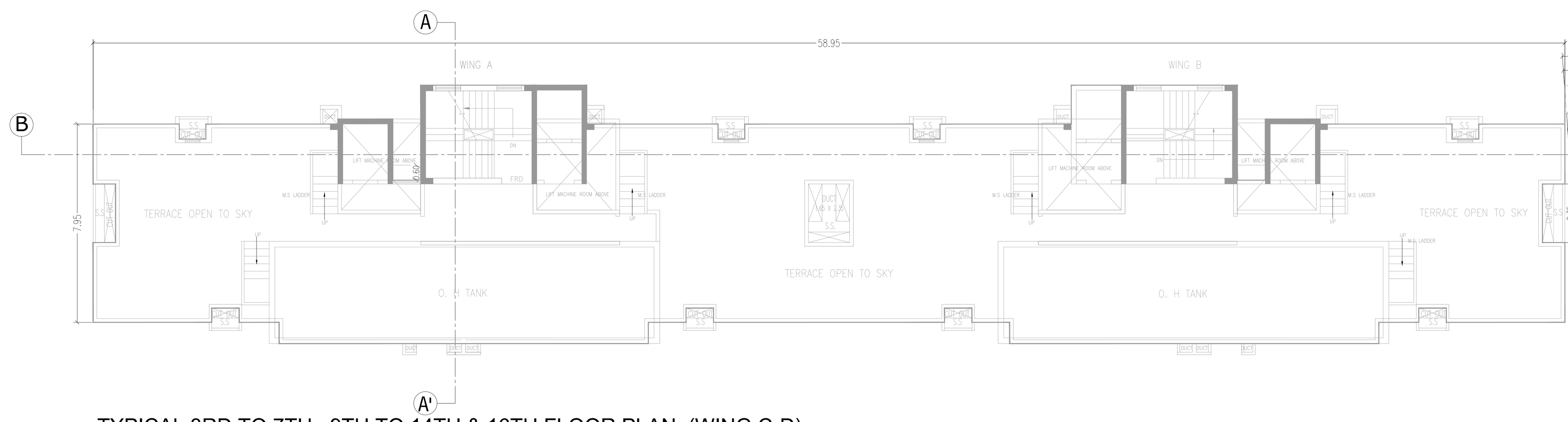
SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 27 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.



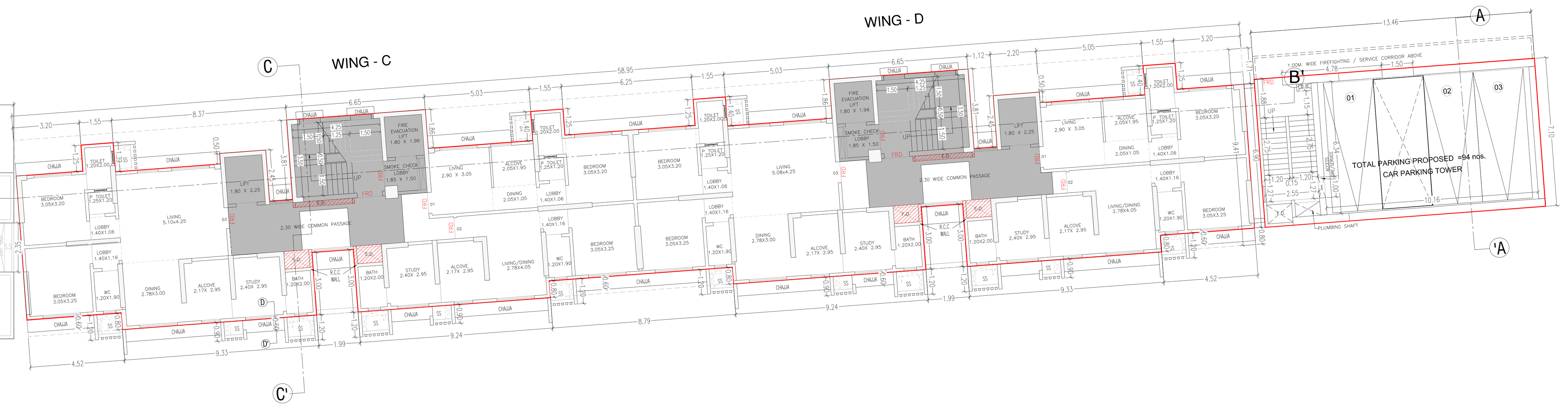
TYPICAL 3RD TO 7TH , 9TH TO 14TH & 16TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



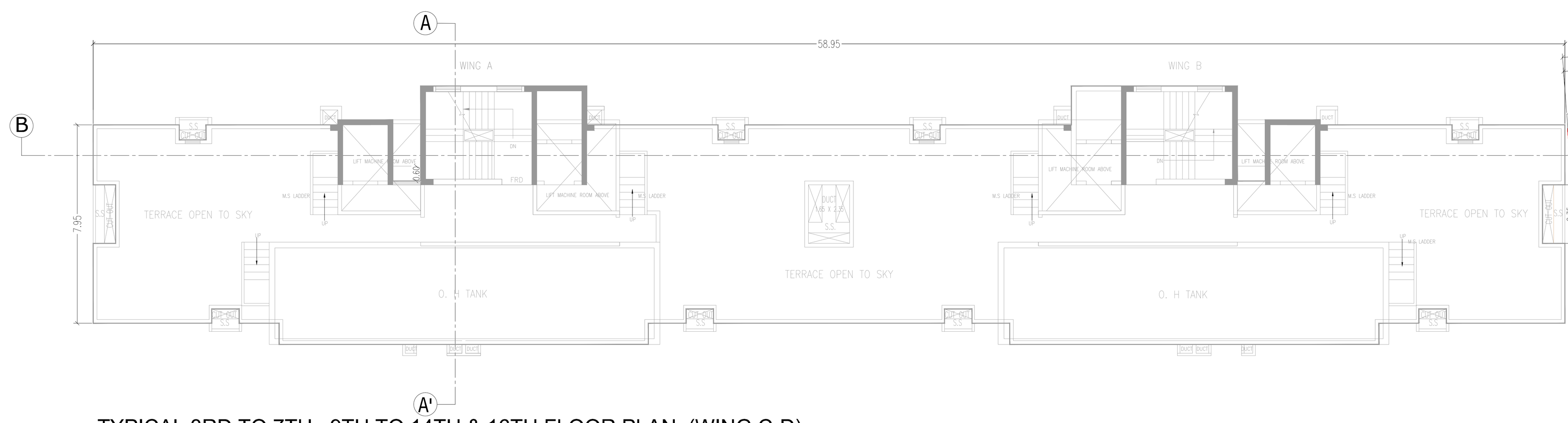
9TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



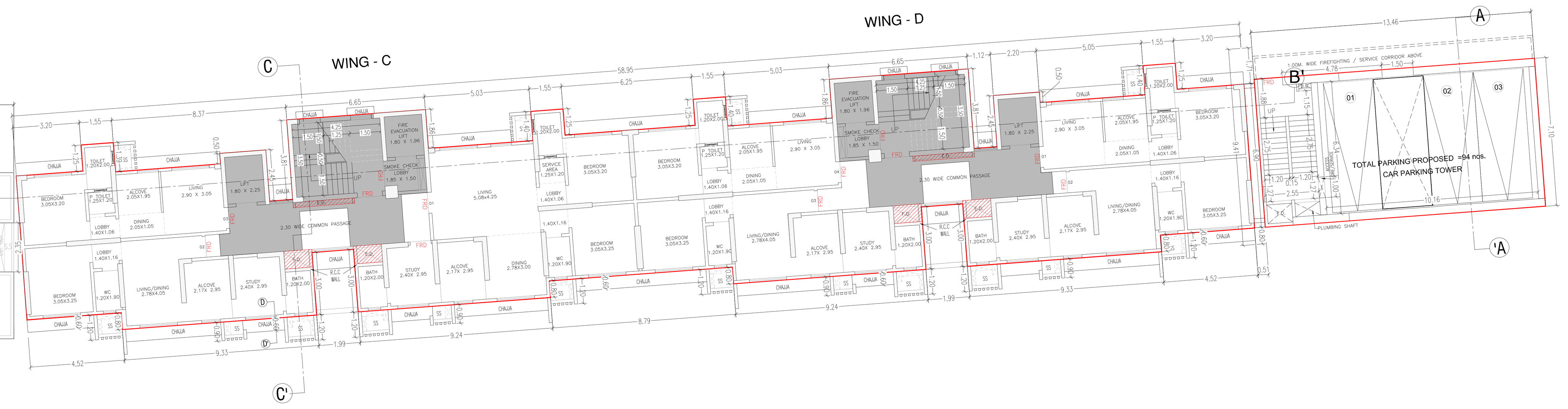
TYPICAL 3RD TO 7TH , 9TH TO 14TH & 16TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



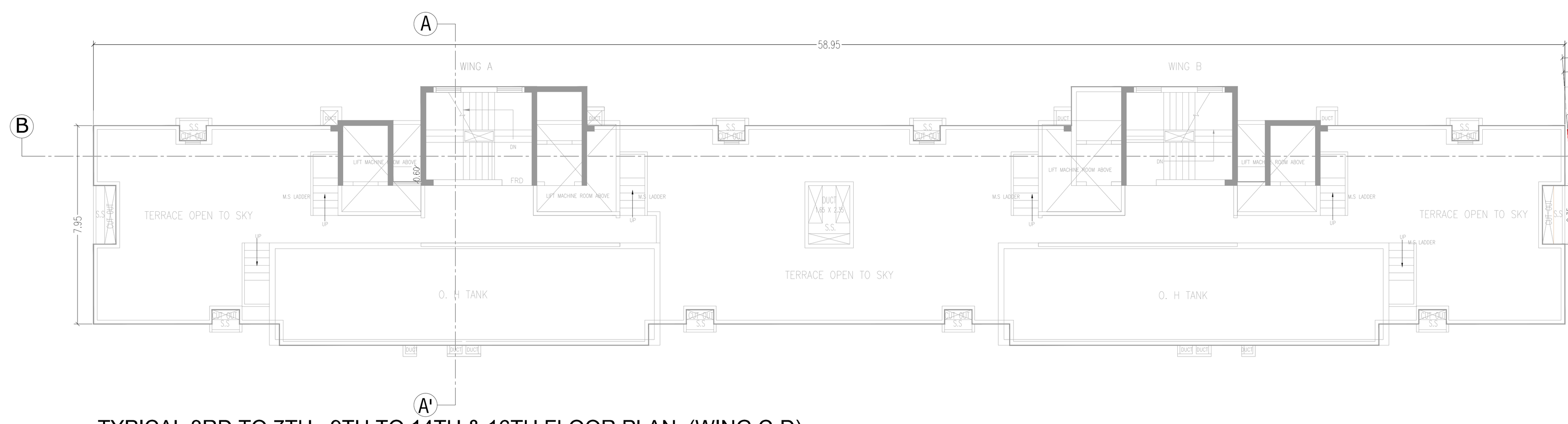
12TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



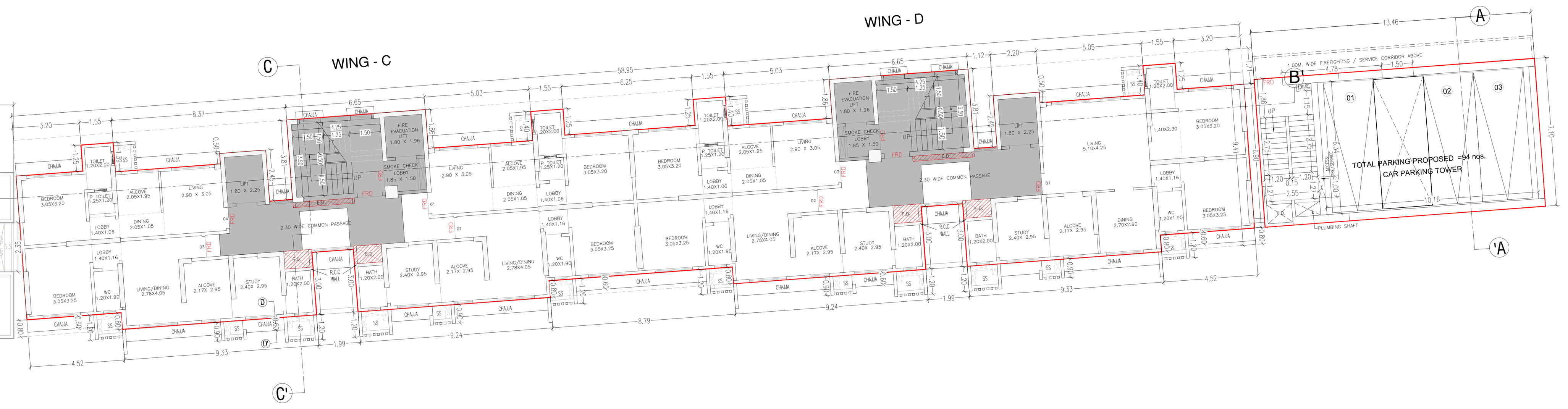
TYPICAL 3RD TO 7TH , 9TH TO 14TH & 16TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



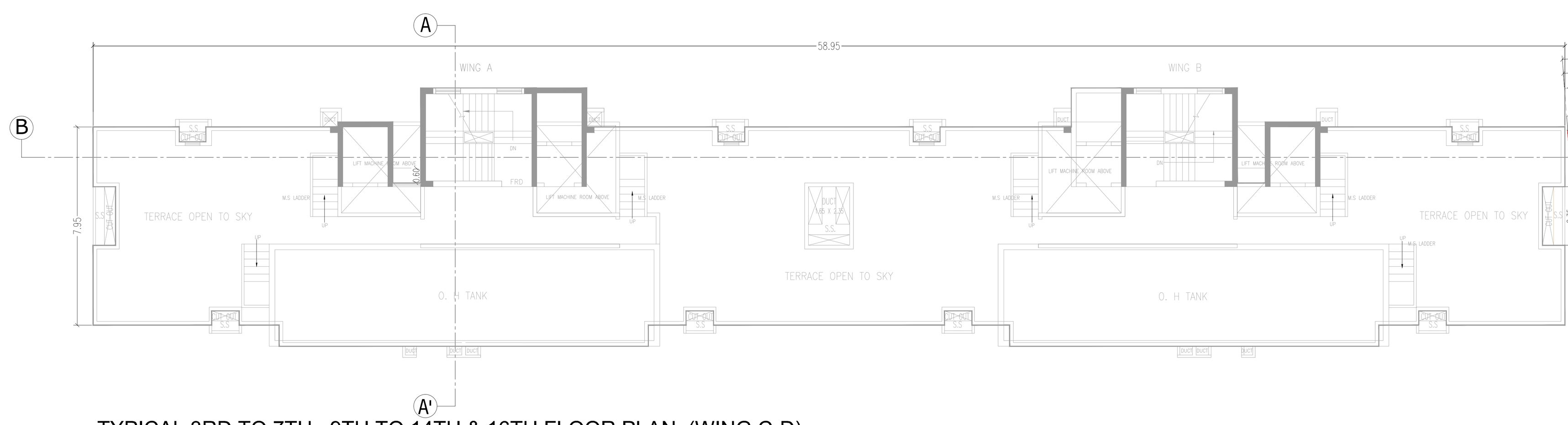
18TH FLOOR PLAN (WING C-D)



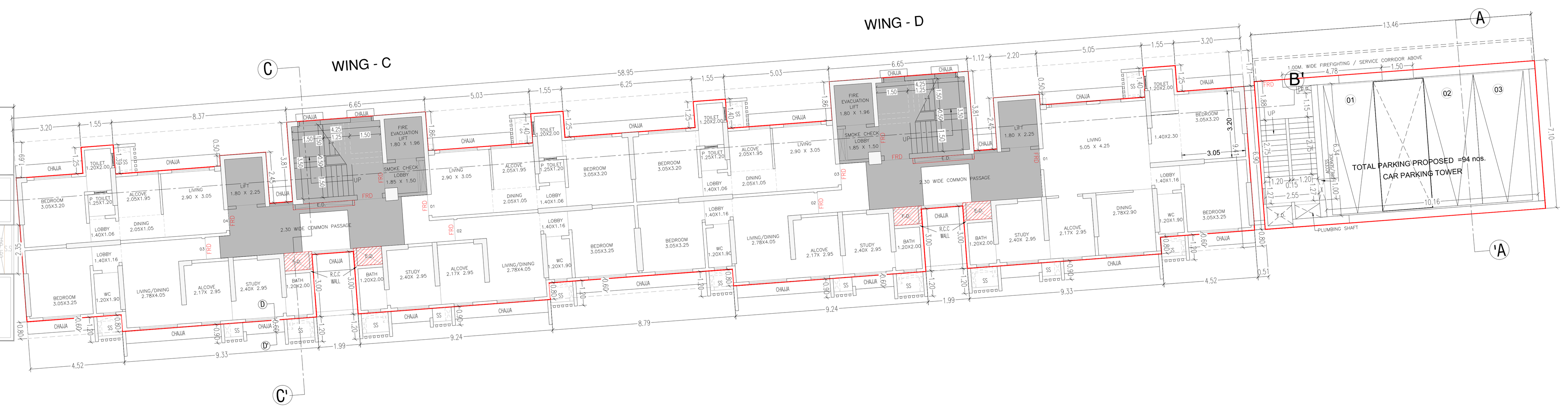
TYPICAL 3RD TO 7TH , 9TH TO 14TH & 16TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



20TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



TYPICAL 3RD TO 7TH , 9TH TO 14TH & 16TH FLOOR PLAN. (WING C-D)
SCALE - 1:100



22ND FLOOR PLAN (WING C-D)

FORM-II

CONTENTS OF SHEET

9TH, 12TH, 18TH, 20TH & 22ND FLOOR PLAN

STAMP OF APPROVAL OF PLANS

THIS CANCELS APPROVAL TO THE PREVIOUS PLANS SANCTIONED UNDER NO.CHE/ES/3635/M/337 (NEW).
DATED : 12/08/2021

APPROVED SUBJECT TO THE CONDITIONS MENTIONED IN THUS OFFICE LETTER NO. CHE/ES/3635/M/337 (NEW).

Bajirao Lahu Patil

Digitally signed by Bajirao Lahu Patil
DN: c=IN, o=Personal, 2.5.4.20=3965a1d9b42a19c66c56b95ca66522949267533b25aeac6b7a585a4df5c00989, postalCode=400071, st=Maharashtra, serialNumber=9b8eace453ea4a8e7db1d40fff07af0a64b246c6f2b423604b30bc97a2c102e3, cn=Bajirao Lahu Patil
Date: 2022.06.16 14:59:52 +05'30'

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-I

PRASAD CHAND RAKANT GOSAVI

S.E.(B.P.) M-I

Nanasaheb Ramsing Kenjale

A.E.(B.P.) M

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO.6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera

DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
MU/02	09-06-2022	AS SHOWN		GOKUL J.	RAKESH JOSHI

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

Hiren S. Thakker

Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:28:16 +05'30'

SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 27 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.

BUILT UP AREA CALCULATION FOR TYPICAL FLOOR (WING C&D)

9TH & 18TH FLR.							SQ.M	
A	58.950	X	9.41	X	1	=	554.72	A
TOTAL ADDITION						=	554.72	
DEDUCTION								
1	3.20	X	1.71	X	2	=	10.94	
2	1.55	X	0.46	X	4	=	2.85	
3	5.05	X	1.86	X	2	=	18.79	
4	2.20	X	1.36	X	2	=	5.98	
5	1.12	X	3.81	X	2	=	8.53	
6	5.03	X	1.86	X	2	=	18.71	
7	6.25	X	1.71	X	1	=	10.69	
8	8.79	X	0.80	X	1	=	7.03	
9	1.99	X	3.00	X	2	=	11.94	
10	4.52	X	0.80	X	2	=	7.23	
ED	1.35	X	0.85	X	2	=	2.30	
FD	1.35	X	0.85	X	2	=	2.30	
TOTAL X						=	107.29	X
STAIRCASE,LIFT PASSAGE AREA (WING C&D)								
ST	4.65	X	3.96	X	2	=	36.83	
L	2.20	X	0.50	X	2	=	2.20	
L1	2.05	X	2.10	X	2	=	8.61	
L2	2.00	X	1.86	X	2	=	7.44	
L3	1.85	X	2.10	X	2	=	7.77	
P	1.12	X	0.15	X	2	=	0.34	
P1	3.40	X	1.25	X	2	=	8.50	
P2	3.92	X	1.05	X	2	=	8.23	
P3	2.30	X	0.45	X	2	=	2.07	
P4	2.61	X	2.30	X	2	=	12.01	
TOTAL						=	93.99	Y
TOTAL DEDUCTION [X + Y]						=	201.29	Z
TOTAL BUILT UP AREA (A-Z)							353.43	
BUILT UP AREA PER WING = 353.44/2							176.72	

BUILT UP AREA CALCULATION FOR TYPICAL FLOOR (WING C)

12TH FLR.							SQ.M	
A	29.475	X	9.41	X	1	=	277.36	A
TOTAL ADDITION						=	277.36	
DEDUCTION								
1	3.20	X	1.71	X	1	=	5.47	
2	1.55	X	0.46	X	2	=	1.43	
3	5.05	X	1.86	X	1	=	9.39	
4	2.20	X	1.36	X	1	=	2.99	
5	1.12	X	3.81	X	1	=	4.27	
6	5.03	X	1.86	X	1	=	9.36	
7A	3.125	X	1.71	X	1	=	5.34	
8A	4.395	X	0.80	X	1	=	3.52	
9	1.99	X	3.00	X	1	=	5.97	
10	4.52	X	0.80	X	1	=	3.62	
ED	1.35	X	0.85	X	1	=	1.15	
FD	1.35	X	0.85	X	1	=	1.15	
TOTAL X						=	53.65	X
STAIRCASE,LIFT PASSAGE AREA (WING C)								
ST	4.65	X	3.96	X	1	=	18.41	
L	2.20	X	0.50	X	1	=	1.10	
L1	2.05	X	2.00	X	1	=	4.10	
L2	2.00	X	1.86	X	1	=	3.72	
L3	1.85	X	2.10	X	1	=	3.89	
P	1.12	X	0.15	X	1	=	0.17	
P3	2.30	X	0.45	X	1	=	1.04	
P4	2.61	X	2.30	X	1	=	6.00	
P5	3.40	X	2.30	X	1	=	7.82	
TOTAL						=	46.25	Y
TOTAL DEDUCTION AREA							100.10	Z
TOTAL BUILT UP AREA (A-Z)							177.26	1

BUILT UP AREA CALCULATION FOR TYPICAL FLOOR (WING C)

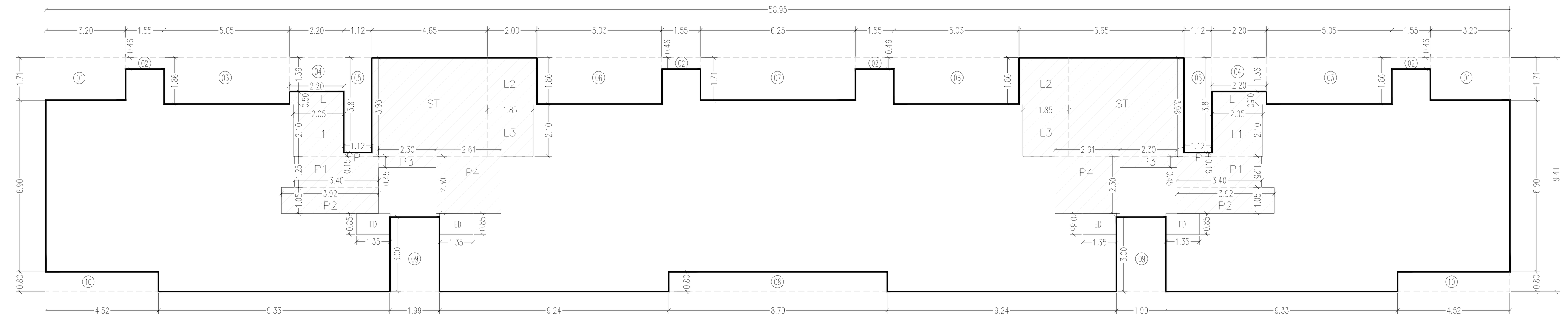
20TH & 22ND FLOOR							SQ.M	
A	29.475	X	9.41	X	1	=	277.36	A
TOTAL ADDITION						=	277.36	
DEDUCTION								
1	3.20	X	1.71	X	1	=	5.47	
2	1.55	X	0.46	X	2	=	1.43	
3	5.05	X	1.86	X	1	=	9.39	
4	2.20	X	1.36	X	1	=	2.99	
5	1.12	X	3.81	X	1	=	4.27	
6	5.03	X	1.86	X	1	=	9.36	
7A	3.125	X	1.71	X	1	=	5.34	
8A	4.395	X	0.80	X	1	=	3.52	
9	1.99	X	3.00	X	1	=	5.97	
10	4.52	X	0.80	X	1	=	3.62	
ED	1.35	X	0.85	X	1	=	1.15	
FD	1.35	X	0.85	X	1	=	1.15	
TOTAL X						=	53.65	X
STAIRCASE,LIFT PASSAGE AREA (WING C)								
ST	4.65	X	3.96	X	1	=	18.41	
L	2.20	X	0.50	X	1	=	1.10	
L1	2.05	X	2.10	X	1	=	4.31	
L2	2.00	X	1.86	X	1	=	3.72	
L3	1.85	X	2.10	X	1	=	3.89	
P	1.12	X	0.15	X	1	=	0.17	
P1	3.40	X	1.25	X	1	=	4.25	
P2	3.92	X	1.05	X	1	=	4.12	
P3	2.30	X	0.45	X	1	=	1.04	
P4	2.61	X	2.30	X	1	=	6.00	
TOTAL						=	47.00	Y
TOTAL DEDUCTION [X + Y]						=	100.64	Z
TOTAL BUILT UP AREA (A-Z)							176.72	1

BUILT UP AREA CALCULATION FOR TYPICAL FLOOR (WING D)

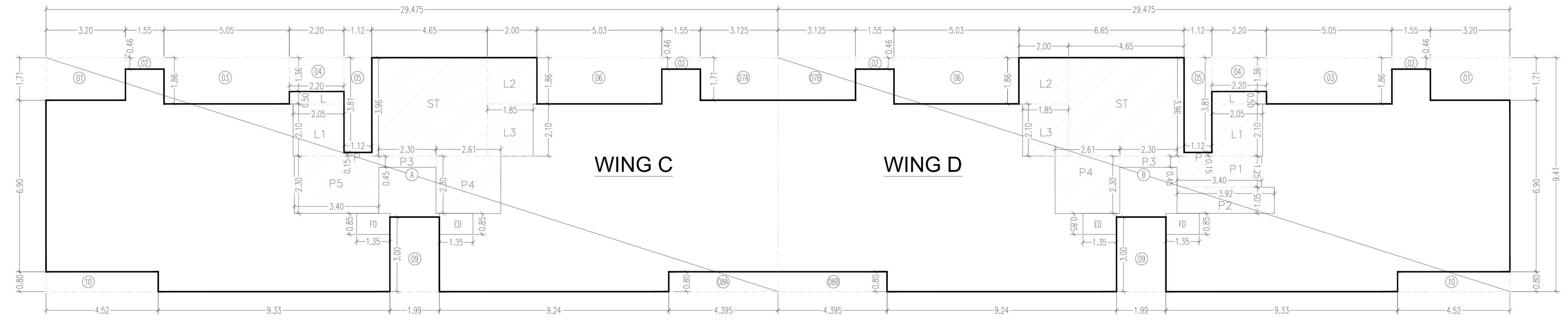
12TH FLR.							SQ.M	
B	29.475	X	9.41	X	1	=	277.36	A
TOTAL ADDITION						=	277.36	
DEDUCTION								
1	3.20	X	1.71	X	1	=	5.47	
2	1.55	X	0.46	X	2	=	1.43	
3	5.05	X	1.86	X	1	=	9.39	
4	2.20	X	1.36	X	1	=	2.99	
5	1.12	X	3.81	X	1	=	4.27	
6	5.03	X	1.86	X	1	=	9.36	
7A	3.125	X	1.71	X	1	=	5.34	
8A	4.395	X	0.80	X	1	=	3.52	
9	1.99	X	3.00	X	1	=	5.97	
10	4.52	X	0.80	X	1	=	3.62	
ED	1.35	X	0.85	X	1	=	1.15	
FD	1.35	X	0.85	X	1	=	1.15	
TOTAL X						=	53.65	X
STAIRCASE,LIFT PASSAGE AREA (WING D)								
ST	4.65	X	3.96	X	1	=	18.41	
L	2.20	X	0.50	X	1	=	1.10	
L1	2.05	X	2.10	X	1	=	4.31	
L2	2.00	X	1.86	X	1	=	3.72	
L3	1.85	X	2.10	X	1	=	3.89	
P	1.12	X	0.15	X	1	=	0.17	
P1	3.40	X	1.25	X	1	=	4.25	
P2	3.92	X	1.05	X	1	=	4.12	
P3	2.30	X	0.45	X	1	=	1.04	
P4	2.61	X	2.30	X	1	=	6.00	
TOTAL						=	47.00	Y
TOTAL DEDUCTION [X + Y]						=	100.64	Z
TOTAL BUILT UP AREA (A-Z)							176.72	2
TOTAL BUA OF 12TH FLR. (WING C&D) (1+2)							353.98	

BUILT UP AREA CALCULATION FOR TYPICAL FLOOR (WING D)

20TH & 22ND FLOOR							SQ.M	
A	29.475	X	9.41	X	1	=	277.36	A
TOTAL ADDITION						=	277.36	
DEDUCTION								
1	3.20	X	1.71	X	1	=	5.47	
2	1.55	X	0.46	X	2	=	1.43	
3	5.05	X	1.86	X	1	=	9.39	
4	2.20	X	1.36	X	1	=	2.99	
5	1.12	X	3.81	X	1	=	4.27	
6	5.03	X	1.86	X	1	=	9.36	
7A	3.125	X	1.71	X	1	=	5.34	
8A	4.395	X	0.80	X	1	=	3.52	
9	1.99	X	3.00	X	1	=	5.97	
10	4.52	X	0.80	X	1	=	3.62	
ED	1.35	X	0.85	X	1	=	1.15	
FD	1.35	X	0.85	X	1	=	1.15	
TOTAL X						=	53.65	X
STAIRCASE,LIFT PASSAGE AREA (WING C&D)								
ST	4.65	X	3.96	X	1	=	18.41	
L	2.20	X	0.50	X	1	=	1.10	
L1	2.05	X	2.10	X	1	=	4.31	
L2	2.00	X	1.86	X	1	=	3.72	
L3	1.85	X	2.10	X	1	=	3.89	
P	1.12	X	0.15	X	1	=	0.17	
P3	2.30	X	0.45	X	1	=	1.04	
P4	2.61	X	2.30	X	1	=	6.00	
P5	3.40	X	2.30	X	1	=	7.82	
TOTAL						=	46.45	Y
TOTAL DEDUCTION [X + Y]						=	100.10	Z
TOTAL BUILT UP AREA (A-Z)							177.26	2
TOTAL BUA OF 20TH & 22ND FLR. (WING C&D) (1+2)							353.98	



LINE DIAGRAM OF 9TH & 18TH FLOOR PLAN. (WING- C -D)
SCALE - 1:100



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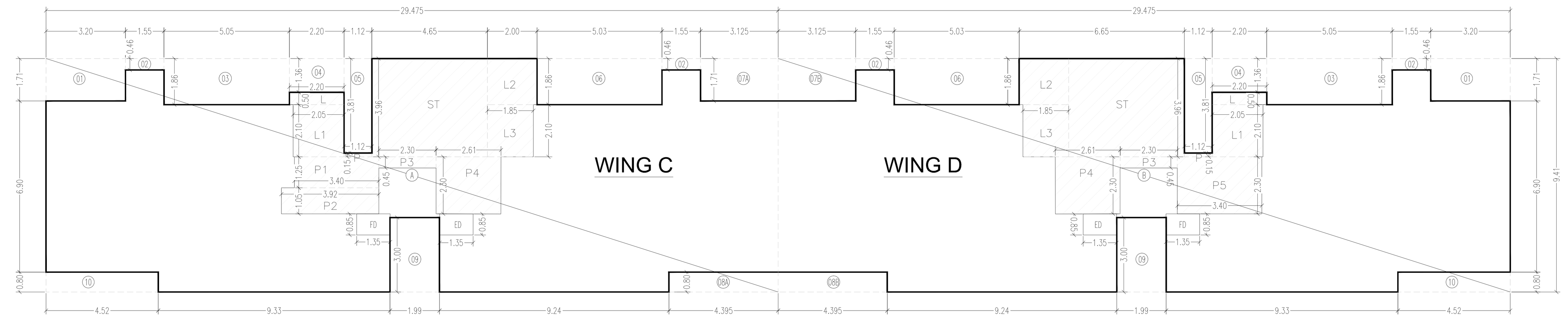


LINE DIAGRAM 20TH & 22ND FLOOR PLAN. (WING- C -D)
SCALE - 1:100

FORM-II

05/06

CONTENTS OF SHEET

LINE DIAGRAM WITH CALCULATION OF 9TH, 12TH, 18TH, 20TH & 22ND FLOOR PLAN

STAMP OF APPROVAL OF PLANS

THIS CANCELS APPROVAL TO THE PREVIOUS PLANS SANCTIONED UNDER NO. CHE/ES/3635/M/337 (NEW). DATED : 12/08/2021

APPROVED SUBJECT TO THE CONDITIONS MENTIONED IN THUS OFFICE LETTER NO. CHE/ES/3635/M/337 (NEW).

Bajirao Lahu Patil

Digitally signed by Bajirao Lahu Patil
DN: c=IN, o=Personal, 2.5.4.20=3965a1d9b42a19c66c56b95ca66522949267533b25aeac6b7a585a4df5c00989, postalCode=400071, st=Maharashtra, serialNumber=9b8eace453ea4a8e7db1d40fff07af0a64b246c6f2b423604b30bc97a2c102e3, cn=Bajirao Lahu Patil
Date: 2022.06.16 15:00:08 +05'30'

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-I

PRASAD CHANDRAKANT GOSAVI

S.E.(B.P.) M-I

Nanasaheb Ramsing Kenjale

A.E.(B.P.) M

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO.6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera

Digitally signed by Manoj Ishwarlal Ajmera
DN: c=IN, o=Personal, 2.5.4.20=53163f8040c149e2a9bed59204bbe2e99d25a1f6fb7149578c7913b1446efd2f, postalCode=400077, st=Maharashtra, serialNumber=c07510bb49235b661d5cdc9029ece2c90bbd1ef98ce5bb4f902d19a58fe772f4, cn=Manoj Ishwarlal Ajmera
Date: 2022.06.09 17:07:06 +05'30'

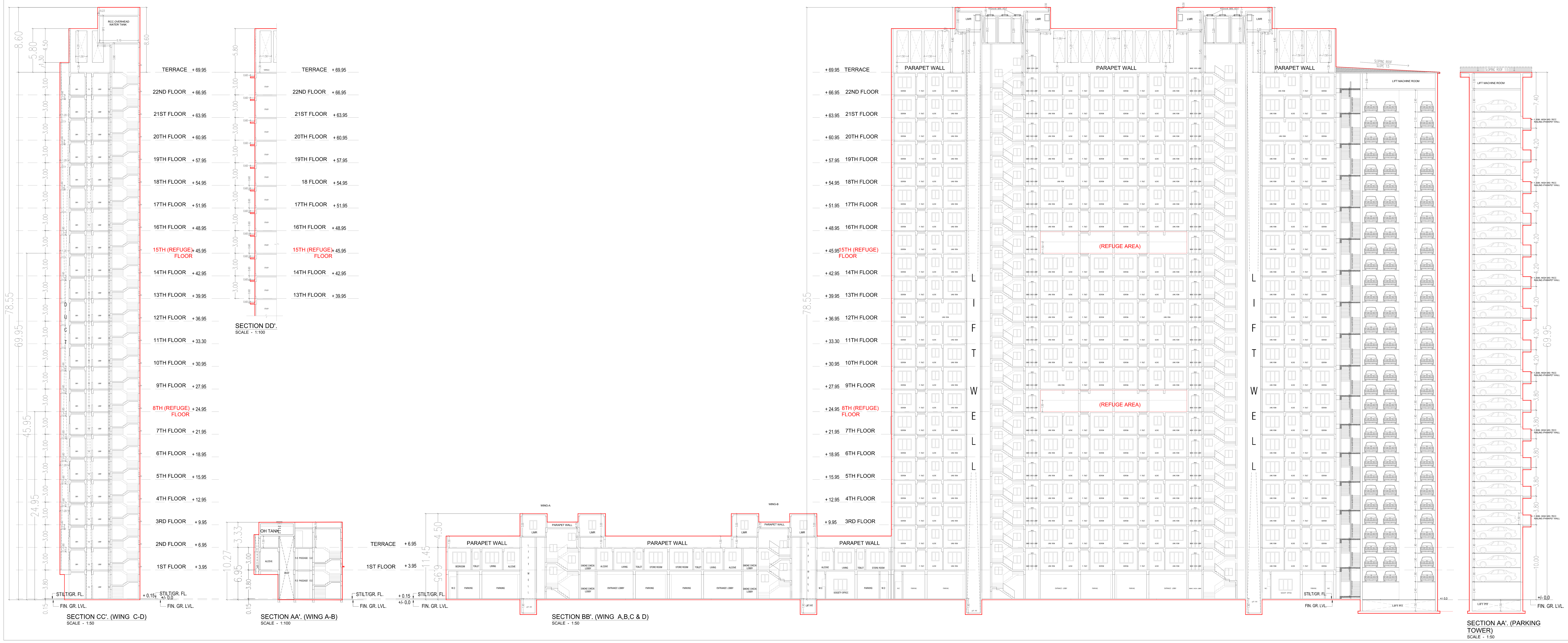
DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
MU/02	09-06-2022	AS SHOWN		GOKUL J.	RAKESH JOSHI

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

Hiren S. Thakker

Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:28:36 +05'30'

SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 27 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.



FORM-II

CONTENTS OF SHEET

SECTION A-A' , B-B' , C-C' , D-D' & TOWER PARKING SECTION A-A'

STAMP OF APPROVAL OF PLANS

THIS CANCELS APPROVAL TO THE PREVIOUS PLANS SANCTIONED UNDER NO.CHE/ES/3635/M/337 (NEW). DATED : 12/08/2021

APPROVED SUBJECT TO THE CONDITIONS MENTIONED IN THUS OFFICE LETTER NO. CHE/ES/3635/M/337 (NEW).

Bajirao Lahu Patil

Digitally signed by Bajirao Lahu Patil
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Date: 2022.06.16 15:00:24 +05'30'

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-I

PRASAD CHANDRAKANT GOSAVI

S.E.(B.P.) M-I

Nanasaheb Ramsing Kenjale

A.E.(B.P.) M

REVISION

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO.6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera

DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
AME-04	09-06-2022	AS SHOWN		GOKUL J.	RAKESH JOSHI

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

Hiren S. Thakker

Digitally signed by Hiren S. Thakker
DN: cn=Hiren S. Thakker, o=H. S. Thakker and Associates, ou, email=svtarchitects@yahoo.com, c=IN
Date: 2022.06.09 17:29:01 +05'30'

SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 27 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.

Ar. Shalu Varma
Architect

1602 B Wing, Dev Prestige, Veera Desai Road, Andheri (W), Mumbai – 400 053 Tel./Fax : 8669837603E-mail : shaluv1973@gmail.com

DATE: 02/08/2023

TO WHOM EVER IT MAY CONCERN

Certificate stating the current status of Construction for the project "Bhakti Park "in accordance with the Environmental Clearance received on date 26/02/2022

Dear Sir,

This construction Status certificate is being issued for the following project:

Project Name: AJMERA BHAKTI PARK

Project Location: Sub plot A of approved layout of Bhakti Park on land bearing CTS No 1A/1, 1A/2, 1A/3 and 1A/6 of village, Chembur (MW Ward), Wadala (E), Mumbai.

Project Proponent: M/s Ajmera Realty & Infra India Ltd

The above-mentioned project received Environmental Clearance on date 26/02/2022 from EAC (MoEF & CC) for the total **proposed built up area 3,02,906.9 Sq.mt**. (1,41,724.75 Sqmt FSI + 161,182.15 Sqmt Non FSI area).

The status of the work at site as on date is as under.

		AS PER EC DATED 26/02/2022						STATUS AS ON 02/08/2023					
Sr No	Building Designation	Wing	Configuration	Units	FSI ARE	NON FSI AREA	TOTAL BUA	Wing	Config.	Units	FSI ARE	NON FSI AREA	TOTAL BUA
1	Building No 1	2	B+S+G+8P+ 30	224	38754.8	45405.2	84160.0	2	B+S+G+ 8P+ 30	224	38754.8	45405.2	84160
2	Building No 2	2	B+S+G+5P+ 34	262	40792.9	40127.2	80920.0	2	B+S+G+ 5P+ 34	262	40792.9	40127.2	80920
3	Building No 3	4	3B+S/G+8P+ Edeck+ 35	540	54430.4	70620.6	125051.0	4	3B(pt)	0.0	0.0	6091	6091
6	Building no 6 (Wing A,B,C & D)	4	S + 22 and S+ 1	184	7746.7	5029.2	12775.9	2	Wing C&D(S + 22)	172	7597.3	4091.9	11689.2
7	Total			1210	141724.8	161182.1	302906.9			658	87144.9	95715.3	182860.8

Ar. Shalu Varma
Architect

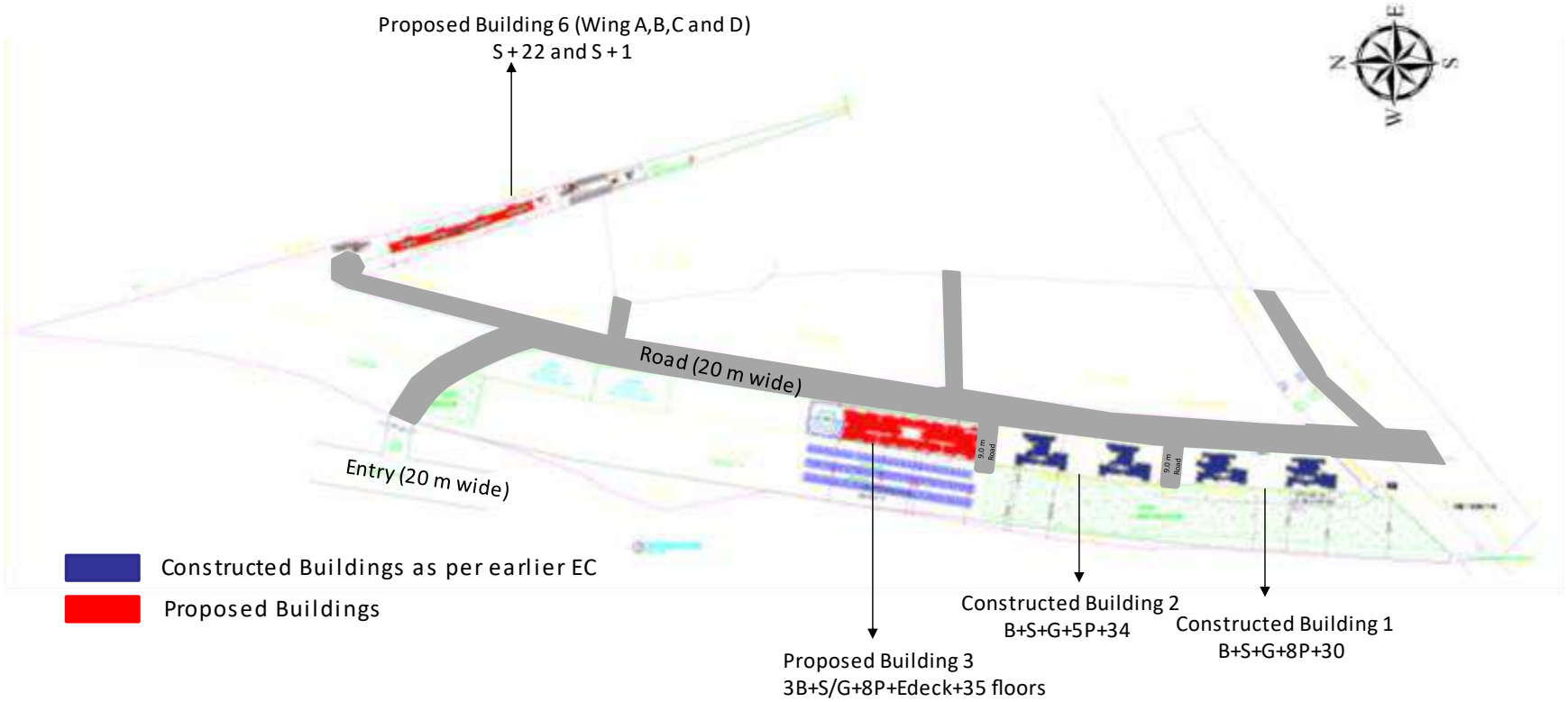
1602 B Wing, Dev Prestige, Veera Desai Road, Andheri (W), Mumbai – 400 053 Tel./Fax : 8669837603E-mail : shaluv1973@gmail.com

Total BUA constructed 182860.8 sqmt (87144.9 sqmt FSI + 95715.3 Sqmt NON FSI) based on last amended Building plans sanctioned by the Municipal Corporation of Greater Mumbai vide CHE/ES/MW/337(NEW) Date: 16/06/2022.

Yours faithfully,

Architect Shalu Varma
(LIS No CA/97/22431)

PROPOSED LAYOUT



Low Temperature Catalysis

Air Cleaning System

For Basement

Manhattan Bldg. No. 3, Ajmera Bhakti Park
Wadala, Mumbai

Dr. Ajay Ojha

Environment Setting - Basement 3

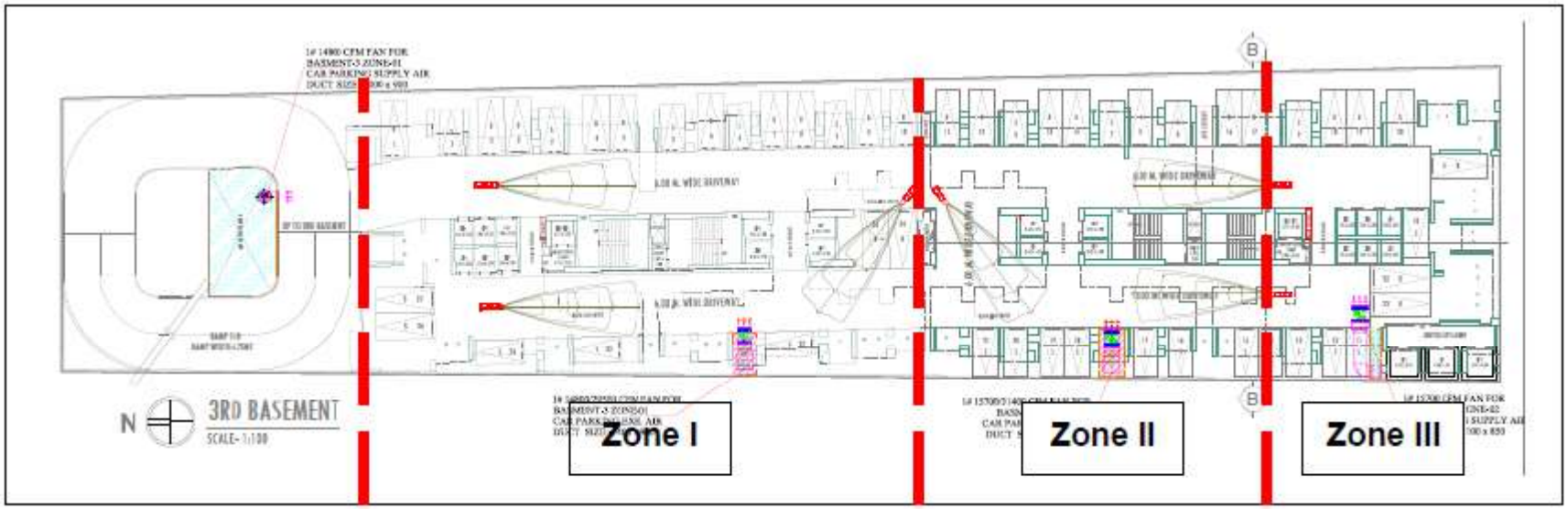
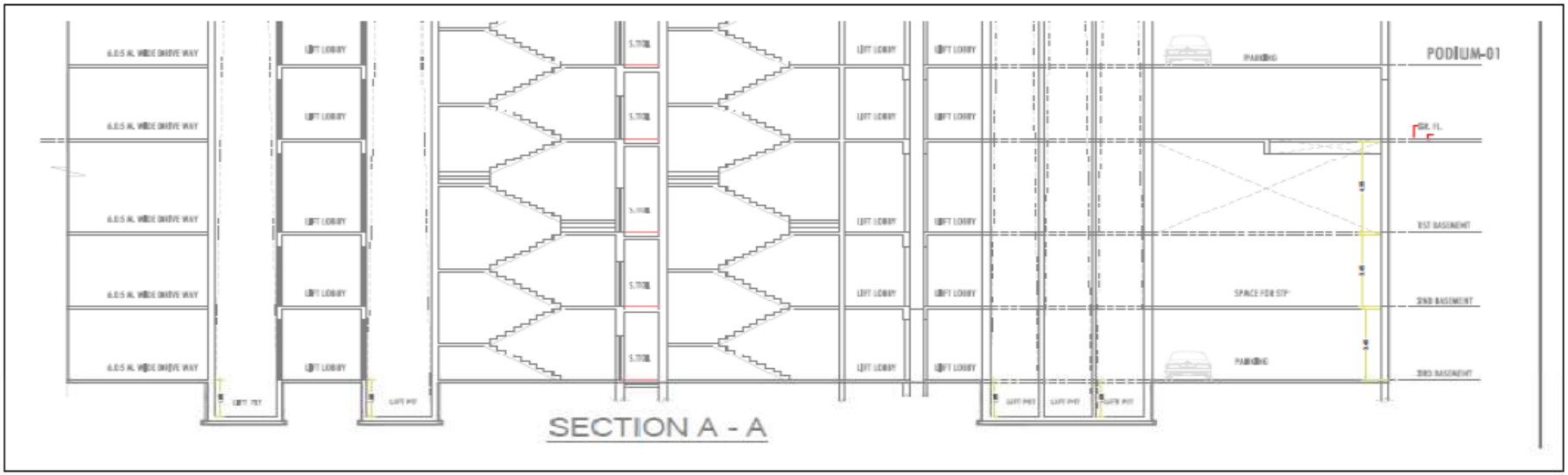


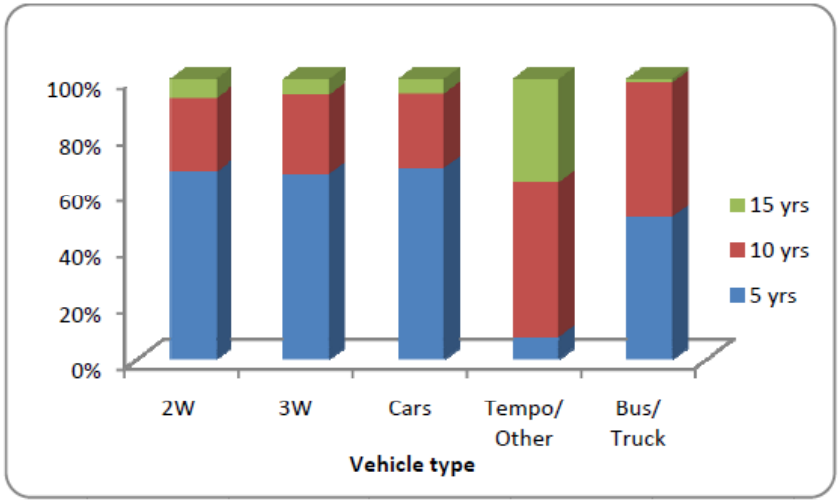
Table 1 **Parking Area Statement & Car Parks**

Floor	Effective Parking Area (m^2)	Parking Nos.
Basement 3	2,960	51
Basement 2	2,960	41
Basement 1	2,960	41
	Total Car Parks Proposed	**133**

Elevation



Emissions Inventory



Activity

- Number of Parking lots = 133
- Age & Fuel Distribution = RTO (15yr data)
- Vehicle Idling time =20sec
- Peak Hour = 2 hours each in mor/eve
- VKT =Cumulative of extreme end parks (130m)

PV-D %	PV - G %
40	60

Emissions Inventory

Emission Factors

EF for Idling (g/s)

Pollutant	Units	LDGV	LDDV
CO	g/s	0.103	0.003
HC	g/s	0.006	0.001
NOx	g/s	0.002	0.002
PM	g/s		0.001

Emission Facts: Idling Vehicle Emissions (EPA420-F-98-014; April 1998)

EF for Travel (gm/vkt)

Age	5 yrs	10 yrs	15 yrs	5 yrs	10 yrs	15 yrs
Fuel	PV -G	PV -G (BS I)	PV - G	PV - D	PV - D (BS-II)	PV - D (BS-II)
CO	0.84	2.74	4.825	0.06	0.3	0.3
HC	0.12	0.19	0.58	0.08	0.26	0.26
NOx	0.09	0.21	0.645	0.28	0.49	0.49
PM	0.002	0.006	0.0195	0.015	0.06	0.06

Air Quality Monitoring Project- Indian Clean Air Programme, 2007", ARAI

Emissions Estimates

Table 4 Baseline Emission Estimates (gm/peak period)

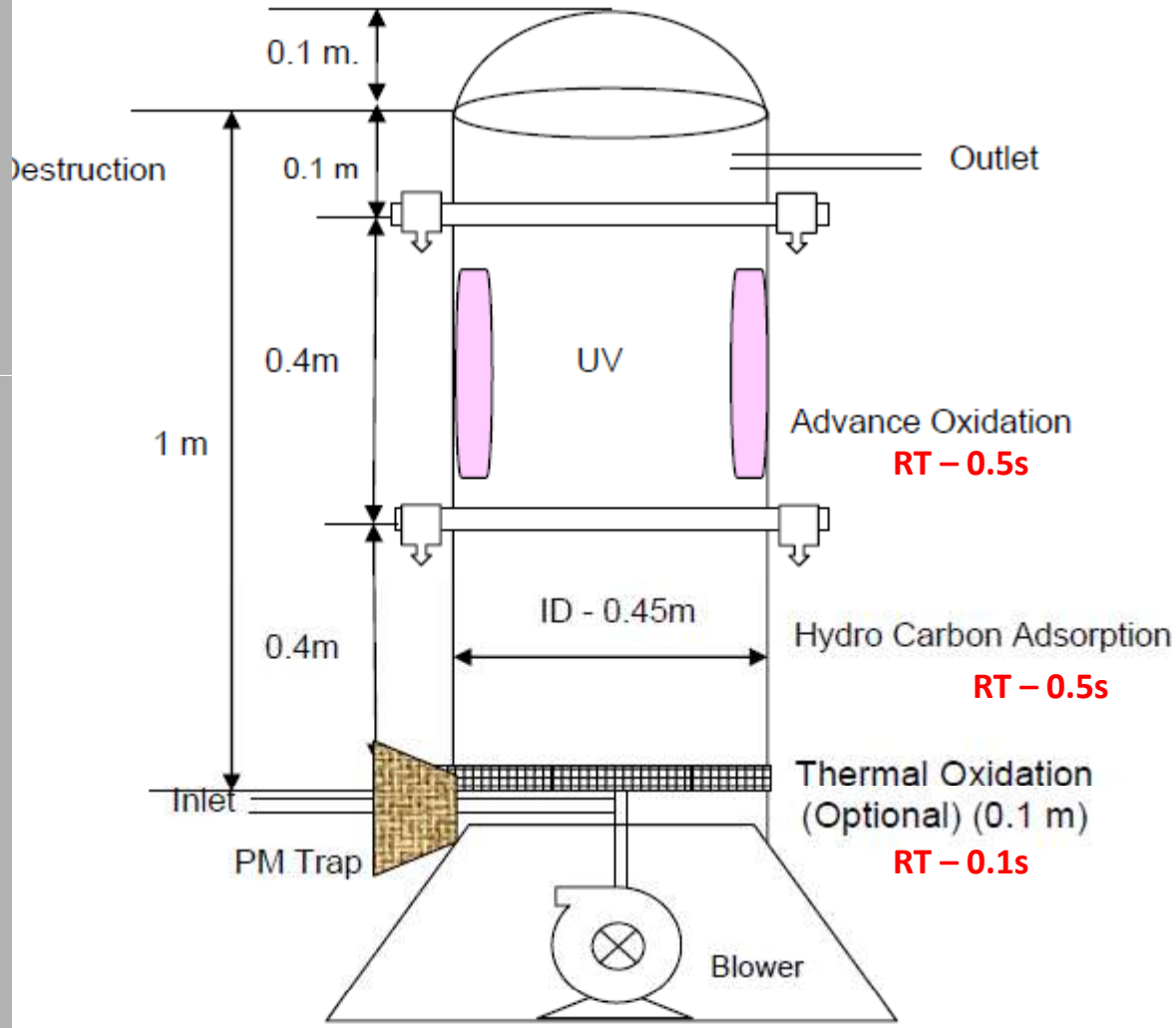
Floor	From Travelling				From Idling			
	CO	HC	NOx	PM_{10}	CO	HC	NOx	PM_{10}
Basement 3	10.15	1.57	2.36	0.15	12.97	0.81	0.36	0.06
Basement 2	6.71	1.04	1.56	0.10	8.57	0.53	0.24	0.04
Basement 1	5.25	0.81	1.22	0.08	6.71	0.42	0.19	0.03

Table 7 Grouped Pollutant Emissions ($\mu g/m^3/s$)

Floor	CO	HC	NOx	PM_{10}
Basement 3	0.314	0.032	0.037	0.003
Basement 2	0.208	0.021	0.024	0.002
Basement 1	0.116	0.012	0.014	0.001

Design Philosophy

- Min. Air Vel. – 0.1 – 0.3m/s @GL
- Blower – 400m^3/h@ 4000mmWC
- Alignment – 0.3m Above GL
- Particle Trap (Filter)
- Synchronized Actuated Valve
- Design Flow – 0.167m^3/s
- PM_{10} removal – 0.004g/d (Reqd.)
- Fluidized Bed - Nano Crystal coated TiO_2
- Self Regeneration
- Air Exchange Cycle – 6.0Hrs/Unit
- PLC Based on Co concentration
  - I/O – 48/38 DI/DO
- Fluidized Carbon – 1500m^2/gm SA & 0.58gm/cc density



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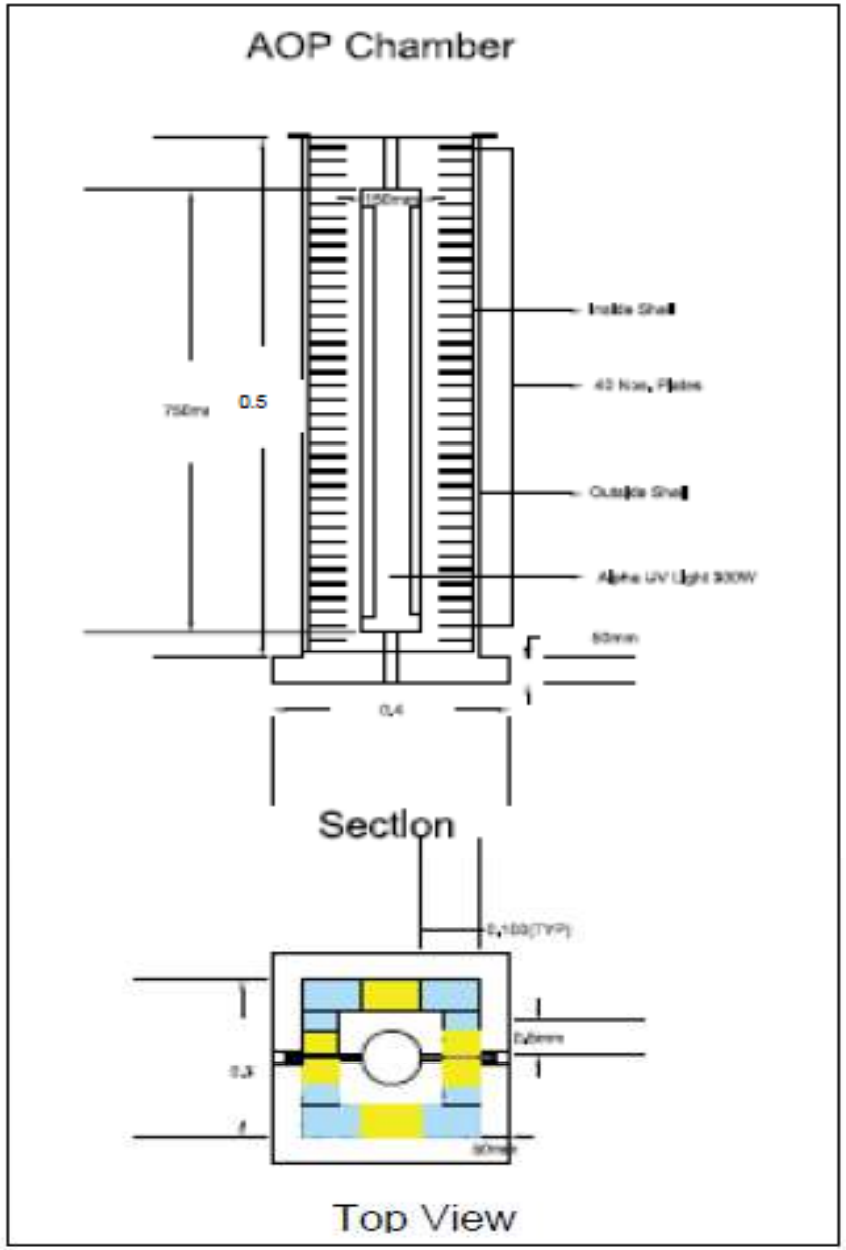
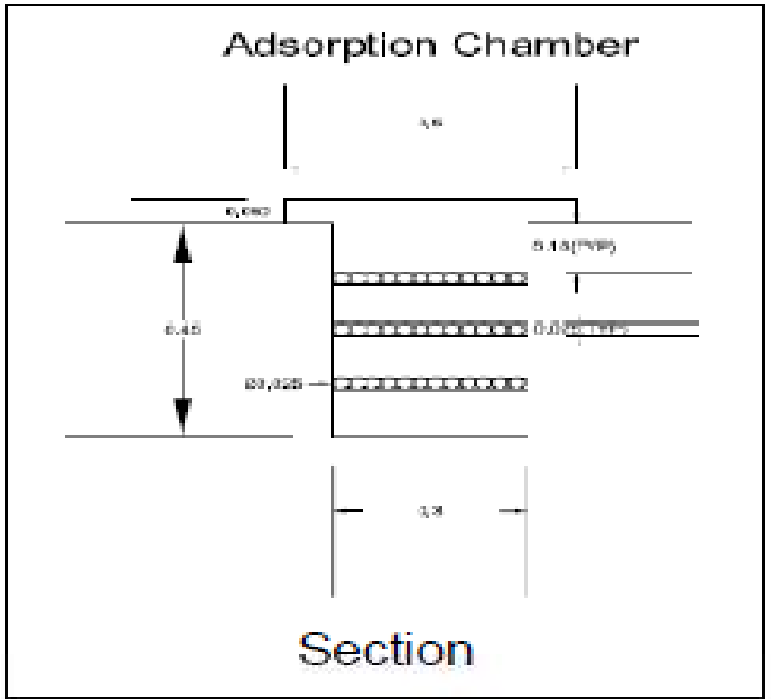
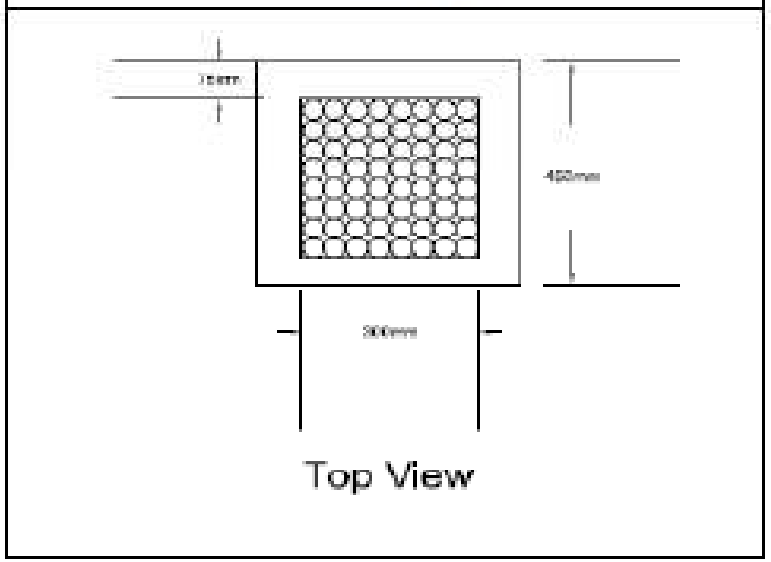
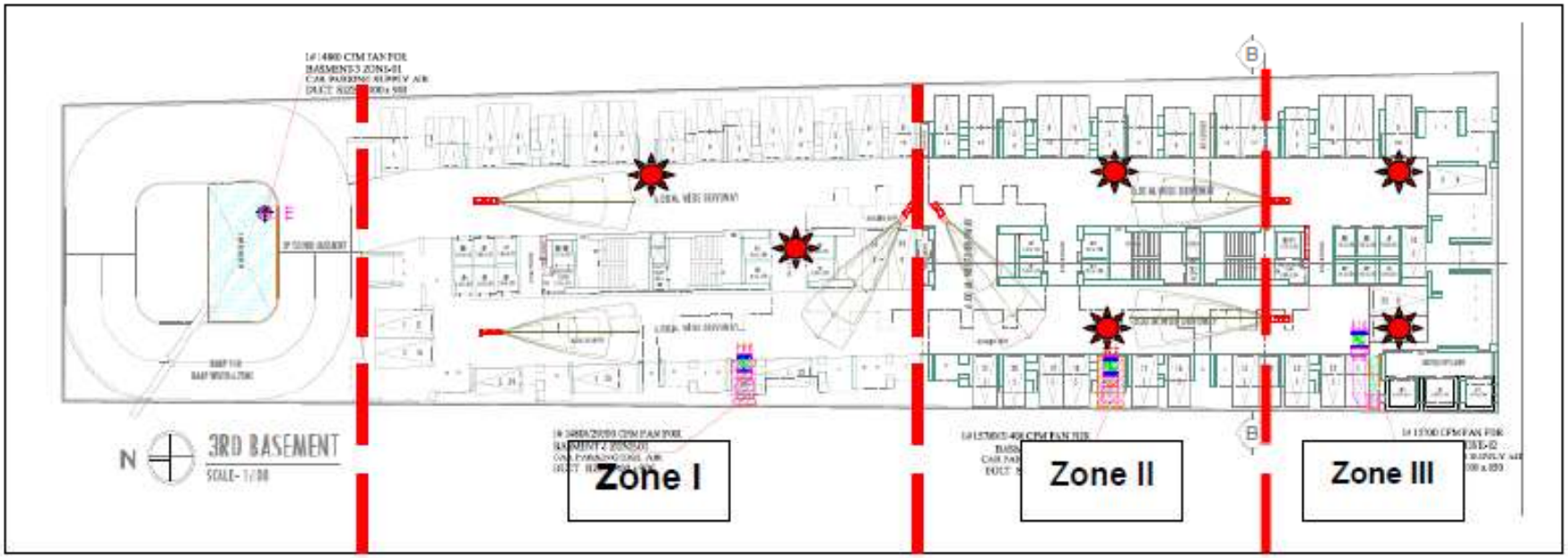






General Arrangement



Standalone Units

Financial Commitment

Capex

- 4.5 to 5.0Lakhs/Unit
  (Without Online Monitors)

Opex

– Power – 36KWH/Day *(12h working)*
  - Rs. 6,50,000/Year for all Units @ Rs. 6.0/unit

– Air Filter Replacement / 3 - 6 Months
  - Rs.500 – 700/Unit = Rs. 6,000/year for all Units

– Re-activation of C
  - Rs. 12,000/Year for all Units

Total Cost of O&M = 6,70,000/year


TECHNOGREEN ENVIRONMENTAL SOLUTIONS
9
TECHNOGREEN ENVIRONMENTAL SOLUTIONS

Thank You

*

2021

Dr. Ajay Ojha

Environment Consultant

Ajmera Bhakti Park, Manhattan - Wadala

[Low Temperature Catalysis for Air Pollution Mitigation in Parking Spaces]

Parking Spaces related pollution has been a neglected area of concern for long and it is the vision of some authorities including initiatives from some selected visionary Developers that such systems are in need now especially in buildings with basement in Mumbai. Conventionally though ventilation have found its way as one of the most applied systems for minimum air exchanges, these have only resulted in minimal dilution of pollutants and further dispersal into atmosphere out of the limited parking spaces. The present report details out a unique methodology using low temperature catalysis with a combination of Advanced Oxidation Process, Adsorption and Thermal Destruction as one of the pioneering technologies for air pollution cleansing in parking spaces of Ajmera Bhakti Park – Manhattan project, located in Wadala, Mumbai. The study also attempts at calculating emissions from parked vehicles assuming idling and travel within the parking space throughout the basement and out thereby asserting conditions of Worst Case Scenario and treatment of pollutants therein

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1.0 Preamble

Manhattan project of Ajmera Bhakti Park, Wadala envisages issues of pollution in its parking areas i.e. 3 Basements providing 133 parking spaces for 4W cars which may lead to complications of severe origins as concerned by the officials. Theoretical and logical analysis shows that these parking of cars in a low footprint & enclosed area might lead to accumulation of pollution to the unsafe levels and creation of bottlenecks leading to excessive concentration build-up at almost all levels of parking that may form considerable concerns.

The Developer already has mandate from various authorities as well as has taken initiative of ventilation especially with regards to Fire Prevention and central ventilation to achieve 6 air exchanges as per standard requirements of law. However, the concept of air exchanges only amounts to dilution & spreading of pollutants out of the parking area untreated and thereby seems to be incomplete. The Developer has now engaged into preparing a comprehensive pollution abatement plan for pollutants arising from parking area and is represented in this report.

1.1 Introduction

While most media attention has focused on outdoor air pollution in the last few years, indoor air pollution is typically under-reported and less regulated than its counterpart (Ott and Roberts, 1998; Smith 1996, 1993). A cursory glance at news reports and government reports in recent years on buildings with poor Indoor Air Quality (IAQ) suggests that the number of IAQ-related health complaints, and therefore, the costs of insurance and litigation to redress these problems, are significant, and perhaps rising (Federal Register, 1994; GAO, 1999).

Environmental Protection Agency studies of human exposure to air pollutants indicates that indoor levels of pollutants may be 2 – 5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants may be of particular concern because most people spend about 90% of their times indoor. Research has shown greater exposure to indoor air pollutants in economically developing countries based on income (Smith et al., 1986, 1996, 2000), and in some cases greater occupational exposure to air pollutants for those in lower income brackets (e.g., Rotko et al., 2000). In addition to exposure, baseline health status and health-related behaviors differ by SES; for example, smoking (CDC, 2005; Watson et al., 2003; Smith 1993) and physical activity (Giles-Corti and Donovan, 2002). A research discussed in line with SES and health, as well as a summary of studies of socioeconomic factors and particulate matter is given in O'Neill et al. (2003).

1.2 India Specific Situation

The speed with which urban air pollution has grown in cities like Delhi, Mumbai, and Kolkata, across the Indian subcontinent in the last decade is alarming[1]. The World Health Organization once ranked Delhi as the fourth-most polluted mega city of the world.[2] However, in Indian subcontinent, it is not just Delhi, but even small and medium towns, which are finding themselves in the grip of deteriorating air quality. Dehradun, located in the Himalayan foothills in western Uttar Pradesh, now often tops the list of one of the most polluted places in urban India. So does Gajroula, a relatively unknown little town of western Uttar Pradesh, India.

Historically, Total Suspended Particulate (TSP) levels in a number of South Asian cities have been high.[3] In comparison, the ambient concentrations of NO_2, SO_2, CO, and ozone have been relatively low, typically not exceeding the WHO health-based guidelines. CO, NO_2, and SO_2 can be elevated in mega cities but the accidences above internationally recognized air quality standards are not of the magnitude observed for particulate matter[4]. Large cities in India and Pakistan appear to have very high concentrations of fine particles[5]. Outside of these countries, Dhaka in Bangladesh and Kathmandu in Nepal suffer from serious particulate air pollution, the latter in part because of its topography (being located in a valley which traps polluted air)[6].

1.3 Traffic Related Pollution

In the last century there was limited production of motors vehicle which has seen exponential growth over the last few decades. The first gasoline powered automobiles appeared in 1886, by 1900 world production was only about 20,000 vehicles per year, compared to about 30 million in 1999. The personal motorcar gives its owners personal mobility and freedom that would have been incomprehensible two centuries ago. Although a single car consumes a little amount of fuel and emits a small amount of pollutants but together roughly 500 million cars in the world consume large amounts of fuel and emit large amount of pollutants.

Asian cities face a serious air pollution problem from two- and three-wheeled vehicles that run on two-stroke engines. At an international conference held 30 March-1 April 2004 at the Centre for Science and Environment (CSE) in Delhi, India. Two-wheelers form a staggering 75-80% of

[1] *Aggarwal, 1999*
[2] *WHO-UNEP, 1992*
[3] *CPCB, 1989; CPCB, 1991; CPCB, 1992; CPCB, 1993; CPCB, 1995*
[4] *Aggarwal, 1999*
[5] *World Bank, 2004*
[6] *Begum et al., 2004; Carrico et al., 2003*

the traffic in most Asian cities[7]. The vehicular population has increased phenomenally, from 2.35Lakhs in 1975 to 26.29Lakhs in 1996, and expected to touch 60Lakhs in 2013. In 1975 the vehicular population in Delhi and Mumbai was about the same; today Delhi has three times more vehicles than Mumbai.

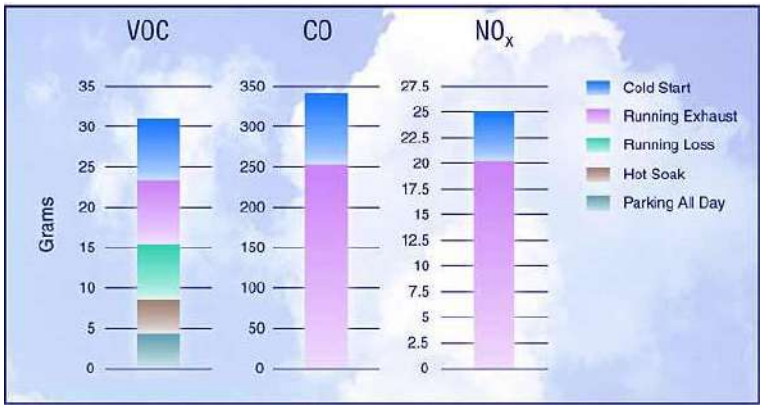
The Central Road Research Institute in New Delhi carried out a study to compare the health problems such as eye irritation and irritation of throat among traffic policemen and those who work in the offices. The study revealed that the eye irritation was more common (94%) in policemen than office workers (28%). Problems related to throat were equally high in policemen whereas the figure among the office worker was less than 15%[8].

1.4 Traffic Related Indoors

Cold Start and idle emissions from vehicles is one of such indoor air problems that have been witnessed in India recently and not much attention has been given to the same. There is an urgent need to assess the status and plan for remedial measure since these concentrations of pollutants in terms of gases sometimes reach to lethal concentrations (acute exposures) in presence of limited or no ventilation. Starting a car cold increases trip emissions compared to starting an engine that is already warm. A typical automobile on the road in 2002 had an average trip length of 4.0 miles, and, with slightly more than 7 trips per day, an average of about 29 vehicle miles traveled per day. On a given weekday, cold starts of a typical vehicle produces 7.7gm of VOC (25% of the typical daily emissions), 88gm of CO (26% of the typical daily emissions), and 5gm of NOx (19% of the typical daily emissions). Running exhaust accounts for another 7.8gm of VOC, 251gm of CO, and 20.2gm of NOx. VOC are also emitted through fuel evaporation. For example, parking the car all day produces 4.3gm of VOC[9]. As per USEPA *Automobile Emissions: An Overview*. Fact Sheet OMS-5, published in 2002, various stages average emissions of a typical car is depicted in **Figure 1**.

[7] *Environmental Health Perspectives; 8/1/2004; Potera, Carol*
[8] *TERI 2002*
[9] *U.S. Environmental Protection Agency. MOBILE6.2 Model run assumed IDLE Test, National Low Emission Vehicle Standards, summer temperature 64-92 degrees, and United States average vehicle operations. 20 April 2004*

Figure 1 Average Emissions of a Typical Car



2.0 Study Domain

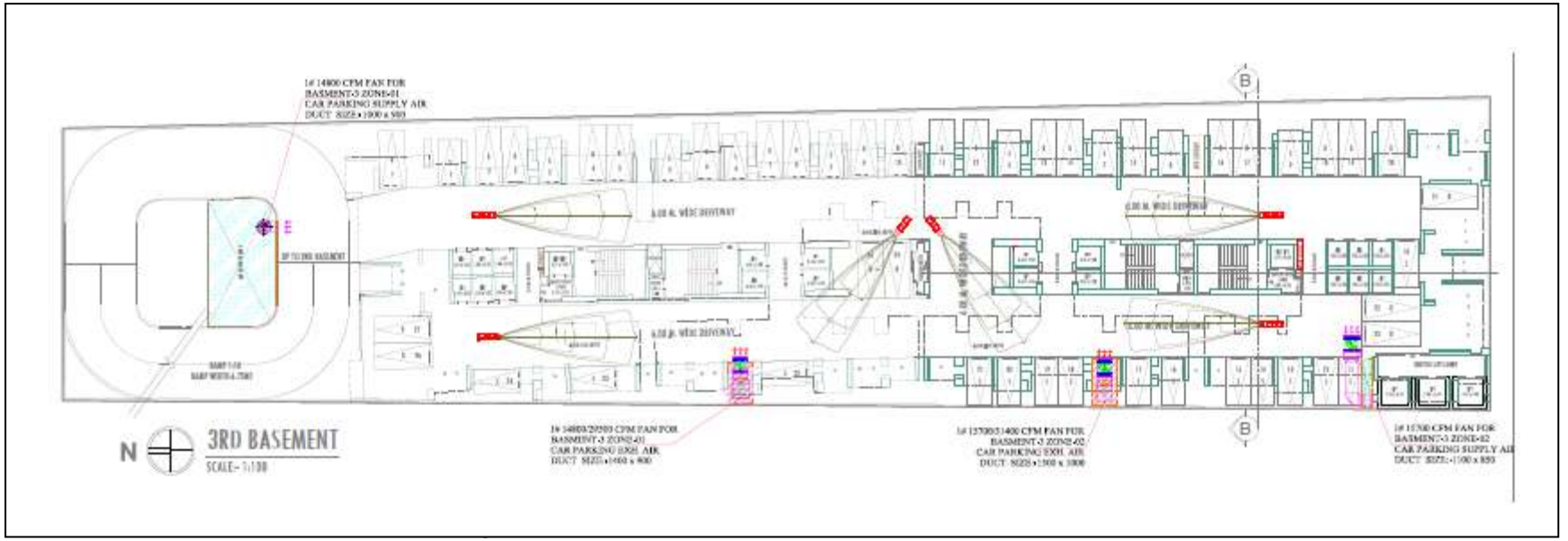
The site selected for proposed building – **"Manhattan project of Ajmera Bhakti Park"** is located at Wadala, Mumbai. The proposed project is a residential building No. 3 on sub-divided Plot A located at C.T.S. No. 1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.), Mumbai located at Lat: $19^0$02'90143"N & Long: $72^0$87"75997"E in State of Maharashtra as represented in **Figure 2**.

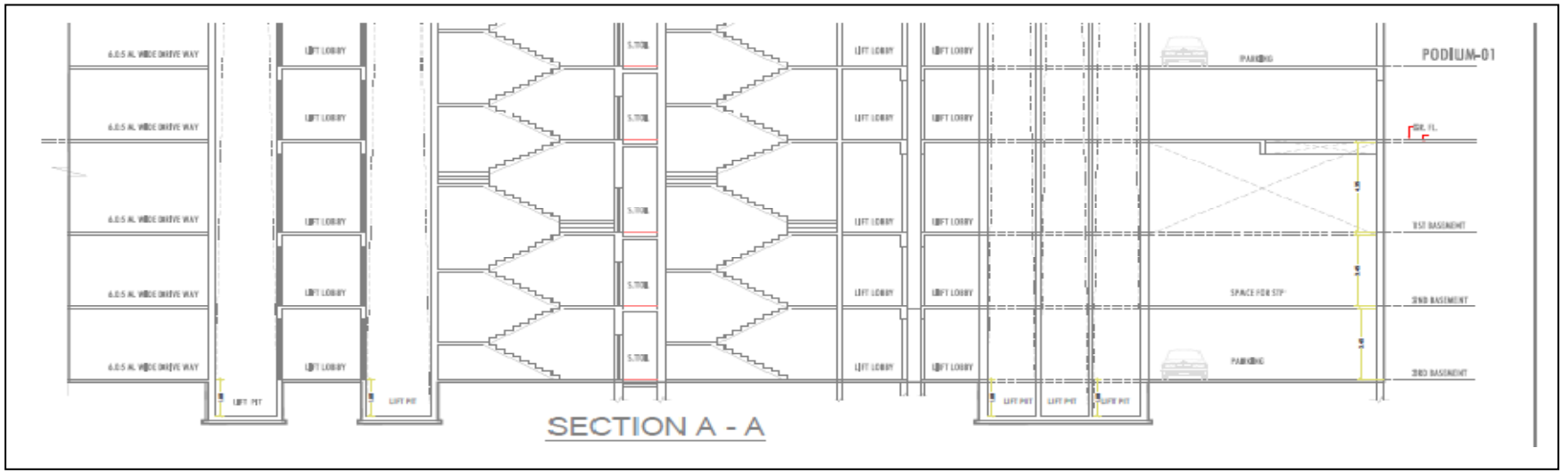
Figure 2 Study Area Representation

2.1 Environmental Setting

The project comprises of ground + 27 floors + 9 podiums & 3 basements needing system of air cleaning, each proposed to have zones of parking spaces. This Building also composes 4 stair case and 26 Lifts. A typical Lower Basement 3 Level Parking Arrangement is represented in **Figure 3**. Basements include 51, 41 & 41 car parks concentrated in an area of approximately 2,960m^2 (effective) spread across each of the 3 basements. The basements are typically similar and approximately 110m in length & 27m wide (effective) from extreme park to the ramp of 36m with floor to floor height of 4.85m (for worst case scenario) with a total of 133 parking of 4W. Description of Basement with height of each and access details are represented in **Figure 4**.

Figure 3 Typical Basement Level Parking Arrangement for Manhattan, Ajmera Bhakti Park





The effective parking area statement along with number of car parks is depicted in **Table 1**.

Table 1 Parking Area Statement & Car Parks

Floor	Effective Parking Area (m^2)	Parking Nos.
Basement 3	2,960	51
Basement 2	2,960	41
Basement 1	2,960	41
	Total Car Parks Proposed	**133**

2.2 Emission Inventory

Vehicle number is the most important parameter to quantify the emissions from mobile sources in addition to the distance travelled by each of the vehicles also known as Vehicle Kilometres Travelled (VKT). Emission factors of different types and origin have been used in the past by researches. However, scenario being the vehicles at idle condition because of parking and the system is expected to be functional mostly during peak hours for cold starts and during evening parking; the commonest and most appropriate method based on the data available is to use emission factor in terms of time based pollutant mass of the vehicle. The emission factors have been taken from a report “Emission Facts: Idling Vehicle Emissions (EPA420-F-98-014; April 1998)” prepared by EPA as well as those from Air Quality Monitoring Project- Indian Clean Air Programme, 2007”, ARAI.

2.2.1 Primary Survey and Methodology for Emission Estimation

Major work elements included in the preparation of vehicular emission inventory were:

i. Estimation of Vehicle idling time for different categories of vehicles
ii. Estimation of area covered by vehicles through parking details
iii. Estimation of number of vehicles, their age & fuel distribution, etc.
iv. Estimation of VKT by each category of vehicle
v. Selection of appropriate emission factors from the EPA vehicle emission study
vi. Estimation of emissions and representation using varying units of measurement

2.2.2 Idling Time of Vehicles

It has been practice of all vehicles studied earlier in Mumbai during various surveys around this site & otherwise to be idled running and accelerated during cold start and also during engine off in evening just before parking. Only 1 to 2% of the 4W are usually observed to be idled for more than a minute. Peak hours were assumed to be 2 hours during morning i.e. 8 to 10am and re-parking during return of these vehicles is expected to considerably though more than 80% of them are parked within a time frame of about 2 hours during evening from 7 to 9pm. Thereby, for all calculation purposes average idle time of the vehicles of all categories are considered to be 20sec.

2.2.4 Effective Area Covered by Vehicles

Parking is spread across different zones in each of the parking basements and thereby it is difficult to ascertain areas that need to be covered by every vehicle coming out of their designated parking spaces. A most conservative approach for this estimation has been arrived at through simple linear calculation, wherein the length of extreme end of the parking space is considered for worst case scenario. Averaging is avoided in this particular study in order to ascertain worst case scenario since it is difficult to portray the exact driving pattern to be followed as of now. Also, for each of the basement vehicles an extra path length of 30m is added for its distance travelled in order to accommodate the connecting area from one basement to other which is also thought to be possibly adding to the pollutant built up in effective zone of treatment.

- Length of parking lot to be covered by vehicles = 110m
- Connecting distance between each basement = 36m
- Average Width = 27m
- Area of the parking lot at each basement = As per **Table 1**
- Total distance to be covered by each vehicle = 130m + 36m incremental for each rising floor except for Ground that is connected to ground level entrance

2.2.5 Vehicles Counts

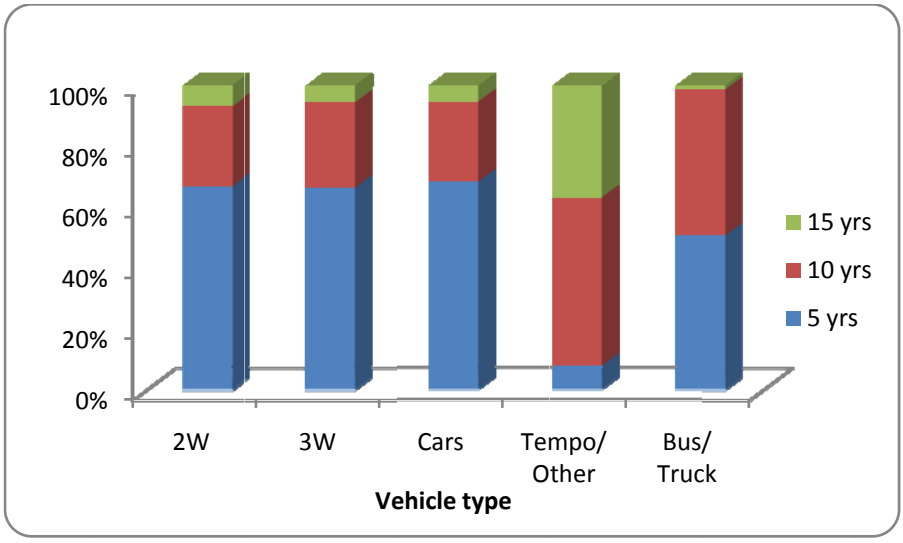
Considering the parking proposed, it is expected that all these vehicles shall be moving in and out of the parking lot every day. However, this is known to be hypothetical situation and surely some vehicles are bound to be parked without use. Though worst case scenario needs to be

worked out in this case, 133 numbers of 4W are accounted for moving in and out of car parks everyday from all these basements.

2.2.5.1 Age Distribution of Vehicles

For the purpose of emission estimates, it is essential that the age of vehicles plying on the road is available. Cumulative vehicle registration data for the past 15 years are gathered from respective RTO and represented in **Figure 5**.

Figure 5 Age-wise vehicle distribution in Mumbai



2.2.6 Emission Factors

Two separate emission factors are considered in this particular case wherein it is expected that cold starts shall be inevitable and thereby idling emissions are accounted for whereas once in motion, these vehicles are expected to travel the course of parking lot area and only then leave the premises. Thereby there is expected to be vehicle kilometer travelled within the podium and also connecting podium spaces and hence ARAI derived emission factors are also accounted for. As with driving emissions, idle emissions are affected by a number of parameters. For analyses not requiring detailed specific emission estimates tailored to local conditions, this summary of idle emission factors can be used to obtain first-order approximations of emissions under idle conditions (e.g., drive-thru lanes).

The emission factors for VOC, CO, NOx and PM_{10} with reference to type of vehicles for idling conditions are presented in **Table 2** whereas those based on VKT are given in **Table 3**.

Table 2 Pollutant Emission Factors with reference to type of vehicle (gm/hr)

Pollutant	Units	MC	LDDV	LDGV	LDGT	LDDT	HDDV
VOC	g/hr	20.1	3.63	21.1	30.7	4.79	12.6
CO	g/hr	388	10.1	371	487	11.5	94.6
NOx	g/hr	2.51	6.66	6.16	7.47	6.89	56.7
PM	g/hr		2.59			2.59	2.59

Note: -

i. *MC: Motorcycles (only those certified for highway use; all gasoline-fuelled);*
ii. *LDDV: Light-duty diesel vehicles, up to 6000 lb GVW (passenger cars with diesel engines);*
iii. *LDGV: Light-duty gasoline-fueled vehicles, up to 6000 lb Gross Vehicle Weight (GVW) (gasoline-fuelled passenger cars);*
iv. *LDGT: Light-duty gasoline-fuelled trucks, up to 8500 lb GVW (includes pick-up trucks, minivans, passenger vans, sport-utility vehicles, etc.);*
v. *LDDT: Light-duty diesel trucks, up to 8500 lb GVW (light trucks with diesel engines);*
vi. *HDDV: Heavy-duty diesel vehicles, 8501+ lb GVW (diesel heavy-duty trucks)*
vii. EPA420-F-98-014 adopted from MOBILE 5b highway vehicle emission factor for VOC, NOx & CO whereas Part5 model for PM_{10} from HDDV

Table 3 Emission Factors Based on VKT from ARAI Study, 2007

Age	5 yrs	10 yrs	15 yrs	5 yrs	10 yrs	15 yrs
Fuel	***PV –G***	***PV -G (BS I)***	***PV - G***	***PV - D***	***PV - D (BS-II)***	***PV - D (BS-II)***
CO	0.84	2.74	4.825	0.06	0.3	0.3
HC	0.12	0.19	0.58	0.08	0.26	0.26
NOx	0.09	0.21	0.645	0.28	0.49	0.49
PM	0.002	0.006	0.0195	0.015	0.06	0.06

2.2.7 Emission Estimates

Using the above mentioned characteristics of emission parameters and estimates of various input data ether through computation or field observations, estimates of major pollutant categories have been arrived at. These are mere estimates based on theoretical calculations and represent worst case scenario and actual conditions on site may be much better and different.

One of the most prominent assumptions of estimates is that all the conditions on site are considered static and box model approach has been deployed to study its behavior. Wind is considered calm as it is an enclosed space & thereby not affecting the estimates and neither any secondary reaction are compensated for in this particular approach. The baseline estimates from Travelling within and connecting basements as well as due to Idling during peak time (2 hours of either morning or evening) for present year i.e. 2016 is depicted in **Table 4**.

Table 4 Baseline Emission Estimates (gm/peak period)

Floor	From Travelling				From Idling			
	CO	HC	NOx	PM_{10}	CO	HC	NOx	PM_{10}
Basement 3	10.15	1.57	2.36	0.15	12.97	0.81	0.36	0.06
Basement 2	6.71	1.04	1.56	0.10	8.57	0.53	0.24	0.04
Basement 1	5.25	0.81	1.22	0.08	6.71	0.42	0.19	0.03

Table 5 represents total emissions from all activities of vehicles in each of the parking floors in order to understand the load of pollutants that needs to be treated and thereby forms the basis of all calculations for design of abatement technology equipment.

Table 5 Baseline Emissions (gm/day)

Floor	CO	HC	NOx	PM_{10}
Basement 3	46.24	4.76	5.45	0.41
Basement 2	30.55	3.14	3.60	0.27
Basement 1	23.92	2.46	2.82	0.21

Since the design of pollution abatement system is based on purification in particular volume of air i.e. confined within the parking spaces of each podium, it is essential to understand the extent of emissions in unit volume of air that shall be treated and thereby also help understand the equipment size based on residence / retention time of treatment of these pollutants as represented in **Table 6**.

Table 6 Volumetric Emissions Load in each of the Parking Spaces (mg/m^3/day)

Floor	CO	HC	NOx	PM_{10}
Basement 3	3.22	0.33	0.38	0.03
Basement 2	2.99	0.31	0.35	0.03
Basement 1	2.34	0.24	0.28	0.02

Thereby, for each basement

Volume of air in effective influence area

Basement 3 = 2,960m^2 (Avg. area) x 3.45m (Clear height)

= 10,212m^3 of air shall be available in the virtual domain of influence

Basement 2 = 2,960m^2 (Avg. area) x 3.45m (Clear height)

= 10,212m^3 of air shall be available in the virtual domain of influence

Basement 1= 2,960m^2 (Avg. area) x 4.85m (Clear height)

= 14,356m^3 of air shall be available in the virtual domain of influence

Assuming that the pollutants are discharged during only the active hours of inflow and outflow of parked vehicles, in the worst case scenario, these emissions shall occur only during 4 hours of the day and thereby the pollutants accumulated during these 4 active hours & discharged in this volume of air, the total concentration per unit area per unit time that actually needs to be treated during entire day is computed as represented in **Table 7**.

Table 7 Grouped Pollutant Emissions (µg/m^3/s)

Floor	CO	HC	NOx	PM_{10}
Basement 3	0.314	0.032	0.037	0.003
Basement 2	0.208	0.021	0.024	0.002
Basement 1	0.116	0.012	0.014	0.001

3.0 Design Philosophy

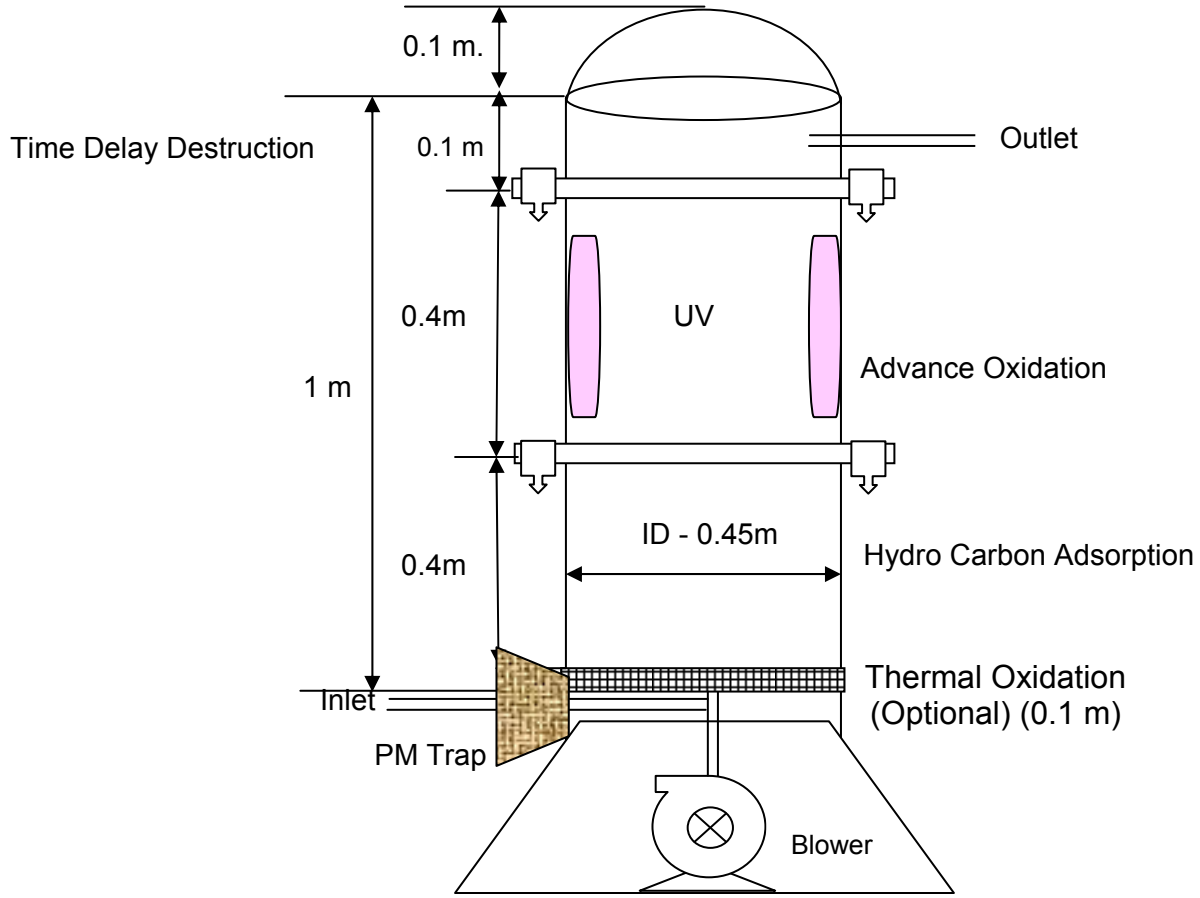
The philosophy of treatment is similar to catalytic oxidation though it is very well known that noble metals used in conventional catalysis is expensive, limited at high temperature and mix pollutants often cause corrosion / poisoning of systems.

Since the volume of air to be passed through these treatment systems are enormous, in the present scenario it is difficult or almost impossible to use catalytic process of noble metals thereby routing whole volume of air within specific treatment equipment.

However, in terms of semi-closed units such as parking lots or even open systems as traffic junctions, hood building for collection of the polluted air itself poses several challenges. The author of this report has already built systems for open end traffic junction related virtual chimney and is being planned to be implemented at several places in Mumbai and elsewhere. Once the volume of air to be treated is assessed with concentrations of desired pollutants, it is essential to understand the system and chemistry of treatment of this air.

Several authors have used centralized ventilation systems with very high power requirement making system not sustainable though for such elite building cost effectively is seldom an issue. The authors of this report though are convinced to put forth more effective decentralized system (Standalone unit) as represented in **Figure 6** which can serve the purpose of treatment high volume of air loaded with extreme concentrations of pollutants and still be regenerative types with minimal operation and maintenance recurring costs.

Figure 6 Design Schematics of Standalone Low Temperature Catalytic Process



3.1 Design Calculations

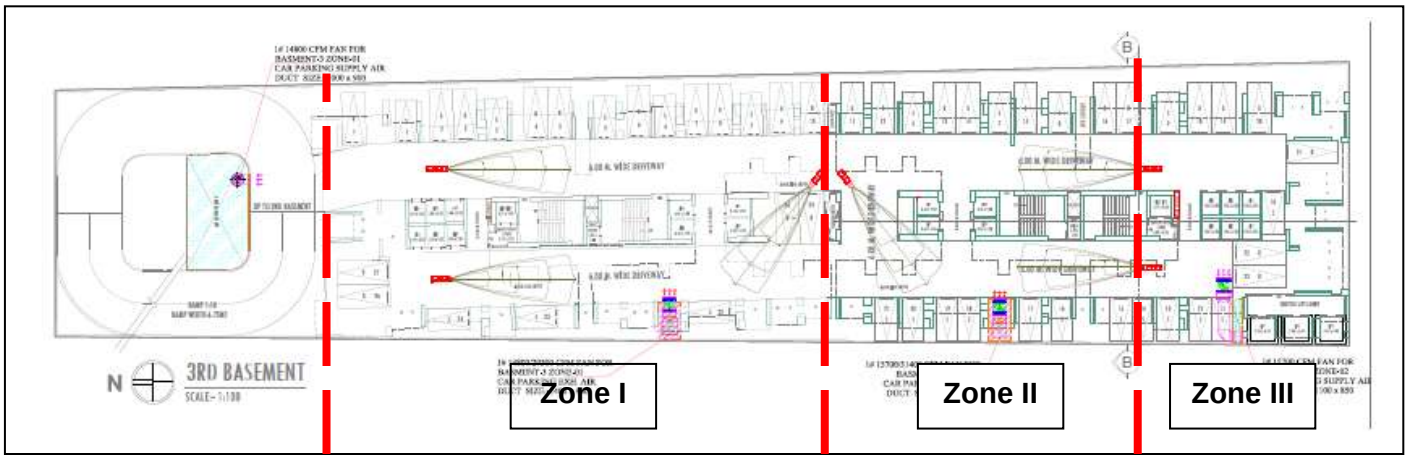
The design is based on several assumptions which are considered to imitate the surrounding environment at study domain as much as possible with the fact that certain of these parameters may have also been considered taking into account the ease of implementation. There are 4 different components of the system which are discussed in detail in the following sections.

3.1.1 Influence Area & Volume Settings

With the area of biggest parking basement being about 2,960m^2 or less & clear height of about 4.85m considering worst case scenario, the total volume of air (considering steady state conditions & worst case scenario) shall amount to be about 14,356m^3. Though each of the floors has effective zone volumes to be slightly different, it may not be of concern in designing of equipments since these are supposedly standalone units and thereby their numbers and placement shall be effective enough gather the air packages in effective zone of influence.

Since each of the parking floor is not continuous & thus can be further subdivided into particular / specific zones of parking enclosed with internal walls making it important to understand the effective volumes of air packages that shall be required to pass through the standalone units to achieve the desired treatment efficiencies and thereby overall acceptable air quality. **Figure 7** represents the superimposed zones of influence in typical basement that seems to contain 3 such zones that seem to be theoretically most active in terms of parking numbers.

Figure 7 Zones of Influence Based on Effective Parking Numbers



3.1.1.1 Details of Collection System / Air Suction Design

- Blower capacity = 400m^3/hr
- Type = Twin Lobe Air Blower / Centrifugal ID Fan
- Thereby, Length of Collection Channel= 0.5m
- ID of Collection Pipe = 0.45m
- No of ducts = 1
- Alignment from ground = 0.3m from ground
- Assumed to be static condition (Box Model)
- Minimal background air velocity at ground of 0.1 to 0.3m/s
- Duct Inlet = Funnel Type with 550mm reducing to 450mm making cyclone for particle Trap made of fiber filter
- Duct convergence = 0.1m into particle trap
- MoC = HDPE
- Blower MoC = CI
- Blower Capacity = 2.0HP @ 4000mm WC
- Operation = Synchronized using actuated valves @ 2Nos.

3.1.1.2 Particulate Filtration System

- Effective Volume of air per zone = Avg. 400m^3/hr
- Inlet Air Temp = Ambient
- Particle Trap = 0.167m^3/s to remove = (PM load/flow) = 32µg/peak hour PM_{10}
- Target air exchange by volume = 95% i.e. 0.158m^3/s
- Max. Mass of PM_{10} load (Worst Case for Upper Basement) = 0.005gm/d
- Air exchange cycle = Hourly Flow/Volume of air = 10sec
- Flow rate = 0.167m^3/s
- PM removal by filtration per sec = 1.64µg/sec
- Dimension Trap = 200mm x 150mm
- MoC = PVC / FRP
- Trap Type = Molecular Sieve / Micron Filter / Fibre Filter
- Cut off size = of 10µm up to 0.25µm

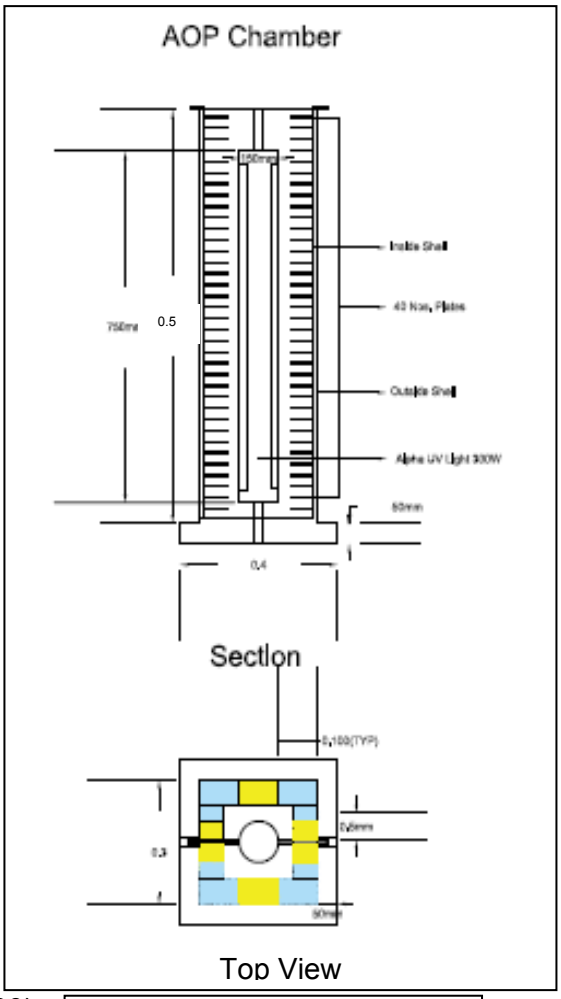
3.1.1.3 Photo-catalytic (AOP) Chamber

Photo-catalysis is a phenomenon, where an electron-hole pair is generated on exposing semiconducting materials to light of suitable energy. Thus, the chemical reactions that occur in the presence of a semiconductor and light are collectively termed as photocatalytic reactions[10]. Organic contaminants can be completely mineralized by irradiation in presence of semiconductor, TiO_2[11].

- Volume of air = 400m^3/hr
- Inlet Air Temp = Ambient
- Material of catalysis = TiO_2
- Activation = UV light with ƛmax of 354nm
- Chamber Dimension = 0.5m Ø & 0.4m Ht.
- System Configuration = Fluidized / Coated
- Type (Phase) = Photo Active - Nano crystal (Sol-Gel)
- Surface Area of catalyst = 400 – 500m^2/gm
- Pore Volume = 0.51cm^3/gm
- Formula Weight = 79.890
- Z = 4

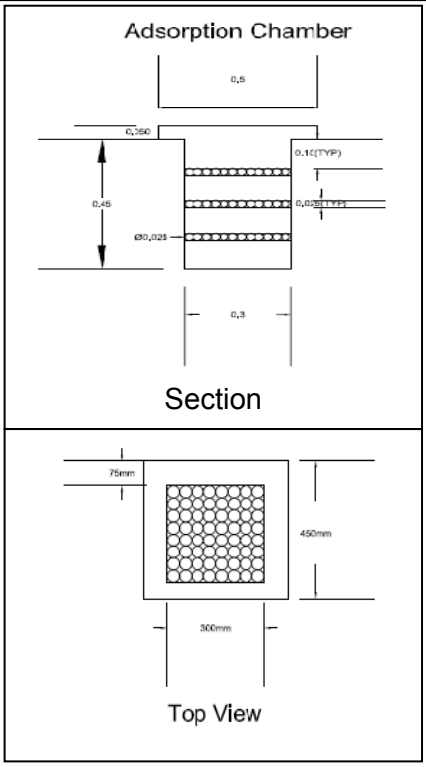
[10] S. C. Ameta, R. Chhaudhary, R. Ameta and J. Vardia, *J. Ind. Chem. Soc*., 80 (4), 257, (April 2003)
[11] T. Hisanaga, k. Harada and K. Tanaka, *J. Photochem. Photobiol*., 60A,229, (1991).

- Crystal System = Tet
- Point Group = 4/mmm
- Space Group = $I4_1/amd$
- Unit Cell
- a(^oA) = 3.7842
- b
- c = 9.5146
- Volume = 136.25
- Molar Volume = 20.156
- Density = 3.8950gm/cc
- Removal efficiency = 95 – 98%
- RT = 0.5sec
- Flow rate = 0.167m^3/sec
- Air Exchange Cycle designed for = 6.0hrs
- MoC = PP FRP
- Regeneration Potential = Self



3.1.1.4 Adsorption Chamber

- Volume of air = 0.167m^3/s
- Inlet Air Temp = Ambient
- Material of catalysis = Activated Carbon (I - 900)
- Activation = Hot Air (As and When required)
- Chamber Dimension = 0.5m Ø & 0.4m Ht
- System Configuration = Fluidized / Packed
- Surface Area of catalyst = 500 – 1500m^2/gm
- Density = 0.46 – 0.58gm/cc
- Removal efficiency = 90 – 95%
- RT = 0.5sec
- Flow rate = 0.167m^3/sec
- Air Exchange Cycle = 6.0hrs
- MoC = PP FRP



3.1.1.5 Pyro-Chamber (Flash Destruction - Optional)

- Volume of air = 0.167m^3/s
- Inlet Air Temp = Ambient

- Chamber Temperature = 300 – 500^{0}C
- Mechanism = Residual Cracking / Residual thermal oxidation
- Activation = Electrical
- Chamber Dimension = 0.5m Ø & 0.1m Ht.
- Heat Active Zone – 0.5m Ø & 0.2 Ht
- RT = 0.1sec
- Flow rate = 0.167m^3/sec
- Open Release system
- Oxidation potential = 95%
- MoC – MS-EP

3.1.1.6 Mechanical Components

- Actuator / Damper –
    - Auto Based
    - Size - 1 Nos. of 100NB
    - Type – Butterfly with Actuator
    - Make – Apoorva / Technogreen / Equiv.
    - 1 Nos. Butterfly type
    - HP – 0.2
    - MoC – CI / GI
- Blower
    - Type – Centrifugal / Twin Lobe
    - HP – 2.0 – 3.0
    - MoC – MS-FRP / CI
    - Flow Rate – 400m^3/hr
    - Operating pressure – 1500 – 2000 mm H_2O
    - Pressure drop considered – 100 - 200mm H_2O
    - Drive – V Belt & Pulley

3.1.1.7 Electrical Components

- PLC System
    - Micro processor / PLC based
    - Make – Technogreen
    - Type – Star Delta

- Make – Allen Bradley
- I/O – 48/38 DI/DO
- Analog Module – 6AI/4AO
- WiFi Module – PLC to HMI Cable (*If Required*)
- HMI Touch Screen 4" Colour with Ethernet Port (*If Required*)
- PLC Programming – Graphic Development
- Inbuilt in Panel with alarm system
- 24 Hr Memory Storage Backup
- PLC Logic
  - 1. Based on CO concentration wherein system shall be functional when CO concentration reaches >4000 µg/m^3 operational at any given point of time
  - 2. If CO <4000 µg/m^3 then blower shall be switched off
  - 3. If CO concentrations at any of the indicators is >4000 µg/m^3, then actuator shall be operational

- Electrical Panel
  - Double Door MCC Panel
  - Make – Technogreen
  - DOL Starters – 1 Nos.
  - Main MCCB – 200A, 3B
  - Multi-Function meter – Energy, Power Factor, Voltage, Ammeter
  - SMPS – 5A, 24VDC
  - Single Phase Preventer
  - 1 Nos. Control MCB
  - CT – Starlite, 200/5 with clamp
  - Indicator System – RYB + R Trip
  - Selector switch & Door switch Illumination
  - Panel Lock & Key
  - Power & Control Terminals
  - PVC Gland, PVC Channel, TIN Rail channels, Lugs, Ferruls, cable tie, stick pad, Hardware, Rubber Gasket, acrylic sheet front door
  - Powder coated Panel box with canopy and mounting stand
  - Control wires – RYB, brown for earthing, grey for sensors
- Process Indicator Systems
  - CO based indicator cum control system

- Sensor – Micro Set / Equiv.
- Range – 2000 to 10000 µg/m^3
- Accuracy – ±0.01
- Junction – Double, PCFE Electrolyte polymer
- Max Press. – 6bar
- Cable – 5m
- Display – Dual, 31/2 digit, 14mm Red/Green LED display
- Power – 220 – 240VAC, 50 – 60Hz
- Size - 96mm x 96mm x 120mm

- Total Connected Load (Max.) – 53Kw
- Working Load (max.) – 25 - 28Kw

3.2 General Arrangement

Based on the zones of pollution influence, as discussed earlier, there are 2 high density parking & 1 low density parking potentially high pollution specific zones in this particular design. Based on the calculations and design considerations of 400m^3/hr air flow, each of these zones shall have different air exchange that shall amount to >95% pollution abatement through standalone units, if 2 such units are placed in each of these zones making it a total of 6 in each basement as depicted below for. However, the authors of this design considers it suitable not to change the design as per volume of air to be treated in each zone since that would only complicate system requirements and manufacturing needs. It would be easier to install similar devices with specifications mentioned above in order to have uniformity. The operation time or air exchange cycle shall only change depending upon the pollutant concentration and volume of air in each zone.

- Basement 1 – 14,356m^3 of polluted air = 4.0 air exchange/day (6.0hours of system operation) from total air volume point of view
- Basement 3 – 10,212m^3 of polluted air = 5.3 air exchange/day (4.3hours of system operation) for worst case scenario from parking numbers point of view

Theoretically, the system shall be placed equidistant from all corners of the active zone of basement since the equipment being standalone shall have equilibrated zone of influence, however practically it seems that the positioning shall be more oriented towards the enclosed part since it expected logically to have higher pollutant accumulation in limited volume of air under the minimal influence of natural air exchange. **Figure 8** attempts to represent GA of

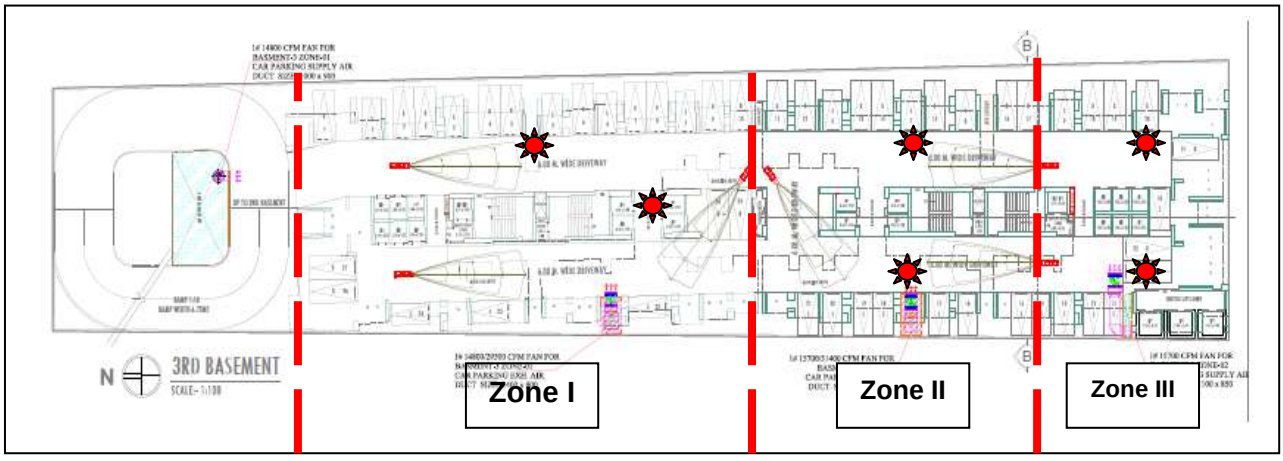
possible unit placements for Basement 1 (Worst case with respect to size of basement though best case in terms of pollution) which might differ a bit when actual conditions of site are studied during implementation of the project for different basements respectively.

3.3 Financial Estimates

The cost this system amounts to be about **4.5 to 5.0lakhs/unit** in initial phases though the cost is expected to be further reduced based on higher demand and production management expected to reduce by 10 – 20% in next 3 years. Being a self regenerating catalysis system, the consumables include only 2HP power supply/Unit to function for about 12hours/day in present project i.e. about 6units x 2HP each, amounting to be 36KWH/Day. Furthermore, air filters require to be replaced in about 3 to 6months costing about Rs. 500 – 700/unit (about Rs. 12,000/Half Year) and recharging of activated carbon half yearly amounting to about Rs. 6,000/Half Year. Thereby, the most conservative cost estimate for annual operation & maintenance would not exceed about Rs. 7,00,000 (@Rs. 5.6/Unit of electricity) out of which almost 80 – 90% is the electricity cost.

A ready to use model of this equipment termed as “Yuka Yantra” is already available and can be installed as presented in **Figure 9**.

Figure 8 Typical GA for Placement of units in Basement



Standalone Units

Figure 9 Yuka Yantra – Ready to Use Model for Air Cleaning in Parking Spaces

Sandeep S. Shah
Architect & Engineer
G-6/C, Swapnalok Apt., Near Andheri Sub-Way, Andheri (E), Mumbai-400 069 Mob : 986901759 E-mail : ssaarch@rediffmail.com

Dt. 17.07.2023

The Executive Engineer (B.P.) M/W
B.P. BMC office,
Vikroli (w), Mumbai.

Dear sir,

Sub: Drainage Completion Certificate for the proposed building no.6, on land bearing CTS no. 1A/1,2,3 & 6, at village Anik, in M(W) ward, Mumbai.

Ref: 1. I.O.D.u/r.no.CHE/ES/3635/M/337(NEW) dt. 17.09.2020
2. Drainage approval dated 19.09.2020

I do hereby certify that drainage work of the entire building of the proposed subject building has been carried out to my entire satisfaction and all the materials and workmanship are used of best quality and there is no provision of the act as per the bye laws. The work is completed.

I also hereby certify that, I have carried out Smoke & Pond test for the entire drainage system and did not found any leakage in the drainage system. The test is found satisfactorily.

Thanking you,

Yours faithfully,

Sandeep Suresh Shah
Digitally signed by Sandeep Suresh Shah
Date: 2023.07.17 05:51:47 +05'30'

Sandeep Shah
Consultant.
Lic no. 79/4999/2016

FORM-II 02/04

CONTENTS OF SHEET

STILT FLOOR PLAN.
1ST FLOOR PLAN OF WING A-B AND C-D
2ND FLOOR PLAN OF WING A-B AND TYPICAL FLOOR PLAN (2ND TO 6TH) WING C-D

STAMP OF DATE OF RECEIPT OF PLANS

STAMP OF APPROVAL OF PLANS

Approved subject to the conditioned in this office letter no CHE/ES/3635/M/337(NEW)

Patil Deelip Parasharam

EXECUTIVE ENGINEER BLDG.PROP.(E.S.)-H

PRASAD CHANDRAKANT GOSAVI

S.E.(B.P.) M-H

sinkar mahesh balkrishna

A.E.(B.P.) M

REVISION

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO. 6 ON SUB-DIV. PLOT-'A' ON PROPERTY BEARING C.T.S.NO.1A/1,1A/2,1A/3 & 1A/6 OF VILLAGE ANIK- AT CHEMBUR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera

DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
AME-02	17-Sep-20	AS SHOWN	A.P.P.	A.P.P.	RUSHABH

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

HIREN SATYENDRA THAKKER

SHRI.HIREN S. THAKKER. (LIC.NO :- T/107/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, KAILAS PLAZA, VALLABHBAUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 10 51 / 2512 64 77 Fax : 2512 18 64
Email :- svtarchitects@yahoo.com.

Sandeep S. Shah
Architect & Engineer
G-6/C, Swapnalok Apt., Near Andheri Sub-Way, Andheri (E), Mumbai-400 069 Tel. /Fax : 2834 71 81 E-mail : ssaarch@rediffmail.com

Date:- 17.07.2023

To,
The Executive Engineer (B.P.), (M/W)
Vikroli B.P. BMC office,
L.B.S. Marg, Vikroli (w),Mumbai.

Dear sir,

Sub : Completion Certificate of Storm Water Drain for the proposed development building no.6, on land bearing CTS no. 1A/1,2,3 & 6, at village Anik, in M(W) ward, Mumbai.

Ref : 1. I.O.D. u/r. no.CHE/ES/3635/M/337(NEW) dated 17.09.2020
2. Remarks issued dated 09.09.2021

I do hereby certify that SWD work of the subject plot has been carried out as per the approval dated 09.09.2021 and to my entire satisfaction and all of the materials and workmanship are used of best quality and there is no provision of the act as per the bye laws.

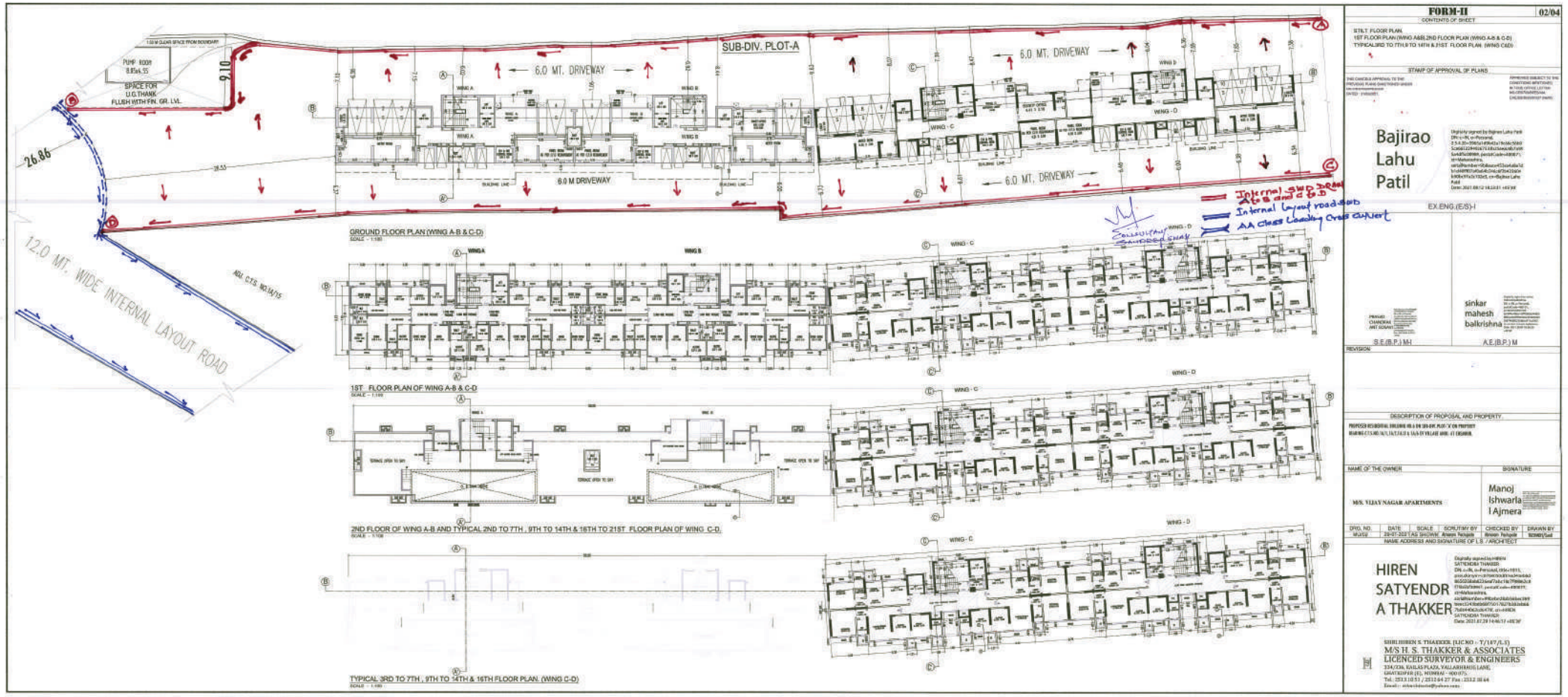
That the affidavit cum Indemnity bond submitted by the owner regarding work done and that the storm water drain arrangement provided on site is found completed. The road is levelled and provided a standard slope towards SWD. The storm water shall be drain out by making pumping arrangement by the owner at their risk and cost shall be binding on the owners and their legal heirs.

Thanking you,

Yours faithfully,

Sandeep Suresh Shah
Digitally signed by Sandeep Suresh Shah
Date: 2023.07.17 06:01:40 +05'30'

Sandeep Shah
Consultant
Lic no. 79/4999/2016



FORM-II 02/04

CONTENTS OF SHEET

STILT FLOOR PLAN
1ST FLOOR PLAN (WING A&B,2ND FLOOR PLAN (WING A-B & C-D)
TYPICAL3RD TO 7TH,9 TO 14TH & 21ST FLOOR PLAN. (WING C&D)

STAMP OF APPROVAL OF PLANS

Bajirao Lahu Patil

EX.ENG.(E/S)-I

sinkar mahesh balkrishna

S.E.(B.P.) MH | A.E.(B.P.) M

REVISION

DESCRIPTION OF PROPOSAL AND PROPERTY.

PROPOSED RESIDENTIAL BUILDING NO.II ON 'ZERO-DR. PLOT-'A' ON PROPERTY BEARING C.T.S.NO. 14/1,14/2,14/3 & 15/A OF VILLAGE ANIK , AT DEONAR.

NAME OF THE OWNER	SIGNATURE
M/S. VIJAY NAGAR APARTMENTS	Manoj Ishwarlal Ajmera

DRG. NO.	DATE	SCALE	SCRUTINY BY	CHECKED BY	DRAWN BY
MUI/02	29-07-2021	AS SHOWN	Ahmmn Pachpole	Ahmmn Pachpole	BOMBAY/Sunil

NAME ADDRESS AND SIGNATURE OF L.S. / ARCHITECT

HIREN SATYENDRA THAKKER

SHRI.HIREN S. THAKKER (LIC.NO :- T/1187/L.S)
M/S H. S. THAKKER & ASSOCIATES
LICENCED SURVEYOR & ENGINEERS
334/336, EAGLAS PLAZA, VALLABHBHUG LANE,
GHATKOPAR (E), MUMBAI - 400 075.
Tel.: 2513 1051 / 251264 27 Fax : 2512 38 64
Email :- sthakker@yahoo.com

CARBON FOOTPRINT REPORT

Carbon Footprint analysis of "Expansion & Modification of Residential Project-BHAKTI PARK"

ECO SOLUTIONS, PUNE

TABLE OF CONTENTS

1. Brief About Project:

The project is located at Anik Village in Chembur,Mumbai, a fast growing suburb furthermore one of the most populated areas in Mumbai. The site location is oriented along the South and East axis. The site is surrounded by few high rise developments on south side and agricultural land on the east and open areas on remaining two sides. The building design is compact with a rectangular plan.

The total plot area of the project is 1,11,732.32 Sq.m and built up area is approx. 329947 sq.m. The planning of buildings is rectangular, such that maximum building façades are facing towards east west axis, which is the ideal orientation for the climate of Mumbai. This ensures minimum heat gain. The client aims at providing services with green concepts which will not have an impact on the environment and reduce carbon foot print of the building thus helping in reducing global warming in Mumbai city.

Location of Project Site (Anik Village, Chembur)

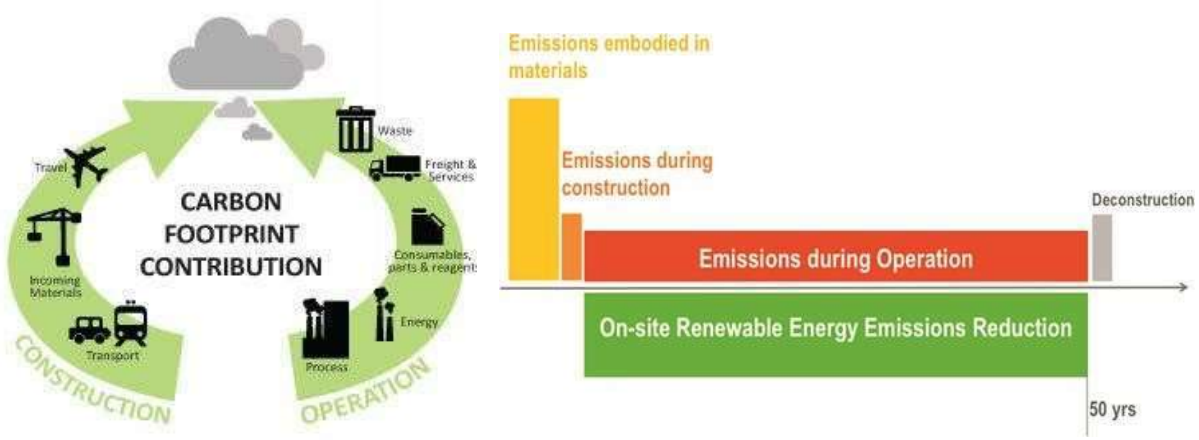

Entry (20 m wide)
COMPOUND WALL
N
W
E
S

2. Background:

2.1 Carbon Footprint

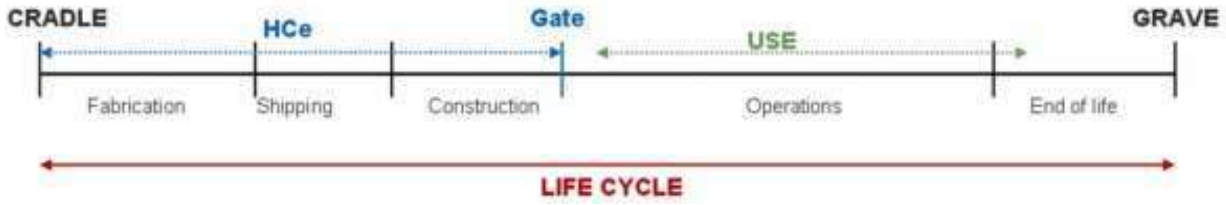
Energy sector in India is poised for transformation due to the high economic growth as well as great concern for climate change induced by greenhouse gases (GHGs), especially carbon dioxide (CO2) emissions due to use of fossil fuels. Man-made climate change, or global warming, is caused by the release of certain types of gas into the atmosphere. The dominant man-made greenhouse gas is carbon dioxide (CO2), which is emitted whenever we burn fossil fuels in homes, factories or power stations. But other greenhouse gases are also important.

(Source: http://timeforchange.org/what-is-a-carbon-footprint-definition)



(Source: http://www.green2biz.com/)

Carbon Footprint is the sum of all emissions of greenhouse gases produced to support human activities, in a given time frame. This value is gaining weight on environmental policies that fight against climate change, is being a numerical factor that is slowly gaining importance in the production and business policies.



Carbon footprint is the total quantum of carbon emissions of an individual or a household as a result of air travel, car travel, usage of electricity and other household appliances. Carbon footprints are expressed as a carbon dioxide equivalent (CO2e), which is a measure used to

describe how much global warming a given type of greenhouse gas may cause, using the functionally equivalent amount of concentration of carbon dioxide as the reference. It is the amount of greenhouse gases produced to directly and indirectly support human activities and is expressed in equivalent tons of carbon dioxide. It can be when we drive a car whose engine burns fuel that creates some CO2, depending on its fuel consumption and the driving distance, use of electricity, oil, gas or coal can generate CO2. The production of the food and goods also emits some quantities of the gas. Carbon footprint is the sum of all emissions of CO2 induced by our activities in a given time-frame. Usually a carbon footprint is calculated for the time period of a year. Carbon dioxide emissions are calculated on the fuel consumption.

The carbon footprint is primary and secondary. The primary footprint is a measure of our direct emissions of CO2 from the burning of fossil fuels including domestic energy consumption and transportation. The secondary footprint is a measure of indirect CO2 emissions from the whole lifecycle of products we use.

Greenhouse gases in the atmosphere increase the temperature of the Earth similarly to the glass walls of a greenhouse. They allow short-wave solar radiation to pass through the atmosphere but trap long-wave energy reflected back from the Earth. The thicker the blanket of greenhouse gases, the more of the outgoing energy gets trapped and the greater the warming effect. Climate change is the result of a rapid rise in the concentration of greenhouse gases in the Earth's atmosphere. Therefore there is a need to estimate the carbon emissions by various sectors to undertake measures to reduce the emissions as far as possible without compromising economic growth.*(Source: http://www.papierenkarton.nl/uploads/CO2%20boek.pdf)*

The major objectives are:

- Understanding the concept of carbon footprint of knowledge industry and its environmental implications
- Highlighting the CO2 emission in knowledge distribution systems

To have a bird's eye view of various initiatives taken and strategies to be adopted to reduce the carbon emission from knowledge sector *(Yoshida Y, 2006, October).*

2.2 Climate study of the city – Macro

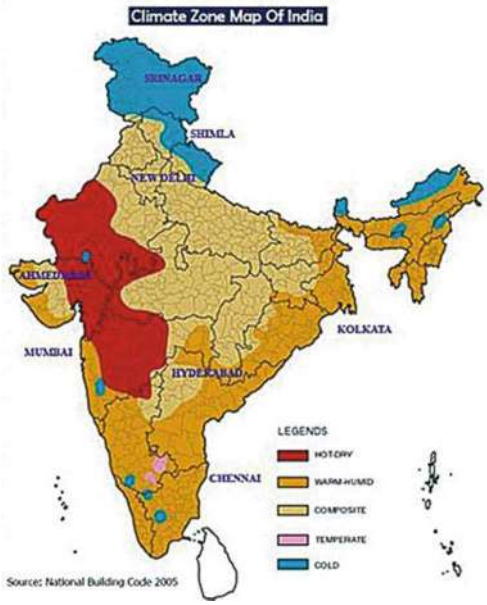
Currently, ECBC classifies Mumbai in the warm-humid climate.

- Temperature- high temperature (32 □ C) and low temperature (25□ C)
- Humidity- 70 -80%
- Rainfall- 2373mm
- Mean sea level-31m
- Wind direction- West

Energy Simulation Inputs:

Location- Mumbai, Maharashtra,

Time Zone- + 5:30 Delhi



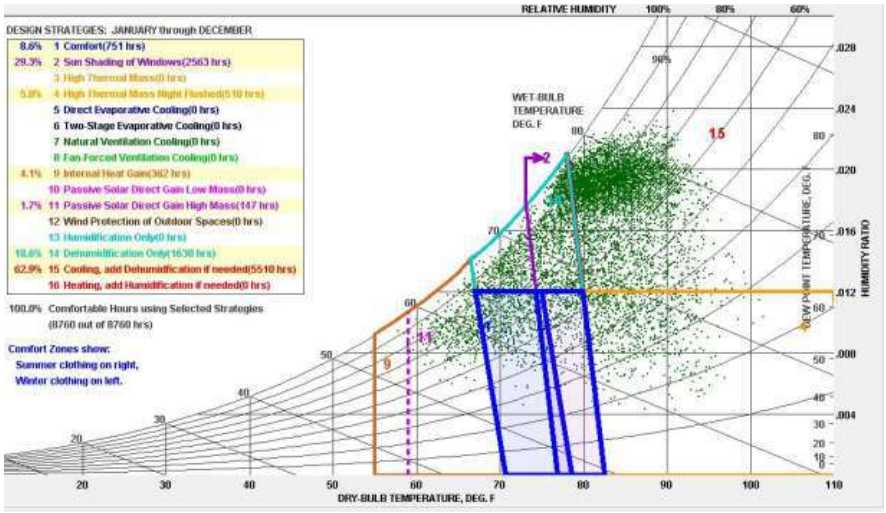


Image showing Climate zones in India **Image showing comfort zone**

2.3 Need of the study

The amount of energy used to operate the HVAC system is affected by its regular maintenance. When mechanical systems need to use more energy to operate, they require more electricity to be generated by power plants, which in turn releases more carbon to the atmosphere. The amount of carbon required to power all the electrical systems in a building are what are called the building's "carbon footprint." It's one way to measure a building's environmental impact.

The increased awareness of the importance of environmental protection, and the possible impacts associated with products, both manufactured and consumed, has increased interest in the development of methods to better understand and address these impacts. One of the techniques being developed for this purpose is life cycle assessment (LCA) and calculating the carbon emissions of human activities. *(Source: ISO-14040)*

The carbon emission is calculated using simulation software which quantifies the energy consumption of the proposed HVAC system. The results are then compared with standards to justify the efficiency of the proposed system over other systems.

The report includes the study of HVAC system to be used in the Buildings and its energy performance. It provides analysis of the overall energy consumption and associated carbon

Emissions of air conditioned areas in the building. The energy consumption of the entire building studied showed that the total annual energy consumption of the air conditioned building contributes to a certain percentage of carbon emissions.

3. Aim:

To quantify and analyze the carbon emissions due the HVAC and constructional methods incorporated in the residential building.

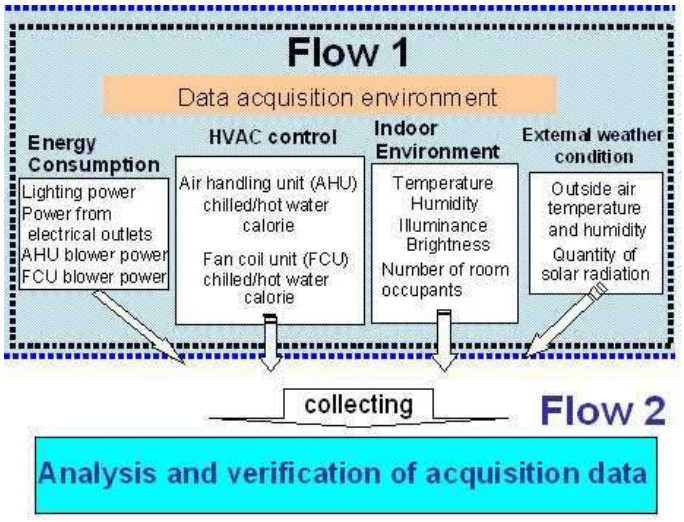
4. Objective:

The scope includes the following items:

- To study of the HVAC system, building typology, planning, activity and schedule
- To study the lighting and electrical system
- Daily energy demand and peak demand
- The functions of the product system or, in the case of comparative studies
- To set a system boundary for calculating the carbon foot print
- Data requirements of HVAC
- Assumptions to be made
- Analyze structural conditions and heat gain/loss factors

5. Methodology

The methodology adopted for carrying out the study is calculations using simulation for energy consumption of HVAC system and analysis using a base case and a proposed case. The results are then compared with standards to justify the efficiency of the proposed system over other systems. The overall impact of the system on the environment is found out by calculating the carbon footprint of the air conditioned areas. The following flow chart shows the data to be acquired for simulations and calculation of Air conditioned rooms:

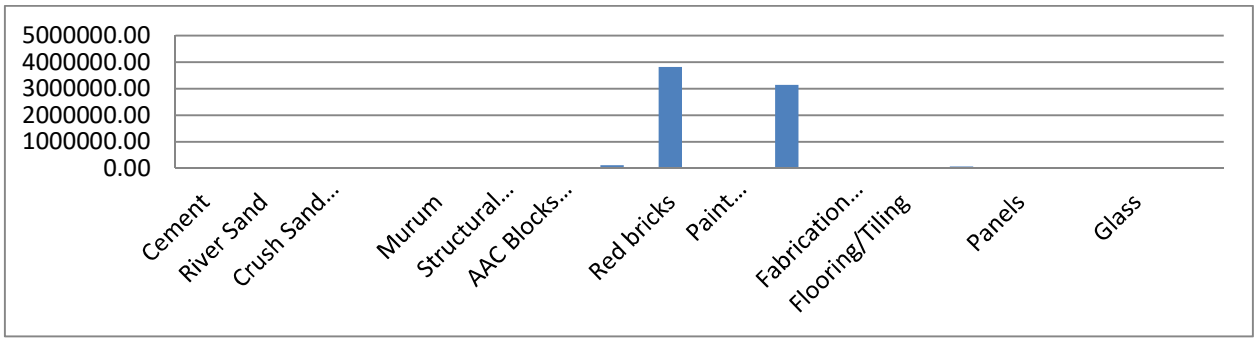


6. Construction phase
6.1 Building Materials Used

Building material industry is a vast varied area with various raw materials composed which require various Manufacturers. Unlike transportation which only requires variable like fuel burned per person, the variables in building material varies according to its making and sources.
A building comprises wide range of building materials while it is constructed. However, this section assumes such building materials which share larger percentage in total, in terms of quantity; like concrete, steel, wall material, flooring, etc. The project has used fly ash Bricks and steel with recycled content, which have lower energy intensity and carbon footprint. The reference section shows the list of reference material which are referred for the numbers of Energy Intensity and amount of tCO2e.

Results Generated:

Building Material	Quantity			Embodied Energy	Equivalent Electricity		CO2
	Area(Sq.m)	Weight(kg)	Volume(CuM)	(GJ/Unit)	GJ	MWh	tCO2e
Cement	-	14111.41	-	6.40	90313.01	25156.83	20452.71
River Sand	-		61045.95	0.00	61.05	17.00	13.82
Crush Sand & Metal,	-	-	41479.71	2.66	110336.04	30734.27	24987.21
Murum	-	-	18019.39	0.02	360.39	100.39	81.62
Structural Steel	-	1897926.98	-	0.02	37958.54	10573.41	8596.27
AAC Blocks (Biltech)	2825207.45		-	0.19	536789.41	149523.51	121563.83
Red bricks	5659876.24		-	2.98	16866431.18	4698170.25	3819650.61
Paint (Internal+External)	-		5176481.53	2.68	13872970.50	3864337.19	3141737.55
Fabrication Steel	11384.95	-	-	0.90	10246.46	2854.17	2320.46
Flooring/Tiling	310717.60	-	-	1.00	310717.60	86550.86	70366.55
Panels	10956.70	-	-	2.60	28487.43	7935.22	6451.40
Glass	31452.02	-	-	1.90	59758.84	16645.92	13533.27
Total Carbon Emission (tCO2e) 7229755.29							



The carbon footprint of the Building during Construction phase is approximately **7229755.29tCO2e**

References:

- CO2 Baseline Database for the Indian Power Sector - by Ministry of Power Central Electricity Authority, New Delhi
- 2 Burnt Clay Bricks Versus Autoclaved Aerated Concrete Blocks - by Radhika Shukla. Published in International Journal of Engineering Research & Technology (IJERT) - Vol. 3 Issue 11, November-2014
- Indexing of Building Materials with Embodied Energy - by Ashok Kumar. Published in Journal of Pure and Applied Science & Technology, Vol. 2(1), Jan 2012
- Embodied Energy in Building Materials and Technologies for Green Residential Buildings - Auroville Earth Institute
- GRIHA Manual: Volume 4
  Low Energy Green Materials by Embodied - by Rohit Deshmukh, Ashok More. Published in International Journal of Civil and Structural Engineering Research - Vol. 2 Issue 1, Septemeber-2014
- https://www.eia.gov/energyexplained/index.php?page=about_energy_conversion_calculator

6.1 Transportation of the Building Materials Used

Carbon footprints through transportation also come into major consideration when whole picture has to be taken care of the reason is the utilization capacity of fuels vary for the carrying of the building Materials and also due to selection of material, distance between extraction and/or manufacturing unit and project site, etc. Furthermore, the project of this size has variation in carbon footprints of the same material, because of availability of the material from the same supplier is uncertain during the whole construction duration. Travelling distance, mode of transportation & type of fuel used for transportation are other major factors associated with carbon emission.

It is assumed that the materials are transported by trucks which run on diesel; this is the most common mode of transport and fuel type. Hence, it is not feasible to consider it as base case and proposing any other mode of transport with the efficient one. The project is considering the same carbon footprint for both cases and excludes any reduction through this.

As the project is under proposal, the transportation will not be considered at this stage as the supply of material will depend on tendering process which is not the current implication.

6.2 Transportation of the Construction Workforce

Every project has a huge team of construction workforce who travel to reach site and go back, and this happens since the first day of the project to the end of the construction activities. They use different mode of transportation like rail, bus, shared vehicle, etc. Although minor, they have impact on the project's overall carbon footprint. Providing a clean and hygienic shelter within or close to the site can considerably reduce CO2 emission through transportation.

For the calculation of estimated tCO2e, the project team has considered following assumptions:

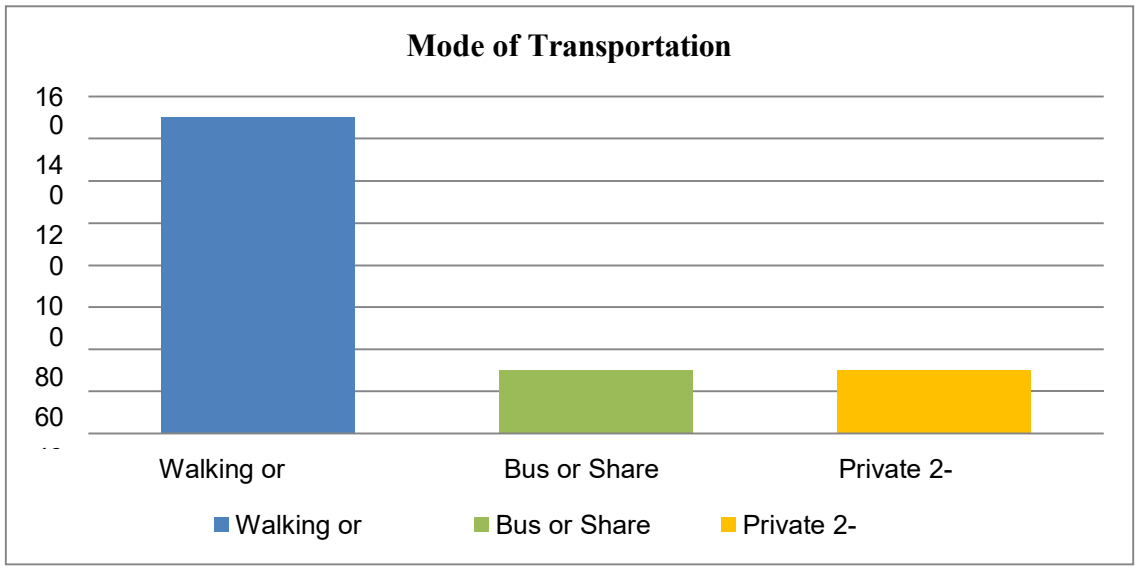
1. In the proposed project, the project team construction workers have been considered travelling from surrounding areas on daily basis.

2. Total numbers of construction workers, their residing status and mode of travel vary during the whole construction process. However, average numbers of workers and residing status have been considered constant throughout the period for simplicity of the process.

3. It has been assumed that average distance of bus rider is 10 km and 2-wheeler rider is 15 km.

4. The construction work will be finished in 5 years.

5. The break-up of the workforce and their mode of transport have been considered as the chart below.



6.3 Results

The calculation has been summed up for 5 years of total construction work period. The CO2 emission is expected to generate 34.49 tCO2e at the end of the construction work.

Table 3. Proposed Case Emission

MODE OF TRANSPORTATION	**TRAVELLING DISTANCE**	**WORKERS**	**EMISSION**		
	Kms	Nos.	KgCO2/ Km/person	KgCO2 /day	tCO2e
Walking or Bicycle	1.36	150	0	0	0
Bus or Share ride	10	30	0.015	4.5	8.21
Private 2-wheeler	15	30	0.032	14.4	26.28
Total Emission (tCO2e)					**34.49**

7. Operation stage

At time of Operation of the Building, various other factors come into consideration like electricity usage, occupancy, solid waste management (mainly organic waste) and most important the life span of the Project which is usually considered as 25 years and hence, the emission reduction takes into consideration the overall 25 years.

Carbon footprint of the project due to electricity consumption (during operation phase) is very straight forward to estimate. The project's estimated annual energy consumption which includes HVAC, lighting, equipment, services etc., can be compared with conventional case. The project will implement many such measures like use of SRI (Solar reflectance index) paints, energy efficient lighting, solar PV panels, etc. to reduce carbon footprint of the project.

Assumption

The project has been modeled in energy simulation software to estimate the annual consumption of both the cases. During the process, certain assumptions and considerations have been made

1. ECBC 2007and ECBC 2017 baseline criteria including envelope parameters, lighting power density, efficiency of HVAC system has been considered for the conventional case.

2. Schedules of occupancy, lighting, HVAC system and hot water consumption. The same has been given in Appendix

3. The project has also considered saving in interior lighting due to availability of daylight in the project. The simulation results have been shown in the Appendix.

Detailed Comparison Between Base Case & Proposed Case (Residential):

The simulation model for calculating the Proposed Design and the Standard Design shall be developed in accordance with the requirements ECBC 2007.

SR. NO.	Model Input Parameter	Baseline Case (As per ECBC 2007)	Baseline Case (As per ECBC 2017)	Proposed Case
1	Exterior Wall	Wall,U-factor= 0.440W/Sq.mt*K	Wall, U-factor = 0.4 W/Sq.mt*K	12 mm Internal Plaster + 160 mm Mivan/ Block + 10mm external Plaster + 2-3 mm External Paint U-Value : 0.348W/Sq. m*K
2	Roof	Insulation entirely above deck. U-factor = 0.409W/Sq.mt*K	Insulation entirely above deck. U-factor = 0.33 W/Sq.mt*K	6mm roof glazed tiles +100mm Brickbat +150mm brick bat coba+ 150mm Concrete Slab+20mm internal plaster. U-factor = 0.335 W/Sq. m*K
3	Glazing	Vertical Fenestration U Value: 3.3W/Sq.mt*K SHGC: 0.25 VLT: 0.56%	Vertical fenestration, U Value: 3W/Sq.mt*K SHGC: 0.27 VLT: 0.27%	**U Value : 1.79 W/Sq.m.K** SHGC : 0.28 VLT : 0.49%
4	WWR	As per design	As per design	21.9%
5	Shading	No shades	No shades	Shading effect of pergolas on top floor roof and shading devices on all façade is considered.
6	Equipment Power Density	1.5 W/ft2	1.5 W/ft2	1.5 W/ft2
7	Pumps & Motors	High Efficiency – 70%	High Efficiency – 85%	High Efficiency – 85%
8	Lighting Power Density	12.9 W/m2	9.7 W/m2	8 W/m2
9	External Lighting Load	13W/m2	10 W/m2	Solar Street Lighting
10	HVAC System Type	Air cooled chiller	Air cooled chiller	Packaged Single Zone (Split Unit)

7.1 Results

Total EPI Calculation for Project:

Building energy consumption (kWh/sq.yr) – 7092.155 KWH/Year

Reduction in Energy consumption	**6966.325**
Reduction in percentage	**6.10 %**

3.1 State wise Emission Factor of Electricity

	Total Electricity Generated (All Sources)[1]	AT&C Loss % (Excluding Aux. Power Consumption)[2]	Emission Factors (Generation based)	A) Emission Factor for End-User Consumption with adjusted Import & Export of Electricity	B) Emission Factors for AT&C Losses	Combined Emission Factor for End-User Consumption (A+B)
	GWH	GWH	(kgCO2e/kWh)	(kgCO2e/kWh)	(kgCO2e/kWh)	(kgCO2e/kWh)
All India	795176	25	**0.89**	**0.89**	**0.30**	**1.19**
South Grid	207995	19	0.90	0.90	0.35	1.25
NEWNE Grid	555418	28	0.85	0.85	0.19	1.04
State/U.T.'s						
Haryana	18105	31	0.87	0.91	0.37	1.27
Himachal Pradesh	4138	21	0.00	0.21	0.05	0.26
Jammu & Kashmir	3988	67	0.00	0.28	0.52	0.81
Punjab	28630	23	0.68	0.76	0.21	0.97
Rajasthan	26572	30	0.79	0.87	0.34	1.21
Utter Pradesh	25936	33	1.05	1.11	0.50	1.61
Uttarakhand	6392	25	0.00	0.09	0.03	0.12
Delhi	4597	22	0.69	0.84	0.21	1.05
Chandigarh[3]	0	23	0.00	1.03	0.28	1.30
Central Sector (NR)	101894		0.66			
Northern Region (NR)	220251	30	0.70			
Gujarat	54129	23	0.73	0.81	0.21	1.02
Madhya Pradesh	19670	38	0.98	1.08	0.60	1.68
Maharashtra	72807	25	0.88	0.97	0.29	1.26
D.& N. Haveli[4]	0	11	0.00	0.76	0.09	0.84
Daman & Diu	0	17	0.00	0.76	0.14	0.90
Central Sector (WR)	82952		0.76			
Western Region (WR)	254475	26	0.83			
Andhra Pradesh	51758	18	0.63	0.76	0.14	0.91
Karnataka	37385	19	0.49	0.59	0.11	0.70
Kerala	8090	20	0.07	0.11	0.02	0.13
Tamil Nadu	44259	18	0.82	0.95	0.18	1.13
Lakshadweep	29	12	1.01	1.20	0.13	1.33
Pondicherry	227	12	0.67	0.86	0.10	0.96
Central Sector (SR)	55460		0.96			

For total built up area i.e. 302906.90 Sq.m, total Building energy consumption 7092.155 **kwh** i.e. **7.09 MWH**

Hence, the total consumption of the project of 7.09 MWH will produce 6.274 tCO2e

8. Operational Savings

The overall reports suggest that the impact of CO2 is less due to efficient design of HVAC system. Operational savings with CO2 are realized to be substantial and benefitting. With the use of HVAC system with good COP (coefficient of performance) 3.19 there is a great saving observed with reduced impact. The refrigerant opted would be with recommended GWP. The following reports are from the **Edge Analysis software** to take a judgment for carbon potential impact for this project. The EDGE application helps to determine the most cost-effective options for designing green within a local climate context. EDGE can be used for buildings of all vintages, including new construction, existing buildings and major retrofits. Detailed report for commercial building is attached separately as annexure.

Results

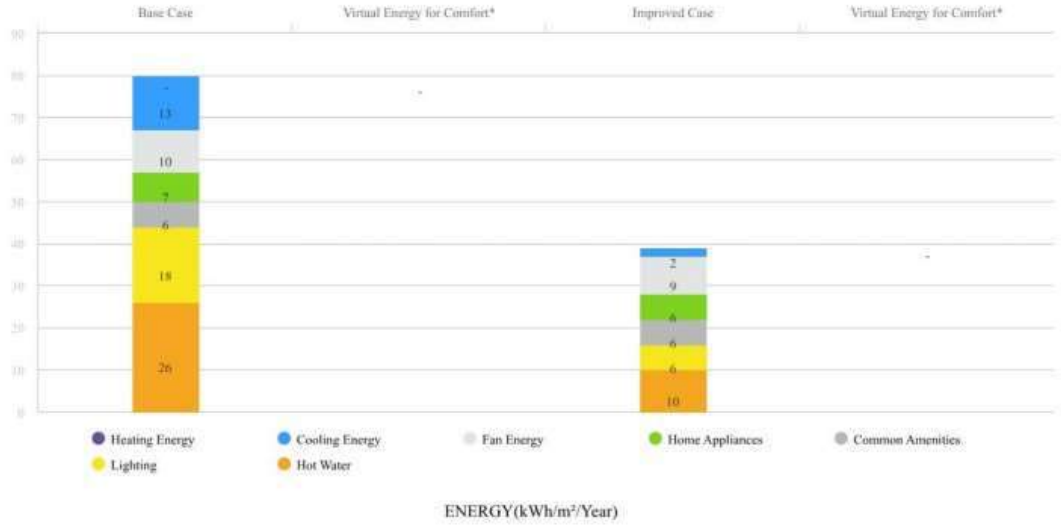
Final Energy Use (kWh/Month/Unit) 266.14	Operational CO_2 Savings (tCO_2/Year/Unit) 2.37
Final Water Use (kL/Month/Unit) 11.64	Embodied Energy Savings (MJ/Unit) -35940.96
Base Case Utility Cost (Rs/Month/Unit) 4681.20	Incremental Cost (Rs/Unit) 947,850.62
Utility Cost Reduction (Rs/Month/Unit) 2,552.91	Payback in Years (Yrs.) 30.94
Energy Savings (MWh/Year) 2031.95	Water Savings (m^3/Year) 64218.57
Embodied Energy in Materials Savings (GJ) -23002.21	Total Subproject Floor Area (m^2) 54400.00
Carbon Emissions (tCO_2/Year) 1,541.41	

ENERGY SAVINGS

EDGE ADVANCED

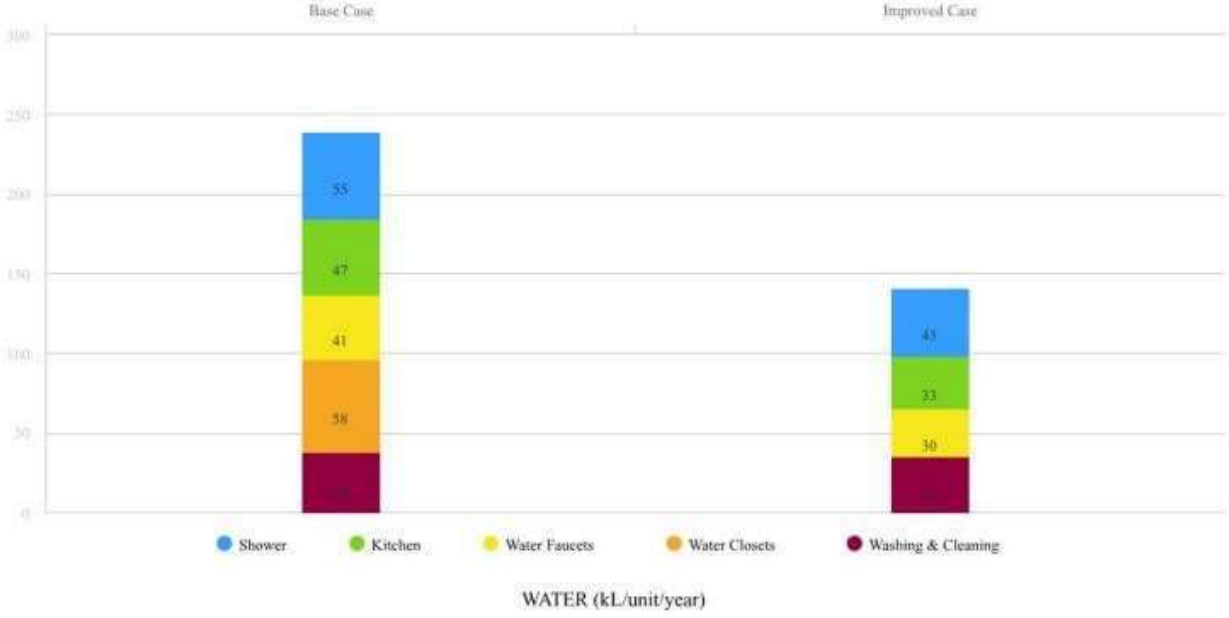
Energy Efficiency Measures 49.85%

Meets EDGE Energy Standard



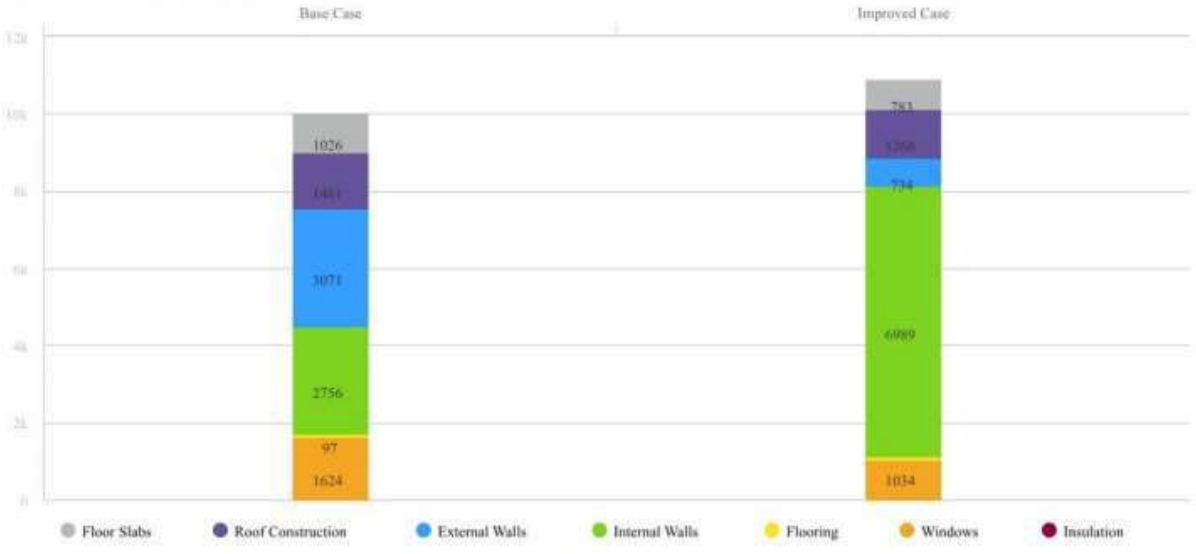
Water Efficiency Measures 41.80%

Meets EDGE Water Standard

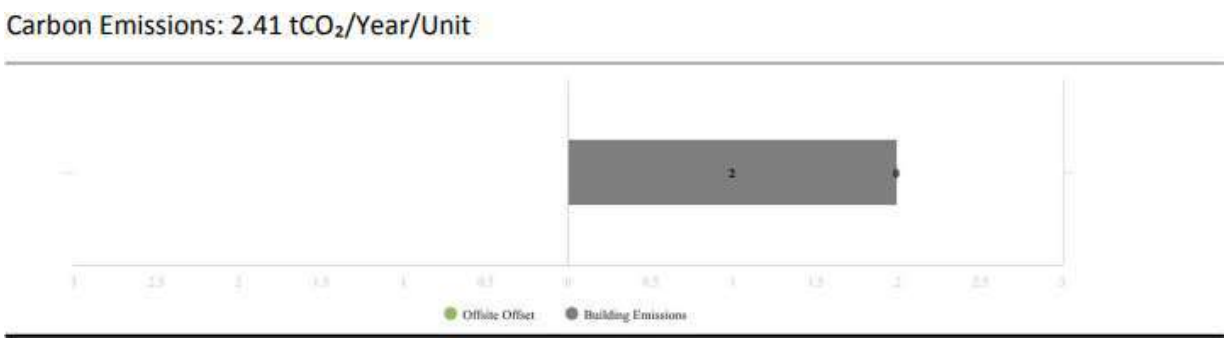


WATER (kL/unit/year)

Materials Efficiency Measures -8.68%



EMBODIED ENERGY(MJ/m²)



Hence, for 6210 users, operational savings would 14717.7tCO2e/Year Operational Emissions = 14966.1 tCO2e/Year

9. Organic Waste Management

During the operation stage, the project will generate huge quantity of dry and wet waste. While, the wet waste typically consisting of organic waste will be processed on site. Generally, the food waste goes into a landfill, it is believed that throwing food scraps and paper products into a landfill is harmless because the materials biodegrade. However, it is surprising to learn that when these materials break down in a landfill they rot un-aerobically (without oxygen) and become powerful contributors to greenhouse gas emissions. When food scraps are thrown in a landfill, the degrading material creates methane, a greenhouse gas that is 70 times more potent than carbon dioxide. Composting is an effective way to reduce greenhouse gas emissions. Composting benefits the environment in many ways. When we compost your food scraps, we produce a nutrient rich soil that is needed to maintain healthy and productive farm fields. This closes an important loop and completes the cycle necessary to grow healthier food. When it comes to global warming, composting directly reduces carbon dioxide & other powerful greenhouse gases, like methane (CH4) and nitrous oxide (N2O).

During the construction stage, 150 no of labor have been considered and the organic waste generated is 0.18 kg per day of food waste generation summing to 27 kg/day of food waste generation.

The project will have approx. 6210 occupants in its operational phase. Following is the details for organic waste:

Type of Waste	Quantity	Management
Biodegradable (@60% of waste generated) (kg/day)	1825	Shall be converted into manure with the help of OWC
Non Biodegradable (@40% of waste generated) (kg/day)	1210	Handed over to recyclers

Results

Total population: 6210 users
Total organic waste = 6210 x 0.10 kg = 621 kg/day
Carbon emission through organic waste **= *10.2586 = 6370.5906tCO2e/year**

10. Solid Waste Management

- Capacity of STP (CMD):940 KLD
- STP Generation: 784 KLD

The total sewage waste generation is 784 KLD which will be treated in sewage treatment plants of capacity 940 KLD. The treated water will be reused for landscape and flushing purpose which will result in minimum use of fresh water. The technology used is MBBR which is the most efficient state-of- art technology for domestic wastewater treatment. The innovative design of the MBBR has overcome all the limitations of conventional wastewater treatment systems. The MBBR uses a first-of-its-kind unidirectional fluidization pattern that makes efficient use of oxygen that is required for biological degradation of organic impurities. The novel design of the aeration system in the MBBR also reduces the operating cost of the treatment.

Thus, by using MBBR Technology, there will be a reduction in the production of untapped methane which has a very high Global Warming Potential (GWP).

Assumption:

For the above calculation, only methane emissions are considered in the process and not the CO2 as this gas is considered Biogenic

Calculation for CH4 emission for STP:

CH_4 EMISSIONS FROM CONSTRUCTED WETLANDS FOR DOMESTIC WASTE

$$CH4\ EMISSIONS = (TOW \times EF \times CF)_{BOD} + (TOW \times EF \times CF)_{COD}$$

Where

1. *TOW: Total organic waste entering CW in inventory year, kg BOD/ Year or Kg 250 COD/yr*
2. *EF: Emission factor, kg CH4/Kg BOD (for Domestic wastewater only) or kg COD (for both domestic and industrial wastewater). The 2006 IPCCC Guidelines provide default values for* ***domestic and industrial wastewater are 0.6 CH4/Kg 278 BOD and 0.25 Ch4/Kg COD***
3. *CF: Correction factor wetland type. For horizontal subsurface type CF is 0.1 by 2006 IPCC, Japan Guidelines.*

TOW Calculation:

Inlet BOD for 784 KLD of Sewage Generation **275 x 784 = 215.6 kg/day**

Inlet COD for 784 KLD of Sewage Generation **525 x 784= 411.6 kg/day**

Thus, CH4 emission = **[{(215.6 x 0.6 x 0.1) + (411.6 x 0.25 x 0.1)}] = 23.226 kg CH4/day**

Considering 1CH4 equivalent emission = 56 CO2 emission, Hence CO2 Equivalent emission = **56 x 23.226 = 1300.656 kg/day = 1.3 t/day**

Hence, total CO2 Emission from STP is 1.3 t/day i.e. 474.5t/year

11. Carbon Sequestration

Terrestrial sequestration involves the capture and storage of carbon dioxide by plants and the storage of carbon in soil. During photosynthesis, carbon from atmospheric carbon dioxide is transformed into components necessary for plants to live and grow. As part of this process, the carbon present in the atmosphere as carbon dioxide becomes part of the plant: a leaf, stem, root, etc. Long-lived plants like trees might keep the carbon sequestered for a long period of time.

The project proposes to opt for various active and passive carbon sequestering measures. The major factor being the plantation of the site that will supplement the carbon sequestration to the Maximum level. The site retains the entire old and existing plantation. The trees that will fall in the designed area will be replanted on site and the ecosystem of the site is retained to enhance the local biodiversity. The plant list is carefully chosen to include the major sequesters species. The overall landscape proposition supports the carbon curb and gets the impact to approximate neutral.

Additional measures like roof painting to reject heat, lime paints, etc will also be opted for in the project as per the design recommendations.

The calculation considers landscape area as a source of terrestrial sequestration. The area of total landscape area is 19,889.24 m^2 which includes trees, shrubs and lawn area.

Since green roofs prove beneficial to act as a carbon sequester, being the main component present in the plant matter which gets naturally absorbed and stored in plant and its tissue. Various studies have been conducted to analyze the amount of carbon being sequestered with different plant types and have shown variations with various species.

For any region the sequestration potential can be improved by changing plant species, increasing substrate depth, substrate composition, and overall management practices. As in the above cases the potential of carbon sink is higher in the above ground area due to its depth that allows better area for carbon storage.

As per the study conducted and paper presented in Landscape and Urban Planning Journal, with the title 'Quantifying carbon sequestration of various green roof and ornamental landscape systems, the authors have concluded that those landscape systems containing more woody plants and herbaceous perennials and grasses for the in-ground and green roofs, respectively had higher carbon content than other landscape systems. The native options also had high carbon content due of the high volume of plant biomass. The vegetable and herb garden and vegetable green roof contained a moderate amount of carbon while the turf green roofs contained less carbon than their counterpart in-ground landscape systems. Green roofs ideally have a lesser potential for sequestering carbon and greater benefit can be achieved in ground level landscape systems. Ornamental landscapes have good potential for carbon sequestration but management practices can affect their net carbon sequestration and the stability of the carbon sequestered.

CO2 sequestration with saturated light intensity, optimal temperature and adequate water

Plant Type	Average CO2 uptake for considered (µmol/sq.m./sec)
Grasses	5-15
Broadleaf Evergreen	
Trees with Sunlit leaves	10-16
Trees with Shaded Leaves	5-7
Broadleaf Deciduous	
Trees with Sunlit Leaves	10-15
Trees with Shaded Leaves	3-6

Following assumptions have been made for calculation purpose:

I. Weight of 1 µmol of CO2 has been considered 44.01 x 10^-6 gm to eventually calculate total sequestration in tCO2e.
II. Approx 68% of trees are considered evergreen like AzadiractaIndica (Neem), NyctanthesArbor (Parijat), Anthoceohallus (kadamb), MinusopsElengi (bakul), Bauhinia Recemosa (Apta), etc.; and the remaining are deciduous
III. Approx 70% leaves are considered sunlit and 30% as shaded leaves
IV. Shrubs and grass both are considered under 'Grass' category in regard to the table above

The hypothesis that 'Addition of roof garden may not only help savings in energy substantially but will help the overall heat island reduction to a large extent' can be justified with the reduction in energy that is noted during the summer and monsoon months. With enhanced green cover the carbon sink is realized to be more and better reduction is observed in heat island effect. Sustainable urban parameters can affect the over project and create a better livable space. The overall impact on environment and society can be enhanced positively with the eco land planning concepts. The landscape and green cover enhancement can be explored with the option of rooftop garden scenario along with norms of base on ground greenery.

The current growing concept of smart city will slowly emerge to grow vast expanse of integrated townships with utmost facilities and comfort as foresighted by the Government of India.

The concept when linked with sustainable landscape features will prove extremely beneficial for all stakeholders and prove economically viable at all ends. Proper approach with phase wise planning at early stages can benefit to a supreme extend not compromising any of the comfort factors. The end users can enjoy a long term benefit and saving for maintenance costs with lesser dependency on natural resources.

Carbon sequestered from the Trees

A. Species Characteristics	C. No. of Trees Planted	D. Survival Factor	E. No. of Surviving Trees	Annual Sequestration Rate(lbs./tree)	Carbon Sequestered(lbs)
Azadirachta indica	150	0.621	93.15	1	93.15
Ficus racemosa	100	0.474	47.4	41	1943.40
Mesuaferrea	150	0.373	55.95	2.2	123.09
Delonixregia	250	0.621	155.25	1	155.25
Borassusflabellifer	250	0.678	169.5	2.8	474.60
Carica papaya	50	0.367	18.35	16.2	297.27
Ficusbenghalensis	100	0.552	55.2	6	331.20
Caryotaurens	300	0.194	58.2	150.6	8764.92
Syzygiumcumini	50	0.373	18.65	1	18.65
Pongamiapinnata	200	0.621	124.2	1	124.20
Eucalyptus globules	200	0.678	135.6	1	135.60
Mangiferaindica	50	0.367	18.35	1	18.35
Manilkarazapota	50	0.552	27.6	6	165.60
Micheliachampaca	100	0.194	19.4	150.6	2921.64
Pongamiapinnata	100	0.194	19.4	150.6	2921.64
	Carbon sequestered(**tCO2e)**				**18488.56** =(18488.56*3.4) for converting unit i.e **62861.10 tco2**

Reference: Method for Calculating Carbon Sequestration by Trees in Urban and Suburban Settings by U.S. Department of Energy Information Administration

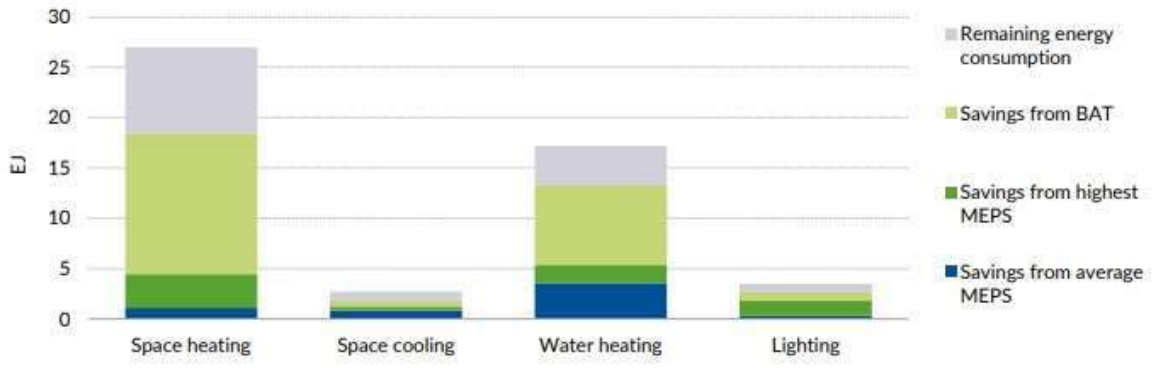
12. Global Benchmark provided for Comparison

The building sector offers the largest cost-effective GHG mitigation potential, with net cost savings and economic gains possible through implementation of existing technologies, policies and building designs.

Various Base Case Benchmarks have been provided in order to give a idea about the savings been benefited from the energy efficient performance Techniques.

Two-thirds of global building energy use is still not subject to minimum energy performance standards (MEPS) 25. Globally, the energy savings potential in 2015 would have been of the order of 6 EJ (1.67 x 106 GWh), or 6% of global residential energy consumption, had average standards been implemented across all countries for space cooling, space heating, water heating and lighting. Implementing the highest current minimum energy performance standards globally would have saved 13 EJ (3.6 x 106 GWh), or nearly 15% of global residential energy consumption. If best available technology (BAT) had been installed globally, the savings would have result in savings of more than two-thirds.

Figure 10 **Energy savings in 2015 if all installed stock had met minimum energy performance standards**

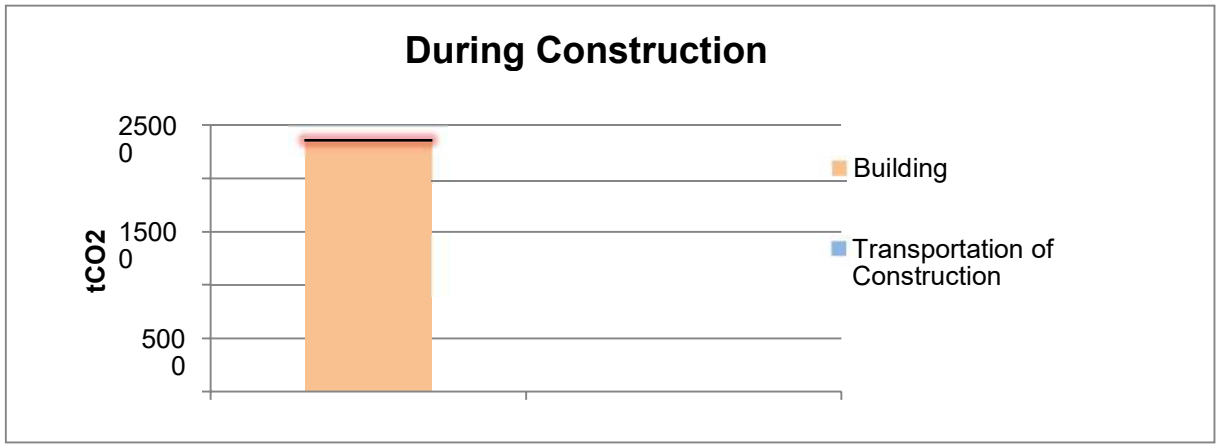


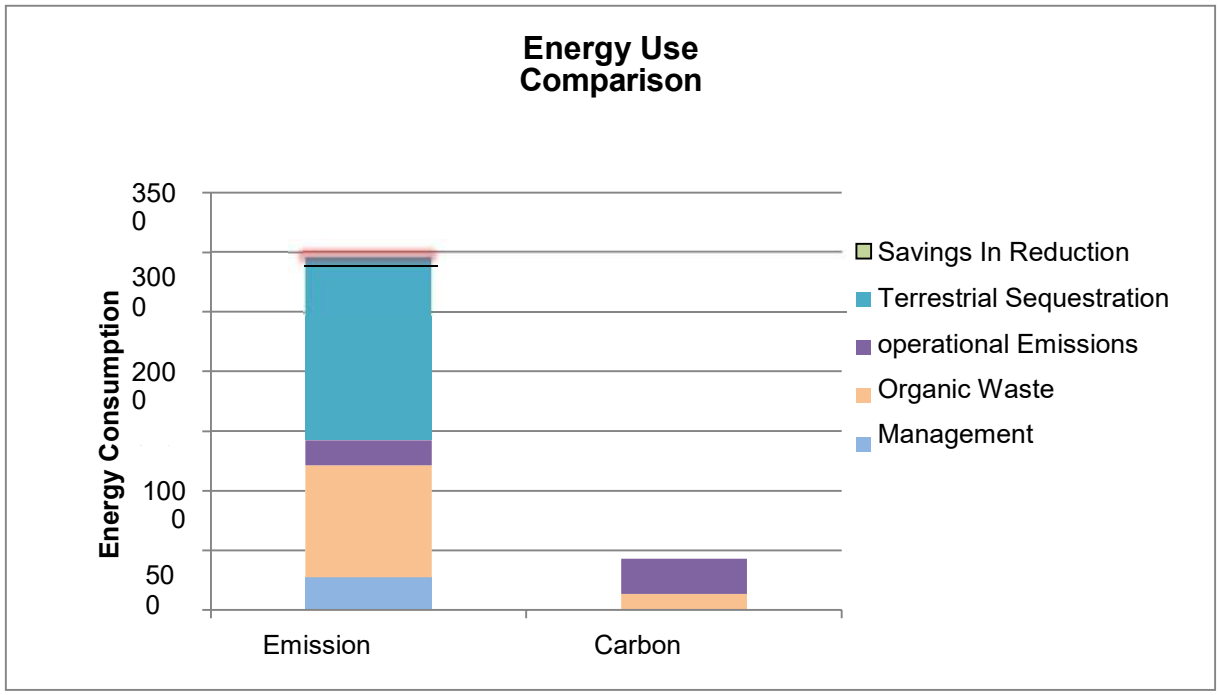
Note: Estimates do not take into account product lifetimes or saturation rates in the energy savings potential.
Source: IEA (2016), Energy Efficiency Market Report 2016.

Hence, Base Standards from ISO 16745 which specifies requirements for the verification of a carbon metric calculation for GHG emissions of an existing building during the use stage, where the carbon metric calculation is performed.

13. Conclusion

The CO2 emission can be categorized in mainly two parts. The first is During Construction Phase, which is one time; and the other on is During Operation Phase, which continues during the whole life cycle.





The emission is mainly from Building Materials. The total emission of the proposed project during construction is estimated to be **7229.75tCO2e**

The emission is mainly from electrical consumption in Building during operational Phase. The total emission of the proposed project during operation is estimated to **14966.1 tCo2e/year; 6370.59tCO2e/year** from organic waste; **474.15 tCO2e/year from solid waste.** Additionally, the project will sequestrate **18488.56 tCo2e** from the Vegetation cover and **14717.7tCo2e** from the energy efficient technologies used during operational phase which sums up to total reduction

of **33206.26**tCo2e/year i.e 5.34Tco2/person.

Hence, total emission sums up to 2.26 tCo2/person i.e 14088.37 tCo2 for 6210 occupants.(18.16%)

The overall impact of carbon with HVAC can be neutralized with the active and passive measures in the project. The impact of the adverse CO2 is somewhat observed in the project propositions through the measure of Trees Planted.

14. References

1) Rao, U.S., Prakasa Rao, G.S, (2004, July). Urban Climate trends-The Indian Scenario. *J.ind. Geophys. Union,* Vol 8, No.3, pp 199-203.

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3) Yoshida, Y. (2006, October 25) Development of air conditioning technologies to reduce CO_2emissions in the commercial sector. *Carbon Balance and Management:* 2006. Accessed on 24/06/2016. Retrieved from: https://cbmjournal.springeropen.com/articles/10.1186/1750-0680-1-12

4) http://igu.in/8-3/5De.pdf

5) http://timeforchange.org/what-is-a-carbon-footprint-definition

10) Iso-14040

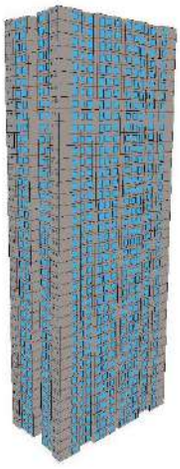
11) Global Status Report 2016

12) Iso 16745

ECBC COMPLIANCE ANALYSIS REPORT

Residential Project "Bhakti Park"

Chembur, Mumbai



Submitted on: **03 September 2020**

For
M/s. Ajmera Realty & Infra India Limited

By

KAIZEN DESIGN SOLUTIONS

INDEX

1. Energy Calculations against Conventional Base Case

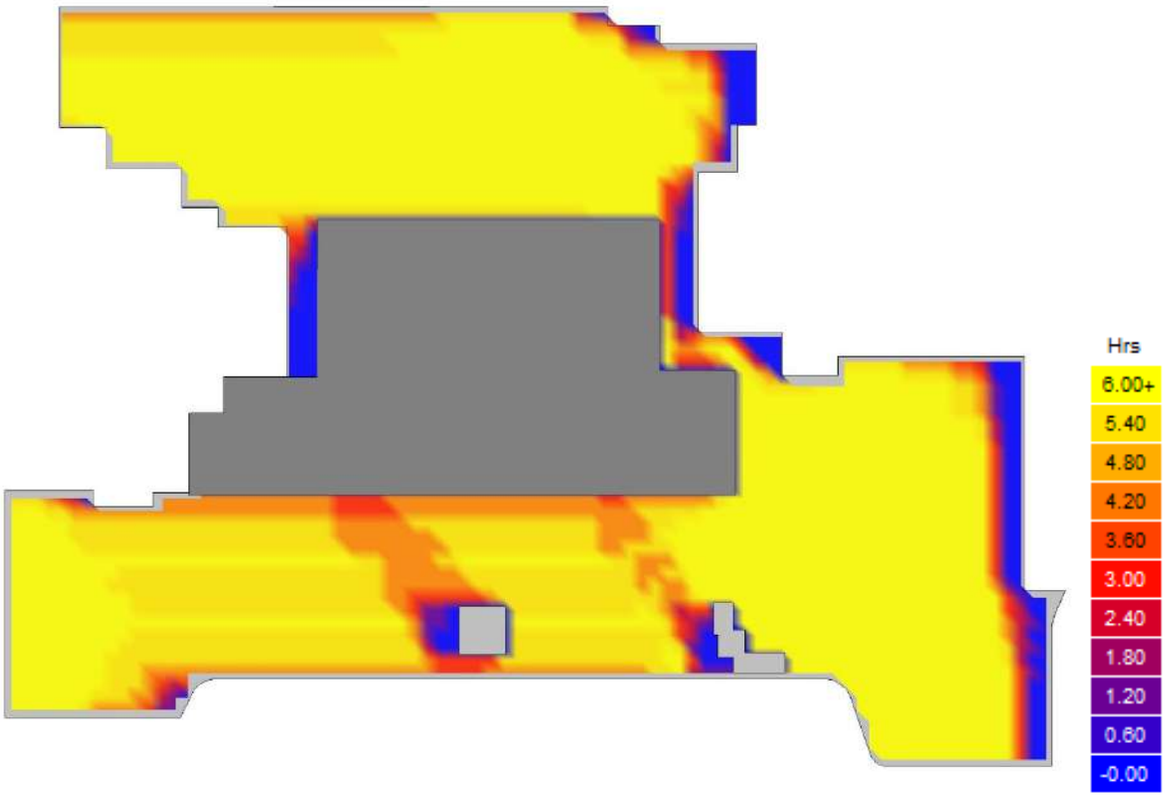
	Building Parameters	Maximum Demand Load in kW		Energy Conservation Measures	% Savings
		Standard Base Case	Efficient Proposed Case		
A) Commercial					
1	Internal Lighting	81	49	# LED Tubes & Lamps for all habitable areas	40.00
2	Air Conditioning	174	122	# Energy Efficient VRF System, with high COP	30.00
3	Equipments	73	73	# 5 A Load - TV, Telephone, Fans, Plug Points etc. # 15 A Load - Fridge, Microwave, Washing Machines etc.	0.00
B) Residential					
1	Internal Lighting	3872	2323	# LED Tubes & Lamps for all habitable areas	40.00
2	Air Conditioning	4646	4646	# Energy Efficient 3 - Star Rated Split AC, High COP	0.00
3	Equipments	3097	3097	# 5 A Load - TV, Telephone, Fans, Plug Points etc. # 15 A Load - Fridge, Microwave, Washing Machines etc.	0.00
4	Water Heating	3291	2633	# 20% of Total Hot Water requirement on Solar	20.00
C) Infrastructure					
1	Common Area Lighting	1239	619	# LED Tubes for Stairs, Stores, MEP Rooms, Toilets, Lobbies	50.00
2	External / Landscape Area Lighting	968	465	# LED Lamps with Timer Based Controls	52.00
3	Parking Area Lighting	929	465	# LED Tubes for Parking Spaces	50.00
4	Plumbing, Fire, Equipment & Ventilation	746	619	# Pumps & Motors with Premium Efficiency of 80%	17.00
5	Lifts & Escalators	688	619	# Energy Efficient Lifts with VVVF Lift Drive	10.00
#	**Grand Total**	**19805**	**15730**	**Total Savings in Energy Demand - 4075 kW**	**20.57**

1. Energy Calculations Against Conventional Base Case

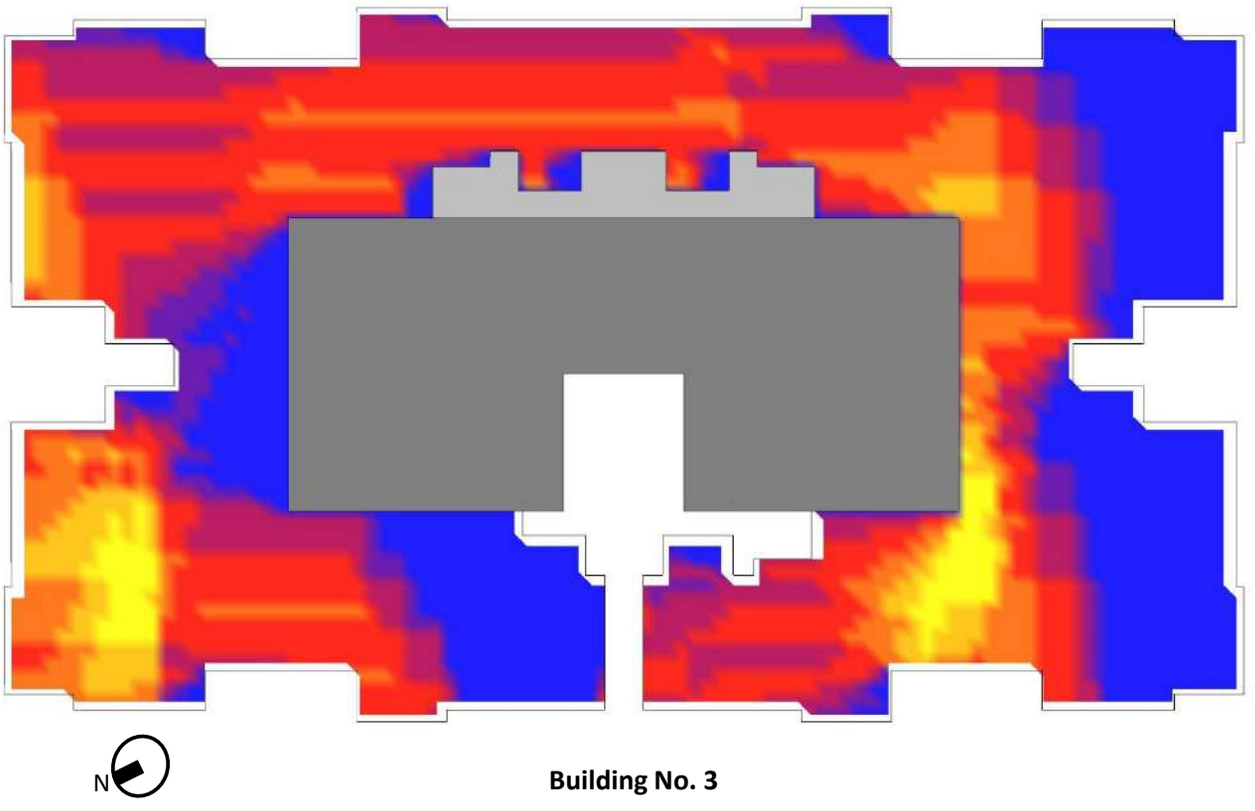
Sr. No.	Energy Conservation Measures	Savings %
1	Better Envelope Design	20.57% Energy saved as per Conventional Base Case. 3.17% Energy saved as per ECBC 2007 Base Case. (R) 5.47% Energy saved as per ECBC 2017 Base Case. (C)
2	Lower Lighting Loads	
3	Efficient Air Conditioning System	
4	Efficient Pumps & Motors	
5	Solar PV System	1.01% of demand Load (160 kW)

Hot water	-	658	kW
Solar PV	-	160	kW
Total	-	818	kW
Demand Load	-	15730	kW
Savings through Renewable energy -		**5.20%**	

2. Shadow Analysis

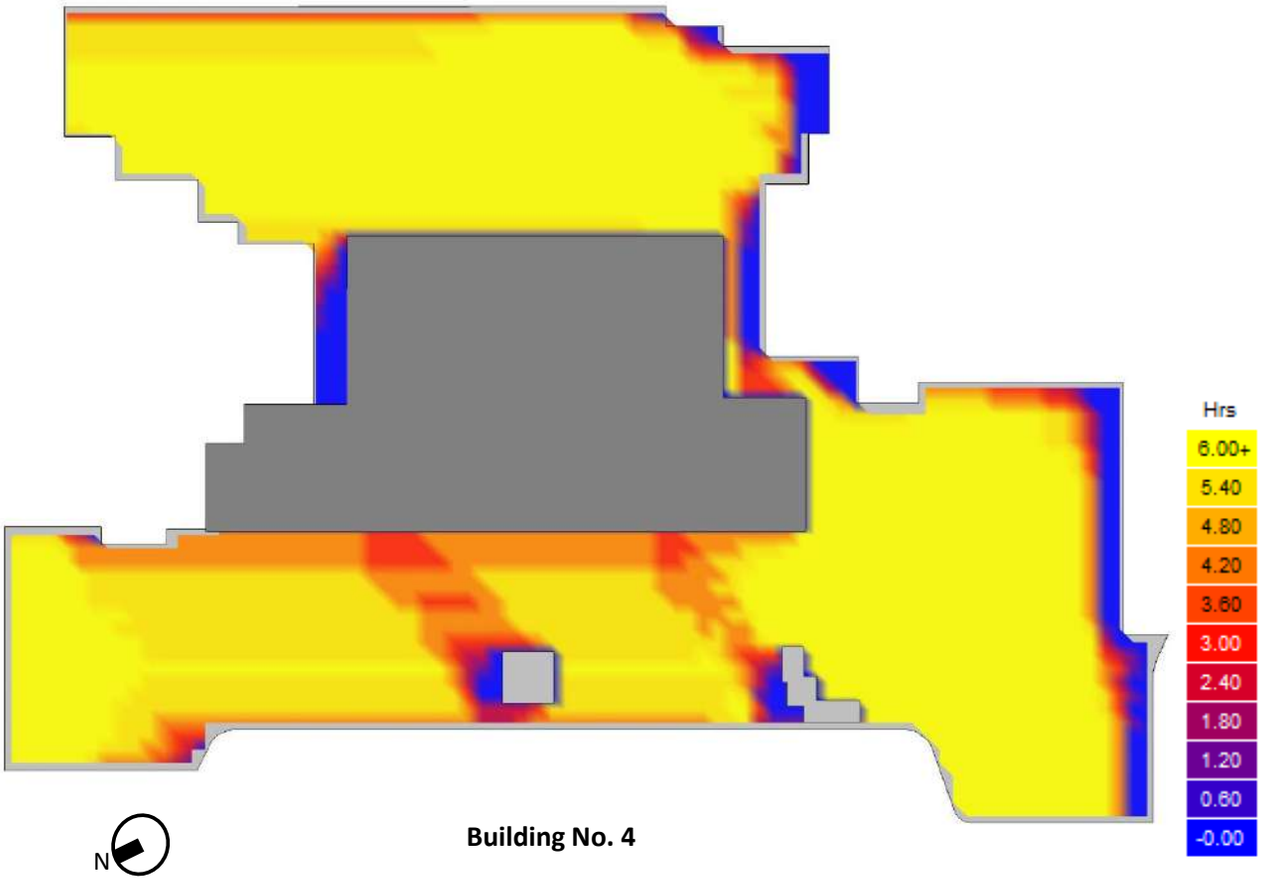


Existing Building No. 2

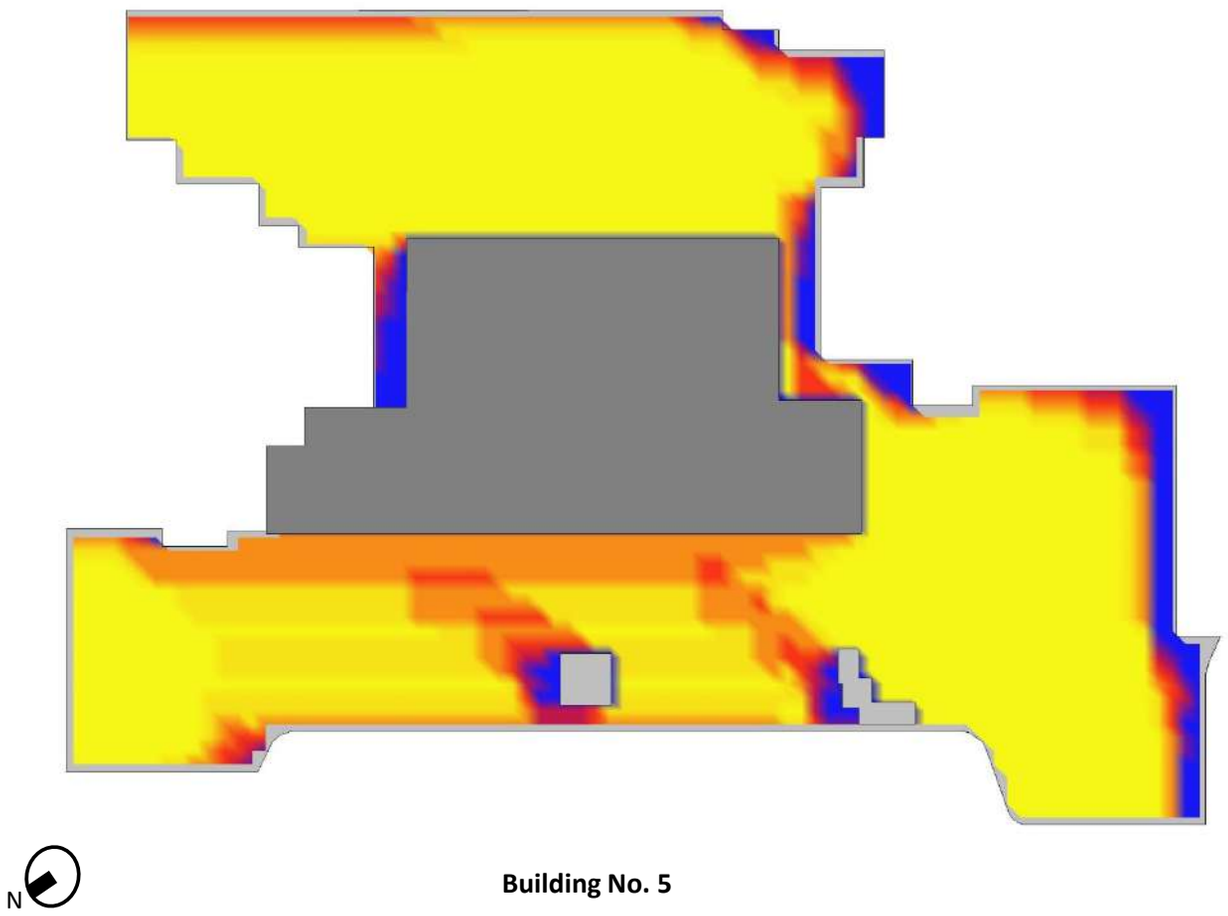


Building No. 3

2. Shadow Analysis

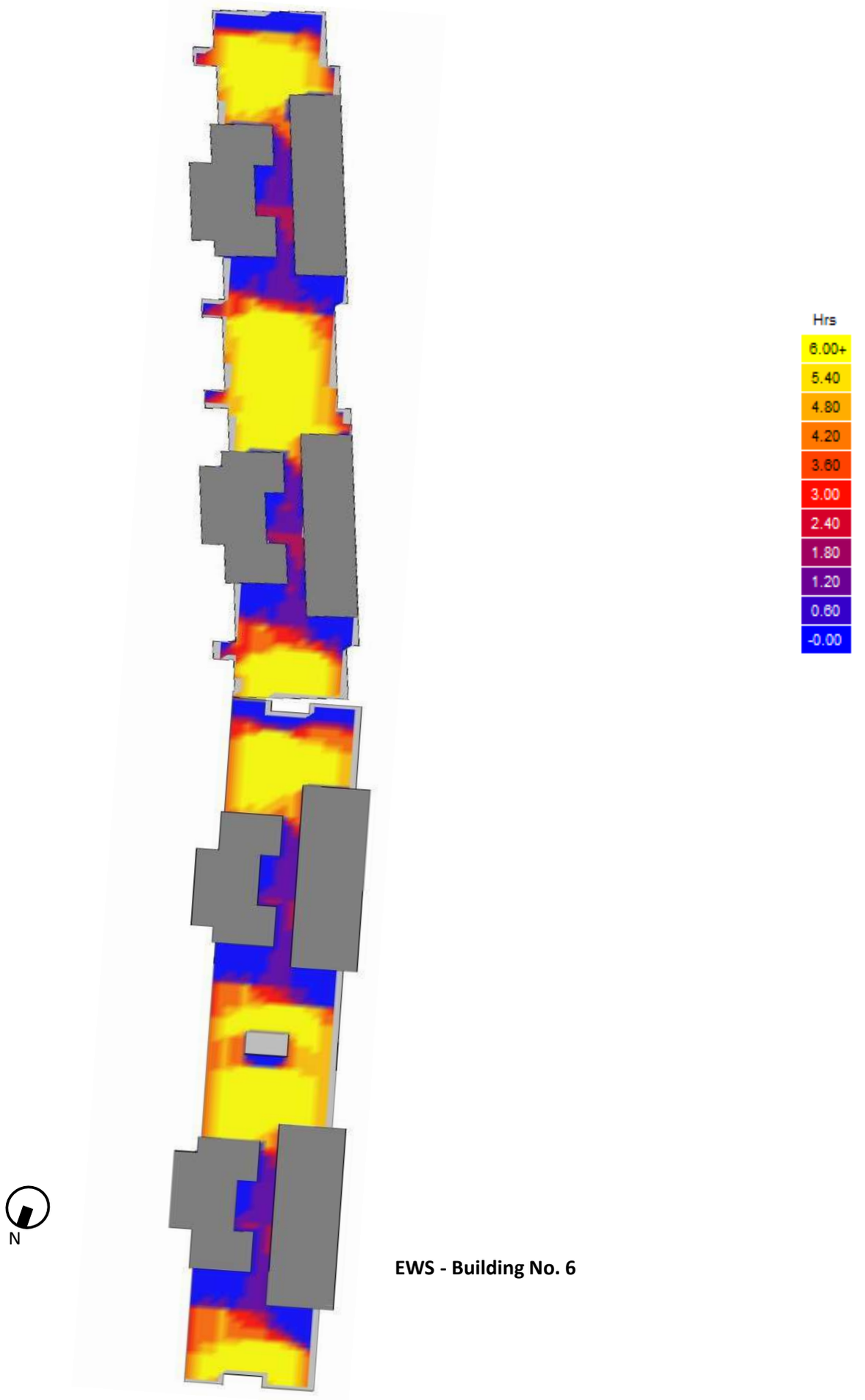


Building No. 4



Building No. 5

2. Shadow Analysis



EWS - Building No. 6

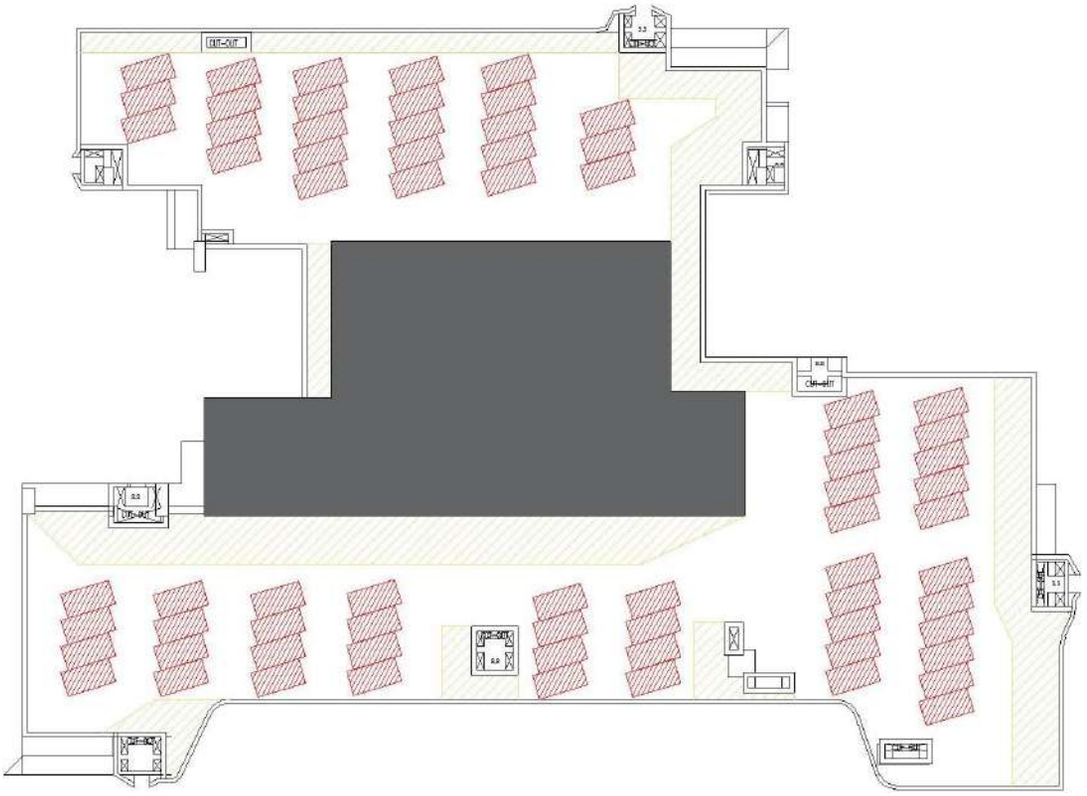
3. Terrace Area Calculations

For the Proposed Project, Solar Hot Water is proposed for whole Project and Solar PV panels are proposed to encourage the Renewable Energy use and also to encourage sustainable development.

Building 1 - 6

Residential Population	-	6158		
Residential Hot Water Requirement	-	**92370**		**(6158 x 15 ltrs/day/person)**
Total Roof Area	-	7339.43	Sq.m.	
Usable Roof Area	-	4771	Sq.m.	(65% of terrace area)
Solar PV Capacity	-	160	kW	
Space Required for Solar PV	-	1600	Sq.m.	(@ 10 sq.m. / kW)
Area Required for 1 Solar Hot Water Panel	-	2	Sq.m.	
Total No. Panels which can be accommodated	-	124		
Total No. Panels Considered	-	124		
Total Hot Water Generation	-	18600	LPD	(124 x 150 ltrs / Panel)
Total % of Hot Water on Solar	**-**	**20%**		**(compared to total hot water requirement)**

4. Solar Panel Layout



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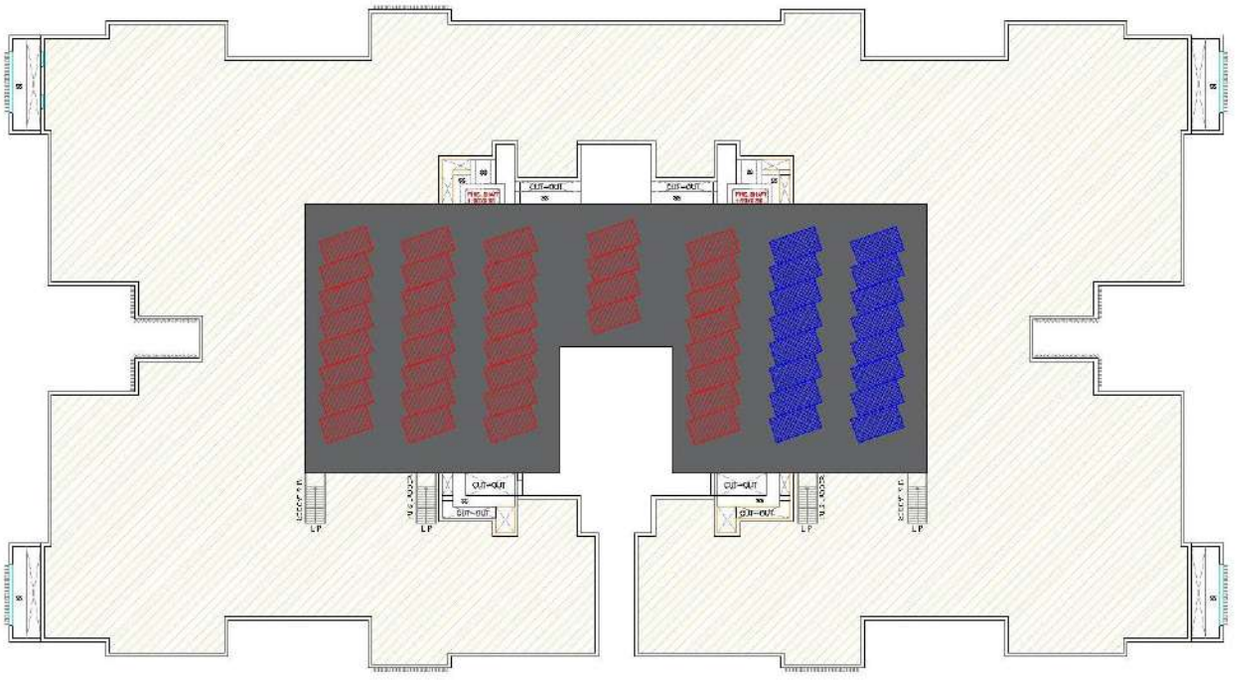
Existing Building No. 2



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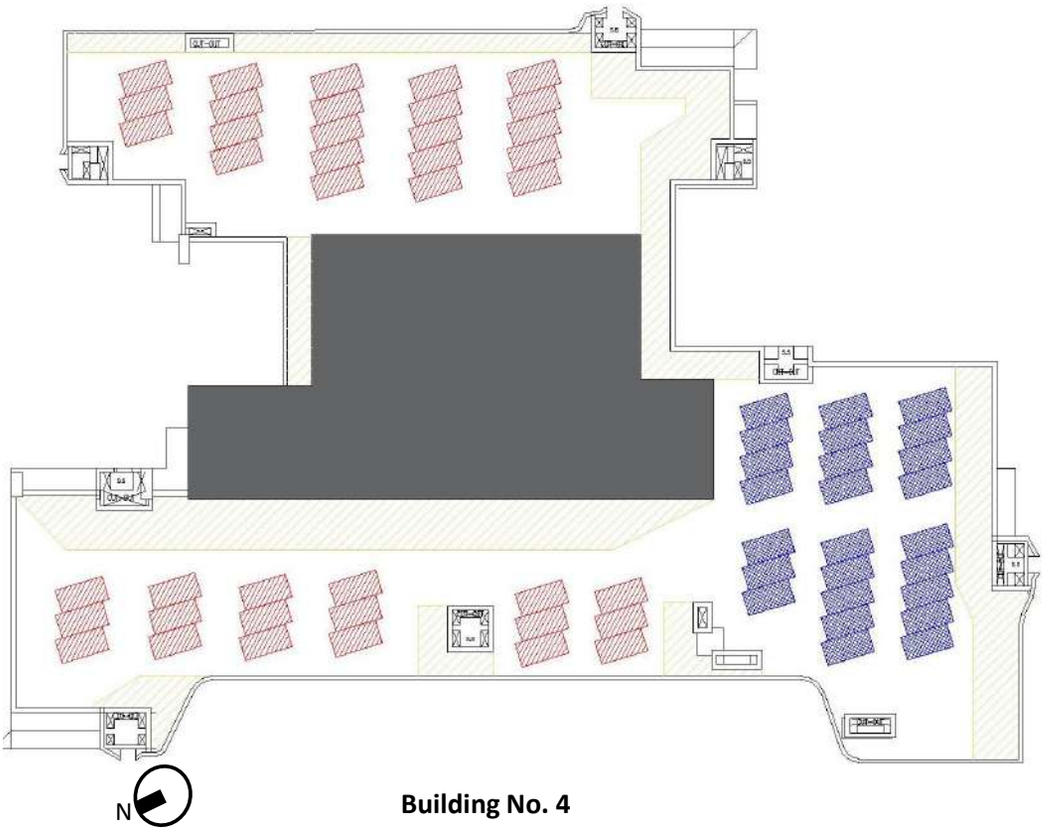
Building No. 3

Legend

- Staircase Block
- Shaded Area
- Solar PV Panel
- Solar Hot Water Panel

4. Solar Panel Layout



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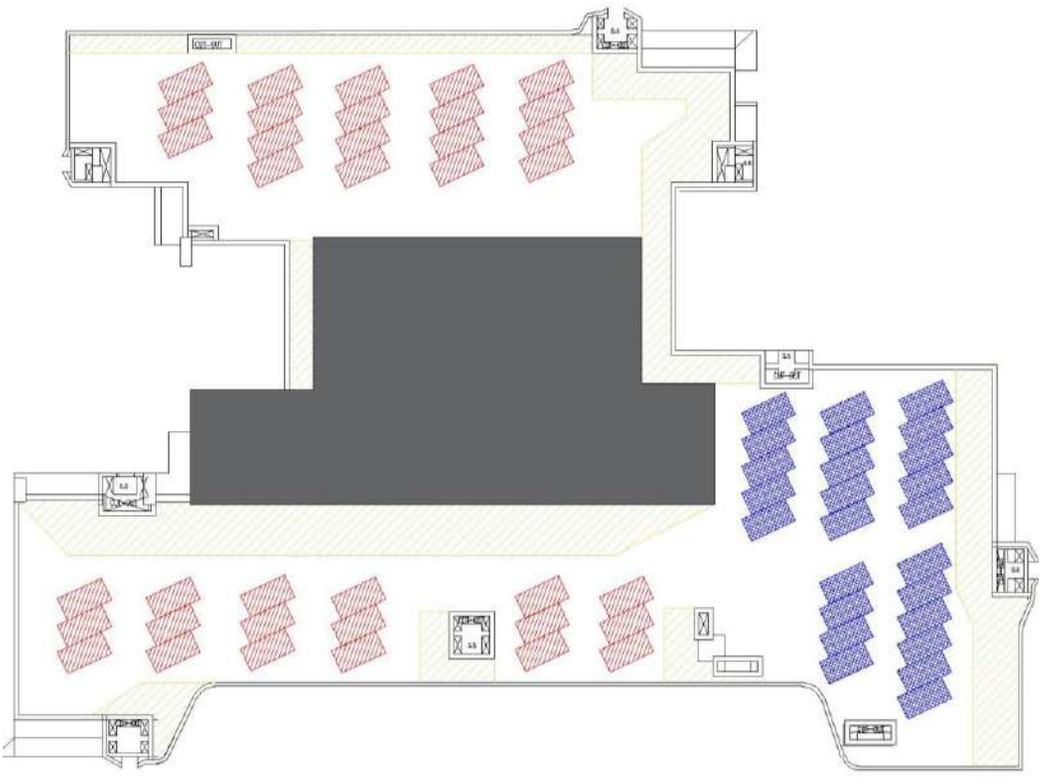
Building No. 4



N

Building No. 5

Legend

- Staircase Block
- Shaded Area
- Solar PV Panel
- Solar Hot Water Panel

4. Solar Panel Layout

5. Executive Summary

This report has been prepared for Residential Project "Bhakti Park" at Chembur, Mumbai. This report is part of a process towards obtaining Environmental Clearance. The specific objective of this report is to evaluate annual energy usage and apply various energy efficiency measures for ECBC Compliance for maximum Energy Efficiency.

The buildings were analyzed using hourly energy simulation to evaluate the performance in terms of energy consumption and thermal comfort of the occupants. The purpose of this report is to present the performance of the design building in comparison to a baseline budget building based on ECBC.

It is observed via various analysis tools that the buildings are properly Shaded and has sufficient Daylight. The Residential Buildings are Naturally ventilated and Commercial Buildings are equiped with efficient air-conditioning system. Following are the final outcome of energy simulation of the proposed buildings.

		ECBC 2007 & 2017	Proposed Case	Proposed Case + Solar PV
Energy Consumption	(MWh)	31,264	30,266	29,954
Energy Saving			**3.19%**	**4.19%**

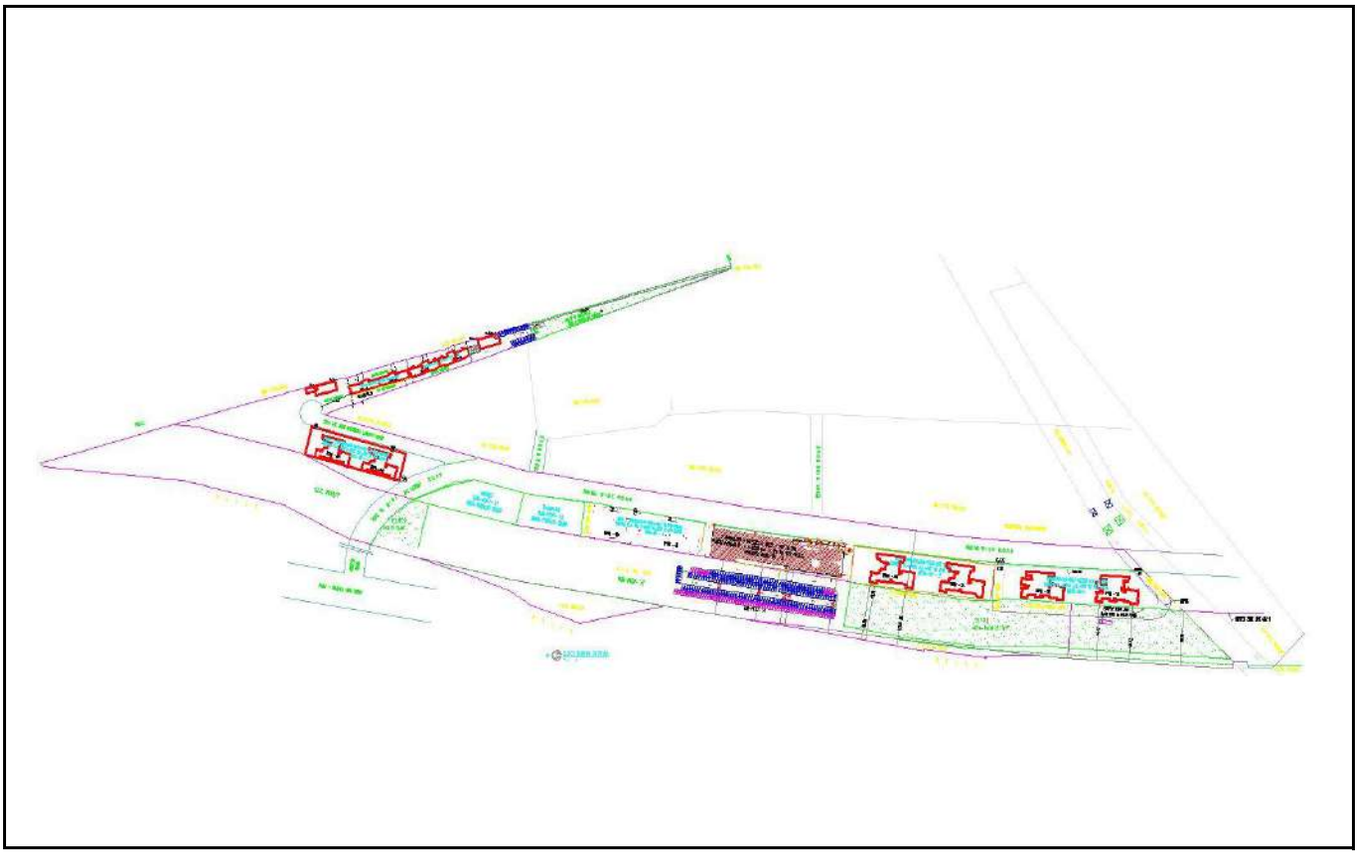
6. Project Description

This report has been prepared for Residential Project "Bhakti Park" at Chembur, Mumbai. This report is part of a process towards obtaining Environmental Clearance from MOEF. The specific objective of this report is to evaluate annual energy usage and apply various energy efficiency measures for ECBC Compliance for maximum Energy Efficiency.

Typical Buildings in the Projects

1. Building No.1 - 5
2. EWS - Building No. 6
3. Retail Shops

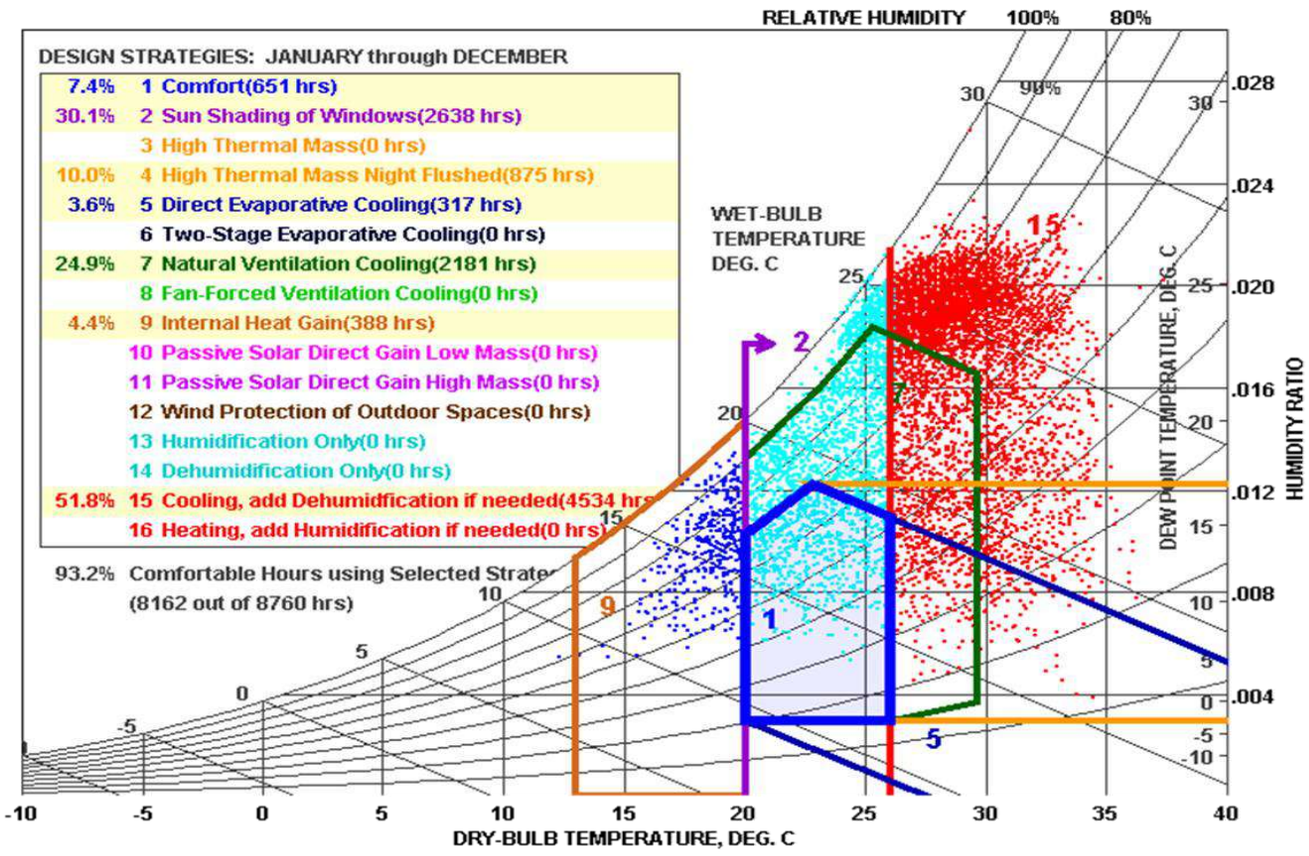
SITE LAYOUT



PROJECT DETAILS

1	Total Site Area	11,732.32	sq.m.
2	Total Built-up Area	3,29,947.17	sq.m.
3	Connected Load	31,254.35	kW
4	Demand Load	15,730.30	kW
5	Solar Hot Water Capacity	20%	of Hot Water Demand
6	Solar PV Capacity	160	kWp

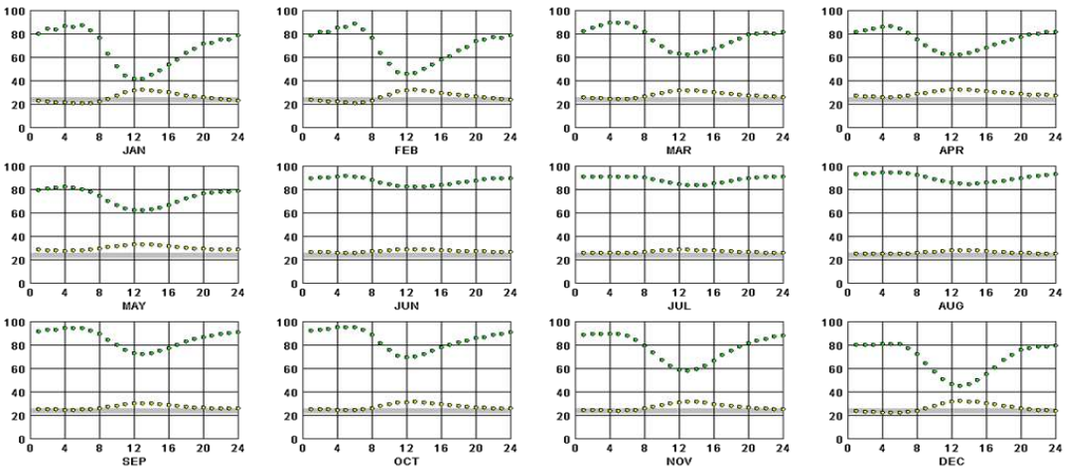
7. Climate Analysis



Psychrometric Chart above explains that, no other strategy is effective for passive comfort except Solar Shading & Natural Ventilation. Strategies like direct evaporative cooling, internal heat gain and High thermal mass are also effective, but for a lesser period. Around 30% of total comfort hours can be achieved by Sun Shading. Around 27% of total comfort hours can be achieved by Natural Ventilation. From all the above strategies around 50 % of total comfort hours can be achieved by Sun Shading and Natural Ventilation & for the rest 50% of the time air conditioning may be required. For this analysis, the Comfort Criterion was set at 20 to 26 degree C for dry bulb temperature & relative humidity to 70%.

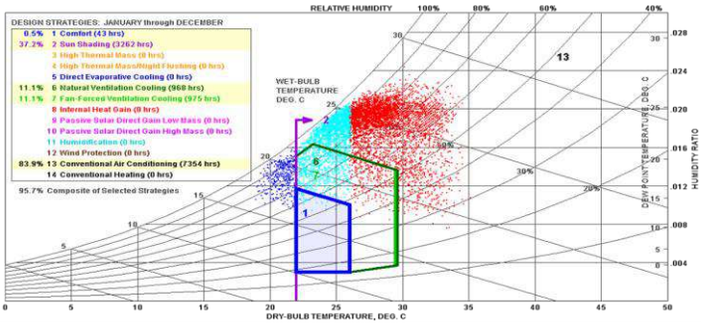
The Pshychrometric Chart above confirms that the four effective strategies are Shading, Ventilation, Internal heat gain and Evaporative cooling. The graph plot on next page shows the degree difference between the Dry Bulb Temperature & Relative Humidity. As per the legend, at least 30% of the total hours are in comfort range with an effective wind speed of 3 to 5 m/s. Fan forced ventilation is also an effective strategy during monsoon period.

Next is the annual wind pattern of Mumbai city. The purpose is to understand this Wind Pattern. If you observe the legend carefully, you will understand that, 22% of the total annual wind is flowing from West direction, which has a temperature around 20 to 26 degree C, with a humidity around 70% & maximum wind speed is 6 m/s at one point of time. The predominant wind direction in Monsoon Period is west.



DRY BULB X RELATIVE HUMIDITY

Dry Bulb
Humidity
Comfort Zone



DRY-BULB TEMP (degrees C)

0%	< 0
4%	0 - 22
34%	22 - 26
61%	26 - 38
0%	> 38

WIND SPEED (m/s)

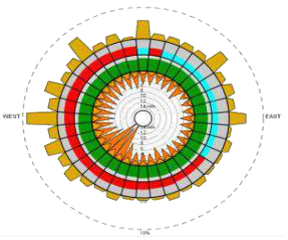
23%	< 2
34%	2 - 3
35%	3 - 5
6%	5 - 9
0%	> 9

TEMPERATURE (Deg. C)

- < 0
- 0 - 22
- 22 - 26
- 26 - 38
- > 38

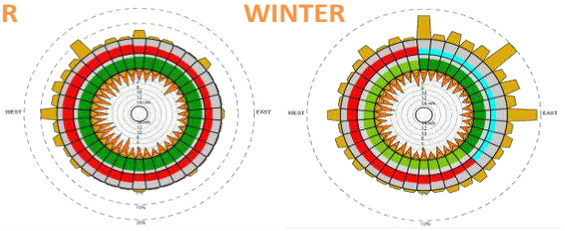
RELATIVE HUMIDITY (%)

- <30
- 30-70
- >70

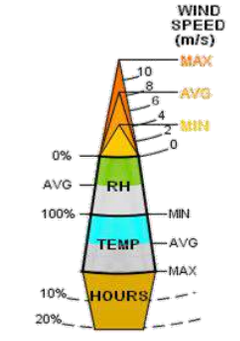


ANNUAL WIND PATTERNS

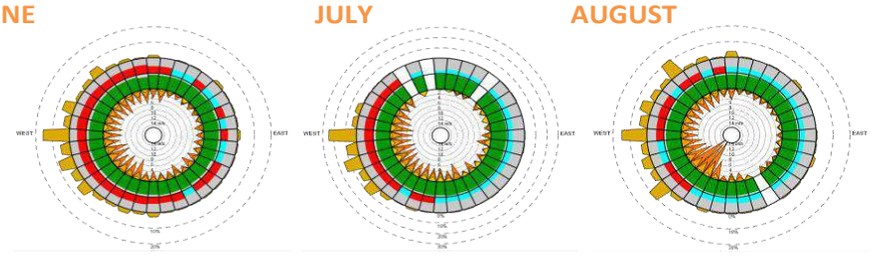
SUMMER WINTER



SEASONAL WIND PATTERNS



JUNE JULY AUGUST



MONTH WISE DETAILS

8. ECBC 2007 Compliance - Residential

SECTION 4 - BUILDING ENVELOPE

4.2.1 Fenestration: The vertical fenestration of the project is labelled by manufacturer. The following value will be considered for the same,

U-value:	4.60	5.40	W/sm.K
SHGC:	0.42	0.64	
VLT:	45%	65%	

4.2.2 Opaque Construction: The U-value of roof and wall assembly are calculated and provided as per Annexure VI.

4.2.3 Building Envelope Sealing: All spaces of the project are naturally ventilated, therefore the criteria don't apply to them.

SECTION 5 - COMFORT SYSTEM AND CONTROLS

5.2.1 Natural Ventilation: The project buildings are naturally ventilated and they comply with all the guidelines provided in NBC 2016, Part 8, 5.4.2 and 5.7.1. The fans are only provided in the common facilities which will be BEE 3-star rated or more. Additionally, the tenant will be suggested to select efficient ceiling fans.

5.2.2 Minimum Space Conditioning Equipment Efficiencies: The clause is not applicable to this project as all the tenant areas are naturally ventilated. The project team would suggest the tenant to install energy efficient air conditioning system through their tenant guidelines.

5.2.3 Controls: The controls like timelock, temperature controls, occupancy controls, fan controls, dampers etc. are associated with air-conditioning, hence they are not applicable.

5.2.4 Piping & Ductwork: Not Applicable

5.2.5 System Balancing: Not Applicable

5.2.6 Condensers: Not Applicable

SECTION 6 - SERVICE WATER HEATING AND PUMPING

6.2.1 Solar Water Heating: The project will have solar water heating for 20% of the design capacity.

6.2.2 Equipment Efficiency: The solar water heater will meet efficiency level as per IS 13129 Part 1 & 2.

6.2.3 Supplementary Water Heating System: Not Applicable.

6.2.4 Piping Insulation: The piping and storage tanks will be insulated with minimum R-value of 0.74 sq.m.K/W.

SECTION 7 - LIGHTING

7.2.1 Lighting Controls: The buildings are residential type and each zone of them are smaller than 30 sq.m. Hence, the lighting controls are not applicable for the space size and building type as well.

7.2.2 Exit Signs: All the electrically powered emergency signs, if there any, will use LED.

7.2.3 Exterior Building Grounds Lighting: No exterior luminaires shall be controlled by a motion sensors. All of them will be LED with timer based control, and they will meet minimum efficacy of 60 lm/W.

SECTION 8 - ELECTRICAL POWER

8.2.1 Transformers: The transformers selected are CPCB approved. Power transformer of optimum rating and design will be selected to satisfy the min. acceptable efficiency at 50% and full load rating as per the table given in the ECBC.

8.2.2 Energy-efficient Motors: All the pumps and motors to be used in the project will be compliant with the relevant IS standards. Motor horsepower rating will not exceed 20% of calculated maximum demand being served.

8.2.3 PF Correction: The Power factor would be maintained in the project with the help of Automatic Power Factor Correction (APFC) system. The system is designed to maintain the power factor of 0.95.

8.2.4 Check-Metering and Monitoring: The project has made provisions for metering. The Energy meters are capable of monitoring Energy consumption (kWh), Demand (kW), Power factor, etc. The metering will also display Current, Voltage and Total Harmonic Distoration as a percentage of total current. As the project is multi-tenant occupied project, there are individual meters provided for each tenant by the Electricity board and separate bills are provided to each of them.

8.2.5 Power Distribution Systems: The power cables in the project are designed suitably to reduce the distribution losses. The design ensures that distribution losses are less than 1% of the total power usage.

ECBC 2017 Compliance - Commercial

SECTION 4 - BUILDING ENVELOPE

4.2.1 Fenestration: The vertical fenestration of the project is labelled by manufacturer. The following value will be considered for the same,

U-value:	4.60
SHGC:	0.42
VLT:	45%

4.2.2 Opaque Construction: The U-value of roof and wall assembly are calculated and provided as per Annexure VI.

4.2.3 Building Envelope Sealing: The project is air-conditioned and the building envelope sealing has been provided as per Annexure VI.

SECTION 5 - COMFORT SYSTEM AND CONTROLS

5.2.1 Ventilation: The project building is ventilated using a mechanical system and outdoor air change rate has been designed as per NBC. There is basement area, hence CO sensors are applicable.

Demand Control Ventilation: The project does not have any spaces served by air side economizer and/or automatic outdoor modulating control of outdoor air damper. Hence, the clause is not applicable for this project.

5.2.2 Minimum Space Conditioning Equipment Efficiencies: The space conditioning equipment meets minimum requirement of both COP and IPLV requirement under ANSI / AHRI 550 / 590 conditions. The chiller capacity of standard design and its efficiency have been mentioned in the next section.

5.2.3 Controls: The controls like timelock, temperature controls, occupancy controls, fan controls, dampers etc. have been provided in the project as and where applicable, as per ECBC 2017.

5.2.4 Piping & Ductwork: Piping for HVAC system will meet insulation requirement as per Table 5-8 in ECBC 2017. Wherever the insulation will be kept exposed to weather, it will be protected by either painted canvas or plastic cover.

5.2.5 System Balancing: The project has total conditioned area exceeding 500 sq.m. Air system balancing and hydronic system balacing will be performed to reduce difference losses.

5.2.6 Condensers: Condensers will be located to make heat sink free of interference from heat discharge by devices located in adjoining spaces, and not to interfere with other such systems installed nearby.

5.2.9 Service Water Heating: The Commercial Building in the Project do not have Hot water requirement & the location doesn't fall under cold climate zone.

SECTION 6 - LIGHTING AND CONTROLS

6.2.1.1 Automatic Controls: The project has interior lighting fittings for more than 300 sq.m., hence automatic controls will be provided in all non regularly occupied areas like toilets, stairs, store rooms, janitors, etc.

6.2.1.2 Space Controls: Each enclosed space will have at least one control device to independently control the general lighting within the space.

6.2.1.3 Control in Daylight Areas: All the luminaires installed within daylighted area will be equipped with manual control device to shut off them.

6.2.2 Exit Signs: Internally illuminated exit signs will be less than 5 watts per face.

SECTION 7 - ELECTRICAL & RENEWABLE ENERGY SYSTEM

7.2.1 Transformers: The transformer will satisfy minimum acceptable efficiency at 50% and full load rating. Permissible total loss values will be within limit specified under this clause.

Recording of losses will be carried out by use of caliberated digital meters having minimum class 0.5 accuracy and certified by the manufacturer.

Voltage drop will not exceed 2% and 3% for feeders and branch circuit respectively.

7.2.2 Energy-efficient Motors: The pumps and motors will be used for water pumping and confirm to relevant IS standards. The efficiency of the motors is IE3 class and which meets the ECBC requirement.

7.2.3 DG Sets: The project will have BEE star rated DG sets in all compliant buildings. Total built-up area of the project is 329947.17 sq.m. and the DG set will be of BEE 3 star rating at minimum.

7.2.4 Check-Metering and Monitoring: The project will have permanently installed electrical metering to record demand (kVA), energy (kWh), and total power factor. The metering will also display current, voltage and total harmonic distortion (THD) as a percentage of total current.

7.2.5 PF Correction: The Power factor would be maintained in the project with the help of Automatic Power Factor Correction (APFC) system. The system is designed to maintain the power factor of 0.97.

7.2.6 Power Distribution Systems: The power cabling has been designed which limit distribution losses upto 3% of the total power usage.

7.2.7 Uninterruptible Power Supple (UPS): The power cabling has been designed which limit distribution losses upto 3% of the total power usage.

7.2.8 Renewable Energy Systems: The project has decided to install roof top solar PV panels of approx. 1.01% (160 kW) of total demand load of the building. The area is free of any obstruction within its boundaries and shadows by objects adjacent to the zone.

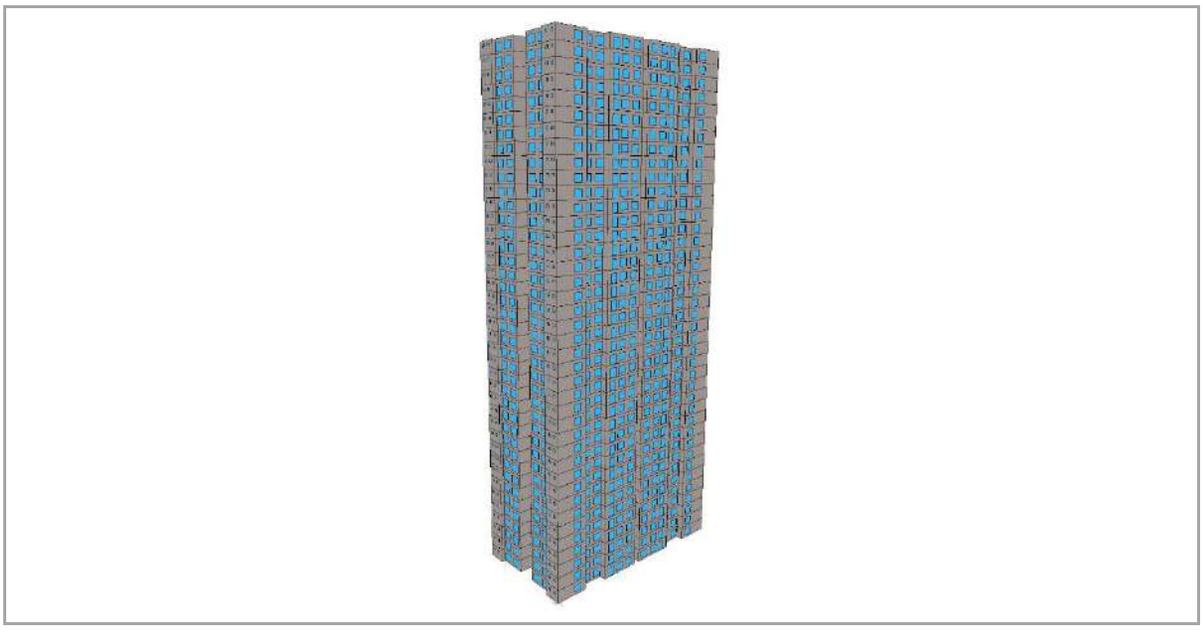
WHOLE BUILDING PERFORMANCE METHOD

Project: Residential Project "Bhakti Park" at Chembur, Mumbai

Zoning: A zoning plan was developed for each floor & entered into the simulation model. Each zone was assigned a set of properties including lighting power density, equipment power density, occupancy rate, outside air requirement etc. Each zone was also assigned physical properties of floor-to-floor height, material conductivity & fenestration area etc.

Modelling: A baseline building as per the properties stated in ECBC was modelled. The Building was simulated with actual orientation and again after rotating the entire Building by 90, 180 & 270 Degrees and then the annual energy consumption results were averaged out to get the ECBC Baseline Building Energy consumption in Megawatt hours. As per ECBC, the average base case energy consumption does not consider the effect of building shades & overhangs.

A wide range of actual as-designed parameters such as Envelope (roofs, walls), Windows (type of window glass), Lighting (lighting power density), reduced Exterior Lighting, efficient system design were added to the Baseline case to simulate the performance of the designed building.



The project has been modelled with the e-QUEST energy analysis software that uses the DOE 2.2 Building energy simulation engine. The e-QUEST energy modelling software allows for a graphical display of all the 3-dimensional geometry entered in the application to describe the building. As per the view shown, the Building has been modelled in detail to improve the accuracy of analysis work.

The project objective is to evaluate energy use and the energy efficiency performance of the Building.

9.1 Residential Buildings

This report has been prepared for Residential Project "Bhakti Park" at Chembur, Mumbai. This report is part of a process towards obtaining Environmental Clearance from MOEF. The specific objective of this report is to evaluate annual energy usage and apply various energy efficiency measures for ECBC Compliance for maximum Energy Efficiency.

It is observed via various analysis tools that the buildings are properly Shaded, Naturally ventilated & has sufficient Daylight. Following are the final outcome of energy simulation of the proposed buildings.

		ECBC 2007	Proposed Case
EPI	(kWh/sm/yr)	94.5	91.5
Energy Consumption	(MWh)	30,975	29,993
Energy Saving			**3.17%**

Details - Residential Buildings

Types of Buildings

A	Building No.1 - 5
B	EWS - Building No. 6

Input Details

1	Built-up Area	327851.96	sq.m.
2	WWR	26%	
3	Connected Load	30912.35	kW
4	Demand Load	15486.90	kW
5	Solar Hot Water Capacity	20%	of hot Water Demand

DETAILED COMPARISON BETWEEN BASE CASE & PROPOSED CASE - Residential

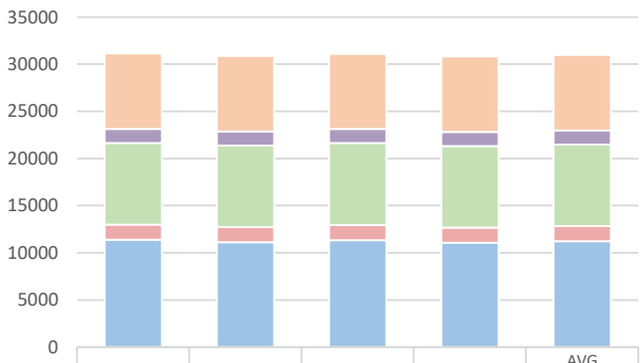
The simulation model for calculating the Proposed Design and the Standard Design shall be developed in accordance with the requirements in Table 10.1 in ECBC 2007.

Sr. No.	Model Input Parameter	Baseline Case (As per ECBC 2007)	Proposed Case
1	**Exterior Wall Construction**	U-factor: 0.44 W/sm.K	U Value: 0.85 W/sm.K 6" External AAC Wall
2	**Roof Construction**	U Value: 0.26 W/sm.K	U Value: 0.47 W/sm.K 6" RCC Slab with 2" XPS insulation
3	**Glazing**	U Value: 3.30 W/sm.K SHGC: 0.25	U Value: 4.60 W/sm.K 5.40 W/sm.K SHGC: 0.42 0.64 VLT: 45% 65%
4	**WWR**	26%	26%
5	**Shading**	No shades	Shading effect of solar panel on roof and shading devices on all facade is considered.
6	**EPD (W/sq.m.)**	15	15
7	**Pumps & Motors**	IE 1	IE 2
8	**LPD (W/sq.m.)**	7.5	5.0
9	**External Lighting Load (kW)**	As per Annexure III	30% lesser than Annexure III
10	**Domestic Hot Water**	20% on Solar (15 ltr/person/day)	20% on Solar (15 ltr/person/day)
11	**HVAC System Type**	Split Unit with COP 3.5	Split Unit with COP 3.5
12	**Process Loads (kW)**	As per Design	As per Design
13	**DG Set**	CPCB Approved	CPCB Approved
14	**PF Correction**	0.95	0.95
15	**Power Distribution Losses**	< 1%	< 1%

BASELINE MODEL - AS PER ECBC 2007

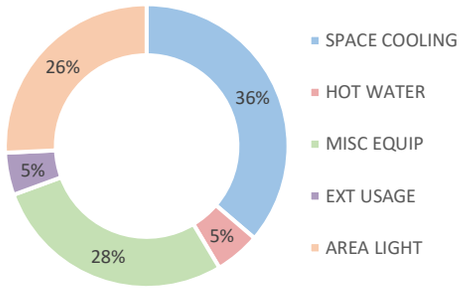
The ECBC 2007 Minimally Compliant Baseline model is used to benchmark the design case. This model geometry is based upon the design case, but the performance parameters listed below are defined to reflect the minimum efficiency levels that ECBC 2007 defines for various building components.

ENERGY-USE COMPARISION FOR ALL END USES
BASELINE CASE (MWh) - As per ECBC 2007



	0°	90°	180°	270°	AVG BASELINE
AREA LIGHT	7976	7976	7976	7976	7976
EXT USAGE	1496	1496	1496	1496	1496
MISC EQUIP	8673	8673	8673	8673	8673
HOT WATER	1601	1601	1601	1601	1601
SPACE COOLING	11386	11116	11352	11060	11228

BASELINE CASE - As per ECBC 2007



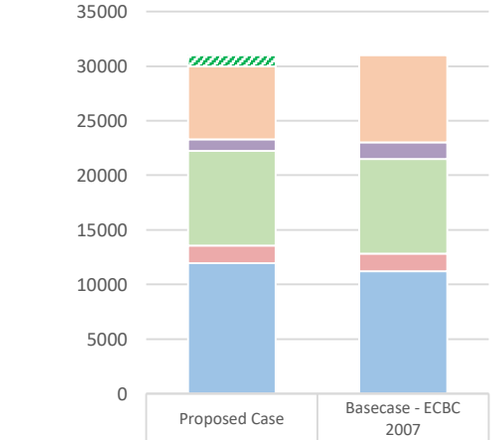
Based on the above paramters, the average Base-Case

Consumption is **30,975 MWh**
The EPI is **94.5 kWh / sq.m. / yr**

PROPOSED CASE MODEL

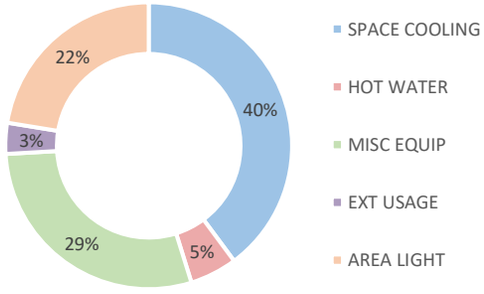
Proposed case assumptions are based on project drawings and operating parameters assumptions based on experience and standards.

ENERGY-USE COMPARISION FOR ALL END USES
PROPOSED v/s BASELINE



	Proposed Case	Basecase - ECBC 2007
SAVING IN ELECTRICITY	982	
AREA LIGHT	6726	7976
EXT USAGE	1047	1496
MISC EQUIP	8673	8673
HOT WATER	1601	1601
SPACE COOLING	11949	11228

PROPOSED CASE



Based on the above paramters, the average Proposed - case

Consumption is **29,993 MWh**
The EPI is **91.5 kWh / sq.m. / yr**

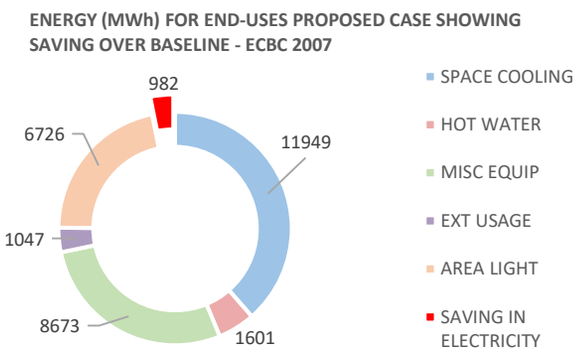
SUMMARY

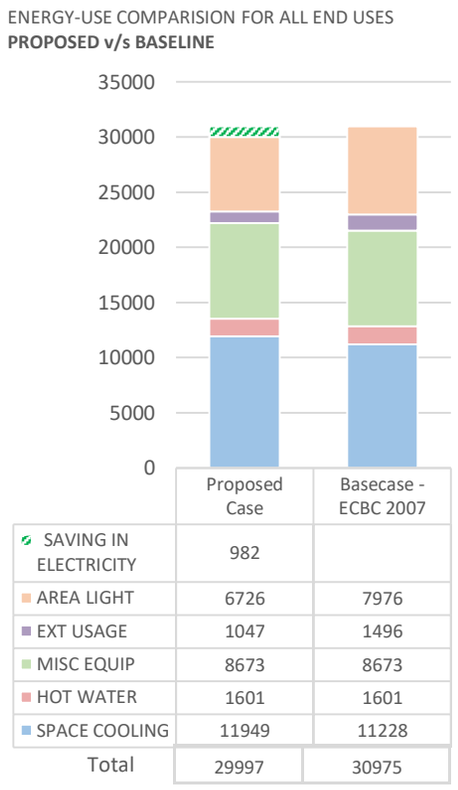
The Proposed case model shows significant savings in internal lighting as well as space cooling energy consumption as compared with the ECBC 2007 stipulated baseline model. These energy reductions can primarily be attributed to improved lighting power density and reduction in cooling loads due to improved envelope and glazing specifications.

For the purposes of determining energy savings in rupees, the energy costs for the proposed case model are compared to the energy costs for the ECBC 2007 minimally-compliant model.

Based on the final design considerations for building envelope and equipment, it is noted from the results of energy simulation that by using efficient envelope and lighting, the total per year energy required for the project - Residential Project "Bhakti Park" at Chembur, Mumbai, are as under:

Proposed project	29,993	MWh
Base line - ECBC 2007	30,975	MWh
Saving over ECBC 2007 - MWh	**982**	**3.17%**





9.2 Commercial Buildings

This report has been prepared for Residential Project "Bhakti Park" at Chembur, Mumbai. This report is part of a process towards obtaining Environmental Clearance. The specific objective of this report is to evaluate annual energy usage and apply various energy efficiency measures for ECBC Compliance for maximum Energy Efficiency.

It is observed via various analysis tools that the buildings are properly shaded, equiped with efficient air-conditioning system & has sufficient Daylight. Following are the final outcome of energy simulation of the proposed buildings.

		ECBC 2017	Proposed Case
EPI	(kWh/sm/yr)	138.0	130.5
Energy Consumption	(MWh)	289	273
Energy Saving			**5.47%**

Details for Commercial Buildings

Types of Buildings

A Retail Shops

Input Details

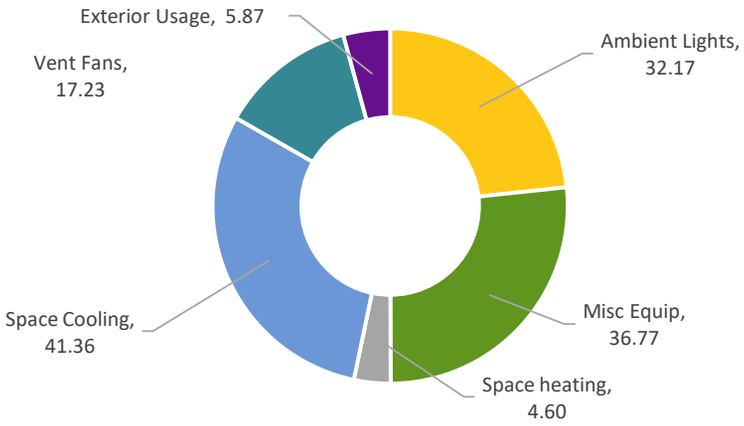
1	Built-up Area	2,095.21	sq.m.
2	WWR	60%	
3	Connected Load	342	kW
4	Demand Load	243.40	kW

DETAILED COMPARISON BETWEEN BASE CASE & PROPOSED CASE - Commercial Buildings

Sr. No.	Model Input Parameter	Baseline Case as per ECBC 2017 Parameters	Proposed Case
1	Exterior Wall Construction	U factor: 0.40 W/sm.K	U Value: 0.85 W/sm.K 6" External AAC Wall
2	Roof Construction	U factor: 0.33 W/sm.K	U Value: 0.47 W/sm.K 6" RCC Slab with 2" XPS insulation
3	Glazing	U factor: 3.00 W/sm.K SHGC: 0.25 Non-north 0.50 North	U Value: 4.60 W/sm.K SHGC: 0.42 VLT: 45%
4	WWR	40%	60%
5	Shading Devices	Not Applicable	As per Design
6	Equ Power Density	15 W/sm	15 W/sm
7	Lighting Power Density	As per Building Area Method LPD: 9.5 W/sm	As per Building Area Method LPD: 7.5 W/sm
8	Pumps & Motors	IE 2	IE 3
9	Occupancy Sensors	Applicable	Considered
10	Daylight Sensors	Applicable	Not Considered
11	Ext. Lighting Load	As per Annexure III	30% lesser than Annexure III
12	Domestic Hot Water	No Hot Water requirement	Not Considered
13	Process Load	As per design	As per Design
14	Renewable Energy	1% of Demand Load (157.30 kW - For Entire Project)	1.01% of Demand Load (160kW - For Entire Project)
15	Data Server Loads	Not Applicable	Not Considered
16	Ventilation Requirement	11 CFM / person ASHRAE 62.1 2010	11 CFM / person ASHRAE 62.1 2010
17	Chiller Parameter	Not Applicable	Not Considered
18	VSD's on Chiller	Not Applicable	Not Considered
19	VFD's on Cooling Tower	Not Applicable	Not Considered
20	Primary, Fire, Condenser Pump	Standard – 60%	Premium – 70%
21	Primary, Fire, Condenser Motor	Standard – 70%	Premium – 85%
22	HVAC System	Split AC with COP 3.5	Split AC with COP 3.5
23	VFD in AHU's & Secondary Pumps	Not Applicable	Not Considered
24	Demand Control Ventilation	Not Applicable	Not Considered
25	Heat Recovery Wheel	Not Applicable	Not Considered
26	Airside Economizer	Not Applicable	Not Considered
27	CO Sensors	Applicable	Considered
28	DG Set	CPCB Approved	CPCB Approved
29	PF Correction	0.97	0.97
30	Power Dist. Loss	< 3%	< 3%

BASELINE MODEL - AS PER ECBC 2017

The ECBC 2017 Minimally Compliant Baseline model is used to benchmark the design case. This model geometry is based upon the design case, but the performance parameters listed below are defined to reflect the minimum efficiency levels that ECBC 2017 defines for various building components.

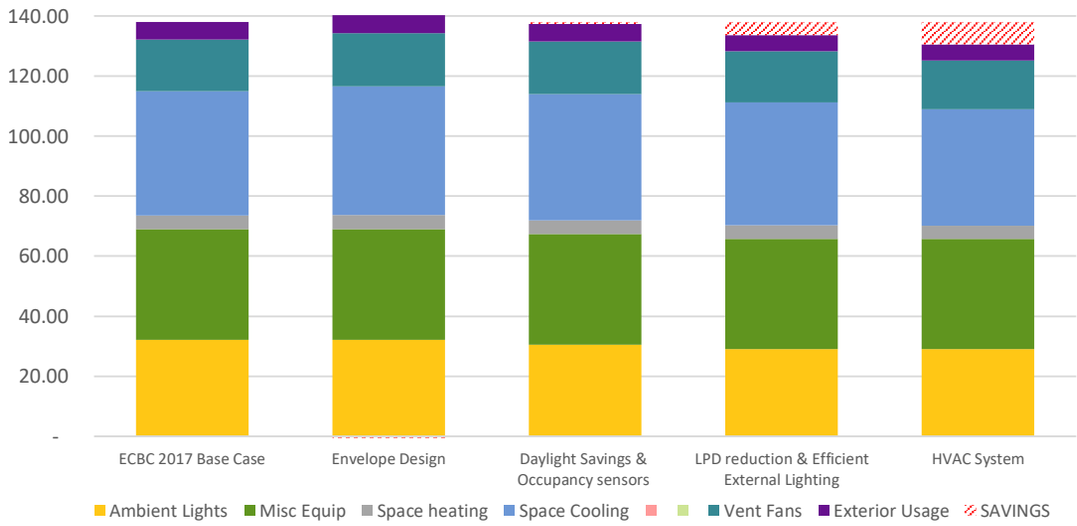


Based on the above paramters,

The average base-case consumption	**289**	**MWh**
The EPI is	**138.00**	**kWh / sq.m. / yr**

PROPOSED CASE MODEL

Proposed case assumptions are based on project drawings and operating parameters assumptions based on experience and standards.



Based on the above paramters,

The average proposed-case consumption	**273**	**MWh**
The EPI is	**130.45**	**kWh / sq.m. / yr**

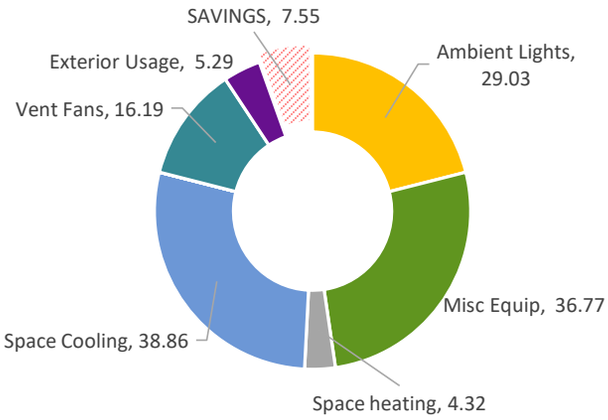
SUMMARY

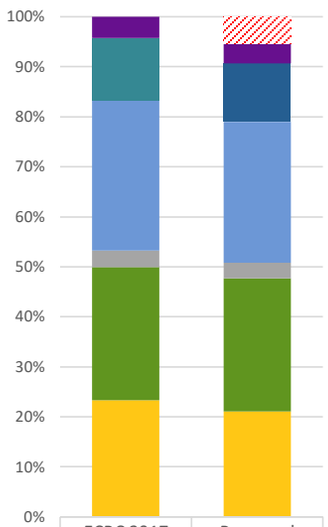
The Proposed case model shows significant savings in internal lighting as well as space cooling energy consumption as compared with the ECBC 2017 stipulated baseline model. These energy reductions can primarily be attributed to improved lighting power density and reduction in cooling loads due to improved envelope and glazing specifications.

For the purposes of determining energy savings in rupees, the energy costs for the proposed case model are compared to the energy costs for the ECBC 2017 minimally-compliant model.

Based on the final design considerations for building envelope and equipment, it is noted from the results of energy simulation that by using efficient envelope and lighting, the total per year energy required for the Project - Residential Project "Bhakti Park"are as under:

Proposed Project	273	MWh
Base line - ECBC 2017	289	MWh
Saving over ECBC 2017 - MWh	**16**	**5.47%**





	ECBC 2017 Base Case	Proposed Case
SAVINGS	-	7.55
Exterior Usage	5.87	5.29
Vent Fans	17.23	16.19
Space Cooling	41.36	38.86
Space heating	4.60	4.32
Misc Equip	36.77	36.77
Ambient Lights	32.17	29.03
	138	130

10. Annexure I: Schedules

RESIDENTIAL BUILDINGS

	Occupancy		Lighting		Equipment		HVAC		Hot Water
Hrs	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends	All Days
00:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
01:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
02:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
03:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
04:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
05:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
06:00	100%	100%	10%	10%	5%	5%	75%	75%	0%
07:00	100%	100%	40%	40%	25%	5%	50%	75%	0%
08:00	100%	100%	0%	0%	40%	25%	20%	50%	25%
09:00	50%	100%	0%	0%	25%	40%	0%	20%	50%
10:00	25%	50%	0%	0%	5%	25%	0%	0%	50%
11:00	25%	50%	0%	0%	5%	20%	0%	0%	0%
12:00	25%	100%	0%	0%	5%	20%	0%	0%	0%
13:00	25%	100%	0%	0%	20%	20%	25%	50%	0%
14:00	25%	100%	0%	0%	20%	15%	25%	50%	0%
15:00	25%	100%	0%	0%	5%	5%	0%	0%	0%
16:00	25%	50%	0%	0%	5%	5%	0%	0%	0%
17:00	50%	50%	25%	25%	5%	5%	0%	0%	0%
18:00	50%	25%	50%	20%	20%	25%	0%	0%	0%
19:00	75%	25%	80%	20%	25%	25%	0%	0%	50%
20:00	100%	25%	80%	20%	50%	25%	25%	25%	50%
21:00	100%	25%	80%	50%	50%	40%	25%	25%	0%
22:00	100%	100%	50%	50%	20%	25%	50%	50%	0%
23:00	100%	100%	10%	10%	5%	5%	75%	75%	0%

Schedules

COMMERCIAL BUILDINGS

Hrs	Occupancy		Lighting		Equipment		HVAC	
	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends	Weekdays	Weekends
00:00	0%	0%	5%	5%	5%	5%	0%	0%
01:00	0%	0%	5%	5%	5%	5%	0%	0%
02:00	0%	0%	5%	5%	5%	5%	0%	0%
03:00	0%	0%	5%	5%	5%	5%	0%	0%
04:00	0%	0%	5%	5%	5%	5%	0%	0%
05:00	0%	0%	5%	5%	5%	5%	0%	0%
06:00	0%	0%	5%	5%	5%	5%	0%	0%
07:00	0%	0%	5%	5%	5%	5%	0%	0%
08:00	0%	0%	45%	5%	5%	5%	75%	0%
09:00	50%	0%	45%	5%	25%	5%	75%	0%
10:00	100%	15%	60%	5%	75%	15%	95%	15%
11:00	100%	15%	60%	5%	90%	15%	95%	15%
12:00	100%	15%	60%	5%	90%	15%	95%	15%
13:00	25%	15%	60%	5%	90%	15%	95%	15%
14:00	100%	15%	60%	5%	90%	15%	75%	15%
15:00	100%	15%	60%	5%	90%	15%	95%	15%
16:00	100%	15%	60%	5%	90%	15%	95%	15%
17:00	100%	15%	75%	10%	90%	15%	95%	15%
18:00	100%	15%	90%	10%	90%	15%	95%	15%
19:00	75%	15%	90%	10%	50%	15%	95%	5%
20:00	25%	0%	75%	10%	25%	5%	75%	0%
21:00	0%	0%	75%	5%	5%	5%	0%	0%
22:00	0%	0%	5%	5%	5%	5%	0%	0%
23:00	0%	0%	5%	5%	5%	5%	0%	0%

Annexure II: Renewable Energy

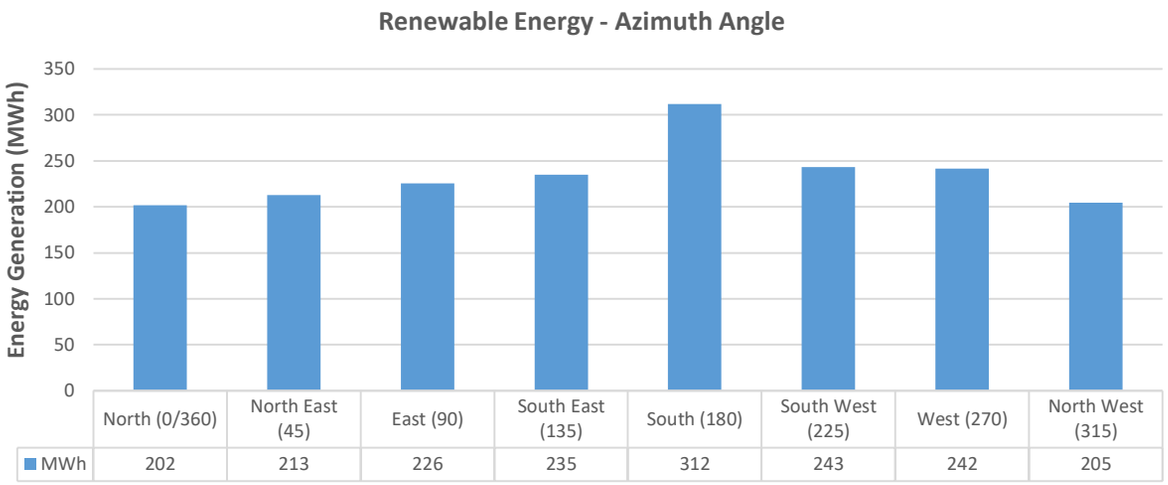
Virtual analysis tool – Retscreen has been used as a basis for the commentary provided in this report. To determine Orientation and Slope of the proposed Solar Panel actual location Mumbai was used for the simulation.

Total Connected Load for Entire Project	31254	kW
Maximum Demand for load of Entire Project	15730	kW
1% of demand load	157.30	kW
Renewable energy proposed for the Entire Project	160	kW

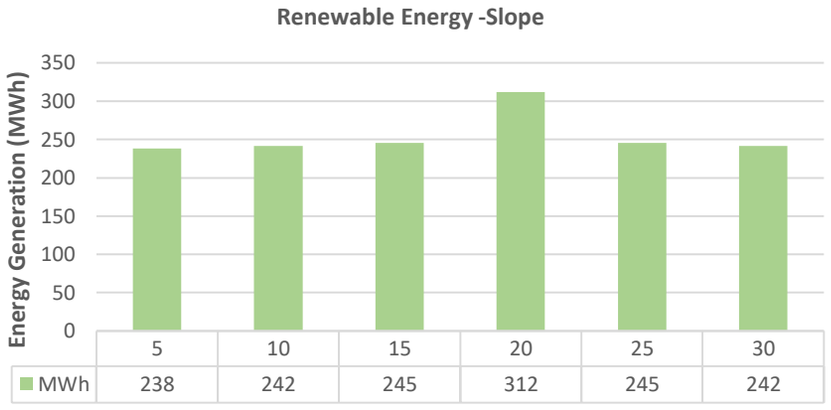
It is determined through simulation that the solar panels of 160 kWp capacity will generate MWh electricity annually. The desired Solar Panel locations are proposed considering right Orientation (Azimuth Angle) and Slope (Altitude Angle) of Solar Panel.

RET Screen Calculation		
Solar tracking mode		Fixed
Slope		20
Azimuth		180
Solar Data		
Photovoltaic		
Type		Low - LID - Mono PREC
Power Capacity	**kW**	160
Manufacturer		LONGI
Model		LR4 - 72HPH - 435M
Number of Units		368
Efficiency	%	19.6%
Nominal operating cell temperature	° C	43
Temperature coefficient	% / ° C	0.4
Solar collector area	m ²	736
Miscellaneous losses	%	5%
Summary		
Electricity generated	**MWh**	312

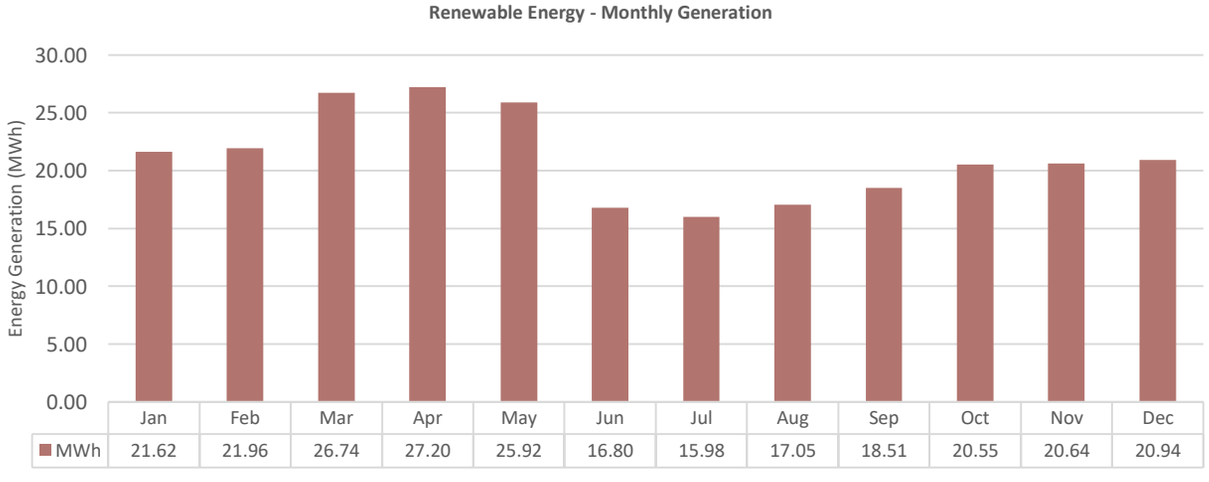
Parametric Study - Azimuth Angles



Parametric Study - Altitude Angles



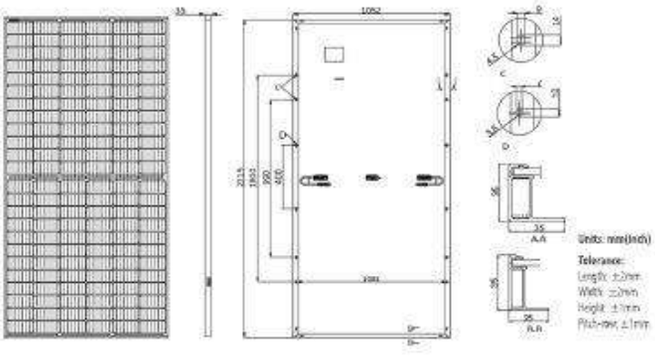
Monthly Solar Generation



Solar PV Panel - 435 Watts

LR4-72HPH 420~440M

Design (mm)



Mechanical Parameters

Cell Orientation: 144 (6×24)

Junction Box: IP68, three diodes

Output Cable: 4mm², 300mm in length, length can be customized

Glass: Single glass 3.2mm coated tempered glass

Frame: Anodized aluminum alloy frame

Weight: 24 kg

Dimension: 2115×1052×35mm

Packaging: 30pcs per pallet

150pcs per 20'GP

660pcs per 40'HC

Operating Parameters

Operational Temperature: -40℃ ~ +85℃

Power Output Tolerance: 0 ~ +5 W

Voc and Isc Tolerance: ±3%

Maximum System Voltage: DC1500V (IEC / UL)

Maximum Series Fuse Rating: 20A

Nominal Operating Cell Temperature: 45±2℃

Safety Class: Class II

Fire Rating: UL type 1 or type 2

Electrical Characteristics

Test uncertainty for Pmax: ±3%

Model Number	LR4-72HPH-420M		LR4-72HPH-425M		LR4-72HPH-430M		LR4-72HPH-435M		LR4-72HPH-440M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	420	311.1	425	314.8	430	318.5	435	322.2	440	326.0
Open Circuit Voltage (Voc/V)	48.8	45.5	49.0	45.7	49.2	45.9	49.4	46.1	49.6	46.3
Short Circuit Current (Isc/A)	11.04	8.90	11.11	8.95	11.19	9.02	11.26	9.08	11.33	9.13
Voltage at Maximum Power (Vmp/V)	40.2	37.1	40.4	37.3	40.6	37.5	40.8	37.7	41.0	37.9
Current at Maximum Power (Imp/A)	10.45	8.38	10.52	8.44	10.60	8.50	10.67	8.56	10.74	8.61
Module Efficiency(%)	18.9		19.1		19.3		19.6		19.8	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25℃, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m², Ambient Temperature 20℃, Spectra at AM1.5, Wind at 1m/S

Annexure III: Exterior Building Lighting Power

ECBC 2017 - Table 6-7 Exterior Building Lighting Power for ECBC Buildings

Exterior lighting application	Power limits
Building entrance (with canopy)	10 W/m2 of canopied area
Building entrance (w/o canopy)	90 W/ linear m of door width
Building exit	60 W/lin m of door width
Building façade	5.0 W/m2 of vertical façade area
Emergency signs, ATM kiosks, Security areas façade	1.0 W/m2
Driveways and parking (open/ external)	1.6 W/m2
Pedestrian walkways	2.0 W/m2
Stairways	10.0 W/m2
Landscaping	0.5 W/m2
Outdoor sales area	9.0 W/m2

Annexure IV: Electrical Wires

It is recommended to use copper wires with high rating to reduce resistance, which would result in energy efficiency. Copper has the highest electrical conductivity of any metal, after silver, with this property accounting for over 50% of its use. As the best, economically affordable conductor of electricity, using copper can reduce electrical energy losses and improve overall energy efficiency.

Annexure V: Building Sealing Requirement

Following areas of the building envelope, of all except naturally ventilated buildings or spaces, shall be sealed, caulked, gasketed, or weather-stripped:

(a) Joints around fenestration, skylights, and door frames

(b) Openings between walls and foundations, and between walls and roof, and wall panels

(c) Openings at penetrations of utility services through roofs, walls, and floors

(d) Site-built fenestration and doors

(e) Building assemblies used as ducts or plenums

(f) All other openings in the building envelope

(g) Exhaust fans will be fitted with a sealing device such as a self-closing damper

(h) Operable fenestration should be constructed to eliminate air leakages from fenestration frame and shutter frame

Annexure VI: U-value Calculations

Building Envelope

Calculation Of 'U' Value For A Wall Section

Material Specification		'R' Value (sq.ft.degF/btu)
1	Outside Air Film	0.17
2	1" Cement Plaster	0.2
3	6" External AAC Wall	5.49
4	0.5" Cement Plaster	0.1
5	Insdie Wall Air Film	0.64
	Total	**6.68**

Therefore,

R' Value of Vertical surface (Wall)		6.68	sq.ft.degF/btu
U Value	(I-P Unit) :	0.15	btu/sq.ft.degF
	(SI Unit) :	**0.85**	**W/sm.degK**

Calculation Of 'U' Value For A Roof Section

Material Specification		'R' Value (sq.ft.degF/btu)
1	Outside Air Film	0.17
2	Floor Finish	0.15
3	1" Screed	0.2
4	2" XPS Insulation	10.14
5	1" Screed	0.2
6	6" Concrete Slab	0.6
7	½" Cement Plaster	0.1
8	Inside Ceiling Air Film	0.61
	Total	**12.17**

Therefore,

R' Value of Vertical surface (Wall)		12.17	sq.ft.degF/btu
U Value	(I-P Unit) :	0.08	btu/sq.ft.degF
	(SI Unit) :	**0.47**	**W/sm.degK**

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ANALYSIS REPORT

F/LAB/04/01/17.12.2012

CLIENT'S NAME & ADDRESS	REPORT NO	HS/LAB/WA/16274A-1
Environmental Clearance Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Wadala (E) Mumbai ,Maharashtra.	DATED	28/03/2023
	LAB REFERENCE NO	HS/LAB/WA/1410A
	DATE OF SAMPLING	21/03/2023
	DATE OF ANALYSIS	22/03/2023

DETAILS OF SAMPLE	SAMPLE COLLECTED BY	NATURE	LOCATION
Surface Water Sample	The Client	---	Project Site 19°13'9.66"N 72°52'45.58"E

RESULT OF ANALYSIS

SR. NO.	DESCRIPTION	UNIT	RESULT	LIMITS IS: 2296 (1992) for Surface Water Quality (Class E)
01	pH @ 25 °C	---	7.50	<8.5
02	Colour	PtCo	0.40	Not Specified
03	Odour	---	Agreeable	Not Specified
04	Taste	---	Agreeable	Not Specified
05	Total Dissolved Solids	mg/lit	242.00	<2100.00
06	Electrical Conductivity @ 25 °C	µS/cm	360.00	<2250.00
07	Phenolic Compounds as C_6H_5OH	mg/lit	NIL	Not Specified
08	Dissolved Oxygen	mg/lit	4.10	Not Specified
09	Biochemical Oxygen Demand @ 27°C for 3 days	mg/lit	9.90	Not Specified
10	Chlorides as Cl-	mg/lit	42.00	<600.00
11	Sulphates as SO_4--	mg/lit	34.00	<1000.00
12	Fluoride as F^-	mg/lit	0.38	Not Specified
13	Nitrate as NO^-_3	mg/lit	1.74	Not Specified
14	Ammonia as N	mg/lit	0.16	Not Specified
15	Total Hardness as $CaCO_3$	mg/lit	98.00	Not Specified
16	Iron as Fe	mg/lit	BDL< 0.01	Not Specified
17	Copper as Cu	mg/lit	BDL< 0.01	Not Specified

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18	Manganese as Mn	mg/lit	BDL< 0.01	Not Specified
19	Boron as B	mg/lit	BDL< 0.01	<2.00
20	Sodium Absorption Ratio	---	10.00	<26.00
21	Barium as Ba	mg/lit	BDL< 0.01	Not Specified
22	Anionic detergents (as MBAS)	mg/lit	NIL	Not Specified
23	Selenium as Se	mg/lit	BDL< 0.01	Not Specified
24	Chromium as Cr+6	mg/lit	BDL< 0.01	Not Specified
25	Cadmium as Cd	mg/lit	BDL< 0.01	Not Specified
26	Mercury as Hg	mg/lit	BDL< 0.01	Not Specified
27	Arsenic as Ar	mg/lit	BDL< 0.01	Not Specified
28	Cyanide as CN	mg/lit	BDL< 0.01	Not Specified
29	Lead as Pb	mg/lit	BDL< 0.01	Not Specified
30	Zinc as Zn	mg/lit	BDL< 0.01	Not Specified
31	Total Coliform	Org/100ml	65.00	Not Specified

REMARK: As per IS:2296; above water sample is useful for irrigation, industrial cooling and controlled waste disposal purpose.

For **HORIZON SERVICES**

MKMangaonkar

(LAB INCHARGE)

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ANALYSIS REPORT

F/LAB/04/01/17.12.2012

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Environmental Clearance Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Wadala (E) Mumbai ,Maharashtra.	DATED	28/03/2023
	LAB REFERENCE NO	HS/LAB/WA/1410A
	DATE OF SAMPLING	21/03/2023
	DATE OF ANALYSIS	22/03/2023

DETAILS OF SAMPLE	SAMPLE COLLECTED BY	NATURE	LOCATION
Ground Water Sample	The Client	---	Project Site 19°13'9.66"N 72°52'45.58"E

RESULT OF ANALYSIS

SR. NO.	DESCRIPTION	UNIT	RESULT	LIMITS AS PER IS10500:2018
01	pH @ 25 °C	---	7.24	6.5 – 8.5
02	Temperature	°C	26.00	Not Specified
03	Turbidity	NTU	0.30	< 1.00
04	Electrical Conductivity @ 25 °C	mS/cm	0.400	Not Specified
05	Total Dissolved Solids	mg/lit	320.00	< 500.00
06	Total Suspended Solids	mg/lit	24.00	Not Specified
07	Dissolved Oxygen	mg/lit	4.00	Not Specified
08	Salinity	ppt	1.20	Not Specified
09	Chemical Oxygen Demand	mg/lit	5.40	Not Specified
10	Biochemical Oxygen Demand @ 27°C for 3 days	mg/lit	1.50	Not Specified
11	Chlorides as Cl^-	mg/lit	54.80	< 250.00
12	Sulphates as SO_4--	mg/lit	40.80	< 200.00
13	Fluoride as F^-	mg/lit	NIL	< 1.00
14	Total Alkalinity as $CaCO_3$	mg/lit	124.00	< 200.00
15	Nitrate as NO^-_3	mg/lit	1.00	< 45.00
16	Nitrite as NO^-_2	mg/lit	0.10	Not Specified
17	Ammonia as NH_3	mg/lit	0.14	< 0.50

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18	Total Phosphate as PO_4	mg/lit	0.32	Not Specified
19	Magnesium as Mg^{++}	mg/lit	27.94	< 30.00
20	Total Hardness as $CaCO_3$	mg/lit	110.00	< 200.00
21	Sodium as Na^{++}	mg/lit	10.00	Not Specified
22	Total Iron as Fe	mg/lit	0.10	< 0.30
23	Copper as Cu	mg/lit	BDL< 0.01	< 0.05
24	Total Chromium as Cr	mg/lit	BDL< 0.01	< 0.05
25	Chromium as Cr^{+6}	mg/lit	BDL< 0.01	< 0.10
26	Nickel as Ni	mg/lit	BDL< 0.01	< 0.02
27	Cadmium as Cd	mg/lit	BDL< 0.01	< 0.003
28	Mercury as Hg	mg/lit	BDL< 0.01	< 0.001
29	Arsenic as As (Inorganic)	mg/lit	BDL< 0.01	< 0.01
30	Cyanide as Cn	mg/lit	BDL< 0.01	< 0.05
31	Lead as Pb	mg/lit	BDL< 0.01	< 0.01
32	Zinc as Zn	mg/lit	BDL< 0.01	< 5.00
33	Total Coliform	MPN/100ml	**18.00**	ABSENT
34	Fecal Coliform	Org/100ml	**PRESENT**	ABSENT

REMARK: As per IS:10500:2018; above water sample is chemically potable and **bacteriologically unpotable** for drinking purpose, for the parameters tested.

For **HORIZON SERVICES**

Mangaokar

(LAB INCHARGE)

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ANALYSIS REPORT

`F/LAB/04/01/17.12.2012

CLIENT'S NAME & ADDRESS	REPORT NO	HS/LAB/WA/16274A-3
Environmental Clearance Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1 , 1A/2 , 1A/3 ,1A/6 of village Anik Chembur (M-ward) Wadala (E) Mumbai ,Maharashtra.	DATED	28/03/2023
	LAB REFERENCE NO	HS/LAB/WA/1410A
	DATE OF SAMPLING	21/03/2023
	DATE OF ANALYSIS	22/03/2023

DETAILS OF SAMPLE	SAMPLE COLLECTED BY	NATURE	LOCATION
Soil Sample	The Client	----	Project Site 19°13'9.66"N 72°52'45.58"E

RESULT OF ANALYSIS

SR. NO	DESCRIPTION	UNIT	RESULT	Standard as per Ministry of Agriculture 2011	TEST METHOD REFERENCE
01	pH @ 25 °C	---	8.10	< 8.5	IS 2720 (Part 26) 1987
02	Colour	---	Brown	Not Specified	Ministry of Agriculture 2011
03	Texture	---	Sandy loam	Not Specified	Ministry of Agriculture 2011
03a	Sand	%	38.00	Not Specified	Ministry of Agriculture 2011
03b	Slit	%	22.00	Not Specified	Ministry of Agriculture 2011
03c	Clay	%	40.00	Not Specified	Ministry of Agriculture 2011
04	Electric Conductance @ 25 °C	mS/cm	0.624	0.15 – 0.65	IS 14767:2000
05	Total Organic Matter	%	0.52	0.5 – 0.75	IS 2720 (Part XXII) 1972
06	Bulk Density	g/cm3	1.24	Not Specified	Ministry of Agriculture 2011
07	Porosity	%	26.00	Not Specified	Ministry of Agriculture 2011
08	Sodium Adsorption Ratio (SAR)	---	**8.01**	10-18	Ministry of Agriculture 2011
09	Available Nitrogen as N	kg/ha	405.00	280 - 560	SOP NO: HS/ NABL/ SOIL/3A

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10	Available Potassium as K^{++}	Kg/ha	154.80	Not Specified	Ministry of Agriculture 2011
11	Available Sodium as Na^{++}	%	0.0142	Not Specified	Ministry of Agriculture 2011
12	Exchangeable Calcium as Ca^{++}	mg/kg	396.00	< 400.00	SOP NO: HS/ NABL/ SOIL/4
13	Exchangeable Magnesium as Mg^{++}	mg/kg	232.00	< 240.00	SOP NO: HS/ NABL/ SOIL/5
14	Available Phosphorus as P	kg/ha	**28.30**	10- 24.60	SOP NO: HS/ NABL/ SOIL/8
15	Cation Exchange Capacity	meq/100gm	358.00	Not Specified	Soil Manual – Ministry of Agriculture 2011 Method No. 4.6.3.3 PP-74

REMARK: SAR is below while Available Phosphorus is exceeding the limit as per specified by Ministry of Agriculture 2011.

For **HORIZON SERVICES**

Mkmangalkar

(LAB INCHARGE)

HORIZON SERVICES
Analytical Laboratory

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AMBIENT AIR QUALITY MONITORING ANALYSIS REPORT

CLIENT'S NAME & ADDRESS	REPORT NO	HS/LAB/AA/16377A
Environmental Clearance Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1,1A/2, 1A/3,1A/6 of village Anik Chembur (M-ward) Wadala (E) Mumbai ,Maharashtra.	DATED	29/03/2023
	LAB REFERENCE NO	HS/LAB/AA/762A
	DATE OF SAMPLING	20&21/03/2023
	DATE OF ANALYSIS	23-28/03/2023

RESULTS

SR. NO.	DESCRIPTION	UNIT	RESULT	NAAQS LIMITS
01	DATE OF SAMPLING	DD/MM/YY	20&21/03/2023	
02	TEST LOCATION		Vadala Latitude-19°13'9.66"N Longitude-72°52'45.58"E	
03	TIME OF SAMPLING (00.00)	Hrs.	12:00	
04	AMBIENT TEMPERATURE (Max/Min)	Deg C	29/21	
05	RELATIVE HUMIDITY	% RH	55	
06	SAMPLING DURATION	Hrs.	24	
07	PM_{10}	$\mu g/m^3$	55.81	100
08	$PM_{2.5}$	$\mu g/m^3$	27.31	60
09	SO_2	$\mu g/m^3$	18.63	80
10	NO_2	$\mu g/m^3$	33.42	80
11	CO (1 hour)	mg/m^3	0.096	04
12	NH_3	$\mu g/m^3$	BDL	400
13	Pb	$\mu g/m^3$	BDL	1.0
14	Ozone	$\mu g/m^3$	BDL	100
15	Benzene	$\mu g/m^3$	BDL	05
16	Benzo(a)Pyrene	ng/m^3	BDL	01
17	Arsenic	ng/m^3	BDL	06
18	Nickel	ng/m^3	BDL	20

REMARK/OBSERVATIONS:
NAAQS–National Ambient Air Quality Standards.
BDL-Below Detectable Level
Monitoring results are well within the limits prescribed by NAAQS.

MKNangaikar

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AMBIENT NOISE MONITORING REPORT

CLIENT'S NAME & ADDRESS	REPORT NO.	HS/LAB/AA/16377A
Environmental Clearance Proposed Expansion and Modification of Residential Project- "Bhakti Park" at CTS no. 1/A1, 1A/2, 1A/3,1A/6 of village Anik Chembur (M-ward) Wadala (E) Mumbai, Maharashtra.	DATED	29/03/2023
	DATE OF SAMPLING	20/03/2023

RESULTS

SR. NO.	TEST LOCATION	UNIT	RESULT
			Day Time 12:10 Hrs.
01	Vadala	dB(A)	61.9

REMARK/OBSERVATIONS:

LIMITS – Refer Noise Annexure Enclosed

MKNargolkar

For **HORIZON SERVICES**

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Noise Annexure

THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000

(The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.)

SCHEDULE

(see rule 3(1) and 4(1))

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

Note:- 1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.