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# **निर्माण भारती** केन्द्रीय लोक निर्माण विभाग

# Nirman Bharati Central Public Works Department







# The Genesis of CENTRAL PUBLIC WORKS DEPARTMENT

The Public Works Department was formally established in the year 1854 in the sixth year of Lord Dalhousie's tenure as Governor General. In the minutes of meeting held on 12<sup>th</sup> July, 1854 the Governor General resolved that a Central Agency be provided by creating an office of Secretary to the Government of India in Department of Public Works. The note recorded by Lord Dalhousie was as under:

"...The organization of the Department of Public Works in the Indian Empire will be incomplete unless there shall be provided for the Supreme Government itself some agency by which it may be enabled to exercise the universal control confided to it over Public Works in India with the best of scientific knowledge with authority and system.

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I have, therefore, now to propose that such an agency shall be provided by creating an office of the Secretary to Government of India in the Department of Public Works. The person who holds it should always be a highly qualified officer of the Corps of Engineers. He should have the aid of an Assistant Secretary, also an officer of the Corps of Engineers. His salary I think should not be less than that of the Secretary to the Government of Bengal, namely Rs.3,000 per month and the salary of the Assistant should not be less than that of the Assistant Secretary in Military Department..."

Indeed, the court of Directors approved Lord Dalhousie's proposal and also appointed the first Chief Engineer of Public Works Department as recommended by Dalhousie. They mentioned: "We do not object, to the appointment, in the first instance, of Major W.E. Baker.

Thus, PUBLIC WORKS DEPARTMENT' came into existence in a systematic and formal reorganized way by bringing all works - both civil and military inclusive of roads, irrigation and railways - under the administrative control of one department.

# हरदीप एस पुरी HARDEEP S PURI



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आवासन और शहरी कार्य मंत्री पेट्रोलियम एवं प्राकृतिक गैस मंत्री भारत सरकार Minister of Housing and Urban Affairs; and Petroleum and Natural Gas Government of India

#### Message

It gives me immense pleasure to extend my best wishes to the Central Public Works Department on its 168<sup>th</sup> Annual Day.

Since its inception in July 1854, CPWD has been leading various public development works over the years. This rich legacy not only sustains the organization but also gives it encouragement to continuously evolve. In the post-pandemic world, it is heartening to see that CPWD is in the process of once again transforming itself to meet present-day demands and challenges.

Such a transformation is an imperative as the world grapples with the challenges of environmental degradation. This has spurred the adoption of construction technologies that minimise the carbon footprint. CPWD must gear itself to develop appropriate skills to not only adapt itself to these new technologies but also be the torchbearer in this vital enterprise.

CPWD is one of the few institutions in the country to have such a long history of service. Established in the British Raj, it is now celebrating India's Azadi Ka Amrit Mahotsav as we come together to commemorate the 75 years of our nation's independence. I believe it is apt, therefore, that it has chosen the theme 'Azadi Ka Amrit Mahotsav (AKAM) – 168 years of CPWD's dedicated service to the nation' for this year's Annual Day celebrations.

I convey my best wishes to all officers and staff of CPWD on this proud occasion, and wish them success in their future endeavours.

(Hardeep S Puri)

New Delhi 28 June 2022

#### कौशल किशोर KAUSHAL KISHORE





आवासन और शहरी कार्य राज्य मंत्री Minister of State, Housing & Urban Affairs Government of India



MESSAGE

It gives me immense pleasure to know that Central Public Works Department is celebrating its 168<sup>th</sup> Annual Day on 12<sup>th</sup> July, 2022 and on this occasion CPWD is bringing out a special issue '*Nirman Bharati*' highlighting the activities and achievements of the Department.

It is really a matter of satisfaction that CPWD, which is not only one of the most important wings of the Ministry but also one of the oldest Government Organizations of the country, even in its 168 year of existence is contributing to the development of the country in a very meaningful way. CPWD has come a long way covering almost every conceivable aspect of public works – be it residential, recreational institutional, infrastructural needs or restoration, up-gradation or beautification works. It gives CPWD a pan India character which few organizations have been able to match.

I congratulate CPWD for taking up the theme 'Azadi ka Amrit Mahotsav (AKAM)- 168 years of CPWD's dedicated service to the nation' for this year's Annual Day Celebrations in consonance with the ongoing celebration of 'Azadi ka Amrit Mahotsav (AKAM) to commemorate 75 years of our Independence.

I wish all success to CPWD on the occasion of its 168<sup>th</sup>Annual Day.

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(Kaushal Kishore)

New Delhi 07<sup>th</sup> June, 2022 मनोज जोशी सचिव Manoj Joshi Secretary





भारत सरकार आवासन और शहरी कार्य मंत्रालय निर्माण भवन, नई दिल्ली–110011 Government of India Ministry of Housing and Urban Affairs Nirman Bhawan, New Delhi-110011



#### MESSAGE

On the occasion of 168<sup>th</sup> Annual day of Central Public Works Department, I convey my warm greetings and best wishes to entire CPWD family. It is encouraging to learn that on this occasion, a special issue '*Nirman Bharati*' highlighting the activities and achievements of the Department is being brought out by them.

It is also encouraging to note that CPWD even in its 168 years of existence, is able to maintain itself in robust health with forward looking aspirations, symptomatic of a young and youthful organization. I am happy to note that, today, CPWD is serving the Nation by creating environment friendly sustainable built environment in a significant manner and has maintained an edge in construction domain due to its large multidisciplinary team of technical professionals and its pan India presence.

I welcome the move of CPWD in taking up the theme 'Azadi ka Amrit Mahotsav (AKAM)- 168 years of CPWD's dedicated service to the nation' for this year's Annual Day Celebrations in consonance with the ongoing celebration of 'Azadi ka Amrit Mahotsav (AKAM) to commemorate 75 years of our Independence.

I wish all success to CPWD on the occasion of its 168<sup>th</sup> Annual Day and call upon all CPWD officers and staff to work with full commitment and dedication to take their Department to greater heights in the coming days and months.

Many Jest.

(Manoj Joshi)

<u>New Delhi</u> 07<sup>th</sup> June, 2022



Shailendra Sharma Director General



सत्यमव जयत भारत सरकार Government of India



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#### MESSAGE

It is a matter of immense pleasure and joy for the entire CPWD fraternity that our department is completing 168 years of its glorious and eventful existence on 12th July, 2022. On this auspicious occasion, I convey my heartiest best wishes to you and your families.

With a hint of pride and joy, I also wish to share with all of you that CPWD has achieved the highest ever workload of Rs.18,814 crore for the financial year 2021-22. Achievement of this landmark has been made possible with the collective effort, dedication and commitment of entire CPWD fraternity. I convey my appreciation to each of you for your contribution in keeping the flag of the Department flying high.

I also take this opportunity to extend my heartiest thanks and gratitude to our large esteemed clientele for reposing their faith on us. I reassure them that CPWD shall continue to provide the requisite services to them to their satisfaction.

This year for our Annual Day Celebration, we have chosen the theme 'Azadi ka Amrit Mahotsav (AKAM)- 168 years of CPWD's dedicated service to the nation' in consonance with the ongoing celebration of 'Azadi ka Amrit Mahotsav (AKAM) to commemorate 75 years of our Independence. While CPWD had a seminal role in the development and construction of the original buildings of the Capital in Delhi, the wheel of time has turned and now we are again into the re-making of the buildings all along the Central Vista. It is a historical opportunity and an apt occasion to celebrate CPWD's journey of achievements and successes together with the building of the Nation.

It gives me immense pleasure to inform that the Department is bringing out its in-house annual publication 'Nirman Bharati' on this occasion. I am happy to note that this special edition has been brought out very well, covering lucid and useful information about the activities and achievements of the Department. The magazine also contains awards/commendations received by the Department and its officers. I am confident that this special edition shall be well received by the officers of the Department as well as client organizations and others, to whom CPWD provide its services.

I congratulate Shri Devendra Kumar Sachan, Director (Tech&PR), Smt. Mitali Saikia, Architect (Tech&PR), CPWD and their team for bringing out this publication, covering the activities and achievements of the Department in a lucid manner.

Once again, I convey my best wishes to all on 168th Annual Day of the Department.

(Shailendra Sharma)





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Hon'ble President of India inaugurates 48 Type II Quarters at President's Estate, New Delhi on November 02, 2021.





Hon'ble Prime Minister of India inaugurates five State of the Art iconic projects i.e. Rudraksh Varanasi Convention Centre, 100 bedded Maternal and Child Health Hospital, 86 bedded Regional Institute of Ophthalmology, 80 Faculty Flats for BHU and multilevel scooter parking at Varanasi on July 15, 2021.













Hon'ble Prime Minister of India inaugurates Defence Offices Complex at Africa Avenue and Kasturba Gandhi Marg, New Delhi on September 16, 2021.







Hon'ble Prime Minister of India inaugurates Administrative block, Library, Auditorium, School and Hostel building for ICAR- National Institute of Biotic Stress Management at Baronda, Raipur on September 28, 2021.







CIPETRIE INSTITUTE OF ETROCHEMICALS ECHNOLOEM IPT Hon'ble Prime Minister of India inaugurates Institute of Petrochemicals Technology for Central Institute of Petrochemicals Engineering and Technology (CIPET) at Jaipur on September 30, 2021.

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Hon'ble Prime Minister of India inaugurates four State of the Art projects i.e. Office Building of Inter University Centre for Teacher Education (IUCTE); Dharamshala and Hostel building for Doctors and Nurses; 2x80 residential flats for Banaras Hindu University at Varanasi on December 23, 2021.



Hon'ble Prime Minister of India inaugurates four State of the Art projects i.e. 200 double seated rooms Girls Hostel, Student Activity Center, 402 double seated rooms Dhanrajgiri Hostel (Phase II) and Faculty Apartment for IIT (BHU) at Varanasi on October 25, 2021.







Shri Amit Shah, Hon'ble Union Minister of Home Affairs and Co-operation inaugurates four buildings i.e. GO's Mess, 60 Women Barrack, Quarter guard and Family Welfare Centre & CPC for Sashastra Seema Bal at Regional Training Centre Salonibari, Tejpur on May 09, 2022.



Shri Amit Shah, Hon'ble Union Minister of Home Affairs and Co-operation inaugurates Phase 1A and Phase 1B campus of IIT Jammu and lays foundation stone for the construction of Phase 1C for IIT at Jammu on October 24, 2021.



Shri Om Birla, Hon'ble Speaker of Lok Sabha lays foundation stone for the construction of Youth Hostel at Kota on December 02, 2021.

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Shri Hardeep Singh Puri, Hon'ble Minister of Housing & Urban Affairs and Petroleum & Natural Gas inaugurates Central Secretariat Building at Naya Raipur, Chhattisgarh on August 27, 2021.





Smt. Nirmala Sitharaman, Hon'ble Union Minister of Finance and Corporate Affairs inaugurates Type-VI Quarters for Income Tax Department at Nungambakkam, Chennai on September 30, 2021.



WELCOMES

Smt. Nirmala Sitharaman, Hon'ble Union Minister of Finance performs bhumi pujan and lays foundation stone for the construction of Income Tax Office Building at Bengaluru on September 05, 2021.





Smt. Nirmala Sitharaman, Hon'ble Union Minister of Finance and Corporate Affairs lays foundation stone for the construction of National Academy of Customs, Indirect Taxes and Narcotics (NACIN) at Palasamudram, Andhra Pradesh on March 05, 2022.





Hon'ble Mr. Justice N V Ramana, Chief Justice of India and Patron-in-Chief, National Legal Services Authority inaugurates NALSA Office at Additional Building Office Complex of Supreme Court of India, New Delhi on November 09, 2021.





Shri Dharmendra Pradhan, Hon'ble Minister of Education and Skill Development & Entrepreneurship inaugurates four buildings i.e. Yagyashala, Auditorium, Computer Lab & e-Classroom for Maharshi Sandipani Rashtriya Vedvidya Pratishthan at Ujjain on May 04, 2022.

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**NIRMAN BHARATI** 

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Shri Dharmendra Pradhan, Hon'ble Minister of Education and Skill Development & Entrepreneurship inaugurates Pandit Deen Dayal Upadhyay Multipurpose Auditorium Hall for Kendriya Vidyalaya at Pandit Deen Dayal Upadhyay Nagar, Uttar Pradesh on December 12, 2021.



Shri Bhupender Yadav, Hon'ble Minister of Labour & Employment inaugurates EPFO Regional Office Building at Chikmagalur on March 12, 2022.



**NIRMAN BHARATI** 

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BHAVISHYA NIDHI BHAVA

Shri Bhupender Yadav, Hon'ble Union Minister of Labour and Employment and Environment, Forest and Climate Change lays foundation stone for the construction of 100 bedded ESIC hospital at Sriperumbudur, Tamil Nadu on May 22, 2022.



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Dr. Mansukh Mandaviya, Hon'ble Union Minister of Health & Family Welfare and Chemicals & Fertilisers lays foundation stone for the construction of School of Public Health for ICMR - National Institute of Epidemiology at Ayyapakkam, Chennai on October 15, 2021.





Shri Ajay Kumar Mishra, Hon'ble Minister of State for Home Affairs lays foundation stone for the construction of 120 Men Barrack for BSF at Keerapakkam, Chennai on May 11, 2022.



Dr. Virendra Kumar, Hon'ble Social Union Minister of Justice and Empowerment lays foundation stone for the of Composite construction Regional Centre for skill development, rehabilitation & empowerment of persons with disability at Rajnandgaon, Chhattisgarh on May 02, 2022.



Shri Ajay Kumar Mishra, Hon'ble Minister of State for Home Affairs inaugurates 180 men Barrack, SO's Mess and Training Block -II for CISF KRTC at Mundali, Cuttack on October 31, 2021.





Shri Nityanand Rai, Hon'ble Minister of State for Home Affairs inaugurates 60 Type II and 32 Type III Quarters, Quarter Guard, SO's Mess, 88 bedded Jawan Barrack and 10 bedded Hospital for 38<sup>th</sup> Bn, SSB at Tawang, Arunachal Pradesh on November 11, 2021.







Shri Nityananda Rai, Hon'ble Minister of State for Home Affairs inaugurates SO's Mess, 60 Men Barrack and Campus for National Disaster Response Force- Regional Response Centre at Kapuluppada, Visakhapatnam on January 21, 2022.



Shri Manoj Sinha, Hon'ble Lieutenant Governor of the Union Territory of Jammu and Kashmir lays foundation stone for the construction of Girls Hostel for NIT at Srinagar on August 14, 2021.



Shri Manohar Lal Khattar, Hon'ble Chief Minister of Haryana and Shri Dharmendra Pradhan, Hon'ble Minister of Education and Skill Development & Entrepreneurship jointly inaugurates IGNOU Regional Centre at Karnal on January 24, 2022.





Shri Pinarayi Vijayan, Hon'ble Chief Minister of Kerala inaugurates Hostel Buildings and Admin cum Academic Building at Kannur University, Kerala on August 16, 2021.





Smt. Sarveen Choudhary, Hon'ble Minister for Social Justice & Empowerment of Himachal Pradesh and Shri Anand Sharma, Hon'ble MP of Rajya Sabha jointly inaugurates Model Old Age Home at Mashobra, Shimla on February 24, 2022.



Shri Jamyang Tsering Namgyal, Hon'ble Member of Parliament Ladakh lays foundation stone for the construction of Double Lane Motorable Bridge (Deskit to Lakjung over Shayok River) at Leh on September 29, 2021.





Shri Vinai Kumar Saxena, Hon'ble Chairman of Khadi and Village Industries Commission inaugurates Multi-Disciplinary Training Centre for KVIC at Barrackpore on February 10, 2022.







Swimming Pool for Indian Coast Guard at Goa.

180 men barrack for Counter Insurgency & Anti- Terrorism School-CRPF at Kalikiri, Andhra Pradesh.





164 Bedded Hostel for AIIMS at Bhubaneswar.



Academic building of Mathematics and Humanities & Social Sciences at IIT Roorkee, Uttarakhand.

Auditorium for IIT Palakkad at Nila campus, Kanjikode.



Office Building for Principal Accountant General of Odisha at Bhubaneswar.



Type V Quarters for AIIMS at Bhubaneswar.



Officers' Institute for BSF-South Bengal Frontier at New Town Rajarhat. Type-II 80 Married Accommodation for Indian Coast Guard at Goa.





Shri Amarnath Yatri Niwas at Ramban, Jammu & Kashmir

Quarter Guard, Canteen and 2 x 180 Men Barracks for CRPF at Group Centre-CRPF, Chandauli.



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Mandakini Hostel for IIT Madras at Chennai.



Equipping Hangar building at HAL Manufacturing Factory, Tumkuru (Karnataka).

Men's Club and SO's Mess for 143 Bn. CRPF at Lamphelpat, Imphal.





4 x 240 Men Barrack for Group Centre, CRPF at Sembo, Ranchi.
# GLIMPSES OF COMPLETED PROJECTS



Office cum Residential Complex for Principal Directorate of Defence Estates at Kolkata.

39 Quarters for CRPF at Peringome, Kannur.





ITBP Campus for 54<sup>th</sup> Bn. of ITBP at Bhalukpong, Assam.

### GLIMPSES OF COMPLETED PROJECTS











Administrative Building and Quarter Guard for Group Centre CRPF at Jamshedpur.



New Parliament Building at New Delhi.

Medical Institute for CAPFIMS at Maidangarhi, New Delhi.





Incubation and Skill Development Centre for Central University of Karnataka at Kalaburagi.



Indian Institute of Technology at Dharwad, Karnataka.



348 Quarters for CRPF at Sambalpur, Odisha.



Academic Building for Indian Institute of Technology at Gandhinagar, Gujarat.



Medical College for AIIMS at Bhopal.

Jawaharlal Nehru Medical College & Hospital at Bhagalpur, Bihar.





100 bedded hospital and Quarters for ESIC at Bhilai, Chhattisgarh.



Research Lab Complex for Indian Institute of Technology at Kanpur, Uttar Pradesh.

Indian Institute of Technology at Palakkad, Kerala.





Indian Institute of Management at Bodhgaya, Bihar.

MoU signed with Hindustan Aeronautics Limited on July 20, 2021 at Bengaluru for infrastructure development of new HAL Helicopter factory at Tumkuru, Karnataka.





MoU signed with UCO Bank on September 01, 2021 for construction of office cum residential building for UCO Bank at Ahmedabad.

MoU signed with NIT Trichy on September 25, 2021 for construction of ICE, EEE, Civil, Production, Mechanical & MME Department Laboratory and 506 bedded Boys Hostel Buildings at NIT Trichy.



MoU signed with Central University of Himachal Pradesh on November 02, 2021 at Dharamshala, Himachal Pradesh for construction of Dharamshala and Dehra campuses of CUHP.





MoU signed with National Institute of Electronics and Information Technology on December 07, 2021 at Shillong for construction of their campus at Shillong.

MoU signed with DMRC on February 28, 2022 at New Delhi for construction of underground METRO services in Central Vista Avenue for connecting Central Secretariat Buildings.



MoU with signed Bhaskaracharya National Institute for Space Applications and Geoinformatics (BISAG-N) on March 04, 2022 Gandhinagar for at construction of their Office Building, Studios and Parking facilities.





MoU signed with National Institute of Technical Teachers Training & Research on March 08, 2022 for construction of their quarters at Chandigarh.

MoU signed with IIT Madras on March 10, 2022 for construction of Research Visitors Guest House for IIT Madras Campus at Chennai.



MoU signed with ICMR on March 11, 2022 at New Delhi for construction of their institutes and health research infrastructure.





MoU signed with Indian Institute of Information Technology, Raichur on March 08, 2022 for construction of various component buildings and allied services in the permanent campus of IIIT Raichur.

MoU signed with Reserve Bank of India on March 16, 2022 for redevelopment of Quarters of RBI at Zoo-Narengi Road, Guwahati.



MoU signed with Auroville Foundation, Tamil Nadu on March 15, 2022 for execution of Projects related to 'Making of Auroville City', Tamil Nadu.





MoU signed with Central University Andhra Pradesh on March 24, 2022 for construction of Central University Phase-I at Andhra Pradesh.

MoU signed with Reserve Bank of India on April 06, 2022 for construction of quarters for RBI at Bhopal.



MoU signed with National Institute of Pharmaceutical Education & Research (NIPER) at New Delhi on April 26, 2022 for construction of their institute buildings at Raibareli, Hajipur and Kolkata.





MoU signed with Hindustan Aeronautics Limited on April 28, 2022 for construction of their Fixed Base Full Mission Simulator (FBFMS) buildings for Jaguar Aircraft at Air Force Station, Jamnagar.

MoU signed with Tata Memorial Centre on May 26, 2022 for construction of Ayurvedic Cancer Hospital for Tata Memorial Centre at Tambati.





Common Central Secretariat Buildings at New Delhi.

Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER) at Karaikal.





Central Library for Indian Institute of Technology at Patna.



Software Technology Park of India (STPI) at Hinjewadi, Pune.

Administrative cum Academic building with Auditorium for International Institute for Population Sciences at Deonar, Mumbai.





OTM for Indian Coast Guard at Worli Mumbai.



300 Bedded ESIC Hospital at Nanda Nagar, Indore.







100 Bedded Hospital for ESIC at Tirupur, Tamil Nadu.



100 Type V Quarters for AlIMS at Jodhpur.

Office Building for Directorate of Revenue Intelligence at Rajarhat, Kolkata.





Office Building for Geological Survey of India at Kolkata.





Engineering Block for NIT Karaikal at Puducherry.





Innovation Centre for IARI at Pusa, New Delhi.

# **NEW e-GOVERNANCE** INITIATIVES

Online Arbitrator Appointment Module launched with the aim to facilitate better information based; transparent & online selection of Arbitrators in CPWD arbitration cases pan India.

'e-NIRMIT (ERP)' & 'Global Housing Technology Challenge' website Link added on CPWD main webpage.

Online module for day to day monitoring and management of providing site infrastructure for installation of PSA liquid oxygen plants in hospitals.

Palpable improvements made in Project Processing & Approval Management Module, Departmental Examination Management & Processing Systems, etc. to make quantum increase and ease in its usage.

Major improvement in APAR module for better user experience.

New Contractor Enlistment Management System module based on 'Rules for Enlistment of Contractors in CPWD 2021' has been launched. CPWD 'Contractor Enlistment Management System' integrated with Invest India's flagship 'National Single Window System (NSWS)' Portal for enlistment of contractors for CPWD works.

Overall Quality Assurance Management System- As per requirement of Standing Committee of Parliament, provision has been made in WBPMS for uploading of inspection reports and their replies by Region/ Sub-Region inspecting authorities. Provision has also been made for uploading of Third Party Quality Assurance inspection reports and their replies.

Provision has been created for entering details in Occupancy Certificate in WBPMS module.

Modifications have been made in the existing Hindi Pranali reporting module in order to enable viewing of quarterly progress report prepared by various Sections under the various Head of the Offices in the CPWD Directorate.

NEW E-governance Initiatives Integration of PPAMS module of CPWD with DUAC/HCC portals has been completed to ensure seamless submission and receipt of required documents including raising and replying the queries.

Modifications made in online examination application DEMPS module.

Following Modules of e-NIRMIT (CPWD)ERP has been launched:

- i. e-Tendering & e-Auction
- ii. Leave Module
- iii. Preliminary & Detailed Estimate Module
- iv. Collaboration Tool

Provision for use of Class III Digital Encryption Certificate has been made mandatory for uploading of tenders by Tender Inviting Authority and by bidders for submission of bids as per STQC & CVC e-procurement security compliance guidelines.

Improvement in Vigilance module as per requirement sent by the Vigilance unit including creating the facility for empanelment of the Enquiry officers and modification in Annual property return statement as per DoPT guidelines.

# SUSTAINABLE DEVELOPMENT ACHIEVEMENTS

CPWD is committed to keeping pace with technological advancement adopting and indigenous, sustainable, energy and efficient green clean technologies in all its construction activities and is spearheading the construction industry in respect of environment friendly construction practices.

CPWD has started its own rating system and the first edition of CPWD Green rating manual was released in 2019. The manual has been revised and updated with respect to the suggestions received and experiences gained. The 2<sup>nd</sup> edition of Green rating manual was released in 2021.



- CPWD has taken firm initiatives for generation of renewable energy in government buildings. Roof Top Solar PV Plants have been made mandatory in all new projects of CPWD. So far, solar plants totalling to 19.37 MW capacity have been installed in 194 government buildings.
- CPWD has taken a significant step towards energy efficiency by implementing replacement of conventional light fittings, fans & ACs with energy efficient fixtures in all its existing buildings. Till date retro-fitment/ replacement has been completed in 550 Government Office buildings resulting in saving of 1674 lakh units cumulatively of electricity and reduction in carbon dioxide emission of 1,50,740 Tons.
- Under India Cooling Action Plan, CPWD has been making sincere efforts to support the cause of reducing carbon footprint by reducing cooling demand in all its existing and upcoming projects through solar passive architecture and green design features.
- All new construction is being done with energy efficient fittings and fixtures. Bureau of Energy Efficiency (BEE) has star rated 37 CPWD Buildings on Energy Efficiency ranging from 2 star to 5 star up to December, 2021.
- To address the problem of depleting ground water resources, CPWD has made it mandatory to install Rain Water Harvesting system and Waste Water Recycling plant in all its major projects. So far over 1100 Rain Water Harvesting Systems have been installed.
- New campuses are being developed by CPWD with zero discharge and zero waste concept.
- To save water, dual piping system has been mandated in all new CPWD projects, wherein wastewater after treatment shall be used in cooling tower, horticulture and flushing.
- Comprehensive outsourcing of maintenance has been adopted, which has been found about 28% more economical than conventional maintenance with work charged staff. It has also increased user's satisfaction level above 95%.
- CPWD is already using C&D waste materials in its works in shape of sand, aggregates, bricks, PCC blocks, Paver Blocks etc. In Delhi, so far, more than 6850 Metric Tons of C&D waste materials have been utilized. This resulted in saving of equal quantity of natural stone and sand, reduction in CO2 emissions by over 137 Metric Tons and saving in water use by 5400 kiloliters.

# **ACCESSIBLE INDIA** ACHIEVEMENTS

Under the 'Sugamya Bharat' Mission, CPWD has undertaken the massive task of making public buildings accessible. Under this mandate, CPWD has completed accessibility works of 211 Buildings of MoHUA. Accessibility works in 808 Buildings of other Ministries have also been completed.



# **AZADI KA AMRIT MAHOTSAV**

On the occasion of 'Azadi Ka Amrit Mahotsay' for commemorating 75th Anniversary of India's Independence, CPWD had a weeklong celebration from 27 September, 2021 to 03 October, 2021 during which CPWD organized webinars on varieties of topics. Plantation and sanitation drive; RWA consultations and health check-up camps were also conducted at 75 different construction sites as well as residential colonies maintained by CPWD:





**NIRMAN BHARATI** 



# **VIGILANCE AWARENESS WEEK**

Shri Shailendra Sharma, Director General, CPWD administering 'Integrity Pledge' to Officers and Staff of CPWD at Nirman Bhawan, New Delhi on October 26, 2021.



A Seminar/Workshop was organised on October 27, 2021 in Nirman Bhawan. It was graced by Shri Durga Shanker Mishra, Former Secretary MoHUA, Shri Pratyush Sinha, Former CVC, Shri Shailendra Sharma, Director General, CPWD and other senior officers of Vigilance Unit of MoHUA, NBCC, HUDCO and CPWD.



**NIRMAN BHARATI** 

# **CONSTITUTION DAY**

Officers of CPWD reading the preamble on November 26,2021 along with the Hon'ble President of India during the live telecast of the event.



# **100 DAYS COUNTDOWN TO INTERNATIONAL YOGA DAY**

'Common Yoga Protocol' was organised by Ministries of Petroleum & Natural Gas and Housing & Urban Affairs on May 03, 2022. Shri Hardeep Singh Puri, Hon'ble Minister of Housing & Urban Affairs and Petroleum & Natural Gas virtually led the online 'Yoga Workshop' on May 03, 2022.

All Project Regions and Field Regions headed by Special Director Generals / Additional Director Generals of CPWD as well as Zone and Circle under field Regions headed by Chief Engineer and Superintending Engineer organised Yoga related events at their respective places. Yoga was practiced and performed by around 1,400 officers and staff of CPWD along with families at more than 35 location all over the country.





**NIRMAN BHARATI** 

# **REPUBLIC DAY CELEBRATION 2022**

CPWD made excellent arrangements for Republic Day Celebration-2022 on January 26, 2022 at Rajpath, New Delhi well in time despite many challenges. A tableau of CPWD on the theme 'Tribute to the martyrs of the Indian National Army (INA) led by Netaji Subhas Chandra Bose' crafted with variety of colourful and fragrant natural flowers was showcased on the occasion and it won Special Prize for the 15<sup>th</sup> consecutive year.









CPWD in collaboration with CIDC conducted 'Skill Development Training' to 180 unskilled horticulture workers at Parliament House Complex, North Avenue from October 2021 to March - 2022. Shri Siddharth Mahajan (IAS), Joint Secretary, Parliament House distributed certificates to the skilled horticulture workers on completion of their training on May 10, 2022.







# e-NIRMIT : THE CPWD ERP GOING DIGITAL - FOR ORGANIZATIONAL CHANGE

Manu Amitabh, Dy. Director General | Devendra Kr. Sachan, Director

In today's connected world, digital data has become very important - not just for information inputs for aiding our decision-making but also for vastly improving the efficiency and effectiveness of our operations through technologies like artificial intelligence and machine learning. Realizing how important digital data has become in governance, the NITI Aayog has published a series of policy papers, reports, guidelines on data management and analysis, and on frontier technologies with the overall aim to position India as a global leader in the inclusive use of emerging technologies and making such technologies part of the mainstream reform agenda of the country for solving real-life problems across departments.

The use of such technologies will get a tremendous boost with the upcoming 5G network in India, which the government is pushing hard. 5G will enable access to high content video, audio as well as mega data on the move in the remotest corners of India.

We, as an engineering department, have to take advantage of the emerging technologies which 5G will enable such as Internet of Things, cloud computing, big data, machine learning, artificial intelligence, augmented reality etc and improve our projects and maintenance delivery. CPWD, under the guidance of MoHUA, has taken the initiative to migrate its entire operations to a cloud-based ERP so that such technologies can be leveraged for improved delivery of all projects and enhanced client satisfaction in our maintenance operations.



The proposed ERP application – e-NIRMIT - will take CPWD to a seamless working environment wherein all ERP modules, existing IT applications along

with all required Central Govt. applications/ portals like PFMS, Bhavishya, ERS, OCMS, PGMS, LIMBS, CPWD e-SEWA, Pragati etc. would operate completely in sync. The ERP solution would allow highly accurate and dynamic project monitoring and control along with risk alerts related to any project.



<u>Nation-wide</u> Intelligent <u>Resource</u> <u>Management</u> with Information <u>T</u>echnology



Apart from the foundational ERP IT, the application will allow in-process on-line data capture from the vast operations of CPWD, E&M and construction equipment through Internet of Things (IOT) Supervisory instrumentation, Control and Data Acquisition (SCADA), Building Information Modelling (BIM), Buildina Management (BMS), System visual imagery equipment installed at worksites and mobile/smart phonebased applications used by site engineers.

This data will be used not only for analytics for tasks such as preventive maintenance, breakdown analysis, real-time progress monitoring and control for projects spread over each corner of the country, but also for machine learning algorithms to aid decision-making in



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Applications which are Live: 2

- e-Tendering and e-Auction portal
- Leave Management System
- e-NIRMIT Implementation Website
- Work Life Cycle management (WLCM):
- Preliminary Estimate
- Detailed Estimate
- Collaboration tool
- Learning Management System (LMS)

real-time, improvement of efficiency in deployment of resources, early-alerts for worker safety at site and better quality assurance in its works using artificial intelligence.

E-Office The ERP will integrate all CPWD stakeholders such consultants, contractors, as vendors, clients, arbitrators, officials, project managers etc into a seamless cloud based environment for improving efficiency,

eliminating time and cost over-runs of projects and works, cutting wastage and improving client satisfaction.

The ERP implementation in CPWD has picked up after the initial setback due to Covid. The e-Tendering and e-Auction Applications certified by Standardisation Testing and Qualtity Certifricate (STQC) have been made

> Go-Live. Over 8500 tenders have been uploaded and over 4000 tenders have been opened on the applications. The initial versions of Project Collaboration Portal (common for Engineers, Architects, Consultants and Contractors), Learning Management System, Preliminary Estimate/ Detailed Estimate Applications, Leave Management Application, e-NIRMIT Implementation Website, Person to Position Mapping Tool have been made "go live".

Over 8000 users are logged in and using the Leave Management System. Over 1200 Users are using the Collaboration Portal and over 1700 users are using the PE/ DE Module. Almost 260 Training Courses/ Seminars have been created using the Learning Management System and almost 4500 Users are Logged in and using the same.

As preparatory work for implementation of ERP, Digitization of 17,500 Employees Service Books, configuration of: 8,000 items of CPWD DSR/PAR / DAR, 5962 Cost Centers (All field level CEs, SEs, EEs, AEs, JEs Service Centres and Pay & Account Offices) 763 Plant Offices (Offices authorized to procure Goods & Services) and details of 1,50,000 Quarters have been completed.





*e-NIRMIT Clinic at Nirman Bhawan* Premises details and 1,000 Service Centers have been configured on ERP - SAP.

Profile Data of 20,550 Contractors / Bidders have been Transferred to ERP. Person to Position Mapping for over 16000 employees has been completed. Around 3000 Bidders and 2000 departmental users have been trained on e-Tendering/ e-Auction Applications and another 5000 users on other modules. Close to 100 Training Resource Objects such as Videos, SoPs, Manuals, Tutorials on ERP are available on the e-NIRMIT Implementation Website (e-Nirmit. cpwd.gov.in)

#### **Applications Under UAT:**

- Cost Index
- Occupation of Premises (Flexible Real Estate Management)
- Transfer / Posting
- Joining / Reliving
- Budget Distribution Application
- REFX Inventory Data Collection Forms

#### USER ACCEPTANCE TESTING User



User Acceptance Testing of Cost Index Application, Transfer/ Posting Application, Budget Distribution Application, Real Estate Functions is in progress. Applications for

Analysis of Rates, Site Registers, EoT Register, and ERP intra-Departmental Communication Portal have been made ready for User Acceptance Testing. In the coming weeks, more applications on works and contract management will be released including login portal for contractors and clients.

Both the MoHUA as well as the Department are seeing e-NIRMIT as an opportunity for organizational change in CPWD and as a tool for its cultural transformation. We have a rich legacy of successful service to the nation for 168 years. We have to ensure that the adoption of new technology not only changes the way we conduct our routine business but also helps us use our immense organizational learning for the benefit of the society and the nation at large

Because of its very nature, ERP implementation has to be top driven. The commitment of top leadership in the Department is the most important criteria for the success of ERP implementation. e-NIRMIT, the CPWD ERP will be a unique customized mix and integration of both open source and Commercial off the Shelf (COTS) based solution to fulfill its IT requirements. Implementation of a compressive ERP application for CPWD will rejuvenate CPWD by unlocking its latent productivity and efficiency.

It will be an important step in realizing our Hon'ble Prime Minister's dream of a digital India and serve as a lighthouse ERP Project for the entire Public Works ecosystem of the country to emulate. This project has the potential of completely overhauling and rejuvenating the

> Public Works administration in our country by providing real time information for decision and control.

CPWD will continue to play its stellar role in building a "New India" as it has been doing since the past 168 years - now using IT as a strategic tool.



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**NIRMAN BHARATI** 



### **PRADHANMANTRI SANGRAHALAYA**

(The Journey of Independent India)

#### Teen Murti Project Team, New Delhi

In March 2018, the Government of India decided to set up a Museum on Prime Ministers of India in the premises of Teen Murti Estate, New Delhi. The vision was to set-up an interpretive and engaging museum deploying relevant learning tools to trace the political & personal journey of the Prime Ministers of India, emphasizing on their responsible leaderships and service to the nation with the vital objective of preserving the legacy of their life, thoughts & works by educating & inspiring the people of India.

CPWD was entrusted with the job of construction of the new museum building and external development works in the premises. Execution of the work of content display and technology was entrusted to Nehru Memorial Museum and Library (NMML), an autonomous body funded by Ministry of Culture.

To render a unique architectural design to the building, a design competition for selection of the concept design was conducted by CPWD in July' 2018 in which the concept design of M/s Sikka Associates Architects, Delhi was declared winner. The project was then implemented by Teen Murti Project Circle under Project Region, Delhi. The execution of the project took 34 months, from February' 2019 to November' 2021. The total cost of the building and external development works is Rs 150 crore (Approx).

#### **Design Philosophy:**

The architectural design of the building has been inspired by the story of Arising India, shaped and moulded over the years at the hands of its leaders, as in a potter's wheel.

The front façade of the museum has been composed to appear

as layered shells representing the hands of

our leaders with the 'Dharmachakra of 360 degrees having 24 spokes' placed right at the centre, symbolic of all round development and continuous unstoppable progress.

The new museum building has been strategically aligned and integrated with the existing Nehru Museum to pay respect to its contextually rich heritage. The new museum building complex has been developed in the midst of the 25 acres of Teen Murti Estate with large lawns and trees. The existing trees on the site have been retained and made part of the design of the building complex.



#### Building Details and Structure/ Envelope:

The museum with total built-up area of 10491 sqm is spread over three floors - Lower Ground Floor, Ground Floor and First Floor, accommodating around 43 display areas/ galleries showcasing the contribution of all former Prime Ministers of India. The service buildings/structures, namely, HVAC plant room, Sub-station and Underground Tank/Plant room, of total built-up area 1,235 sqm have been built away from the main museum building so as not to infringe with the main building in any manner whatsoever.

A composite structural arrangement consisting of 600 mm thick Diaphragm Wall and 200 mm thick skin wall on the inner (building) face of the diaphragm wall has been constructed along the periphery of the Lower Ground Floor.

The central façade of the building emerges out from the sunken courtyard. There are three main circular galleries on each floor in the central part

of the building, each gallery inter-connected through spiral ramps. The layered shell structure for the Central Composite Roofing cum Façade System of the building has been constructed by using Yst 310 grade steel. The steel structure has been clad with Zinc Titanium panels. The three different shades of Zinc Titanium cladding have been used in the roofing cum façade system to achieve sophistication in the composition of elevation.



Digitally controlled theme based façade lighting has been provided in the roofing cum façade system.

The external walls of the building other than central shell structure are clad in rosewood sandstone with bands of quartz stone towards the base of the walls. Perforated Zinc Titanium panels have also been fixed on the stone cladding to further enhance the elevation and break the monotony of the stone cladding.





#### **Interior Finishes and Details:**

Epoxy based terrazzo seamless flooring has been provided in all the galleries and circulation area.

There are three grand open staircases having 100 mm thick rose wood stone treads and three escalators connecting the floors one above the other. Large array ceiling panels consisting of

sheets of stretch fabric lit from inside by LED strips have been provided in open staircases and main circulation areas.



Toilets in the building are equipped with modern and sophisticated sanitary fixtures.



#### **Electrical & Mechanical Services:**

The building is equipped with centralized HVAC system with VFD controlled AHUs and Building Management System (BMS). The entire indoor lighting, AHUs and addressable type Fire Alarm System are controlled through BMS. Other E&M services such as Sub-stations, Electrical Distribution Panels, DG sets and Lifts are monitored through BMS. Seamless Wi-Fi networking system has also been provided in the entire building for operation of Audio-Guide system. The entire building complex has been provided with centralized CCTV monitoring system.

#### **Accessibility Details:**

Entry to the building for visitors is through Lower Ground Floor via two open staircases and a ramp between them. Five lifts (3 - 26 P + 2 - 16 P) and 6 fire exit staircases have been provided in the building. The building has been made fully accessible for differently abled persons in compliance with accessibility norms.

The entire project was conceived and constructed keeping principles of sustainability and environment friendliness in mind.

The museum building after its completion and commissioning has been named 'Pradhanmantri Sangrahalaya'. Our Hon'ble Prime Minister Shri Narendra Damodardas Modi Ji dedicated 'Pradhanmantri Sangrahalaya' to the People of India on 14th April, 2022.



**NIRMAN BHARATI** 

# PUDUCHERRY'S BAZAAR POST OFFICE: A CONSTRUCTION TURNAROUND BY CPWD

**C K Varma,** Additional Director General

Abhishek Gopal, Executive Engineer

#### Introduction

In one of the uncommon instances, CPWD undertook the construction activity of a Government Organisation which has its own dedicated engineering wing. The fact that it was done with the satisfaction of the Department of Post is in itself an accomplishment particularly when this task was carried out in a very congested area in a busy market and with new technology of construction. Many challenges appeared



Figure 1: The old Post Office Building



Figure 2: function The New Post Office Building private

durina the construction and pre construction phase but the final outcome taken has away the tense moments and bitter memories and replaced them with the feeling of great sense of satisfaction and achievement.

It is the saga of CPWD's ingenuity in handling challenging tasks with finesse. Various challenges faced during the construction have now become the edifice of strength of CPWD.

#### Historical Perspective

The building in which the post office was functioning was a private property, bought by Department of Post. It was 150 years old lime concrete structure. Located in the busy Bazar area called JN Street adjacent to original French township, Tamil Nadu Circle of Postal Department had decided to reconstruct the building as it was not able to fulfil the present day requirements of ever growing Central Business District of Puducherry. Further, the entire building was not trustworthy from structural integrity point of view.

One of the first written communications of this unusual alliance of department of post and CPWD traceable was dated Feb14, 2012. The MoU was finally signed in Jan 2017 between Dept. of post and CPWD. Due to a host of factors, final Revised AA&ES was received for Rs. 6.45 Cr in Nov 2018 over Rs. 3.21 Cr of March 2013 and stage was set for demolition and reconstruction of old building.

# Challenges Involved in undertaking the construction Activity

A series of challenges waiting in the background came to the fore, once decision of reconstruction was undertaken by CPWD. The entire area was to be utilised for building construction as per the concept drawing received from the architectural unit of Postal Department. The available plot size after demolition of the existing structure was very narrow i.e. 6mx50m to be precise. Not only this, but just 6m space was available between main road and the plot while the main street adjacent to the site was just 7m wide and rear side street was only 4.5m wide. This unusual size and situation of the plot posed a challenge for carrying out the construction activity with so many constraints like what conditions to be put in the NIT to fulfil site constraints in the best possible ways and so on and on. The Geotechnical investigation also suggested a very typical situation. The bearing capacity of the soil was not very good and needed to be replaced by the raft foundation supported on piles.

Further, Department of post desired to preserve the old wooden/steel frames etc. retrieved during demolition of the old building having historical/heritage value. A joint inspection was done with Department of post and a detailed list of 97 such items was identified which postal department wished to preserve. The list was curtailed down to 15 after an internal discussion within the postal department. A condition needed to be incorporated therefore in the NIT to demolish the existing structure by retaining the preserved items and handing over to the postal Department.

#### Dilemma concerning New versus Old Technology

The new construction technology circular in April 2017 from the Directorate required that all works should incorporate the use of new technologies. It was a follow up of the MoHUA's directive to implement new technologies for rapid construction along with ensuring best quality.

Prefab technology used in one of the recent construction works undertaken by CPWD unit experienced the benefits of prefab construction Factory casted immensely. RCC panels assembled at site caused less chaos at site with improved quality of construction. It has also saved precious time spent during conventional cast in situ construction. Though, such methodology has extensively been used in metro construction and bridges, its use in building construction have just recently been gaining popularity. The proposal of prefab construction assured quality and speed, but the bigger question still loomed large was how to go ahead with erecting the building in a narrow, congested and crowded space. A thorough field visit was organised for the erection team and despite the challenges, they came up with a reasonable erection plan. Detailed discussion was carried out regarding the maximum weight of each building element to be lifted and accordingly, maximum capacity of crane that was required was assessed.

#### **Fulfilment of Construction Regulations**

Setback, accessible India and latest fire norms are some of very important regulations to be fulfilled while undertaking any construction project by CPWD, considering safety and

universal accessibility policies of Government of India. These were fulfilled here also in the most agreeable manner. The proposed building was more than 15m high. Although local body approval was obtained, it was thought prudent to clarify the setback requirements and the lift size once again. For more than 15m height, the setback required was 6m as per Puducherry planning authority (PPA) norms. However, the plot itself was 6m wide and in the drawing there was no setback. On enquiry it was clarified that in JN street region of Puducherry, PPA norms do not require setback provisions. With respect to lift, it was again clarified with postal department that although AIC norms required 13 passenger lift for wheelchair movement while there's a provision of only 6 passengers lift. The postal department clarified in Nov 2019 that they can only provide 6 passenger lift due to severe space constraints and as a result all public activities will be limited to ground floor only. Similarly, a detailed list of fire norms were obtained from fire department as NBC 2016 had come into force by then and it had a set of fairly stringent fire norms for compliance.

#### **Call of Tender**

The NIT was finalised in Dec 2019 considering all the constraints & regulations as far as possible and it was decided to be called in EPC mode to keep the designing in the contractor's scope after the concept was finalised and frozen. It was more than desirable for bringing homogeneity in building design and synchronised erection sequence. March 2020 was the month in which the work was awarded. This month is historical due to imposition of nationwide lockdown on account of Corona.

#### **Construction Challenges**

#### Passing the litmus test of Corona & Nivar

The construction faced two big challenges in the form of Natural disaster & calamity right in the beginning and within a year thereafter. When the work was to begin, nationwide lockdown was imposed just four days after the scheduled start of the work to contain the spread of deadly corona virus.

After easing out of restrictions owing to corona, the demolition work was slowly started. The legacy items as identified were duly handed
over to the postal department. When the site clearance was done, the piling work was commenced and completed. It was now time to start the earthwork for pile cap. At that point of time, it was discovered that the neighbouring buildings had no recognisable foundation. As the pile cap was all the way to the property line, any excavation was ruled out. The earth was removed only till that depth where the founding levels of the adjacent buildings are not exposed. There was a minor redesign of the foundation and redesigning of the space for UG sump (Despite all the challenges, there are two UG sumps).

In November 2020, IMD forecasted that Nivar cyclone would be hitting Puducherry and nearby areas. The site being just one km from the coast line, left all concerned deeply disturbed since the pile cap was yet to be finished. As a preventive safety measure, discussions were held with the occupants of the adjacent buildings to apprise them of the various possibilities. The balance pile cap was completed on top priority and some filling was also done on sides as a precautionary measure to ensure that foundation of adjacent buildings is not exposed. In the night of 27th of Nov when the cyclone hit the main land, there was absolutely no damage to the adjacent buildings in any manner.

#### The site constraints



Figure 3: The narrow JN Street

Figure 4: Narrow Spacing

Another major challenge was in the form of site constraints. The work was to be carried out in a very congested place which was predominantly



Figure 5: Trailor Restrictions Figure 6: Projected Crane Parking

a Bazar area with narrow streets on front as well as back. The foremost effect of this situation was reversal of working hours i.e. from 11 pm to 5 am instead of usual timings i.e. from 9am to 6pm. Not only this, but the neighbouring buildings were functional and any damage during demolition of the existing structure had to be taken care of to avoid any dispute from the neighbourhood.

The narrow streets bring with them their own set of challenges. The positioning of crane, storage of building materials, working space etc. all was affected. Concreting, which is a major activity in any construction project was quite challenging due to lack of movement space for transit mixer. This was further compounded by the fact that there was no space for storing materials. A mix of different types of constructions without any recognisable structural and foundation system with height going up to three stories left the construction team truly at their wits end. A few glimpses of the difficulties encountered at site will complete the picture narrated above.

#### The Finishing Touches

After the second corona wave subsided in July 2021, it was time for carrying out the finishing of the erected structure. Due to storage space shortage and sequential nature of many finishing activities, the work took more time than that of a comparative site with open setbacks. The drawings prepared by the architects of

postal department were used after a series of discussions with them for the finishing activities of structure as per their requirements. The work was finally completed in Nov 2021. Numerous inspections have been done since then by the postal department for taking over the building. However, the final challenge still remains. The Puducherry Electricity Department had agreed to give the LT supply from the existing transformer initially.

Nevertheless, it is a treat to see the erected and finished structure as exhibited above.

#### Lessons Learnt & Conclusion

The synergy required between two entities should be of highest level for fulfilling the

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department as well as to resolve the challenges faced by

entity. The success of timely and quality construction entirely depends on intense collaboration

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Figure 7: Erected Structure necessity.

Many such challenging works have been undertaken by CPWD in the past and will be undertaken in the future as well, because CPWD has vast expertise and processes to deal with such type of works. Their chronological documentation can be a real treasure for providing learning ground for engineers entering the Department and a lesson in the project management. Small buildings often present the biggest of challenges. The seemingly small work of mere Rs.6.57 crores in an even smallest site in the smaller UT of Puducherry had a host of lessons in it all the way from first client interaction to the completion over a span of 10 years. Operation of CSSA head, the benefits of prefab technology and above all continued collaboration between postal department and CPWD are some of the obvious outcomes. The 150 year old crumbling building replaced by the state-of-art prefab structure is a visual treat. The 10 year journey concept to completion from despite innumerable challenges can be viewed as lessons not only in engineering domain but in philosophical parlance as well i.e. "keep going come what may and the challenges will ultimately dissolve with shining success".



Figure 8: Finished Structure

#### Acknowledgement

The then SDG(SR) Shri P K Singh who helped in breaking the deadlock of Head of Account issue on one time basis, as initial deposit accepted from Postal Department was objected by PAO.

Postal Department for their vision to modernise their infrastructure and continuous interaction with the executing team to resolve various site issues.

Team CPWD Puducherry who has resolved the issues cropped up during the course of construction under the guidance of ADG (RC).

The Agency for its determination to complete the work despite two Natural Calamities and many site constraints.

# USE OF FAR UV-C (ULTRAVIOLET) LIGHT: DEVELOPMENT OF U.V. STERILIZATION CHAMBER FOR STERILIZING COVID-19 VIRUSES.

T S Vivekananda, Additional Director General

**B S REDDY**, Superintending Engineer

#### 1. Introduction:

Airborne-mediated microbial diseases such as influenza and tuberculosis represent major public health challenges. A direct approach to prevent transmission is inactivation of these pathogens, and the antimicrobial potential of UVC (Ultraviolet) light has long been established.

However, its widespread use in public settings is limited because conventional UVC light sources are both carcinogenic and cataractogenic. By contrast, far-UVC light (207-222 nm) efficiently inactivates bacteria and viruses without harm to exposed mammalian skin. This is because, due to its strong absorbance in biological materials, far-UVC light cannot penetrate even the outer (non-living) layers of human skin or eyes. However, because bacteria and viruses are of micrometer or smaller dimensions, far-UVC can penetrate and inactivate them. Far-UVC efficiently inactivates airborne aerosolized viruses, with a very low dose of 2mJ/cm2 of 222-nm light inactivating SARS group of viruses. Continuous very low dose-rate far-UVC light in indoor public locations is a promising, safe

and inexpensive tool to reduce the spread of airborne-mediated microbial diseases.

Keeping this in view, a UV Sterilization chamber using Philips UVC Lamps 15 W has been developed. This UV Sterilization chamber is a self-contained unit designed to sterilize the files, documents, cloth, covers, glass articles and other items used in day to day operations. The UV light rays kill the viruses, bacterial and fungi in extreme short period of time with appropriate UV dose.

#### 2. Background:

Ultraviolet (UV) is that part of electromagnetic light bounded by the lower wavelength extreme of the visible spectrum and the X-ray radiation band. The spectral range of UV light is, by definition between 100 and 400 nm and is invisible to human eyes. Using the CIE classification the UV spectrum is subdivided into three bands.

- UVA (long-wave) from 315 to 400 nm
- UVB (medium-wave) from 280 to 315 nm
- UVC (short-wave) from 100 to 280 nm



A strong germicidal effect is provided by the Light in the short-wave UVC band which damages the DNA.

The most efficient source for generating UVC is the low-pressure mercury discharge lamp, where on average 35% of input watts is converted to UVC watts. The radiation is generated almost exclusively at 254 nm viz. at 85% of the maximum germicidal effect. Low pressure tubular fluorescent ultraviolet (TUV) lamps have an envelope of special glass that filters out ozone-forming radiation, in this case the 185 nm mercury line.

This UV light emitted by a source is expressed in Watts (W) and the irradiation density is expressed in watts per square meter (W/M2). For germicidal action, proper dose is important. The dose is the irradiation density multiplied by the time (t) in seconds and expressed in Joules per square Centi-meter (J/Cm2).

According to an article published in 'The Nature', an international Scientific Journal published in February 2018, the data analysis for exposure of UV radiation on the microorganisms is as below:

Virus:	mJ/Cm2	Fraction of Survival
Hepatitis A	73	0.032
Influenza virus	36	0.064
MS-2 Coliphase	186	0.012
Polio Virus	58	0.040
Rotavirus	81	0.028

#### 3. Data Analysis:

The surviving fraction (S) of the virus after exposure to UV radiation was calculated according to the equation:





Where k is the UV inactivation rate constant or susceptibility factor (cm2/mJ), D is the virus inactivation cross section.

#### 4. UV Sterilization Chamber:

Keeping this in view, a UV Sterilization chamber using Philips UVC Lamps 15 W has been developed in house. This UV Sterilization chamber is a self-contained unit designed to sterilize the files, documents, cloth, covers, glass articles and other items used in day to day operations. The UV light rays kill the viruses, bacterial and fungi in extreme short period of time with appropriate UV-C dose. But, when exposed, erythema (reddening of the skin) and conjunctivitis can, also be caused by this form of Light. Because of this, when germicidal UV-Light lamps are used, it is important to design systems to prevent UVC leakage and so avoid these effects.

#### 4.1 Built:

The built of the UV sanitization box comprises of a stainless-steel metal enclosure of double shell, using 7 Nos. 15 Watts Philips TUV lamps, the stainless steel material has

been used for the purpose of better hygiene as well as maintaining minimum reflectance



within the enclosure. The TUV lamps are well protected within the enclosures between the double shelves and also shrouded by quartz glass for ease of day to day maintenance. If bare TUV lamps are used, the dust formed on them will reduce the radiance of the UV light. Hence, suitable quartz glass cover has been used to protect them as well as ease of maintenance.

On the front cover, apart from the usual operation instructions, an adjustable timer has been provided with a default setting of 30 seconds. The adjustable timer can be increased in case of usage of the same box for other viruses like Ebola virus etc. which may take slightly more time. Apart from this a trick counter has also been provided to allow the user / replacement of the TUV lamps after their recommended life of 20,000 hours. A safety interlock has also been provided so as to shut off the lamps in case front door cover is opened accidentally during the operation cycle, in order to avoid unwanted exposure to the UVC radiation. The dimensions of the box can accommodate an object of 45 cm x 45 cm x 45 cm for surface infection all-round in one go.

#### 4.2 Advantages:

The advantages of this chamber are as below:

- 1. Disinfection & decontamination from SARS Covid-19 Virus within 30 Seconds.
- 2. All round 360° disinfection in one go.

- 3. Prevents surface to human transmission.
- 4. Chemical free process
- 5. Ease of use
- 6. Auto cut-off for Safety.
- 7. Safe, Reliable& Quick.
- 8. Useful for disinfection of office papers, DAK Covers, Articles both Commercial, Domestic and official.

## 4.3 Testing:

Developed equipment has been tested in a BSL-III Laboratory at ESIC Hospital-cum-Medical College at Sanath Nagar, Hyderabad by placing live Covid viruses in the box. The data of testing is published as below:

Exposure time to UV-C	Gene	Materials used for surface sanitisation				
radiation in the chamber	detected	Glass Slide	Plastic cover	Paper	Cloth (cotton)	
10 seconds	E gene	Detected at 35.58	Detected at 35.42	Detected at 35.6	Detected at 35.21	
	ORF gene	Not detected	Detected at 37.08	Not detected	Detected at 34.91	
20 seconds	E gene	Not detected	Detected at 35.58	Detected at 37.27	Detected at 35.82	
	ORF gene	Detected at 35.57	Not detected	Detected at 35.66	Not detected	
30 seconds	E gene	Not detected	Not detected	Not detected	Not detected	
	ORF gene	Not detected	Not detected	Not detected	Not detected	

## 5. Conclusion:-

In general, the spread of the Covid-19 is attributed not only to air-borne properties, but also through contact by carrying the infected articles or by touch. Though many similar products are available in the market, majority of them are either not tested and certified or their processing times are very huge from 3 to 5 minutes. Therefore, an effort has been made to develop a multi-utility disinfection chamber in the shortest possible time of 30 seconds (which incidentally, is one of the fastest Covid disinfection boxes in the world) with all-round disinfection for the use by commercial as well as office establishments at large by using near Far-UVC lamps with due certification and validation.

## 6. References:

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## **COMMON CENTRAL SECRETARIAT**

#### Gopal Varshney, Chief Engineer

### **A Brief History**

The Central Vista was designed to be the administrative centre for India. Drawings done by the Architects of Central Vista - Edwin Lutyens and Herbet Baker - show that the area was originally imagined with administrative buildings on either side of King's Way (now Rajpath) in a symmetrical layout. These buildings had internal courtyards and were to be the "living centre of administration" - meant to house all the administrative offices of the Government of British India. This design was never fully realized and only the North and South Blocks were built as administrative offices at the time.

Post-Independence, the imperial buildings were unhesitatingly appropriated by the people of India as the seat of their government. The most important Ministries of the government were housed in the North and South blocks. Due to a rapidly growing population and changes in governance, these buildings were soon packed to capacity and stressed for space. In response, more buildings (the Bhavans) were built along Rajpath to accommodate the immediate pressing needs for office space.

#### **Central Secretariat Today**

Today, the North and South blocks, and the various bhavans along the Rajpath house the administrative offices of the Government of India. These buildings, however, accommodate only twenty-two out of fifty-one Ministries of the Government and a considerable sum is spent annually on rented spaces outside the Central Vista for the rest. In some cases, the same Ministry offices are split between different buildings - at Central Vista and outside of it. This hampers the efficiency of administration and increases operational costs and energy usage.

Moreover, with growing occupancy and rapid technological advancements, the administrative buildings themselves became cramped, difficult to maintain, expensive to operate and environmentally unsustainable. In these buildings, the quality of office spaces became inconducive to efficient working. The existing buildings also make very inefficient use of land. Some military barracks (hutments), originally built as temporary structures during World War II, continue to be used as repurposed offices. These are spread across approximately 90 acres of precious land in the heart of New Delhi.

#### **Common Central Secretariat**

The proposed Common Central Secretariat consolidates all the Ministries at the Central Vista and provides modern, efficient and flexible workspaces with state-of-the-art infrastructure and facilities to improve productivity and efficiency of Government administration. The layout comprises of 10 office buildings and a Central Conference Centre. All buildings will be connected by an underground loop Metro for connectivity to each other and to the existing Blue & Yellow Line at Central Secretariat Metro Station and by an overground shuttle to the city's bus network, making the Central Secretariat a fully transit-oriented development.

These buildings will house office facilities for all the Ministries, and subordinate and attached offices of the Government of India. The office buildings follow a clear and rational scheme of planning. Work halls are open-plan spaces that overlook a central courtyard and other office spaces are located along the periphery.

At the four corners of the rectangular plan are cores – incorporating building services and amenities such as creche, toilets, gymnasiums etc. Facilities such as cafés are located on the ground floors and spill over into the shaded courtyard in the form of outdoor seating.

The design also proposes a Central Conference Centre as a part of the layout. This facility will provide centralized conferencing and meeting areas for larger gatherings – reducing unnecessary delays, costs, and emissions due to travel.

The new development is designed with green building features such as maximising natural light inside the building, integrated air-conditioning for each building, rainwater harvesting systems,

consolidated plumbing systems designed as independent components and Integrated Building Management System (IBMS).

The buildings of the Common Central Secretariat are respectful in material and form to the historic buildings of the Central Vista, including the North and South blocks and the present Parliament building. The two-tone sandstone on the exterior facades complements the historic context, while the facades facing the courtyard make use of modern materials to maximise efficiency and natural sunlight. All the buildings at the Central Vista are designed to be mindful of the Vista's original layout and the public nature of the central space. The Common Central Secretariat is planned to ensure that it does not hamper public spaces along the Central Vista; the height of the buildings does not exceed that of the India Gate; and the buildings do not hamper the view from Rajpath.

The tenders for first 3 CCS buildings having a total built up area of 4,46,954 sqm with 2 basements+G+7 floors have been awarded to M/s Larsen and Toubro Ltd. amounting to Rs. 3,142 Cr. with date of completion as January 2024. The upcoming 3 CCS buildings on completion will be housing ministries currently located in Nirman Bhawan, Udyog Bhawan, Shastri Bhawan and Krishi Bhawan along with all their subordinate departments, attached offices etc. with an approx. strength of around 18,000 employees, i.e., 6,000 employees per CCS building. The buildings have 2 common huge basements housing all services viz substation, HVAC plant, STP, WTP, solid waste management, firefighting systems with water

tanks for entire building. The basement will also provide parking facilities for 1,864 four wheelers & 1,382 two-wheeler along with provision for charging of EV vehicles. The buildings are fully air conditioned with access control systems, BMS controlled services along with facilities like gym, creche, yoga, music room, centralized café, multipurpose hall etc.



Figure 1: A drawing of the Central Vista as proposed by the architects Lutyens and Baker.



Figure 2: People at the North and South Blocks on August 15th, 1947.



Figure 3: Existing land-use pattern at Central Vista.



## **DEVELOPMENT/RE-DEVELOPENT OF CENTRAL VISTA AVENUE**

#### Gopal Varshney, Chief Engineer

The Central Vista Avenue - the three-kilometerlong stretch connecting Rashtrapati Bhavan to India Gate is a much loved and precious public space for the people of Delhi as well as for tourists. Located at the heart of our capital, the Avenue is a symbol of our vibrant democracy - a space for all. The Avenue comprises the central road called Rajpath flanked by 70 m wide lawns on both sides, water canals, and rows of trees.

The Avenue was originally designed as a grand processional route to the Viceroy's House (now Rashtrapati Bhavan). After independence, as Indians appropriated imperial spaces and made them their own, King's way became Rajpath and Queen's way became Janpath, Central Vista Avenue became a civic garden and the site for important National Events. The most important of these being the Republic Day Parade.

The Avenue – originally intended as a royal processional axis – was not designed for heavy public use. Over the years, various parts of the Avenue such as the canals, the lawns, Rajpath, and the Avenue's flora, had fallen into dilapidation and disrepair. Central Vista Avenue came under much stress and the inadequate civic facilities like walk ways, street furniture, vending zones, proper lighting, parking and toilets etc. necessitated the re-development.

Additionally, while the Avenue has been the venue for the annual Republic Day Parade since 1951, the event still relied upon make-shift measures for its infrastructural needs. Ad-hoc arrangements and temporary infrastructure that had to be installed and dismantled every year such as make-shift bridges over the canals, temporary parking, and extemporaneous seating and electro-acoustic arrangements for Republic Day Parade, were insufficient, disruptive, and damaging to the landscape of the Avenue.

As a part of the comprehensive Central Vista Redevelopment Project, the government resolved to address this by refurbishing and improving the Avenue and addressing its various needs. The objectives of the Central Vista Avenue refurbishment project are to:

- 1. Refurbish, strengthen and restore the Avenue's landscape.
- 2. Provide amenities that make the Avenue comfortable for civic users and tourists.
- 3. Make the Avenue more pedestrian friendly and easier for traffic to negotiate through.
- 4. Provide adequate space and facilities for vendors.
- 5. Ensure that arrangements for national events cause minimal disruption.
- 6. Ensure integrity and continuity of the Avenue's original design.

These objectives have been met through the following design strategies:

- 1. Historic chain links and 79 light poles along the Rajpath have been preserved and restored and 58 new poles have been added. Original light poles along Rajpath have also been retrofitted with integrated smart features to facilitate electro-acoustic arrangements for National events.
- 2. Painted concrete bollards have been replaced with sandstone bollards to achieve coherence with the architectural character of the Avenue.
- 3. The edges of Rajpath have been paved for pedestrian comfort. A drain channel has been designed along the edge of these pathways for better storm water drainage.
- Granite has been used on the walkways. The edges of Rajpath (walkways) used to be Bajri / Murram (loose gravel) earlier.
- 5. The network of pedestrian pathways has been designed such that its junctions are at perpendicular angles. This has been done to reduce wear and tear of the lawns due to pedestrian movement and maintain a complete circuit of pedestrian network.

- 6. The Avenue lawns have been refurbished with the selection no.1/ Nilgiri species of grass depending upon the shadow/ sunny area.
- 7. Most of the original Rai Jamun trees have been retained and more trees have been added through a planned strategy of planting.
- 8. Canals have been refurbished to stop seepage and 60 aeration systems have been added to ensure that the canals have clean water.
- 9. The currently inaccessible area beyond canals have been activated through the introduction of walkways and sixteen permanent bridges. These also ensure cross connectivity for the lawns on either side of the canals thereby reclaiming the vast area behind canals.
- 10. The area behind the canals has been designed as a landscaped area that would also function as parking spaces during national events and occasions.
- 11. Parking has been designed to accommodate up to 1,122 cars and 35 buses along with charging points for e-vehicles and a dedicated space for app-based taxi and auto-rickshaw service.
- 12. Eight public amenities blocks and six vending plazas have been thoughtfully located and designed keeping existing trees in mind. In accordance with the building bye laws of the Central Vista precinct, public amenities have been located below ground level. They will

be well lit and ventilated and have been designed to accommodate the expected number of visitors.

- 13. The provision of a designated space for vendors further ensures pedestrian priority.
- 14. A total of four pedestrian underpasses - two each at Janpath and C-Hexagon junctions - have been designed

keeping pedestrian safety in mind. 8m wide and secure underpasses have been integrated within the original and new rows of trees to ensure a shaded environment and minimum damage to trees in the process. These underpasses were being envisaged by Traffic Police and NDMC since last 20 years to ease the pedestrian traffic on Janpath and C-Hexagon Road.

- 15. Collapsible bleachers modular multi-tiered seating system with ascending rows of seats will be used for seating arrangements during events. This will not damage the Avenue's landscape, reduce installation time, ease transportation, and free up storage space for other preparatory equipment.
- 16. The precinct around India gate has been refurbished with robust paving, and stepped plazas and amenity blocks one on each side of India Gate have been designed for recreational/ cultural public use.

The project work started in February, 2021 and the first phase was completed in time for the Republic Day Parade on the 26<sup>th</sup> of January 2022. The overall project is targeted to be completed on June 30, 2022. The redevelopment proposal improves the physical aspects of the Central Vista Avenue for everyday use as well as for the many annual and occasional events. It retains the essence of a beloved public space in the heart of Delhi while enabling comfort and ease for its users. It enhances the experience of the administrative and cultural centre of India, keeping the public at the core of its design strategies.



Rajpath Re-Developed







Amenity Block



Bridge Over Refurbished Canal



Parking

# **GEOTHERMAL - THE TRULY SUSTAINABLE** SOLUTION FOR ZERO NET ENERGY BUILDINGS **MAKING UT OF LADAKH CARBON NEUTRAL &** SUSTAINABLE!

Pradeep Gupta, Chief Engineer-cum-ED | Ravinder Pal, Executive Engineer

#### Introduction:

Owing to the diverse and harsh topographical, geographical location and climatic condition of Ladakh, it becomes one of the most challenging locations for CPWD for creating national assets. These peculiar conditions do not exist in any other part of the country. Though there is presence of connectivity with national grid as well as with the local hydel grid, but still there is acute shortage of primary energy in Ladakh.

In the cold climatic condition of Ladakh, there is need for space heating for at least 6-7 months in a year and need for Domestic Hot Water (DHW) round the year. During the winter period when the river freezes, the hydel power plants are shut down. During the shivering cold in the winters the outside temperature drops even up to -30° C, thus we need direct thermal space conditioning, instead of converting electrical energy to thermal energy. Therefore, the requirement of space conditioning with Renewable Heat emerges as an engineering challenge.

#### **Climate Vagaries:**

So, Leh Project Zone of CPWD constrained to think differently and adopt the technological solution that has not been adopted so far in Ladakh. Not only this, the technological solution ought to be sustainable, cost effective and in line with the narrative of the Hon'ble PM to build the Ladakh Carbon Neutral in terms of UN Climate Change Conference in Glasgow (COP26).





#### The Principle of stable heat:



The graph shows the variation of the ground temperature with the depth. This means even if the outdoor ambient is at minus 30, the heat exchange in the soil is possible at +14 to +18 approximately. Ground Source or Geothermal will mitigate the extreme high, thus reduce the

dependency on the Grid to a great extent.

The geological studies revealed that the heat is available under the earth in the soil, already stored there, thus making the earth a huge natural battery, where we could store and tap our building energy when not in use or draw the



heat when we need. The earth can be used as a source as well as sink for energy.

The technique was to find out how to get this energy out for the space to condition. Previously projects were attempted with horizontal loops embedded in the ground at a depth of approx. 2 m in Ladakh by other construction agencies, but this project made sure that CPWD doesn't commit the same mistake. We must reach the depth in the ground where the quantum of heat is enough.

We have to adopt systems & techniques for heat exchange between the earth and the building, therefore unlike all other infinite systems, geothermal happens to be a finite system of thermal exchange that stores energy in the soil, using the earth as battery. In this process the borewells are dug and HDPE pipes are inserted to depths of 100-140m below the ground and through these pipes, fluid with proper mix of antifreeze is exchanged which must be able to cross the freezing point,

Circulation System must be able to handle the density/viscosity. The System must be able to maintain "flow and Return" under the freezing conditions. The Pipes must not "burst". This fluid brings the energy from the soil to building in a heating cycle and sinks the building heat in a cooling cycle.

The way to ascertain the ability of exchange is a diagnostic test called TRT (thermal response test) through which the conductivity of the soil is ascertained and the system designed accordingly. We need to remember that this is an exchange-storage system and no generation of energy unlike by other renewable sources of energy like solar or wind.

That makes Geothermal such strong and everlasting renewable energy source. Unlike the solar and wind, it's not resource dependent. Geothermal is the 24X7 renewable energy.

Today, in buildings we require around 70-80% energy for space conditioning (heating or cooling). However, in Ladakh, we have situations where building's heating needs account for 85% of the electrical energy. So, we require energy either from grid or fossil fuel to fire up a source that could generate heat for the space conditioning.



If we have to generate this electricity from diesel or burn boilers to generate heat, we will give rise to tremendous amount of pollution defeating the very vision of our Hon'ble PM for making Ladakh carbon free in line with COP26 pledges.

CPWD needed a solution that can decarbonize heating and shift away from the fossil-based source, solution to hot water generation along with space heating in Buildings at least in BAU (building as usual) hours when we can be offgrid. Therefore, that would eradicate the need of burning fossil fuels and looking for electrical energy when it's not easily available.

#### Why Ladakh is so apt for Geothermal?

Ladakh has a unique advantage of having very good thermal conductivity of soil. Nature has made Ladakh a very cold place but parallelly has given ample energy to exchange from earth through thermal conductivity of the soil/rock. So, we must harness this energy. This is Green, Clean, Localised, Site Agnostic and completely Renewable with ample thermal conductivity that encourages geothermal exchanges.

Geothermal is a purely exchange system, there are 2 circuits,



	Thermal con	ductivity
Mineral	Btu/hr · ft <sup>2</sup> (°F/in.)	W/m, °C
Quartz (single crystal)	87, 47	12.5, 6.8
Quartz	40	5.8
Quartzite	22 to 37	3.2 to 5.3
Hornblende-quartz- gneiss	20	2.9
Quartz-monzonite	18	2.6
Sandstone	9 to 16	1.3 to 2.3
Granite	13 to 28	1.9 to 4
Marble	14 to 21	2 to 6
Limestone	6 to 22	1 to 3
Chalk	6	0.9
Diorite (dolerite)	15.6	2.25
Basalt (trap rock)	9.6 to 15	1.4 to 2.2
Slate	13.6	2

- 1. The primary circuit which exchanges with the soil and
- 2. The secondary that exchanges in the space.

The fluids in each circuit transfers the heat energy to the space as required (fig. below).

The fluid with anti-freeze is sent to the depth of soil and it collects the heat energy and supplies to a geothermal pump that uses a stable temperature for exchange that is normally 14-18 deg C at depths of 100 m or so. The energy is then used by the geothermal heat pump and reached to the space through a secondary circuit for distribution of heat. So basically, we are bringing up the heat, say 75 KW thermal out of the 100 KW and the balance 25% from an electrical source generated through Solar Photo-Voltic Cells, thereby achieving the Zero Net Energy Building (ZNEB).

It's clean, green and renewable heat energy. The exact form of energy, that we require for achieving "Carbon Neutral Ladakh".

So, we need to think in different lines, first make sure to heat the buildings with decarbonised



heat exchange, make sure we get hot water without burning fossil fuels and finally make sure to run the buildings off-grid at least during major portions of the day by getting balance energy requirements from the solar resource which Ladakh is richly endowed with.

#### **Distribution of Heat:**

Unlike our applications in cooling dominated climate, heating is a completely different concept. The heating of the thermal mass is the only way to retain heat. Here, the conventional space conditioning systems like VRV / VRF just

don't work, hence we need to revisit the high school physics of hot air rising above



the heated floors.

#### Geothermal System much more versatile

Exchanges from ground, hence no relation with outdoor ambient temperature.

Ability to produce Heating, Cooling and Hot water from the same system.

Ability to cascade, makes entire system modular, no need for standby.

## Capacity Building by CPWD:

CPWD, being pioneer and leader in adopting the emerging technologies has worked towards demystifying the concept of geothermal and Zero Net Energy Building (ZNEB) and had organized a capacity building Workshop for Ladakh PWD Engineers in Leh on 5th May 2022 which was attended by the Principal Secretary level officers and other Senior Stake holders in Ladakh Administration.

#### Conclusion:

Geothermal systems are carbon free, hence the entire HVAC & ventilation system will be almost carbon free with complete Hybridization between Geothermal exchange and solar and therefore, Minimal Grid intervention.

# स्थापत्य और तकनीक की अद्वितीय धरोहर-राष्ट्रपति भवन

अनुराग खरे, अधीक्षण अभियंता

तकनीकी कुशलता भव्य स्मारक के संरक्षण में परम्परा और नवीनीकरण के सह अस्तित्व की ऐसी विशिष्टता प्रदान करती है जो धरोहर की गरिमा को बनाए रखते हुए इसको नयी–नयी खोजों से भी जोड़ देती है।

राष्ट्रपति भवन की महिमा को अक्षुण्ण रखना न केवल महत्त्वपूर्ण है बल्कि चुनौतीपूर्ण भी है। देश की गौरव गाथा को बयां करता हुआ यह भव्य स्मारक अपने निर्माण के लगभग 90 वर्ष पूर्ण कर चुका है लेकिन लम्बी अवधि तय करने के बावजूद यह भवन आज भी अपने निर्माण, स्थापत्य और अपने रख–रखाव के सौन्दर्य को दर्शाता है। इस अमूल्य धरोहर को संरक्षित करने के लिए नयी–नयी तकनीकी खोज पद्धतियों के प्रति कृतज्ञता प्रकट करनी होगी जिनके परिणामस्वरूप इस स्मारक ने अपने स्थापत्य की भव्यता, सुन्दरता और सुदृढ़ता को अक्षुण्ण बनाए रखा है।

जैसे ही बीटिंग रिट्रीट के साथ गणतंत्र दिवस समारोह का समापन हुआ, राष्ट्रपति भवन फिर से जगमगा उठा। इसके साथ नॉर्थ ब्लॉक के छोर से लेकर साउथ ब्लॉक के दूसरे छोर तक इसने एक जादुई चित्रपट बनाया जिस पर असंख्य रंगो ने क्षण भर में एक अद्भुत परिदृश्य प्रदर्शित कर दिया। यह भवन इतना भव्य है कि 'राजसी' और 'स्मारकीय' जैसे विशेषण भी भारतीय गणराज्य के केंद्र में स्थित इस इमारत की भव्यता के साथ न्याय नहीं कर सकते। इसका इतिहास और राज-सिंहासन के रूप में इसकी भूमिका इसे और अधिक भव्यता प्रदान करते हैं लेकिन विशुद्ध रूप से स्थापत्य की दृष्टि से भी, एडविन लुटियंस का चमत्कार अपने आप में अद्भुत और अद्वित्तीय है। उनके एडवर्डियन अलंकृत रचना में गुंथे हुए कई भारतीय रूपांकन और अभिकल्पनाएँ हैं–कमल और हाथी, छत्रियाँ और छज्जे।

यह स्मारक भारत के नाटकीय परिवर्तन का साक्षी रहा है। सन् 1911 में वायसराय के लिए भव्य महल के निर्माण की योजनाएँ शुरू हुई और यह निर्माण कार्य 1929 में पूरा हुआ। अनेकों उथल–पुथल से भरी सदी ने इस भवन पर भी अपनी छाप छोड़ी है। लगभग एक सदी पुराने किसी अन्य भवन की भाँति राष्ट्रपति भवन भी समय और मौसम के प्रकोपों से अत्यधिक प्रभावित हुआ है।





320 हेक्टेयर में फैला यह भवन और इसके आसपास की सम्पदा हमारे राष्ट्रपति जीवन का केंद्र बिंदु रही है। यह हमारी सांस्कृतिक धरोहर का प्रमुख और महत्त्वपूर्ण हिस्सा है। आगे आने वाली पीढ़ियों के लिए इसकी भव्यता को और अधिक सर्वेत्तम ढंग से सुरक्षित और संरक्षित करने के लिए निरंतर प्रयास किए जा रहे हैं।

सिविल इंजीनियरिंग की दृष्टि से भवन का रखरखाव चुनौतीपूर्ण है, समय व्यतीत होने के साथ यह आवश्यक है कि इसकी सुविधाओं को और अधिक उन्नत किया जाए,

पुराने उपकरणों के स्थान पर नए और आधुनिक उपकरणों को प्रयोग में लाया जाए तथा और अधिक साधनों का उपयोग किया जाए किन्तु यह सब कुछ 'धरोहर ग्रेड–।' के रूप में वर्गीकृत भवन के स्वरूप में परिवर्तित किए बिना किया जाना आवश्यक होता है। ऐसी इमारतों के लिए बाहरी, आंतरिक या प्राकृतिक सुविधाओं पर किसी भी प्रकार का हस्तक्षेप करने वाले नियम तब तक प्रतिबंधित हैं जब तक कि इन भवनों या इनके किसी हिस्से या इनकी सुविधाओं की मजबूती और जीवन–काल को बढ़ाने की दृष्टि से आवश्यक न हो। इस प्रयोजन के लिए अत्यंत आवश्यक और न्यूनतम परिवर्तनों को ही अनुमति दी गयी है बशर्ते वे परिवर्तन मूल के अनुरूप और अनुकुल हों।

इस प्रकार हमारी धरोहर के इस स्मारक को संरक्षित करना एक अत्यंत सूक्ष्म कार्य है क्योंकि यह कोई ऐसा स्मारक नही है जो सायंकाल को बंद हो जाता हो बल्कि यह वह गरिमामय स्थान है जहां राष्ट्रीय प्रमुख निवास करता है। सैकड़ों लोग यहां काम करते हैं फिर भी यह इमारत पूर्णतया सुदृढ़ है।

हालाँकि संरक्षण गतिविधियों की दृष्टि में छज्जा संरक्षण अधिक चुनौतीपूर्ण कार्यों में से एक रहा है। यह बाहर लटका हुआ छज्जा या छत है जो कि भारतीय वास्तुकला की सामान्य विशेषता है। राष्ट्रपति भवन में छज्जा मुख्य भवन की परिधि के साथ कुल 1.2 किमी के घेरे में है। यह



चने के कंक्रीट से अत्यधिक सुदृढ़ीकरण के साथ बनाया गया है और जमीन से लगभग 20 मीटर ऊपर स्थित है। झुके हुए छज्जे के निचले भाग में पवित्र एवं प्रतिष्ठित कमल के पुष्प की पंखुड़ी के चित्र वास्तुशिल्पीय अलंकरण के रूप में उत्कीर्ण है जिन्हें उभरे हुए रूप में दोहराया गया है। मौसम के अनावरक कारकों के दीर्घकालीन प्रभाव के कारण छज्जे को 'विस्तरण' का सामना करना पड़ता है अर्थात् इसकी सामग्री प्रायः परतों में टूट जाती है और अनेक स्थानों पर इसकी लंबाई अधिक झुक गयी है। इसके लिए प्रायः छज्जों की मरम्मत की आवश्यकता पड़ती है जो कि भिन्न–भिन्न प्रकार से की जाती है।

हालांकि 2019 में अत्यधिक क्षय के कारण छज्जा कुछ स्थानों पर आंशिक रूप से ढह गया। इस तरह के क्षरण न केवल भवन के सौंदर्य को प्रभावित करते हैं बल्कि 20 मीटर की ऊँचाई से नीचे गिरने वाले चूने के कंक्रीट बड़े टुकड़े प्राण घातक खतरा भी पैदा कर सकते हैं। यह समय इस समस्या का सम्पूर्ण रूप से निदान करने का नहीं बल्कि सम्पूर्ण भाग की मरम्मत करने का था।

जब छज्जे का संरचनात्मक निरीक्षण किया गया तो पाया गया कि इसकी वास्तविक स्थिति जो प्रतीत होती है, उससे भी कहीं अधिक बदतर थी। निरीक्षण में कई स्थानों पर लगातार क्षैतिज दरारें और प्रमुख विक्षेपण का पता चला। इसकी सामग्री की गुणवत्ता तब तक इतनी खराब हो चुकी

थी कि चूना पत्थर हथौड़े के हल्के प्रहार से भी गिर जाता था। जब अव्यवस्थित पत्थर को हटाने की प्रक्रिया चल रही थी तो लगभग 20 मीटर लंबाई का छज्जा ढ़ह गया जिससे संक्षारित सुदृढ़ीकरण उजागर हो गया।

जब 2020 में मरम्मत कार्य आरम्भ हुआ तो सबसे बड़ी चुनौती थी – सुदृढ़ीकरण तथा क्षय को रोकने की। इस हेतु जिस समाधान पर निर्णय लिया गया वह था 'कैथोडिक प्रोटेक्शन', एक इलेक्ट्रोकेमिकल प्रक्रिया

जिससे 'ड्यूल फेज हाइब्रिड यूजन एनोड सिस्टम' प्रदान किया जाना था। निरीक्षण में यह पाया गया कि छज्जे की ढ़लाई के लिए सामान्य रूप से उपलब्ध सामग्री जैसे सामान्य पत्थर अत्यधिक विक्षेपण का कारण हैं। अंततः संरचनात्मक रूप से कम भार वाले पत्थर (एसएलडब्ल्यूसी–स्ट्रक्चरल लाइट वेट कंक्रीट) को सबसे उपयुक्त सामग्री माना गया।

पुर्ननवीनीकरण योजना के अनुसार निश्चित छोर से आगे तक फैले हुए छज्जे के हिस्से को हटा दिया जाना था और संरचनात्मक रूप से कम भार वाले पत्थर को हटाने से पहले चूने के पत्थर से बने हुए छज्जे को निश्चित छोर से 0.50 मीटर, 1.0 मीटर 1.50 मीटर की ऊँचाई पर आधार प्रदान किया जाना था ताकि संक्षारित सुदृढ़ीकरण को झुकने, ढहने और गिरने से रोका जा सके। मौजूदा सुदृढ़ीकरण को पूर्ववत रखने का निर्णय लिया गया। ऐसे स्थानों पर जहां 20 प्रतिशत से अधिक क्षय हो चुका था वहां लैपिंग या रासायनिक समन्वयत के माध्यम से अतिरिक्त सुदृढ़ीकरण प्रदान करने की योजना पर कार्य किया गया। इसके साथ ही छज्जा के सम्पूर्ण सुदृढ़ीकरण संजाल में विद्युत निरंतरता के परीक्षण के साथ कैथोडिक संरक्षण विधि को लागू किया गया।



ग्रेड 1 के मानदंडों को ध्यान में रखते हुए छज्जे के सर्वाधिक उपयुक्त रूप और डिजाइन का पुनर्निर्माण बेहद महत्त्वपूर्ण था। छज्जा भवन की परिधि के साथ भवन की सीढ़ियों और वक्रों का अनुगमन करता है, साथ ही यह वर्षा के जल के निरंतर प्रवाह के लिए दृढ ढाल भी बनाए रखता है। इस क्षरण ने मौजूदा संरचना की नियमावली प्रक्रिया (मैन्युअल प्लॉटिंग) को अत्यंत जटिल बना दिया। इसके लिए उन्नत कंप्यूटर प्रौद्योगिकी को उपयोग में लाया गया। 'लाइट डिटेक्शन एंड रेंजिंग' (LIDAR) स्कैनिंग तकनीक का प्रयोग करते हुए पूरे छज्जे को एक त्रि–आयामी प्रतिमान बनाया गया। प्रतिमान के आधार पर 'फायबर रेनफोर्सड पॉलीमर' (एफआरपी) मोल्डिंग तकनीक का उपयोग करते हुए समान विशेषता और डिज़ाइन के साथ ढांचागत कार्य तैयार किया गया।

इसके अतिरिक्त छज्जों के नीचे निर्मित कमल की प्रत्येक पंखुड़ी जो कि इसका एक अभिन्न अंग है, अपने आप में अद्वितीय आकृति में है। एफआरपी मोल्डेड ढाँचे का उपयोग करके मूल संरचना के अनुरूप उस स्वरूप को फिर से बनाने पर विचार किया गया।

एसएलडब्ल्यूसी के उपयोग ने टीम के कौशल की भी परीक्षा ली। अन्यत्र पूर्व मिश्रित किये गए कंक्रीट को वाहनों की भीड़–भाड़ के व्यस्त यातायात और वीवीआईपी आवागमन संबंधी गतिविधियों के बीच से गुजरते हुए सावधानीपूर्वक इसे कार्यस्थल (साइट) पर बैग में लाया गया और फिर इसे 20 मीटर की ऊँचाई पर रखा गया। यह सम्पूर्ण कार्य मात्र तीन घंटे की अवधि में किया गया क्योंकि सामग्री तापमान के प्रति भी अत्यधिक संवेदनशील थी। साथ ही भवन के अंदर और बाहर हो रहे कार्यो को प्रभावित किये बिना हरे पर्दों के आवरण के साथ मरम्मत का कार्य किया गया।

कार्य संतोषजनक प्रगति कर रहा है। 'नॉर्थ कोर्ट' की ओर इसका लगभग एक चौथाई कार्य पूरा हो गया है और शेष कार्य इस वर्ष के अंत तक पूरा कर लिया जाएगा। तकनीकी कौशल नवीन विचार और धरोहर के प्रति अत्यधिक सम्मान की दृष्टि से यह अत्यधिक अपेक्षापूर्ण कार्य रहा है। भवन के सौन्दर्य को बनाए रखते हुए यह कार्य इतनी बारीकी से किया गया है कि विशेषज्ञों के अतिरिक्त पुनर्नवीनीकरण के कारण इस अंतर को पहचानना किसी के लिए संभव नहीं होगा।

# राष्ट्रष्पति भवन परिसर में आरोग्य वनम् का निर्माण

#### off th anर्यपालक अभियंता

भारत के माननीय राष्ट्रपति जी ने फरवरी 2021 में गुजरात के केवड़िया में स्टैचू ऑफ यूनिटी का दौरा किया। इस यात्रा के दौरान उन्होंने वहां पर स्थित आरोग्य वन का भी दौरा किया व इस अवधारणा को पसंद किया। यात्रा से लौटने के पश्चात् राष्ट्रपति जी ने राष्ट्रपति भवन के परिसर में भी उसी प्रकार के औषधीय उद्यान के निर्माण की इच्छा व्यक्त की ताकि राष्ट्रपति भवन में आने वाले पर्यटकों के बीच आयुर्वेदिक औषधीय पौधों के बारे में जागरूकता पैदा की जा सके। वर्तमान में राष्ट्रपति संपदा में मौजूद हर्बल गार्डन है परन्तु वह छोटे पैमाने पर है।

तत्पश्चात् केन्द्रीय लोक निर्माण विभाग को गुजरात व हरिद्वार में स्थित आरोग्य वन के स्वरुप राष्ट्रपति भवन परिसर में आरोग्य वन के विकास के लिए विभिन्न विकल्पों की योजना बनाने की जिम्मेदारी सौंपी गई। इस उद्यान के लिए पौधों की अवधारणा, चयन व खरीद के लिए गुजरात और छत्तीसगढ़ के वन विभागों की मदद ली गई। यहां स्थित गेट नंबर 37 व 4 के वन 6.6 एकड़ भूमि के क्षेत्र को इस उद्यान को निर्मित करने के लिए चुना गया। जिसका उपयोग भंडारण, पार्किंग और विविध उपयोगों के लिए किया जा रहा था। केन्द्रीय लोक निर्माण

विभाग के वास्तुकार द्वारा विभिन्न प्रकार के वास्तु अभिकल्पन ड्रॉईंग तैयार कर मार्च 2021 में माननीय राष्ट्रपति जी के सम्मुख प्रस्तुत की गई। प्रस्तुत वास्तु अभिकल्पन ड्रॉईंग में से योग मुद्रा में स्थित आरोग्य मानव ड्रॉईंग का चयन कर अनुमोदित किया गया। उद्यान को जनता के देखने के लिए उपलब्ध कराने का निर्णय लिया गया।

उपरोक्त को संज्ञान में लेते हुए आरोग्य वनम् की परिकल्पना आयुर्वेदिक वनस्पतियों की महत्ता तथा मानवीय अंगों पर उनके प्रभाव को जनमानस में प्रचारित करने के उद्देश्य से की गई है। इसकी स्थापना का ध्येय जागरूकता फैलाना भी है ताकि राष्ट्रपति भवन के भ्रमण हेतु आने वाले अतिथिगण यहां लगाए गए विभिन्न प्रकार के औषधीय गुणों से भरपूर पेड़–पौधों के गुणों से, उनकी सुगन्ध से तथा उनके महत्त्व से अवगत हो सकें। आरोग्य वनम् की संरचना योग मुद्रा में बैठे हुए मानव के आकार में की गई है। इसके साथ ही यहां फव्वारे, योगमंच, सेल्फी स्थल, व्यू प्वाइंट, झरने, कमल–सरोवर व ग्रीन हाउस भी हैं।

इस आरोग्य वन में अरण्ड, बेल, घृतकुमारी, गिलोय, नीम, सहजन, तुलसी, बबूल, जामुन, हरसिंगार, अर्जुन, लेमनग्रास, कालमेघ, अश्वगन्धा, ऐलोवेरा, पीपल, पाकड़ व अन्य पौधों सहित कुल 215 प्रकार के पौधों का रोपण किया गया है। ये सभी पौधें शरीर के विभिन्न अंगों के लिए लाभदायक व उपयोगी होने की दृष्टि से लगाए गए हैं।

इस आरोग्य वन में योग साधना के लिए योगमंच का भी निर्माण किया गया है। आरोग्य वनम् के मध्य में निर्मित आरोग्य मानव की आकृति में लाल व सफेद पत्थर का पथ बनाया गया है तथा आरोग्य मानव के सिर व पैरों की ओर मोर पंख—नुमा आकृति की छः फुलवारी बनायी गयी हैं। इस उद्यान में मुख्य द्वार से प्रवेश करने के साथ ही जल की शीतलता की सुखानुभूति के लिए सामने तथा दाहिनी ओर फव्वारे बनाए गए हैं। यहाँ झरने का भी निर्माण किया गया है ताकि आगन्तुकों का प्रकृति से सीधा तादात्म्य स्थापित हो सके।



# SOIL NAILING TECHNIQUE FOR SLOPE STABILIZATION AT NEW PARLIAMENT BUILDING SITE: AN OVERVIEW

Vishal Kumar, Assistant Executive Engineer

#### **Background:**

Two 218m long utility buildings with one Basement and Ground floor, one each on the Northern side and Southern side of the main New Parliament Building are to be constructed along the boundary wall of the site (Plot 118) of the proposed New Parliament complex. During layout on the ground as per the approved drawings, few trees were falling within the standard excavation widths. Moreover, many underground services are also running below adjoining footpath. To save the trees and to avoid shifting of underground services, excavation was required to be carried out with almost vertical slope. Such steep slopes were required to be stabilized with soil stabilization techniques. Hence, the soil nailing technique was adopted to protect trees falling along with these utility buildings.

## **Soil Nailing:**

Soil Nailing is a methodology for the treatment of Natural soil slope or unstable artificial (fill) slope to ensure stability of slopes. It is increasingly employed in urban environments where there is a shortage of space to provide gradual slopes. Soil nails develop their reinforcing action through soil-nail interaction.

## Origin of the Soil Nailing Technique:

The soil nailing technique was developed in the early 1960s, partly from the techniques for rock bolting and multi-anchorage systems, and partly from the reinforced fill technique (FHWA, 1998). The New Austrian Tunneling Method introduced in the early 1960s was the premier prototype to use steel bars and shotcrete to reinforce the ground. With the increasing use of the technique, semi-empirical designs for soil nailing began to evolve in the early 1970s. The first systematic research on soil nailing, involving both model tests and full-scale field tests, was carried out in Germany in the mid-1970s. Subsequent development work was initiated in France and the United States in the early 1990s.

- Tunnelling Method in the 1960's. One of the first applications of soil nailing were in 1972 for a railroad widening project near Versailles, France, where an 18 m (59 ft) high slope was stabilized.
- In Germany, the first use of a soil nail wall was in 1975. The United States first used soil nailing in 1976 for the support of a 13.7 m deep foundation excavation in dense silty sands.
- In India use of soil nailing technology is gradually increasing and guidelines have been made by IRC with the help of the Indian Institute of Science, Bangalore.

## **Cost of Soil Nailing Work:**

Soil nailing work would cost around Rs. 8,000 per sq meter of the protected soil surface. The cost includes preparatory works, drainage system, soil nailing, and shot-creting, but could vary depending upon the complexities of the site.

## **Execution of Soil Nailing Work:**

#### **General Arrangement of Soil Nailing System**

a. Soil nailing typically starts from the top of the slope and gradually proceeds towards the bottom in stages. Each stage is generally between 1.5m to 2.0 m deep.



Figure 1: Top to bottom excavation in stages



Figure 2: Channel section being used to maintain the angle of inclination of Bar while Nailing

b. TMT bar (Fe 500 D) of 25mm diameter and 4m to 9m in length (varying as per depth) as per site requirement and as shown in



Figure 3: Typical section for excavation profile for 8.175 m



Figure 4: Nailing of Bar using Hydraulic Hammer

the drawing were inserted/nailed using a hydraulic hammer at an angle of 10 to 20 degrees horizontally with the spacing of 1-meter c/c in both directions and as per site requirement.

- c. On completion of the nailing of the first full length of an excavated face in the same plane, the next stage is excavated and nailed. The process is repeated till the bottom of the proposed excavation is reached.
- d. After nailing of TMT bar, it was plugged with a 12 mm thick 150X150mm MS Bearing Plate by welding.



Figure 5: Typical detail of MS bearing Plate

e. Weep holes of 150 mm diameter were provided by boring method at a minimum 1.00 m depth with Insertion of 100 mm diameter PVC Perforated pipe with geotextile fabric at two different vertical levels and a spacing of 1.25 m c/c horizontally.



Figure 6: Weep hole and Perforated Pipe wrapped with geotextile



Figure 7: shows the schematic arrangement of Nail and Weep holes.

f. Hard-drawn steel wire fabric 4 mm thick and 100X100 mm size were provided in the area to protect soil & trees.



Figure 8: Typical detail of wire mesh

g. M-25 grade shotcrete of 75 mm thickness was applied all along the area's periphery to stabilize using spraying machines. Shotcrete provides a continuous, supporting layer over the excavated face that can also serve to fill voids and cracks on the excavated face.



Figure 9: Activity of Shotcrete

#### SITE CHALLENGES:

#### a) Steep Excavation

With almost negligible clearance between the line of excavation and the retaining wall raft line and to protect the Heritage tree, we had to under-go steep cutting of nearly 90 degrees.



Figure 10: Picture showing nailed 90-degree vertical wall.

# b) Intermediate Collapsing of the excavated wall

As the area of the excavated face for nailing is continuously being exposed to vibration load caused due to Rock breakers running in the vicinity.

#### **CONCLUDING REMARKS:**

Soil nailing is a suitable technique for stabilizing steeply cut slopes reducing cutting and filling of soil. This also helped in protecting the heritage trees falling along the Raisina and Red Cross roads of the New Parliament Building and avoiding shifting of major services lays below footpaths.

# ACTIVITIES OF OFFICERS' WIVES ASSOCIATION







#### Prime activities of the association

- Scholarship for degree and diploma courses on merit-cum-means basis for the wards of Group C & Work-charged employees.
- Special donation for the education of the underprivileged students to help them in pursuing their studies.
- One time ex-gratia payment to needy Group C & Work-charged employees of CPWD in the event of untimely death, accident, long illness etc.
- Donations for humanitarian causes like flood affected areas, Blood Banks, Red Cross Society, Schools for Blinds, Missionaries of Charity, PM Relief Fund, CM Relief Fund etc.
- "Parivar Ki Har Beti Apne Bharose" scheme to provide aid to the girl-child of Group C

& Work-charged employees of CPWD with the objective to make them economically independent in their life.

- Special donations in cash or kind to support financially deprived people or to organizations sharing same object.
- Satya Goel Scholarship for students of CPWD Group C & Work-charged employees who score high in their X and XII exams on merit basis by these trusts through OWA.
- Legal Aid Clinic A new initiative to provide free legal advice to Group C & Work-charged employees of CPWD, staff and laborers by the professionally qualified advocates and groups.
- Crèches at construction sites under the name 'Bal Basera' for the children of laborers who are engaged by the contractors at various construction sites. These crèches provide informal education, nutrition, medical care

and a safe environment to children aged 1-7 years. Presently 6 crèches are being run with around 20-25 children.

- Day Care Centre, Nursery and Play School at its Head office building premises for children of age 6 months to 12 years at a very nominal fee.
- Vocational Training Centre with the sole objective to provide training and empowering women economically. The Centre conducts different diploma courses like tailoring and embroidery recognized by Usha Sewing School, computer courses and many short term hobby classes being conducted from time to time.
- Cultural, recreational programs and workshops are conducted for the children at Day Care, Vocational Training Centre and at the crèche sites.
- Organising Health Camps for workers



# **BEST PROJECTS**

## (I) BEST COMPLETED PROJECTS

S. No.	Region	Name of Building	Location	Prize
1	Project Region Delhi	Pre-Engineered Building Complexes at KG Marg and Africa Avenue, New Delhi	New Delhi	1 <sup>st</sup>
2	Region Bengaluru	Industrial buildings for Helicopter Manufacturing Factory under Phase-I Stage-2 for Hindustan Aeronautics Limited at Tumakuru, Karnataka	Tumakuru, Karnataka	2 <sup>nd</sup>
3	Project Region Mumbai	Lecture Hall Complex for IIT Indore Simroi Campus Indore	Indore	3 <sup>rd</sup>
4	Region Hyderabad	Deficient OTM Complex and Office of ADG for Indian Coast Guard, Coast Guard Enclave, Malkapuram, Visakhapatnam	Visakhapatnam	4 <sup>th</sup>
5	Project Region Chandigarh	Dormitories (Cluster Type) Pre- Engineered Steel Structures light gauge for Shri Amarnathji Shrine Board at Ramban, J&K	Ramban, J&K	Special Prize (execution under challenging conditions)

## (II) BEST E&M SERVICES COMPLETED

S. No.	Region	Name of Building	Location	Prize
1	Region Bengaluru	Sensor Technology Development Centre on 'Turnkey Basis' for CMTI at Tumkur Road, Bengaluru	Bengaluru	1 <sup>st</sup>
2	Region Delhi	Atal Akshay Urja Bhawan, New Delhi	New Delhi	2 <sup>nd</sup>
3	Project Region Delhi	Pre-Engineered Building Complexes at KG Marg and Africa Avenue, New Delhi	New Delhi	3 <sup>rd</sup>
4	Region Chennai	Indian Institute of Information Technology, Trichy	Trichy	4 <sup>th</sup>

## (III) BEST INTERIOR COMPLETED WORKS

S. No.	Region	Name of Building	Location	Prize
1	Region Bengaluru	Interiors works of partitions, false ceilings, furniture, audio visual equipment, equipment etc. for Software Technology Parks of India (STPI) at Electronic City, Bangalore	Bengaluru	1 <sup>st</sup>
2	Project Region Delhi	Pre-Engineered Building Complexes at KG Marg and Africa Avenue, New Delhi	New Delhi	2 <sup>nd</sup>
3	Region Delhi	Renovation of office space for National Health Authority at 4th floor, Jeevan Bharti Building, New Delhi	New Delhi	3 <sup>rd</sup>

## (IV) BEST ARCHITECTURAL PLANNING / DESIGN

S. No.	Region	Name of Building	Location	Prize
1	Project Region Chennai	Construction of 400 (350+50) bedded ESIC Hospital at Visakhapatnam	Visakhapatnam	1 <sup>st</sup>
2	Project Region Delhi	Construction of 184 Multistoried flats for Hon'ble MPs at BKS Marg, New Delhi	New Delhi	2 <sup>nd</sup>
3	Project Region Chennai	Proposed Engineering Block for National Institute of Technology at Karaikal, Puducherry	Karaikal, Puducherry	3 <sup>rd</sup>
4	Project Region New Delhi	Proposed National Police Academy at Karve, Nepal	Karve, Nepal	4 <sup>th</sup>

## (V) BEST LANDSCAPE DESIGN

S. No.	Region	Name of Building	Location	Prize
1	Region Delhi	Aarogya Vanam at Rashtrapati Estate, New Delhi	New Delhi	1 <sup>st</sup>

## (VI) BEST SERVICE CENTRES

S. No.	Region	Name of Building	Location	Prize
1	Region Bengaluru	Service Centre - 350 (Electrical), GPRA HSR Layout, Bangalore	HSR Layout, Bangalore	1 <sup>st</sup>
2	Region Chennai	Service Centre - 1373 (Elect), GPRA KK Nagar Chennai	KK Nagar, Chennai	2 <sup>nd</sup>
3	Region Bengaluru	Service Centre - 481 (Civil), GPRA Koramangala, Bangalore	Koramangala, Bangalore	3 <sup>rd</sup>
4	Region Bhopal	1479 (Elect), GPRA Colony, Bharat Nagar, Bhopal	Bhopal	4 <sup>th</sup>

# **BEST PERFORMERS**

## **DG MEDALS AND COMMENDATION CERTIFICATES (EE & ABOVE LEVELS)**

## (I) OFFICERS SELECTED FOR DIRECTOR GENERAL MEDAL

S. No.	Name of the Officer	Category	Post held	
1	P. Kanaka Raju	Chief Engineer	Chief Engineer, Vijayawada, CPWD	
2	Satyendra Prasad Gupta	Superintending Engineer	Director (Dev) ERP, CPWD	
3	Ashok Kumar Dhiman	Senior Architect	Senior Architect-II o/o CA, Project Region Chennai, CPWD	
4	Sudhir Kumar Tiwari	Executive Engineer (Civil)	Executive Engineer, Central Vista Proje Division-V, CPWD	
5	Pardeep Kumar	Executive Engineer (Civil)	Executive Engineer (Civil), ERP, CPWD	
6	Raju Prasad	Executive Engineer (Elect)	Executive Engineer (Elect), Gandhinaga CPWD	
7	Pushpraj Kashyap	Architect	Architect o/o Chief Engineer, Raipur, CPWD	

## (II) OFFICERS SELECTED FOR COMMENDATION CERTIFICATE

S. No.	Name of the Officer	Category	Post held	
1	Gurbax Singh	Chief Engineer	Chief Engineer, IIT Project Ropar, CPWD	
2	Shailesh Kumar Ugrejiya	Superintending Engineer	Superintending Engineer, Border Fencing Circle-II, Bhuj, CPWD	
3	Anurag Kumar	Superintending Engineer	Superintending Engineer, IIT Bhilai Project, CPWD	
4	Manish Kumar Rawat	Superintending Engineer	Superintending Engineer, Development Project Circle, New Delhi CPWD	
5	Arbind Kumar Singh	Executive Engineer (Civil)	Executive Engineer (Civil), Meghalaya Central Division, CPWD	
6	Rajiv Sharma	Executive Engineer (Civil)	Executive Engineer (Civil), Central Vist Project Division-III, CPWD	
7	Ashwani Mittal	Executive Engineer (Civil)	Executive Engineer (Civil), Central Vista Project Division-I, CPWD	
8	Srinivasulu Vadde	Executive Engineer (Civil)	Executive Engineer (Civil), Hyderabad-II CPWD	
9	Aman Kumar	Executive Engineer (Elect)	Executive Engineer (Elect), Bangalore CPWD	
10	M. Siva Kumar Reddy	Executive Engineer (Elect)	Executive Engineer (Elect), Trichy, CPWD	
11	Anurag Singh Gangwar	Architect	Architect o/o Senior Architect, Project Region New Delhi, CPWD	
12	Smt. Valli Essaki	Architect	Architect o/o Chief Architect, Project Region Chennai, CPWD	



National CPWD Academy Kamla Nehru Nagar Ghaziabad Inaugural Function of "52 Week Foundation Training Programme" for

Chief Guest : Sh. Shailendra Sharma, DG, CPWD Friday, 6<sup>th</sup> May 2022 Venue : Auditorium

### SHRI SHAILENDRA SHARMA Director General, CPWD

inaugurates 52 weeks foundation training programme for Assistant Executive Engineers (Civil, E&M) of 2021 batch at National CPWD Academy, Ghaziabad on May 06, 2022.



Glimpses of few **CPWD FLORAL TABLEAU** displayed over the years during **REPUBLIC DAY** Celebration

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Tribute to the Martyrs of the Indian National Army (INA), 2022

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