Building Services For High Rise Building

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Abstract- *In certain technologies, such as high-rise buildings or those of great volume, the decision about the laying of installations, the way the main centralizations are raised and the choice of the system for fire evacuation, are the great shapers of the buildings. Indian cities are witnessing immense demographic expansion due to migration from surrounding villages, leading to urban sprawl, housing demand, rise in cost of land. Everything inside a building which makes it safe and comfortable to be in comes under the title of 'Building Services'. Paper includes various types of services found in the high-rise building more emphasis can be made on their requirements of services as per occupancy. It deals with to study on Evaluation, planning and design of building services for live project as well as utilization of various building services*

Keywords- Building Serices, etc…

I. INTRODUCTION

In certain technologies, such as high-rise buildings or those of great volume, the decision about the laying of installations, the way the main centralizations are raised and the choice of the system for fire evacuation, are the great shapers of the buildings. Indian cities are witnessing immense demographic expansion due to migration from surrounding villages, leading to urban sprawl, housing demand, rise in cost of land. Everything inside a building which makes it safe and comfortable to be in comes under the title of 'Building Services'.

A building must do what it was designed to do -not just provide shelter but also be an environment where people can live, work and achieve. It's a need for any structure to keep healthy environment effect on inside and outside of structure.

Building services engineers are responsible for the design, installation, and operation and monitoring of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally friendly operation of modern buildings. Modern buildings are built to create better, consistent, and productive environments in which to work and to live. Building services engineers are responsible for the design, installation, and operation and maintaining of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally friendly operation of modern buildings. Modern buildings with advanced services are built to create better, consistent, and productive environments in which to work and to live. Many citizens all over India migrate to the cities for better jobs and education. Industries, trade and commerce activities and number of educational centers in cities attract floating population from all their surrounding villages and districts. This has expanded the cities in all directions and all aspects of development. With an urban sprawl of kilometers, these face the problems of congestion, pollution, everyday commuting to work place, competition, deforestation etc. The architects who have analyzed different naval and aeronautical references to apply them in architecture have been many, although in some cases it only formal operations were transferred to their project and not intellectual strictness. It is surprising that in a high tonnage ship, where the available space is so tight, machines have what they need in their technical rooms to make maintenance easy (without it, the ship-machine does not work) and however in some projects of architecture, installations have to be adjusted to minimum areas, in plan and section, that are designed in this way without really knowing why. The correct design of installations in architecture should be situated at a point of equilibrium and compromise between the virtues of these sophisticated machines, the coordination between the occupancy of areas and the laying of networks of the different installations, and the rest of aesthetic, functional and economic parameters that constitute architecture. It makes no sense; therefore, to talk about hidden or visible installations each architecture must have its corresponding design of installations. It is not about different realities that join together to form a building, but different visions of the same object

1.1Scope

The main purpose of this project is to improve safety of high rise building that do not conform to current city codes so that the health, safety welfare of general public is provided for and promoted. It is recognized that the application of present day protection techniques to some existing high rise building is difficult. For this reason, this project may permit the use of alternative methods and innovative approaches and techniques to achieve its purpose, when approved by the chief and official. This report deals with the additional scope of services associated with these factors and provides insight and guidance to residents and member firms as they define the anticipated scope of work and determine an appropriate fee for specific services and specialty consultants outside the normal scope of basic services. The design of installations refers here to it being suitably setting up and to its easy subsequent maintenance and not only (obviously) to its aesthetic result. The real open floor in many architectural projects does not lie only in the more or less complex change of partitions, but in the possibility of access to all services demanded by the users in any location. Therefore, the limit of the real flexibility is the limit of use of the whole installation services in any place of the building.

1.2 Objectives of the Paper

1. To Study of various services in high rise buildings.
2. Conducting the case study for building services of high-rise rise building.
3. Evaluation, planning and design of building services for live project.

II. CASE STUDY FOR BUILDING SERVICES

2.1 General Details

Case Study is a plush residential property that you were looking for. Case Study are the perfect residential place where one can truly experience the joy of his dreams coming true. The beautiful natural surroundings will soothe your mind, heart and mind and the lavish greenery offers you a perfect healthy living. Case Study is an edifice that offers you to be in close touch with the gentle elements of natural cross ventilation and rays of sunlight. It has been passionately created to suit your needs and offer you a life that is perfectly aristocratic in nature.

- Strategic Location
- Earthquake Resistant RCC Framed Structure
- Utility Shops within the Premises
- Fire Fighting Systems and Fire Retardant Structure

Table. No 1Case Study specified services.

Sr.NO	Specifications of services at Case Study
1	Water supply by BMC
2	Natural Ventilation
3	Air Conditioning
4	Drainage an Sewage treatment plant
5	Plumbing and piping Fixture
6	Lift
7	Gas Installation
8	Electric Installation
9	Fire prevention
10	Security
11	Solar panel

Designer Vitrified Tile flooring in the entire flat. False Ceiling with Spot Lights. POP Finished walls with Acrylic Distemper Paint Designer Curtains of Imported Fabrics in Living and Bedroom. Texture Paint Highlighted wall in Living and Bedroom exquisite Granite Kitchen Platform with Stainless Steel Sink, Designer Kitchen Trolley with Kitchen Cabinet, Full Tiles in Kitchen .Decorative Main Door Full Tiles in Bathroom and Toilets Water Tank with Geyser in Bathroom.

2.2 **Mechanical Electrical and Plumbing (Mep)**

Site engineer who is the controlling authority of MEP department of building Coordination of mechanical and electrical systems to detail their configuration provides a major challenge for complex building and industrial projects. Specialized consultants and contractors design and construct these systems. Computer tools can assist with this activity, but fragmentation of responsibility for these systems and the knowledge required for their design make this difficult. This paper reports initial results from a research project to develop a computer tool to assist in coordinating MEP systems. It describes current practice, a revised work process using a computer tool, the required knowledge, development of a prototype system. These results confirm the feasibility of capturing specific types of distributed knowledge required and developing a computer tool to assist with MEP coordination, along with the potential to implement the tool and significantly improve this important project process. Phase two of the project, now underway, will add construction and operations and maintenance knowledge to the tool and further develop its capability. As a result of these problems with current processes, the product of MEP coordination does not fully satisfy the objectives of any of the project participants. To improve project performance, the construction segments focused on complex buildings and high tech plants need increased horizontal integration between design consultants or design-build contractors to improve the effectiveness of the coordination process and better meet project objectives. This first requires a simplified method to consolidate the designs from multiple sources to visualize and easily change the configuration for initial coordination. The next key need is to capture the knowledge required for application of diverse criteria in making coordination decisions. This will eventually allow partial automation of MEP systems coordination. For improved Me cycle performance of the facility, a major need is to increase vertical integration by reciprocal information exchange with facility managers and operators for the building or plant. Phase one of this research supports CIFE's integration goals by applying information technology to improve horizontal integration in the MEP coordination process, a major need on complex buildings and industrial projects. Phase two is addressing vertical integration with construction and facility management, two more major opportunities.

2.3 Water Supply

Water system improvements proposed for inclusion into service area shall is designed in accordance with all appropriate Indian standards, include all landscape demands for residential common areas, have those demands integrated into the demand calculations, and maintain the following criteria construction's staff reserves the right to determine criteria for each water system or sub-system based upon conditions that may exist for that particular location, anticipated level of development, planned use or other criteria. In general, however, water pipelines, tanks, pump stations, pressure reducing stations and appurtenances shall be sized to handle the highest demand on the system within the sphere of influence and shall provide capacity for the following conditions:

Table. No 2:-.Water supply

Sr.No	Vital Demand Factors	Quantity in litre/second
1	The peak hour demand.	0.01052
2	The maximum daily demand plus fire flow.	0.001852
3	Tank refill, if required.	0.28925

It is very difficult to precisely assess the quantity of water demanded by the public, since there are many variable factors affecting water consumption. The various types of water demands, which a city may have.The design of water supply conduits depends on the resistance to flow, available pressure or head, and allowable velocities of flow. The water supply to Bombay from various sources is about 563 million gallons per day (MGD). The monsoon precipitation is collected in six lakes and supplied to the city through the year. 460 MGD are treated at the Bhandup Water Treatment Plant, the largest in Asia. The BMC manages to supply between 70 and 75% of the city's water needs

2.4 PLUMBING AND PIPEING FIXTURES

Water is pumped directly into the distribution system without the aid of any overhead tank, except for flushing purposes. The pumps are controlled by a pressure switch installed on the line. Normally a jockey pump of smaller capacity installed which meets the demand of water during low consumption and the main pump starts when the demand is greater. The start and stop operations are accomplished by a set if pressure switches are installed directly on the line. In some installation, a timer switch is installed to restrict the operating cycle of the pump. Currently the BMC earns about Rs. 4.5 billion (450 crores) a year through water charges and levies. Water production costs Rs. 24 per 10,000 litres. The BMC charges Rs. 6 for 10,000 liters for domestic consumption, and has a system of cross-subsidy by charging Rs. 150 for 10,000 liters for industrial and commercial users.

Table. 3 Plumbing units and Water supply

Sr.No	Plumbing Units at Case Study	Litre/second
1	W. C. with flushing cistern	0.14
2	Wash basin	0.15
3	Wash basin with spray taps	0.04
4	Bath tub (private)	0.30
5	Shower (with nozzle)	0.13
6	Sink with 15 mm tap	0.23
7	Sink with 20 mm tap	0.44

Water is pumped from the street level using large pumps up into a storage tank/water tower on top of the building. This tank is sized to buffer between the peak rate and duration of water consumption, and the steady-state rate that the supply pumps can replenish the tank. Ideally the pressure tank outlet is located at least 30 feet higher than the highest point of usage, to provide sufficient water pressure simply through gravitational pressure head. Water supply pipes run down through the building, with shut-off valves to isolate individual apartments or units for service. The lower in elevation the water gets from the storage tank, the higher the water pressure becomes, ultimately beyond a usable range for standard fixtures. To correct for this, at every few floors down the building there will be a pressure-reducing valve (PRV), which operates mechanically (without power) to limit the pressure in the pipes.Implementing an effective control and management scheme is a fundamental part of controlling any risk attributed to any property.

Table. 4 Fixture and Fixture units

Sr.No	Fixture	Fixture Units
1	Bath or shower	2
2	Clothes washer (automatic)	3
3	Drinking water tap	3
4	Kitchen sink	1.5
5	Urinal or water closet (with flush tank)	3
6	Urinal or water closet (with flush valve	6
7	Washbasin	1

Whether it is a complex industrial site, office, hospital or public facility we have the knowledge and ability to provide and deliver bespoke control schemes through our team of experienced Service Technicians and Engineers. Engineers at Case Study are able to offer a true nationwide service and can accommodate any size of portfolio. Monitoring and recording of these activities is provided by MEP system whereby engineers log in real time all site parameters and raise any non-conformance reports instantaneously. Clients have the ability to remotely access all data to verify and validate all site activities providing a true and open account of work progress.

2.5 WATER CHLORINATION

Where chlorine and temperature control of water services is difficult to achieve, or where problems in water quality may be present, some systems may require specialist treatment in the form of continual biocide dosing. Agarwal builders have experience in the design, management and operation of several of these solutions including chlorine dioxide, silver and copper ions and ultra-violet light, ensuring that the most effective and efficient solution is applied to each system. They are not associated directly with any manufacturer and as such can offer the client a truly independent and uninfluenced design solution to any water management issue.

2.6 WATER PIPELINE SIZING USED

The total number of fixture units connected to each branch pipe is then added, multiplied by the factor referred to above, and the result used to calculate the flow in water or drainage pipes in accordance with tables such as the following examples. If included in, or annexed to, a plumbing code, these tables should be detailed for a larger schedule covering the whole range of fixture unit values to be expected; examples may be found in various national codes.

Table. 5:-.Fittings and Pipe size units at Case Study.

Sr.No	Fitting/Valve	Pipe size in Inches
1	45-degree elbow	1.2
2	90-degree elbow	2
3	Tee run	0.6
4	Tee branch	3.0
5	Gate valve	0.4
6	Balancing valve	0.8
7	Plug type cock	0.8
8	Check valve	5.6
9	Globe Valve	15.0
10	Angle valve	8.0

From Table 5the size of the water pipes may be calculated using normal design principles (allowing for head loss, friction and other factors). Fixtures using both hot and cold water (such as in baths and sinks) should be assumed to take equal quantities of each for design purposes: a bath would be counted as one fixture unit on the cold water system, and one fixture unit on the hot water. Supply piping would be calculated accordingly, while the total figure of two fixture units would be used to design the drainage piping. From Table 5the size of internal and external drains may be calculated according to the total number of fixtures discharging into each section, with the proviso that underground drains shall not be smaller than 100 millimetres (4 inches) diameter, and that no internal branch or drain of less than 80 millimetres (3 inches) diameter should carry the discharge of more than two water closets.

2.7 Ventilation Design

Two essential residential criteria are adequate comfort and the need of occupants to be able to adjust the controller set point. In larger residences (over 2400 ft2), the use of multiple HVAC systems should be considered, to allow zoning at Case Study.

The discussions with MEP expert Sanjay Grewal which follow are limited to some of the more common applications. In every environment there are concerns for temperature, relative humidity, sound level and character, and the general quality of breathable air. In general, the higher the standard to be met, the more expensive the system will be to install, and probably to operate.

Table. 6Air Factor change with Altitude at virar zone in Mumbai.

Sr.No	Height above sea level in feet	Atmospheric Pressure lb/in^2	Density Ratio
1	0	14.7	1.000
2	1000	14.2	0.966
3	2000	13.7	0.932
4	3000	13.2	0.898
5	4000	12.7	0.864
6	5000	12.2	0.832
7	6000	11.8	0.803
8	7000	11.3	0.769
9	8000	10.9	0.741
10	9000	10.5	0.714
11	10000	10.1	0.687

In Virar at area near Case Study up to about 2000 ft the altitude related change in air density has less than a 7 percent effect (see Table 4.5). With higher elevations, the decreasing air density has an increasingly significant negative effect on air-handling system performance. Heat exchanger (coil) capacities are reduced. Fans still move the same volume of air, but the heating/ cooling capacity of the air is reduced because the air volume has less mass.

2.8 Indoor Air Quality

The subject of moisture in Case Study is primarily the responsibility of the architect, but the HVAC designer of building is aware of conditions that might lead to problems, such as mold, which might be aggravated or alleviated by HVAC design.

Table. 7:-Standard Power with Air delivery fans as per Indian standard.

Sr.No	Fan Size	Type	Minimum air delivery (m3/min)	Mininmum service Value (m3/min/W)
1	900	Capacitor	130	3.1
2	1050	Capacitor	150	3.1
3	1200	Capacitor	200	4
4	1400	Capacitor	245	4.1
5	1500	Capacitor	270	4.3

But there is a great deal more to improving IAQ than simply using outdoor air at regions of Mumbai. Outdoor air is not necessarily ''better'' than indoor air, and simple ventilation is not enough. Design of Case Study must also control humidity; temperature; gaseous, particulate, bacterial and allergen contaminants; as well as air movement within occupied spaces in order to provide a comfortable and healthy environment.

For regions like Mumbai it is recommended a minimum of 5 ft 3/min of outdoor air per person, but later it increased that number to 20 ft3/min for normal situations. an increase in productivity of 10 percent or more, when the air quality and other environmental factors are optimized, and there is less time off for sickness and fewer complaints. Housekeeping and cleaning are made easier and less expensive. Thus, good IAQ is economically advantageous, and it improves the morale of the people who work and live in the building

2.8 DRAINAGE AND SEWAGE TREATMENT PLANT

1. In the drainage system for Case Study, the drains from the plumbing fixtures are connected to vertical drain stacks that convey the waste and sewage to below the lowest floor of the building.
2. The fixture drain traps in Case Study is vented to prevent their water trap seal from being siphoned by negative pressure or blown out by positive pressure in the drain piping. The fixture vent pipes must extend through the roof to outdoors.
3. They can be run individually or be combined into one or more vents through the roof.
4. Where Case Study are over 10 storey's high, the drainage stacks require relief vent connections at specified intervals from the top, and connected to a vent stack that terminates above the roof.
5. This relieves and equalizes the pressure in the drainage stack to maintain the water seal in traps serving plumbing fixtures. Wherever possible, the sanitary drainage system from a building have discharge to the public sewer by gravity at Case Study.
6. All plumbing fixtures located below ground level is pumped into the public sewer or the drainage system leading to the sewer.
7. The pump line in Case Study is as short as possible and looped up to a point not less than 0.6 meters (24 inches) above ground level to prevent back- siphon age of sewage.
8. The pump discharge rate in Case Study is controlled so as not to cause scouring of the internal bore of the pump line or the drainage or sewer system into which it discharges.
9. High-velocity discharge rates may also cause the flooding of adjoining plumbing fixtures or overloading of the sewer itself.
10. The sump pits for sewage pumps in Case Study have sealed covers, vented to outdoors and have automatic level controls and alarms. Sewage pumps in multiple dwellings and in multistory dwellings have duplex,

with each pump having 100% of the required pumping capacity for the building. Alternatively, an approved vacuum drainage system may be considered.

4.12 VACCUM DRAINAGE AT CASE STUDY.

In a vacuum drainage system, the differential pressure between the atmosphere and the vacuum becomes the driving force that propels the wastewater towards the vacuum station. Table 4.6 provides a summary of the advantages and dis advantages of vacuum drainage systems. Table 4.6 provides information on specific installation and operation requirements. Vacuum drainage systems should be considered when one or more of the following conditions exist:

Table. No 4.7:-.Installation and operation of drainage systems at Case Study.

Sr.No	Parameter	Gravity
1	Pipe size (mm)	Branches 32–100
2	Pipeline gradient	To a fall
3	Maintenance	Negligible
4	Energy requirements	At time of installation
5	Retrofit or extension of system within building	May be difficult to accommodate pipe work and falls
6	Conventional water	7.5 litre flush WC
7	Low water	6 litre flush WCs
8	Loading of sewerage	Dependent upon appliances installed

When conventional gravity drainage systems are extended, as in refurbishment work, the existing gravity drainage system can be fed into the vacuum drainage system. This may be achieved by the use of a sump into which the wastewater from the gravity system drains. When sufficient water has accumulated in the sump, an interface valve will open allowing the wastewater to enter the vacuum drainage system. This arrangement can also be used to collect rainwater or as an interface between a building with conventional drainage and a vacuum sewer. The collection arrangements and the small-bore pipework of vacuum drainage systems provide the possibility of easily separating greywater and black water. This would be of particular advantage if sewerage capacity was limited, as the grey water could be run to a watercourse after appropriate treatment.

III. SUGESTIONS & DISCUSSIONS

1. Nowadays, the system used in these installations does not always satisfy the users, if the location of the power points and switches does not suit them; changing the position of just one means calling on different tradesmen or having to spend hours of do-it-yourself work to achieve a not-always satisfactory result. Think about the existing differences between the use and maintenance of the electrical installations in a kitchen, perhaps the part of the house with greater technological load, and an automobile.
2. This use and social dependence of the devices and mechanisms that technology offers, and those that we cannot dispense with in as much as they contribute to the leisure time of the Western society, may soon lead to demand for the installation of systems of uninterrupted supply in dwellings, with the same passion shown over the last few years for the 'necessity' of having a cooling system in each home.
3. Up till now we have acted in the simplest way on the temperature, but we also have to act on the humidity. This can be done with more or less complex humidifiers, but also with the simple resort to putting a container with water near the radiator –as it is done in some homes- to favor its evaporation, and reach a humidity of between 40-60% where, depending on different parameters, the human well-being is situated.
4. There are installations that offer different points of view from western architectural norms, as for example the oriental tradition of Feng Shui, in which it is believed that the staircases and elevators are the 'bloodstream' of a business, so the better the service, the more profit the business makes.
5. Although they share criterions for laying with the electricity or data network, they are installations that generate specific conflicts with some constructive elements, as occurs with built-in sockets or electrical locks in doors.
6. Sometimes, it is advisable that the terminal elements of these installations (cameras, detectors, alarms) be visible; then in this way they carry out an important dissuasive task.
7. In the future we will continue to need water for human consumption, which does not represent in any way a condition for the formalization of the architecture, but will the plumbing of these waters be needed.
8. All the appliances that we use daily need electricity: lights, different electrical appliances, and computers. But think about the size and durability of the first mobiles and the designs that the industry offers nowadays. If to this functional and design evolution we add the application of new technologies such as hydrogen mini-batteries, does

anyone dare to say that it would not be possible for eacheveryday device to leave the factory directly with a battery inside with a durability of years. The electrical appliances (television, toaster, printer.) will be delivered and placed, a button will be pressed and it will work all its useful live without the hindrance of any cable.

9. Air-conditioning in this section about a possible future refers to small spaces such as offices or houses, since the big air-conditioned volumes occupied by people will continue to need the contributions of impelled air (that is, built volume) to satisfy the needs of quality. In the related spaces two questions are considered:

10. Increase of the heat recovery systems. It will be obligatory by law: it is not logical that a society concerned about recycling and energy should use all the normative means within its reach to avoid the wasting of produced heat which can be used somewhere else or for another purpose and not allow it to be released into the atmosphere. These solutions affect architecture in as far as systems of exchange, recovery or accumulation of energy require volume for their introduction, and condition the constructive solutions and the choice of the air-conditioning systems.

11. In the future there will also be more requirements on the parameters of air-quality in buildings. Optimum quality is obtained from natural ventilation, for which the best thing is to introduce exterior air with the heatrecovery mentioned before, avoiding obligations of the ventilation systems in the rest of the building (in that sense the technology of active carbon filters for the kitchens that do not require to taking the ducts to the roof is fully developed).

I hope I have conveyed the message that this section is no more than a theoretical exercise with which to open our eyes towards the possibilities of installations in architecture. The future can be different, and if it is somewhat like what is suggested here, architecture will have returned to its origins, though wrapped in a greater complexity: it would be a refuge, an empty space in which one can do activities without any other limitation that the exterior closures and the structure that maintains the whole structure.

IV. CONCLUSION

Building Services Engineering involves the design of the environments of the future; comfortable living and work spaces which allow people to function sustainably and effectively within the built environment. Building Services Engineers create lighting, heating and air conditioning systems for large communal spaces such as sports centers, shopping centers, hospitals or hi-tech facilities. Their job focuses on creating vibrant, dynamic sustainable environments within large building complexes, maximizing the contribution from renewable energy technologies whilst minimizing the total energy consumed.

1) Technological advances have transformed virtually every aspect of building services including vertical transportation, fire detection and protection, hydraulics and plumbing, heating ventilation and air conditioning, electrical and lighting, security and data networking.
2) This services develops a critical understanding of the principles of selection, operation and management of these service systems in buildings of larger-than-domestic scale.
3) Building Services Engineering is concerned with aspects of the built environment, involving air conditioning and mechanical ventilation, electrical light and power, fire services, Fire Safety Engineering, water and waste services, data and communications, security and access control, vertical transportation, acoustics in buildings and energy management.
4) Building should be design with features to provide better lighting, comfortable space, temperature and air quality, convenient power and communication capability, high quality sanitation and reliable systems for the protection of life and property. Building services are mainly divided into mechanical, electrical and building operation system. They are all very important and should be put into consideration during planning, designing and construction.
5) Today with the advancement of sciences and technology, all those building services listed above are more modern and became indispensable for buildings. As an example certain types of building such as department store or industrial buildings are almost 100% dependent of electrical lighting, ventilating an and space heating and high rise buildings rely on vertical transportation and high speed pressure for water supply.
6) Although those services are indispensable for modern buildings, they also have an impact. In fact the implementation of those services demands a considerable amount of floor and ceiling so proper planning is necessary for their allocation. Increase of ceiling and floors will lead to an increase of the cost of construction to which building construction team should be aware of. One of the considerable impacts on building is the increase of energy consumption which does not only affect the building but the environment as well
7) Mechanical building services account for around 30% of the capital and 50% of the operating cost for a typical office, and substantially more in highly serviced buildings such as hospitals. They play a central role in creating a

successful project and a successful building and are certainly the first thing noticed when not working well

8) Communication amongst design and construction teams affects an overall building services design if it inhibits adequate coordination and information flow to take place. Consultant designers have a higher level of communication overall as they appear to be interacting with all parties involved in a project and have adopted. However, design and build designers have a much better level of communication with the construction team than consultant designers.
9) For developments that include considerable amounts of mechanical, electrical and hydraulic building services this is particularly the case. It is recommended to consider building tuning requirements and commitments at the early design stage of such a building.
10) It's important to note that inefficiently performing services, such as HVAC plants, may not only impact on indoor environment qualities but may also increase running costs, greenhouse gas emissions and disturb neighboring properties.

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