iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** III **Month of publication:** March 2021

DOI: https://doi.org/10.22214/ijraset.2021.33201

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue III Mar 2021- Available at www.ijraset.com

Reconsidering School Design: In a Post Covid-19 World

Prashant Mehrotra[1], Prof. Rajiv Kacker[2]
[1, 2, 3]*Faculty of Architecture & Planning, Dr. A.P.J. Abdul kalam Technical University, Tagore Marg Campus, Lucknow, Uttar Pradesh 226007, India*

***Abstract:** In the recent times the COVID-19 pandemic results in the shutdown of School & colleges which cause the damage to studies of students. As students in the junior schools (up to standard-5th are not much capable of using internet and can't learn digitally properly. The physical wellness of students is also prominent which can get while going out for school or in playground. Stay in the home inside isn't a solution to cope up with COVID-19 virus, some design features in school design can allows the student to come to School and study. The research consisted of study of the schools where the implementations on the safer COVID-19 proof school have been done by the Architects or School administration. Also, how the existing schools can be retrofit to fight against the COVID-19 virus. So, the basic purpose of this dissertation is to reconsider the school design so that students can go back to schools and everything get back to normal. In digital learning there is a lot of academic dishonesty. Also, the interaction between students-students and students-teachers is minimized due to online learning. The importance of play for the students in their upbringing also plays a vital role.*

***Keywords:** Digital Learning, Social Interaction, Importance of play, Uttar Pradesh Primary School Retrofitting*

I. INTRODUCTION

The school plans in India and different nations, significantly doesn't centers around the social separating between the students and the educators individually.

In a post COVID-19 world it is required presently to keep a distance with another human, so as we mindful with the closure of school everywhere on the world due to the way that the plans of school aren't according to the measures of social separating and understudies can't keep social removing between themselves.

Additionally, we can't continue abandoning resuming of the schools. School is a spot that offers openings understudies would never get at home. particularly younger than 8, direct proximal play and the social connection of learning must consistently be up front. The most serious issues confronting mankind today can't be settled simply by tossing innovation and cash at them. These are basically emergencies of inner voice, profound quality and value for which an alternate method to teach our youngsters is fundamental. We are in good company in our earnest conviction that the rise of another sort of school that prepares our students to manage these bigger inquiries will be the enduring and most remarkable tradition of the Coronavirus pandemic.

II. DIGITAL LEARNING VS SOCIAL INTERACTION

we can't overlook the way that while only learning on the web, youngsters miss the social commitment that is so vital to their development.

The advancements in digital technologies have totally changed the homeroom educational program as of late, with numerous understudies taking part in distance learning even pre-pandemic.

But then, the far-reaching lock down during COVID-19 has made it completely clear that there are a few things that are not replicable through innovation – something is social connection. Indeed, even the most community advancements with an academic center can't supplant a kid's natural social commitment and play.

III.IMPORTANCE OF PLAY

we can't overlook the way that while only learning on the web, youngsters miss the social commitment that is so vital to their development. The advancements in digital technologies have totally changed the homeroom educational program as of late, with numerous understudies taking part in distance learning even pre-pandemic. But then, the far-reaching lock down during COVID-19 has made it completely clear that there are a few things that are not replicable through innovation – something is social connection. Indeed, even the most community advancements with an academic center can't supplant a kid's natural social commitment and play.

IV. SCHOOLS AS PER COVID-19 GUIDELINES

A. *The Tree House School by Architect Valentino Gareri, Italy*

Sustainable and modular educational building for the post COVID-19 era.

The Tree-House School is a modular Educational Center that can incorporate all the periods of the Educational cycle: Kindergarten, Primary and Secondary schools. All the prominent spaces are fitted into two rings: the massing articulation allows to create two courtyards and an additional usable roof. The modularity of the design permits the structure to be adapted to different programs. Kindergarten, Primary School, Secondary School and community Centre are independent but belong to the similar architectural entity. The classrooms are situated in circle and have connections to the courtyards and the outdoor landscape. Every module, of 55 sqm, is made of cross laminated timber and relates to an ideal classroom of 20/25 students connected by a central corridor. The circular perimeter allows to obstruct the immediate sunlight with the opaque panels, and get diffuse light and free view through the transparent ones. The modularity of the design permits for future school expansion, different programs, different number of classrooms and also can be adapted to create different functions, such as temporary medical centres for emergencies or temporary residential units. The school of the future has to be sustainable and, in the same time, able to sustain the new post COVID-19 requirements. It must be open air spaces comprehensive and open to nature, made of regular materials and ease development procedures, as measured plan.

Figure 1- conceptual view of tree house school (Source- (Harrouk, Valentino Gareri Proposes New Model of Educational Building for the Post-Covid Era, 2020)

B. *Layford Cay International Baccalaureate School, Nassau Bahamas*

The fundamental structure that is only one room wide to permit simple cross ventilation for every inside space, with 12-foot-wide verandas that flank every classroom and expand floor region into the outside. In addition, the grounds likewise include a devoted, completely outside classroom space. Different suggestions incorporate the utilization of outside study hall structures and garage style doorways that make genuine indoor/open air spaces. From facilitating proper cross air flow, creating outdoor rooms, and offering simple changes among exterior and interior spaces, these plan of action tackle first student medical problems.

Figure 2- conceptual view of layford cay international baccalaureate school (Source- (Harrouk, Reconsidering School Design: Indoor and Outdoor Learning as a Solution for a Healthy Future, 2020)

C. American Institute of Architects (AIA) design strategies for safer Schools post Covid-19

1) The desk/benches are placed at 6 feet's distance between them.
2) Direct connection of classrooms with the outdoor spaces and landscapes.
3) Retrofitted the existing classrooms by decreasing the capacity from 24desks (33sqft/student) to 12 desks (66sqft/student).
4) Provides movable partition to increases the floor area.
5) Remove the non-usable furniture, equipment, etc. to increase the floor area and ease of cleaning.
6) Enhances acoustic treatment so students can hear and be heard through masks.
7) Provides touchless handwashing hygiene station inside the classrooms.
8) Provides touchless drinking water dispenser.
9) Video technology provided for extended learning.

a) Single Classroom (800 sq. ft.)

- Pre-pandemic capacity of classroom: 24 desks (33 sf/student)
- Pandemic capacity of classroom: 12 desks (66 sf/student)
- Arrange desk & seats position to face the same direction.
- Paste the stickers/signages to delineate proper furniture placement & circulation.

b) Double Classroom (1600 sq. ft.)

- Pre-pandemic capacity of classroom: 48 desks (33 sf/student)
- Pandemic capacity of classroom: 24 desks (66 sf/student)
- Increase the floor area by opening movable partition.
- Provide disposable cloths and sanitizers for students to clean desks before and after use.

D. Pop-Up Schools by Curl la Tourelle head Architecture (CLTH), London

CURL LA TOURELLE HEAD Architecture (CLTH) has put together its idea with respect to starting exploration and investigation, and created a "progression of spring up, tent-like constructions, every one of which is masterminded to follow the two-meter social removing rules with the flexibility to have diverse study hall arrangements". CLTH has delivered a creative idea "to help moderate confined flow courses inside schools and keep up the fundamental social separating among students and staff". In certainty, the proposition introduced is a transitory vision expecting to "help free existing inner school space taking the understudy load off course regions, yet in addition upgrade wind stream adding to people's prosperity". Using marquees and convenient washroom offices, with environmentally friendly power sources like PV exhibits and sun oriented cleared cylinders for boiling water warming. Moreover, staff & understudies will be urged to set up clockwise developments inside & outside the designs, to maintain a strategic distance from intersections.

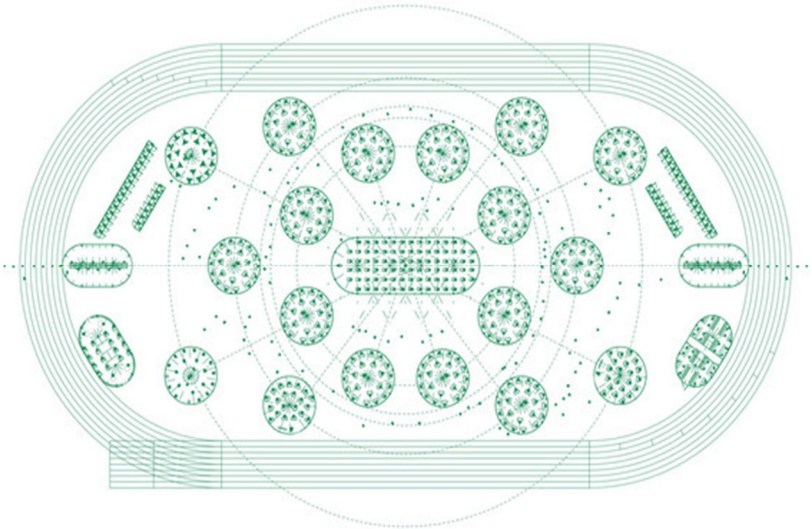


Figure 3- Site plan of POP-UP School by CLTH, London (Source- (Harrouk, CLTH Proposes Adaptive Design for Schools post COVID-19, 2020)

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue III Mar 2021- Available at www.ijraset.com

E. Modular School Classrooms in Response to Covid-19 by SOM, Architects (USA)

American Architecture studio SOM has made a plan for a ventilated, high-ceilinged, secluded study hall for schools that need impermanent convenience. Named School, the spring up study halls were planned because of the current COVID-19 pandemic however are proposed to give a better option in contrast to current alternatives accessible for schools needing extra homeroom space. The modular study halls are intended to be solid indoor learning spaces for 25 understudies situated 1.8 meters (six feet) away from one another, or up to 50 understudies in an ordinary setup. They would have pitched rooftops making study halls with six-meter-high roofs, while a raised floor would contain power attachments and ventilation to eliminate air from around every work area. The entire inside would be clad in effectively disinfected wraps up. The higher roof heights upgrade air course. Access to common light and perspectives offer a more human space for understudies and educators. The impression has been measured to oblige a full class of 25 students at a six-foot distance for the pandemic. The dividers and top of each School/House would be collected from seven collapsed secluded boards, each highlighting an aluminum outline loaded up with fiberglass strengthened boards (FRP). The floors would be a standard raised aluminum network loaded up with vinyl piece tile (VCT) boards.

Figure 4- Construction panels design by SOM Architects (USA), (Source- (Ravenscroft, 2020)

F. Comparative study of All the Schools on Aspect of Covid-19 Guidelines

Parameters	Tree-house School	Lyford cay international baccalaureate school	AIA strategies for school post covid-19	Pop-Up schools by (CLTH), London	Modular school by SOM Architects, USA
Social distancing (2metres)	Furnitures are placed at 2metres distance between them.	Furnitures are placed at 2metres distance between them.	Furnitures are placed at 2metres distance between them.	Furnitures are placed at 2metres distance between them.	Furnitures are placed at 2metres distance between them.
Physical barriers/ screens	No physical barriers provided.	No physical barriers provided.	No physical barriers provided.	No physical barriers provided.	No physical barriers provided.
Outdoor learning spaces	Direct connection of classrooms with the outdoor spaces and landscapes.	Direct connection of classrooms with the outdoor spaces and landscapes.	Direct connection of classrooms with the outdoor spaces and landscapes.	Direct connection of classrooms with the outdoor spaces and landscapes.	Direct connection of classrooms with the outdoor spaces and landscapes.
Limit number of students per class	Classrooms for 20-25 students (55sqmt)	Classrooms for 20-25 students (55sqmt)	decreasing the capacity to 12 desks (66sqft/student).	Classroom Tent are for 21 Students & 1 Teacher	healthy indoor learning spaces for 25 students

Physical guides, such as tape on floors and signs on walls	Not provided	Not provided	The floor surface was mapped to delineate circulation and/or furniture location.	Not provided	Not provided
Hygiene & Sanitation	Provided	Provided	Provides touchless drinking water dispenser, handwashing station and trash cans.	Separate handwashing tents.	Separate handwashing pop-ups.
Circulation	No Cross passing between students.	No Cross passing between students.	Clockwise movements to avoid crossings.	Clockwise movements to avoid crossings.	Clockwise movements to avoid crossings.
Ventilation	Proper ventilation. Design is based on courtyard planning.	Proper ventilation	Proper ventilation	Proper ventilation	The higher ceiling heights enhance air circulation and lighting.
Remote learning	Provided.	Provided.	Video technology provided for extended learning	-	Provided

Table 1: comparative analysis/ inferences (Source- Author)

V. RETROFITTING IN EXISTING U.P. GOVT. PRIMARY SCHOOL (INDIA)

A. Existing Ground Floor

The classroom area of existing school is 30 sq.mt.

The school is comprising of 4 classrooms of similar sizes.

A classroom can accommodate 28 students and 1 teacher as per the standards of 1.1 sq.mt. per student

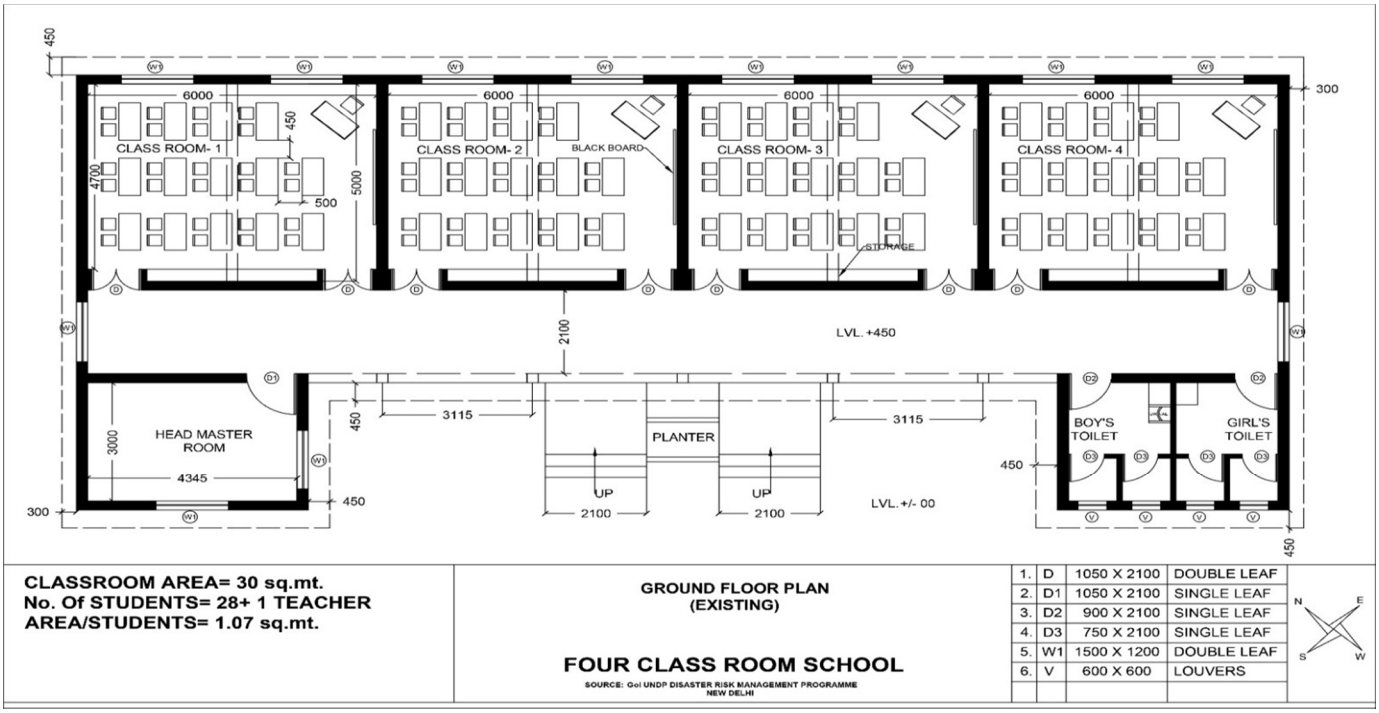


Figure 5: floor plan (Source- GOI- UNDP Disaster risk management programme)

B. Retrofitting in Ground Floor

The first step taken in retrofitting is removing the wall between two classrooms. Now the size of classroom will be 12.23 x 5 meters. The classroom area after removing the partition wall between 2 classrooms is 61.15 sq.mt.

Keeping in mind, the furniture's are placed as per the new norms of social distancing of 1.8mt between students.

A classroom will accommodate 18 students and 1 teacher as per the new standards of 3.3 sq.mt. per student.

Installation of disinfection tunnel for sanitization of students before entering the classroom. Addition of touchless hand washing and drinking water dispensers for the safety of students.

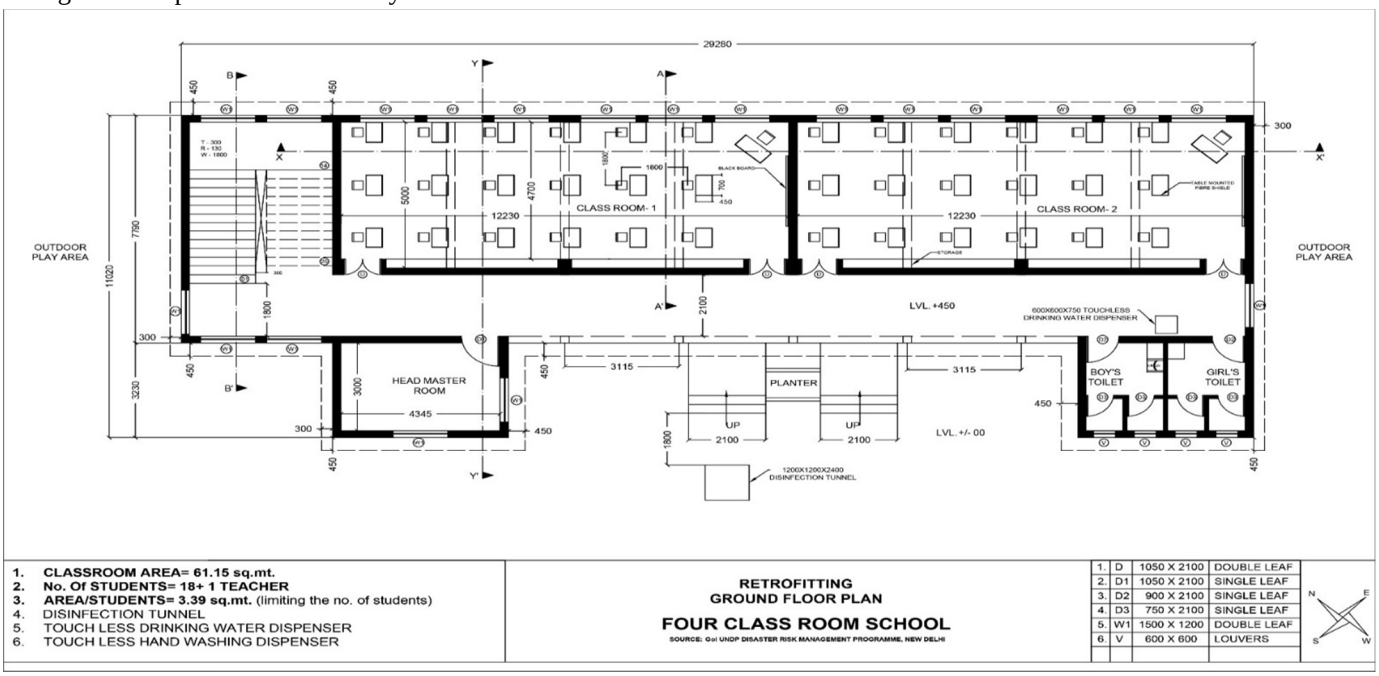


Figure 6: floor plan (Source- GOI- UNDP Disaster risk management programme)

C. Addition of First Floor

After removing the partition wall between two classrooms at ground floor. There is a need for other classrooms to accommodate all the students. So, addition of first floor to accommodate remaining students in the other two classrooms.

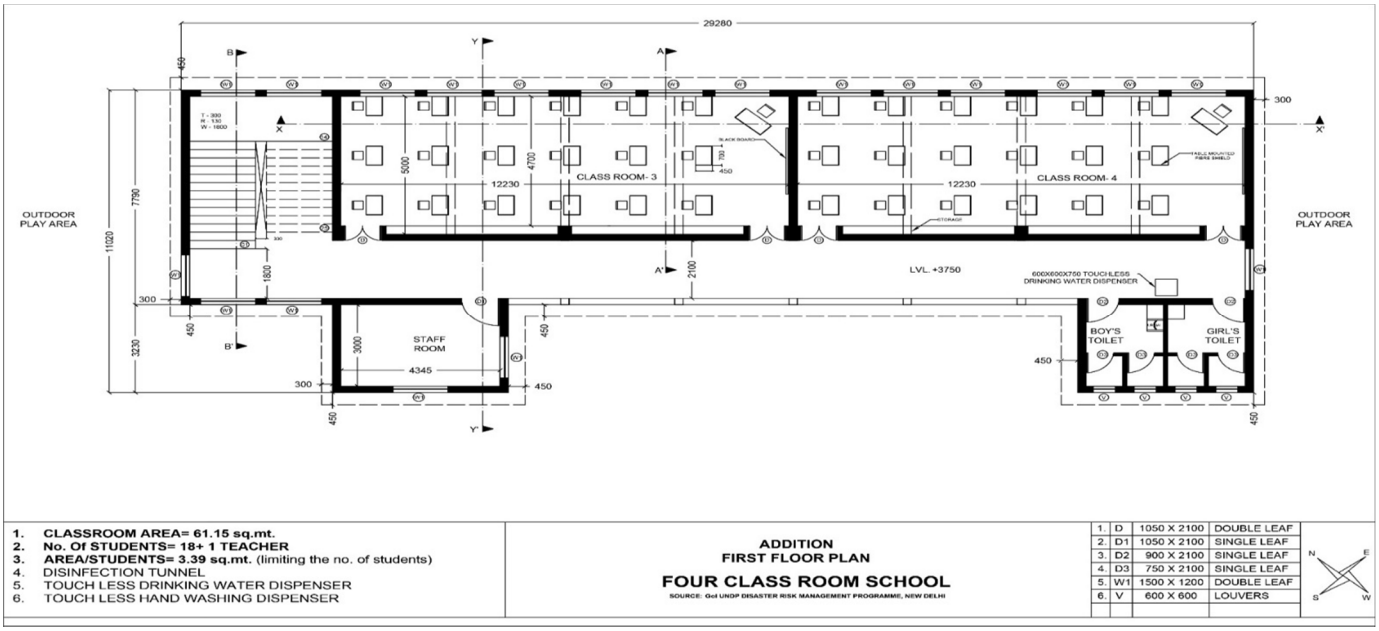


Figure 7: floor plan (Source- GOI- UNDP Disaster risk management programme)

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue III Mar 2021- Available at www.ijraset.com

D. Sections

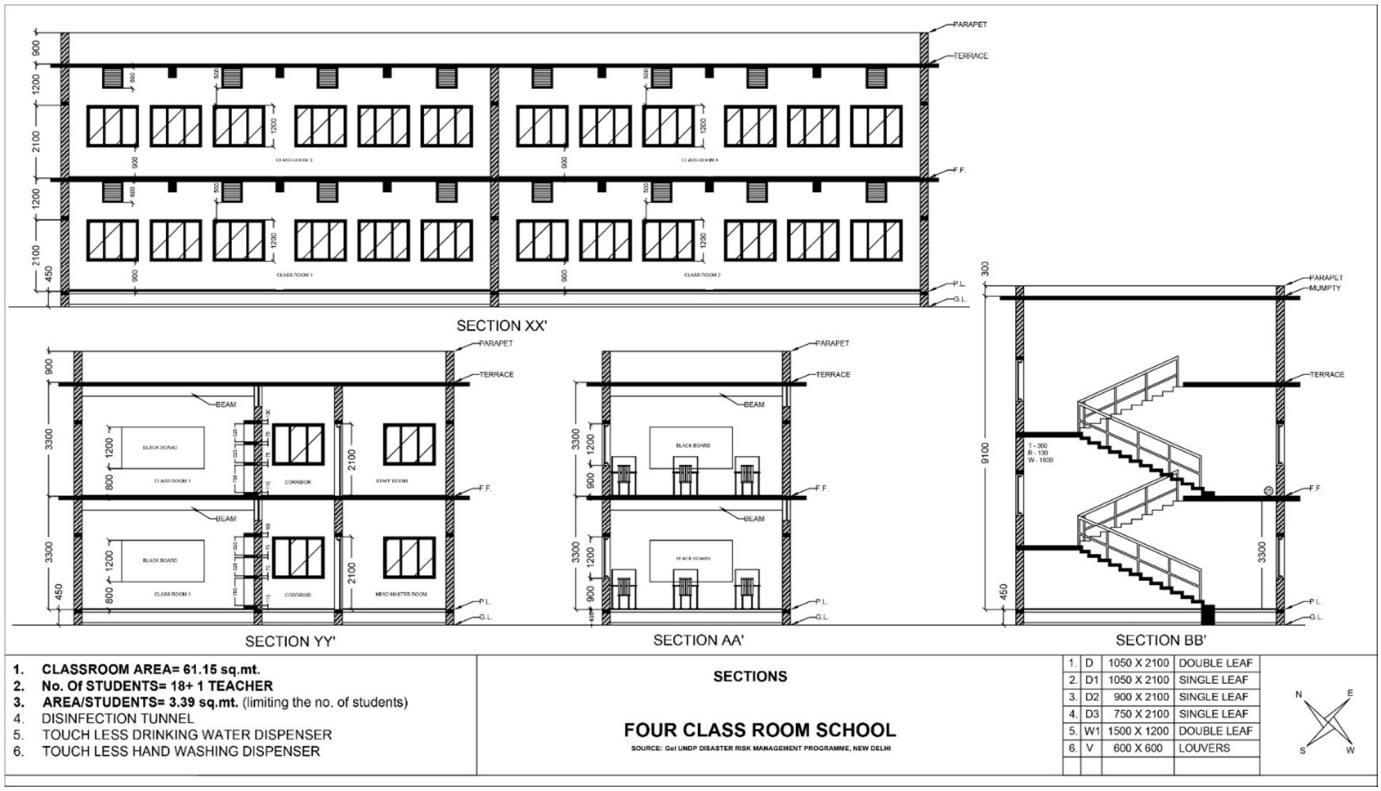


Figure 8: Sections (Source- GOI- UNDP Disaster risk management programme)

E. Daylighting

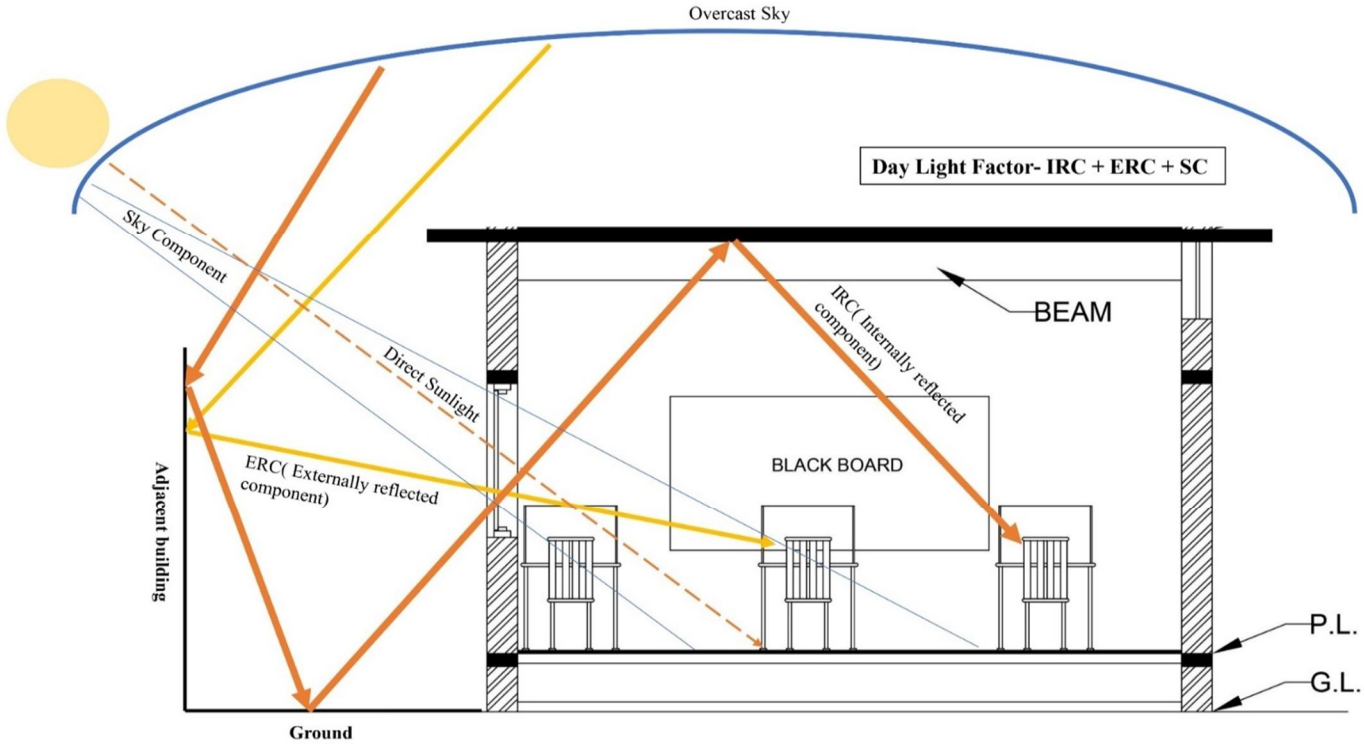


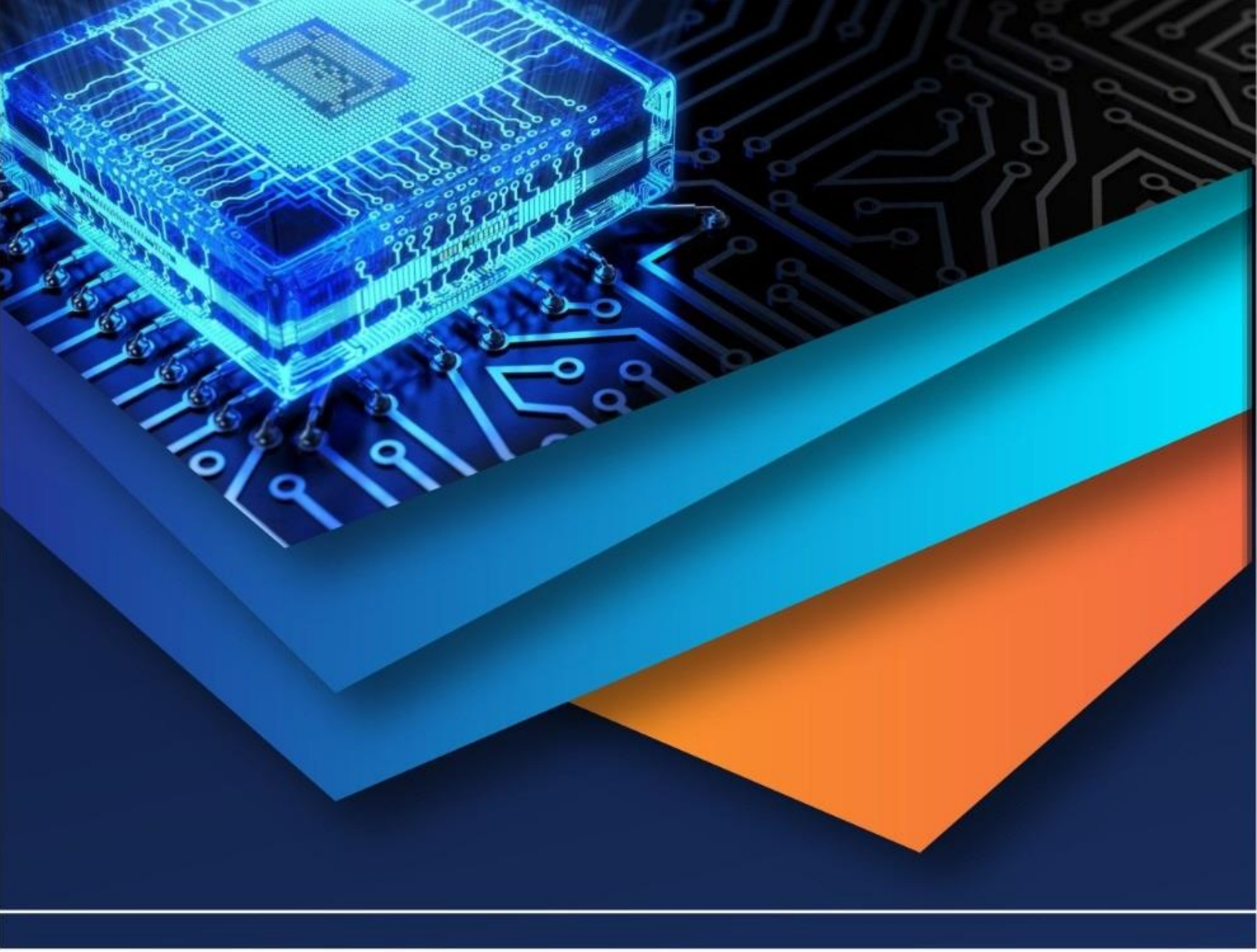
Figure 9: Daylighting (Source- Author)

VI. CONCLUSION

During the course of this study, it is observed that the current School designs throughout India isn't as per the covid-19 guidelines, which is a later addition done after the spread of novel corona virus (COVID-19) pandemic throughout the whole world which cause severe damage to the education of the students. The schools and colleges globally have been forced to shut down indefinitely. The purpose of this study is to investigate the impact of COVID-19 virus on Schools. The few planning features which need to be change in the design of Covid-19 proof Schools such as distancing between the students in the classrooms for minimum of 2 metres which is given by the World health Organization (WHO) to incorporate in the existing schools globally. The distancing between the students in classroom minimizes the risk of spreading pathogens microbes discharged from the infected person via coughing, sneezing, laughing, etc. Based on the studies incorporating the Architectural Design elements like courtyard planning, direct connection of classroom with the open spaces for the outdoor teaching, High ceiling height for the proper ventilation. Addition of detachable top mounted fibre sheets over the desks of student also result in decreasing the spread of air borne pathogens microbes. Installing new technology disinfection tunnel, touchless water dispenser and handwashing taps. Thus, in conclusion few design features have been added in the school designs which can be incorporated in both the existing schools and new school designs.

REFERENCES

[1] affairs, T. m. (2020). sop/guidelines for reopening school. Delhi: Government of India.
[2] Choudhary, R. (2020, april 16). COVID-19 Pandemic: Impact and strategies for education sector in India. Economics times.
[3] development, M. o. (2020). National Education Policy 2020. Delhi: Government of India.
[4] González, M. F. (2017). Lanka Learning Center / feat.collective. Arch Daily.
[5] Harrouk, C. (2020). AIA Releases Design Strategies for Safer Schools post COVID-19. Arch Daily.
[6] Harrouk, C. (2020). CLTH Proposes Adaptive Design for Schools post COVID-19. Arch Daily.
[7] Harrouk, C. (2020). Post-Pandemic Schools, Indoor/Outdoor Learning is a Must. Arch Daily.
[8] Harrouk, C. (2020). Reconsidering School Design: Indoor and Outdoor Learning as a Solution for a Healthy Future. Arch Daily.
[9] Harrouk, C. (2020). Valentino Gareri Proposes New Model of Educational Building for the Post-Covid Era. Arch Daily.
[10] Hitti, N. (2020). Education spaces will never be the same again. Dezeen.
[11] Inquiry, C. o. (2006). Learning environment. Delhi: Community of Inquiry.
[12] PEARSE, R. (2020, may 27). Why post-COVID school design must still centre around proximal play. Hames Sharley.
[13] Ravenscroft, T. (2020). SOM unveils modular School/House classrooms in response to coronavirus. Dezeen.
[14] Shah, D. (2020). Tracing the impact of COVID-19 on design education. Stir World.
[15] https://prakashnair.com/wp-content/uploads/2020/03/Newsletter.pdf
[16] https://www.thehindu.com/society/what-post-covid-school-life-may-look-like/article31686136.ece
[17] https://timesofindia.indiatimes.com/home/education/news/association-gives-post-covid-19-guidelines-for-school/articleshow/75796668.cms
[18] https://www.who.int/news/item/10-03-2020-covid-19-ifrc-unicef-and-who-issue-guidance-to-protect-children-and-support-safe-school-operations
[19] COVID-19: IFRC, UNICEF and WHO issue guidance to protect children and support safe school operations
[20] GOI- UNDP Disaster risk management programme
[21] https://www.unisdr.org/files/11714_ModelSchoolDesignGuideline.pdf



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY