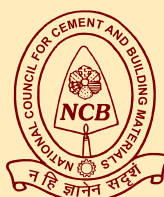


Annual Report

2017-18



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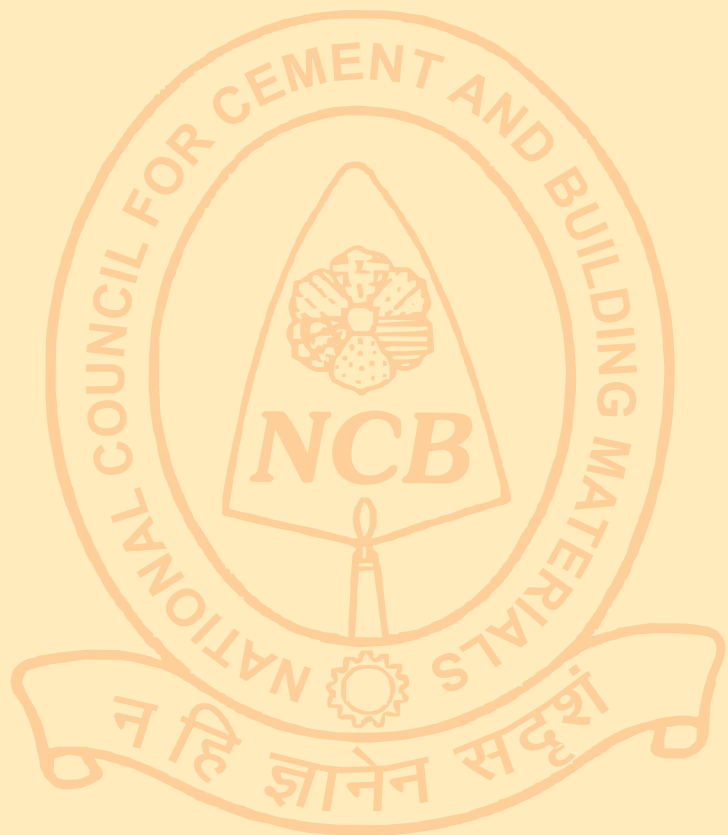
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Annual Report 2017 - 18

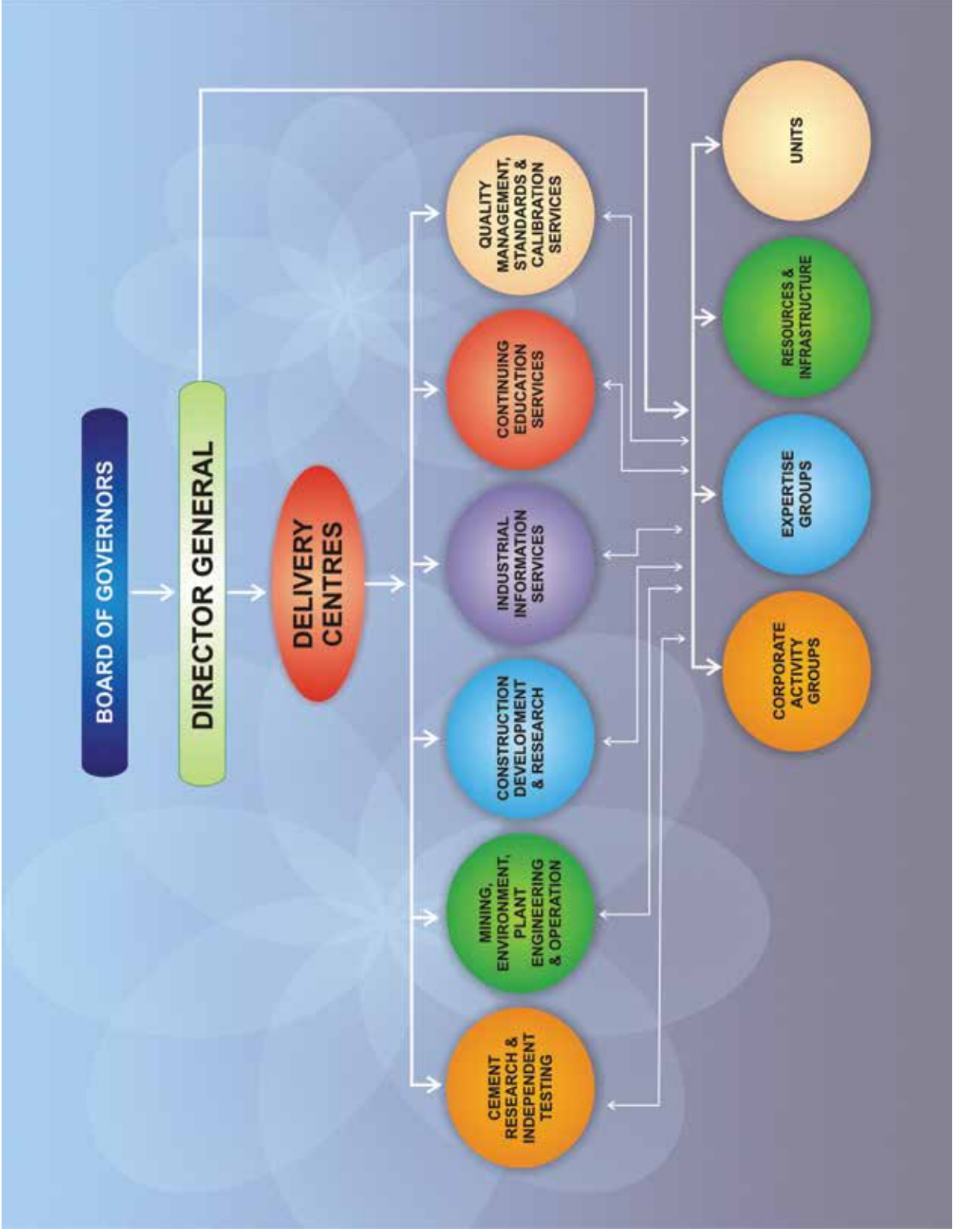
1 April 2017 to 31 March 2018



National Council for Cement and Building Materials

(Under the Administrative Control of Ministry of Commerce & Industry, Govt of India)

34 Km Stone, Delhi-Mathura Road (NH-2), Ballabgarh-121 004, Haryana



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FOREWORD



It is a matter of utmost pride that India has regained the world's fastest growing major economy tag which is attributed to strong performance of the manufacturing sector. With such consolidated pace, Indian economy, and also the Indian cement industry, has very positive expectations in the coming years. Indian government's efforts for making India, the manufacturing hub of the World through Skill India and the Make in India Programmes are further expected to contribute to India's growth story. It is expected that Indian Government's initiatives such as Make In India, Clean India Mission, 100 Smart cities, Housing for all, World-class Cement Concrete Highways, Dedicated Freight Corridors, Ultra Mega Power Projects and many more would lead to spur in cement demand in the coming years and accordingly the projected demand for cement in 2022 would be in excess of 600 million tones. While the short term goals and objectives appear quite challenging, the long term goals and objectives should be quite achievable and would render the Indian cement industry technologically more sound and socially more responsible and caring.

Research and Innovations play a pivotal role for any industry to remain competitive and keep pace with the demand and growth of the society and the country at large and cement industry is not an exception. NCB, as a premier R&D institution of its kind in the country equipped with multi-disciplinary expertise coupled with world class state of the art testing and evaluation facilities, is conducting frontline research activities catering to the needs of the Indian Cement Industry. Over the years, it has contributed immensely for the development and growth of cement industry by addressing appropriately the Indian cement industries concerns in the area of sustainable development and growth, raw materials and energy conservation, environmental protection and climate change. It is a matter of great satisfaction to note that NCB's current Research and Innovation projects are well aligned to national priorities and requirement of society at large besides addressing current Research and Innovation requirements of cement, building materials and construction industries.

NCB has chalked out a very ambitious and visionary Research and Innovation plan for 2021 and beyond which include research in the area of Low carbon and multi component blended cements, Alternative binders and cementitious materials, Alternate fuels and raw materials, productivity & environment improvement in cement industry, stable and durable construction systems and high performance concrete systems. The research outcomes from these projects will provide Indian cement, building materials and construction industry a technologically sound platform to further reduce CO₂ emissions, energy consumption and resource & environment conservation, higher thermal substitution rates, longer service lives of concrete structures to achieve sustainability and cost optimization taking due care of national and international commitments. Over the years, NCB has attained the identity as a customer friendly and responsive technological support and service organization in India. The proactive approach adopted by NCB for identification of current Research and innovation requirements and working systematically for finding plausible solutions has made NCB as the preferred research and innovation partner of the industry.

With recent pragmatic support and direction from DIPP, NCB today is pursuing a total of 17 nos. of Research and Innovation projects including two under Swatchchta Action Plan. These research projects include beside others, development of Portland limestone cements, High volume fly ash cement, reactive belite cement using low grade limestone, activation of fly ash quality, geopolymers concrete products, performance evaluation of cement samples by mechanical mixing keeping fixed w/c ratio, development of chemical formulations for enhancing properties of cement, best practices for reduction of NO_x and SO₂ emissions, water footprint assessment, high performance concrete, repair systems including advanced electronics techniques such as Unmanned Aerial Systems (UAS) or drones in construction and condition assessment of structures, 3D concrete printing, cost effective rural concrete roads, which are of national importance. The research outcomes from these projects so far have established that low grade/dolomitic limestone upto 15-20% can be used in the manufacture of cement conforming to 43 grade OPC. Fly ash upto 45 % can be used in high volume fly ash cement thereby enhancing the fly ash utilization. In order to overcome manual errors encountered during mixing of cement, the research carried out at NCB has found mechanical mixing a better option to use and accordingly require amendment in relevant BIS codes. The research outcome from projects pursued under Swatchchta Action Plan established that poor quality fly ash can be used upto 40% by activating it through mechanical and chemical routes resulting in additional fly ash utilization of about 15 million tonnes annually over and above the current quantum of fly ash utilization limit of 35%, thus cleaning the country in big way.

The services rendered by NCB provides a complete gamut of services to the cement and building material industries by executing projects on sponsored basis, testing materials in its NABL accredited and BIS recognized laboratories, providing calibration, reference material and proficiency testing services, training and solving problems wherever required need special mention. In the area of technical services, NCB has acquired ISO 17020 certification for providing third party inspection services particularly for construction activities.

NCB has completed 331 sponsored projects during the year 2017-18. Some of the important assignments include, development of synthetic slag from low grade materials, technical feasibility of wollastonite as cement raw materials, Burnability investigations under PAT scheme, Use of carbon nano tube composites, Evaluation of Limestone-calcined clay cement, etc. Further, a MOU has been signed by NCB with NTPC-NETRA for undertaking collaborative research in the area of enhancing fly ash use in cement and construction beyond 35% and the work is continuing. A large number of sponsored projects has been completed in the area of Structural Assessment and Rehabilitation (SAR), Evaluation of concrete making materials and concrete mix design, Alkali Aggregate Reaction (AAR) studies of Aggregates, Evaluation of corrosion inhibitor and Third Party Quality Assurance services.

In the area of quality management, NCB conducted 10 inter-laboratory proficiency testing schemes in accordance with ISO17043:2010 out of which 2 concrete cubes schemes have been conducted for the first time in India. NCB developed 2 new reference materials during the year and continued the supply of reference materials to the industries. So far, 79 types of CRMs have been developed since its inception. NCB provides metrological traceability to SI units for all its CRMs and meets the requirement of ISO 17043. Many of NCB CRMs are quoted in IS codes for reference, application and calibration. NABL accredited calibration services were also provided.

NCB's stride in organizing seminars, workshops and symposiums to disseminate new and innovative technologies has reached a milestone with the organization of NCB Seminar on Durability and Service Life Design of Concrete Structures held on 07 April 2017 at NCB-Ballabgarh which attracted huge participation from cement, concrete and construction sectors. 15th NCB International Seminar, a biennial event, was organized successfully during 5-8 Dec 2017 at New Delhi. Participation of about 1200 delegates including foreign delegates from 22 countries, 120 exhibition stalls, presentation of 180 technical papers, etc was a remarkable feat to achieve and the seminar was rightly rated as one of the biggest events in this part of the globe.

NCB left no stone unturned in its efforts to develop the Human Resources in cement and building materials sectors. It conducted 79 training programmes during the year 2017-18 benefiting 1249 participants from various organizations in India and abroad. So far, 2533 training programmes have been organized since its inception in 1972 and a total number of 42,239 participants comprising of industry professionals and fresh graduates/post-graduates in science and different disciplines of engineering have benefited. With the construction of new hostel facility, it opens up opportunities for growth in organizing more number of residential programmes/special Group Training programmes.

In the area of International assignments, NCB has recently undertaken joint project on Co-processing of Alternative fuels and resources in the Cement Industry- Phase- II jointly with SINTEF Norway, DPR Preparation work for setting up 600 tpd cement plant in Republic of Congo. (Under line of credit scheme of Govt. of India) and Technical Study for using vehicles tyres as alternative fuel and Raw Mix design for M/s Oman Cement, Oman.

It is a matter of great satisfaction that ongoing UNIDO project titled "Development & Adoption of Appropriate Technologies for Enhancing Productivity in the Cement Sector in India" implemented jointly by UNIDO and NCB has been completed successfully. It has effectively met the objective to strengthen the global competitive position of the Indian Cement Sector by enhancing the technical capacities and capabilities of NCB. 6 nos. of technical workshops were organized on topics like, Alternate raw materials and fuels, best available technologies, KPI's and Patents and IPR and study tours and fellowship tours have been undertaken by NCB scientists/engineers to various reputed international laboratories, cement plants and alternate fuels processing facilities in countries like Denmark, Spain, Germany, Austria, Poland, Belgium, South Africa and 27 scientists/engineers have been trained under this project. The international exposure provided to NCB's scientists/engineers will go a long way in improving the quality of services provided by NCB to its user industries in the years to come.

The achievements and progress made by NCB to a great extent are due to the active support and cooperation from the Government, industry and other organizations. Under the leadership of the Director General (Actg.) of NCB Shri Ashutosh Saxena, the scientists and engineers including other technical and non-technical staff with their continuous efforts have achieved these significant goals as mentioned which are worth appreciating. I express my sincere thanks to my colleagues in the Board of Governors of NCB and its Advisory Committees for their valuable advice and guidance. Sincere most thanks are due to Department of Industrial Policy and Promotion (DIPP), Government of India for their continuous support and guidance for improving NCB's performance year on year and to achieve the status of the preferred technology partner in cement, building materials and construction sectors.

10 November 2018

Mahendra Singhi
Chairman

INTRODUCTION

I take immense pleasure in presenting the Annual Report for the Year 2017-18. The Report contains the achievements of NCB through its programmed projects and the activities that have been carried out during the year. With its innovative and sincere efforts NCB has maintained its status as the leading research organization and also the preferred technology development partner in the cement and construction sector. NCB has executed number of research and development projects maintaining standards, quality and timeliness, imparted training programmes in the fields of cement, construction and building materials, rendered services on quality management, developed newer reference materials etc. The programmed projects covered a wide spectrum from cement research to utilization of waste derived fuels and development of special concretes.



The research projects in the specific areas such as maximizing limestone in Portland Limestone Cement, enhancing the use of fly ash in PPC (beyond 35 %), use of mechanical mixer and fixed w/c ratio in physical testing of cements (OPC, PPC and PSC), Development of Active Belite Cement using Low Grade Limestone, development of composite cements & environmental friendly low carbon cements, process optimization, utilization of waste as secondary fuel, application of 3D printing technology to construction industry and Unmanned Aerial Systems (UAS)/drones for condition assessment of tall structures etc have yielded encouraging results and are worth mentioning. Besides these, NCB has done the Evaluation of Limestone Calcined Clay Cement, studied Effect of Different Chemical Formulations on Enhancement of Cementitious Properties, studied white Portland cement containing up to 35% dolomite as additive, etc which benefited the industry. During the year, LCF studies were completed for 15 cement plants all over the country and so far established the same for 202 cement plants. Number of samples including that of cement, raw materials, coal, fly ash, slag, other industrial waste from different organizations were analyzed in NABL accredited NCB laboratories.

NCB renders its services to the cement and building material industries by executing projects on sponsored basis and carried out in the areas of computer-aided deposit evaluation, environment management, Beneficiation Low/Marginal Grade Limestone, monitoring of environmental parameters, Pollution Load due to Operation of Flyash Dryer, Minimizing Excessive Kiln Build-ups, Capacity Assessment & expansion, Techno Economic Feasibility of Used Tyres as Alternate Fuels in Preheater and Clinkerisation, Co-processing of Alternate Fuels, Heat and Gas balance, Productivity & Process Optimization, Project Monitoring and Control for Setting up a Cement Plant, Coal & Petcoke Handling System, DPR for Setting up a Green Field Cement Plant, DPR for Pond ash Drying System, TEFr for Setting up a Cement Grinding Unit.

In the areas of construction development and research, with state-of-the-art NDT equipments along with sample processing lab, the Centre could handle a good number of assignments in condition/health assessment for old & new structures including service life. The Centre is equipped with ISO 17025:2005 accredited NDE lab and well experienced & trained personnel. More than 285 concrete mix designs have been carried out and 35 admixtures tested and evaluated. 75 numbers of aggregates have been evaluated using Petrographic Analysis and Accelerated Mortar Bar Test. Concrete Mix design for Special Applications like Self-compacting concrete & Abrasion Resistant Concrete with and without Steel fiber were designed. Considerable amount of work is done in areas such as :corrosion inhibitor, Bottom Ash as partial replacement of fine aggregate for making concrete, Design of High Performance Concrete Mixes for specified long Service Life, Development of Ultra High Performance Concrete (UHPC) , enhanced utilization of Construction & Demolition (C&D) Waste and Other waste based aggregates in concrete structures & Pavements etc are of interest to cement, concrete and building materials' industry. Third Party Quality Assurance/Audit (TPQA) programme of the center has assisted various organizations to ensure quality of materials and workmanship to meet their quality commitments in constructed facilities. TPQA was carried out for roads and bridges construction, residential blocks, community facilities and institutional buildings, canal lining work, concrete drain projects, boundary wall construction etc for construction industry.

Being the first PT provider in the area of cement, it maintained its spirit with completion of ten PT schemes on materials like: OPC, PPC, Fly ash, Burnt clay building brick, Coarse & Fine Aggregate, Mortar & Concrete cube. The calibration laboratories continued to implement Quality Management System as per ISO 17025:2005 requirements. 1600 equipment/apparatus including proving rings, compression testing machines, vibrating machines, environmental chambers, ovens, furnaces, balances, rebound hammers etc. were calibrated maintaining timeliness, work quality and interaction dimensions.

Human resources development is another area, in which NCB conducted short and long term training programmes on subjects related to cement manufacture, testing and calibration, quality management, concrete technology and construction practices during the year 2017-18 benefiting huge number of participants from various organizations in India and abroad.

NCB is organizing the 16th NCB International Seminar on Cement, Concrete and Building Materials during 03-06 December 2019 in New Delhi for which preparations are now in full swing for the successful organisation of the seminar.

The Pursuit of Excellence in Cement and Concrete can only be achieved by the collective effort of all in NCB. I wish to thank my colleagues for their dedicated support, whole hearted cooperation and commitment to uphold the high standards of professionalism. I am grateful to the Board of Governors and its Committees, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India for their support, guidance and encouragement. I also thank industry in general for reposing faith in NCB's services and their continued patronage without which no achievements would have been possible.

10 November 2018

Ashutosh Saxena
Director General (Actg.)

NCB'S PROGRAMMES AND THEIR FULFILMENT

THE CORPORATE PROGRAMMES

Over the years, NCB has emerged as preferred research & consultancy partner for the cement and construction industry. With its modern laboratories, experienced team of scientists and engineers and pro-active leadership, NCB has been providing innovative technological solution to overcome the hurdles faced by industry. Services were provided in the area of development of newer products, optimal utilization of resources be it limestone or industrial waste, process optimization, energy studies, plant maintenance, structural assessment and rehabilitation, quality assurance in construction, concrete technology, materials evaluation, application of nanotechnology and total quality management.

Further investigation on development of composite cement containing clinker, flyash and granulated blast furnace slag provided encouraging results. Limestone consumption factor was established for fifteen cement plants. A Study has been taken up on preparation and evaluation of high volume fly ash cements (HVFA). Evaluation of Limestone Calcined Clay Cement is taken up in association with Indian Institute of Technology, New Delhi. On the utilization of catalytic waste (FCC-E-Cat) from petroleum industry, studies were conducted.

Study on various technologies currently available and their efficacy in reducing the emissions of NO_x and SO_2 are being evaluated. Water footprint assessment (as per ISO 14046) of various cement plants have been done. Environment Monitoring Studies were carried out at various cement plants & Thermal Power Plants. Technical Study of feasibility of used tyres as alternate fuels in preheater and clinkerisation was carried out for a cement plant abroad. Co-processing of alternate fuels & resources of cement industry and a baseline report on Construction and Demolition Wastes (C&D waste) is also prepared. Application of Computerised Fluid Dynamics (CFD) in Indian Cement Industry and International practices on CFD technologies were studied. NCB has provided its continual services of Project Monitoring and Control for Setting up a 600 tpd Cement Plant in Republic of Congo (RoC). Detailed Project Report was prepared for expansion of existing Capacity to 2.0 MTPA for cement plant.

In the area of structural optimization and design, services of condition/health assessment for old & new structures were provided. NCB has conducted evaluation of wide range of concrete making materials for prestigious clients. Fine and coarse aggregate samples from various organizations were evaluated for Petrographic and Mineralogical Analysis and Alkali Aggregate Reaction (AAR) studies. Concrete Mix design for Special Applications were done like Self-compacting concrete, Abrasion Resistant Concrete with and without Steel fiber. Guidelines developed for Design of High Performance Concrete Mixes for specified long Service Life using latest available Ultrafines and

Admixtures. A study was taken up to improve the characterization of C&D waste by different methods so that the percentage utilization of C&D waste can be enhanced more than the prescribed limit in IS:383-2016. TPQA of construction projects have been taken up this year for a large number of satisfied customers. A study focusing on using polymer modified mortar (PMM) systems, protective systems and surface applied/penetrating protective and strengthening measures coatings were completed.

Of the 3 Proficiency Testing schemes on concrete cube, 2 have been completed and 10 PT Schemes were completed. Under the programme, Standard Reference Materials, 2 new types of certified reference materials have been developed & commercialized. So far, 79 types of CRMs have been developed. The calibration laboratories continued to implement Quality Management System as per ISO 17025:2005 requirements.

The 15th NCB International Seminar on Cement, Concrete and Building Materials including the Technical Exhibition was successfully organised in December 2017 in the series of biennial seminars. The seminar attracted much larger participation from Cement and allied industries in terms of delegates, papers presented and exhibitors.

NCB's current Rolling Plan of Missions is given in Appendix I. During the year under review specific projects with targets of time, cost and assured end-product were pursued under six Corporate Centres which are responsible for delivering the needed technological support services to the user industries. Close liaison was maintained as in the past with Cement Manufacturers' Association (CMA), Ministry of Environment and Forests (MoEF), Central Pollution Control Board (CPCB), Bureau of Indian Standards (BIS), Bureau of Energy Efficiency (BEE), Indian Bureau of Mines (IBM) and concerned department of the state governments on aspects related to the development of cement and construction industries including availability of raw materials, quality assurance, modernization, energy management, environment, consumer protection, human resource development etc.



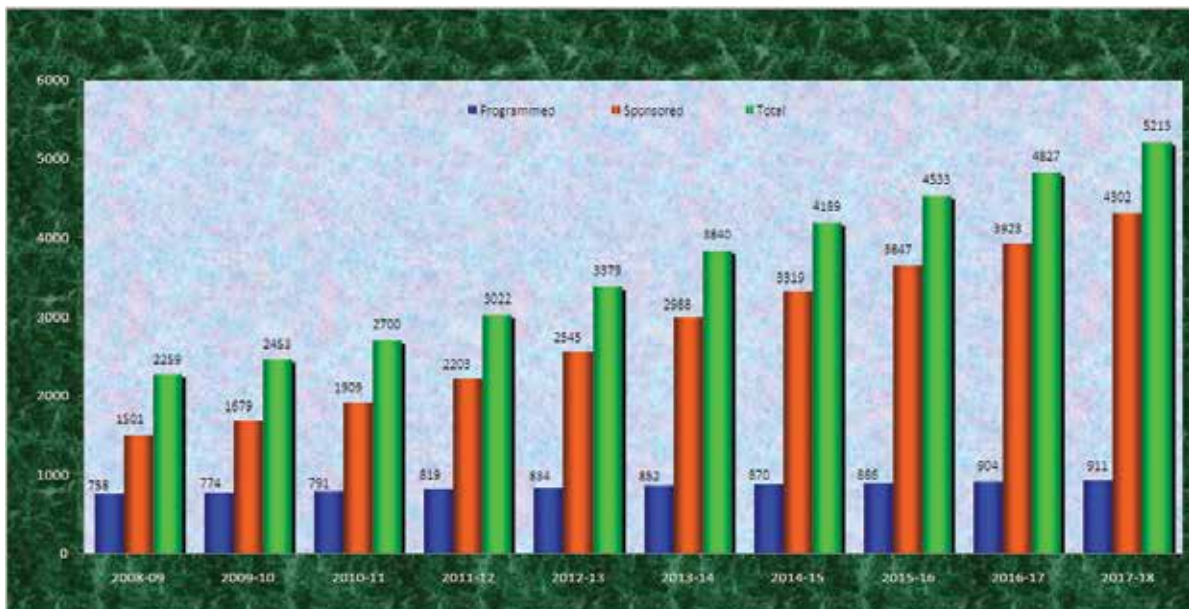
114th Board of Governors Meeting in Progress

FRAMEWORK OF INSTITUTIONAL EFFORTS

The activities of the Council were carried out under the six Corporate Centres at NCB's Units, situated in Ahmedabad, Ballabgarh and Hyderabad. While the infrastructure is physically distributed over these Units, all the Units are involved in the execution of projects or services as necessary following the matrix approach.

During the year, 7 Programmed and 379 Sponsored projects were completed as listed in Appendices II and III respectively. The programmed projects, carried forward along with the new ones taken-up, comprised the R&D Programme for 2018-19, as given in Appendix IV.

The broad activities carried out by the six Corporate Centres during 2017-18 are highlighted in the following sections.



Projects Completed by NCB (Cumulative)

CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING - CRT

The Centre executes its activities through five programmes viz. Cements and Other Binders, Wastes Utilization, Refractories and Ceramics, Fundamental and Basic Research and Independent Testing. 30 Sponsored Projects were successfully completed and 9 Programmed Projects were pursued during the year.

CEMENTS AND OTHER BINDERS

Establishing Limestone Consumption Factor (LCF)

Limestone consumption factor (LCF) studies have much significance for rationalization of limestone consumption in production of cement, estimating royalty payable to state for the limestone mined from their respective captive mines besides internal material audit of the concerned cement plants. NCB has carried out LCF studies for cement plants from all over the country and so far 202 such studies have been conducted for different cement plants. During the year, LCF studies were completed for 15 cement plants from Rajasthan, Maharashtra, Andhra Pradesh, Tamilnadu, Gujarat and Madhya Pradesh.

Investigations on Portland Limestone Cement

European standard EN-197-1 permits the use of maximum 35% limestone in the manufacture of Portland Limestone Cement. At present, Portland Limestone Cements (PLC), are not being used in India and BIS has also not formulated standard specifications for it. However, its utilization will be helpful in not only mitigation of environmental pollution but also, conservation of good quality raw materials, required for cement manufacture, through lowering of clinker factor.

NCB has taken up the studies to investigate the feasibility of using different grades limestone in development of Portland Limestone Cement and to formulate new Indian standard for its commercialization along with lowering of clinker factor in cement. Different Portland Limestone Cement blends were prepared by inter-grinding as well as separate grinding & blending of 10, 15, 20, 25, 30 and 35 wt. % of cement grade, dolomitic and low grade limestone with OPC clinker and gypsum. The cement blends were designated as PLC-D, PLC-E and PLC-F corresponding to the use of cement grade, dolomitic and low grade limestone respectively. The trend of compressive strength development showed marginal reduction in strength development with increasing dosages of limestone in cement mix as depicted in the *Figure 1*. However, increase in the early strength has observed with addition of low quality of limestone that may be attributed to the formation of monocarboaluminate phase (*Figure 2*).

Investigations on Preparation and Evaluation of High Volume Fly Ash Cements

The Indian standard specification IS: 1489 (Pt.I)-2015 for Portland Pozzolana Cement (PPC) permits 35% (max) fly ash addition in PPC. In view of enhancing the use of fly ash in PPC in order

to achieve resource conservation and environmental sustainability, NCB has taken up studies on preparation and evaluation of high volume fly ash cements (HVFA) in line with European standard EN-197-1. Different approaches have adopted to achieve desired strength development and other physical characteristics of HVFA using fly ash and clinker materials available in different parts of India. Investigations have been carried out on performance evaluation of High Volume Fly Ash Cement (HVFA) up to 50 percent fly ash prepared by inter-grinding as well as separate grinding and blending of all the constituents. Almost similar strength development pattern was observed in the cement samples prepared with increasing percentage of fly ash with clinkers of different alite contents and maintaining same fineness level by inter-grinding as well as separate grinding and blending. The observed trends in compressive strength is given in the *Figure 3*. The effect of fineness levels was found to be more pronounced of HVFA prepared with the clinker having higher alite

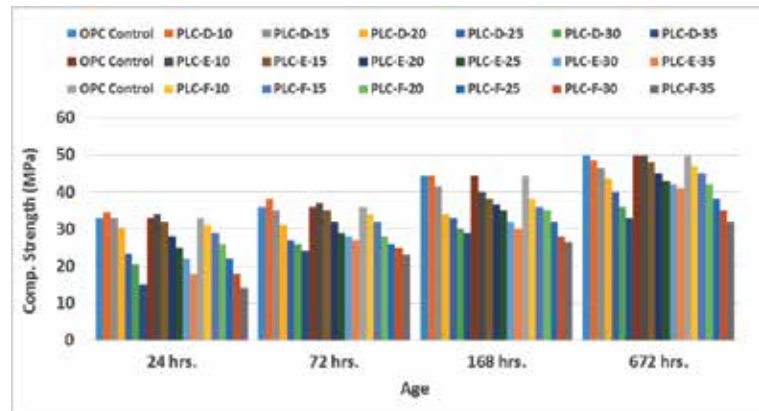


Figure 1 : Trend of Compressive Strengths development of PLC blends

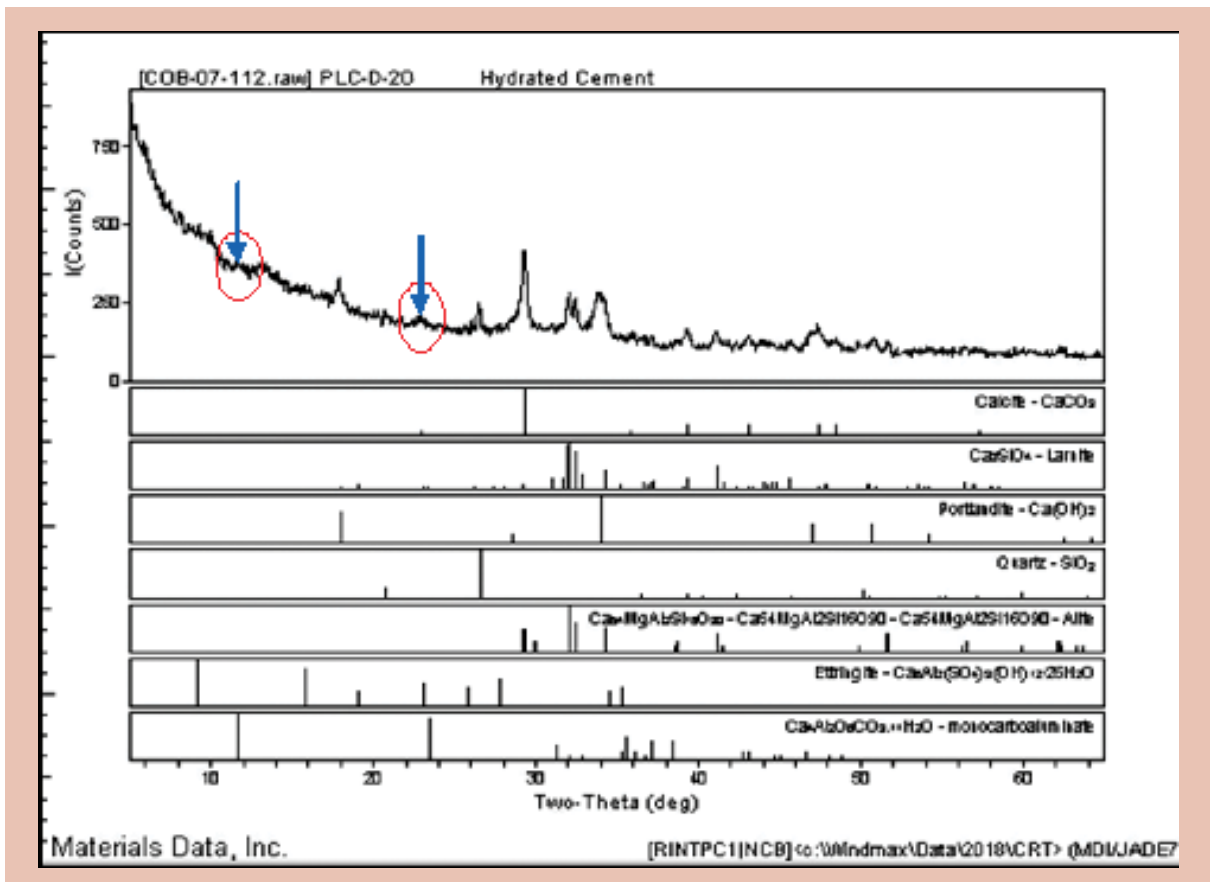


Figure 2 : X-ray Diffractogram of hydrated PLC (cement grade limestone)

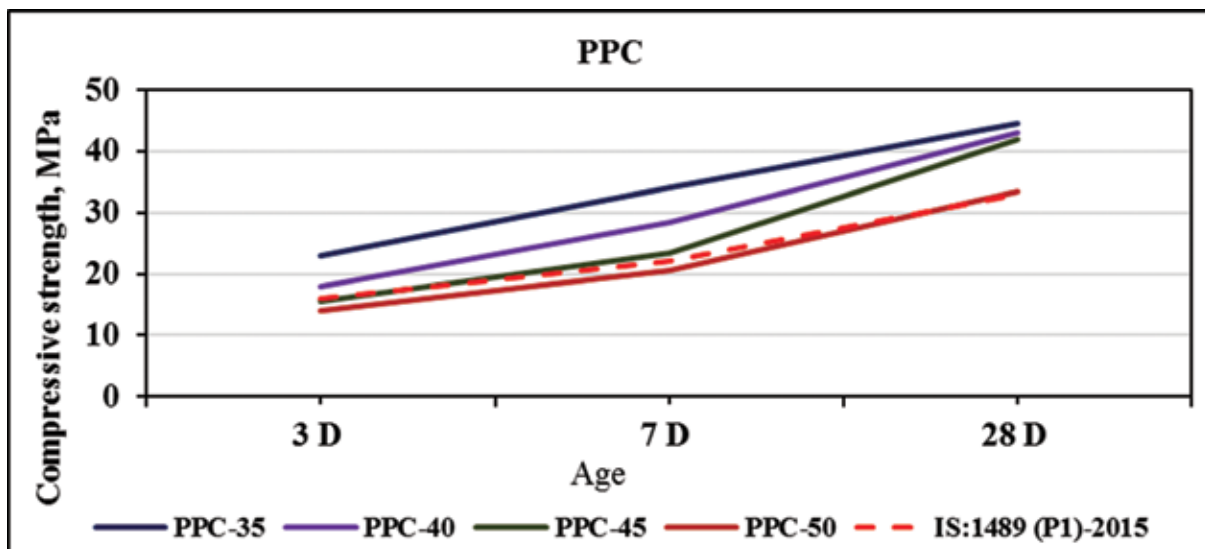
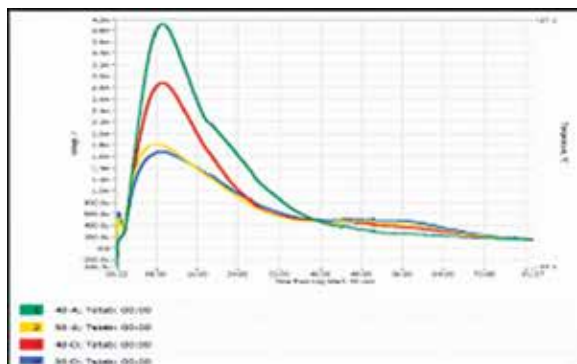


Figure 3 : Trend of Compressive Strength development of HVFAC



A



B

Figure 4 : (A). Graph showing Heat Evolution in Chemically Activated Cement Samples using Isothermal Calorimetry. (B) Photograph of Isothermal Calorimeter

content. Further, the investigations showed no significant effect on the compressive strength property by increasing fly ash fineness but maintaining clinker fineness same. Hydration studies on HVFC blends were conducted using Isothermal Calorimetry (Figure 4A), XRD and SEM.

Use of Mechanical Mixer in Physical Testing and Fixed w/c Ratio for Compressive Strength Testing of Cements

The Indian standard methods for physical tests of cement as given in IS 4031 specifies the use of trowels for preparation of cement paste and mortar. The manual gauging of paste and mortar may introduce man to man and lab to lab variations, especially in determination of normal consistency of cements. Studies were taken up on use of mechanical mixer and fixed w/c ratio in physical testing of cements. OPC, PPC and PSC samples were tested as per Indian standard test methods using manual gauging as well as mechanical mixer for preparation of paste and mortar. These cement samples were also tested for compressive strength using mechanical mixer and fixed water/cement (w/c) ratio of 0.4 &

0.5. Usage of mechanical mixer would improve the consistency level and reduce variability in test results of compressive strength of cement, particularly that of normal consistency. Use of mechanical mixer resulted in lower values of normal consistency from current practice of manual gauging for OPC, PPC and PSC. Use of mechanical mixer also showed relatively lower setting times of OPC but relatively higher setting time of PPC (Figure 5 & 6) and PSC. Le-Chatelier and autoclave expansion were not affected by use of mechanical mixer.

Development of Rective Belite Cement using Low Grade Limestone

Belite Cement production is a challenge for Portland cement manufacturers. It can be prepared at low clinkerization temperature, requires less energy, low carbon footprint and can be reactive for hydraulic activity through doping with heteroatoms like boron, phosphorous, etc.

The belite phase (C_2S) is also the second most abundant constituent of OPC. Dicalcium silicate (C_2S) has five polymorphs (γ , β , $\alpha'L$, $\alpha'H$ and α) and among them orthorhombic crystal structures of $\alpha'H$ - and α -polymorphs have calcium cations in both eight and nine irregular coordination. It was reported that an increase of the calcium coordination number seems to enhance the water reactivity. The presence of structural defects or strains in crystalline structures causes more active belite phase.

This reactive belite clinker using low grade lime stone fired at 1300°C and 1350°C were produced at NCB laboratory and characterized by X-ray diffraction (XRD) in Figure 7 and optical microscopy (OM) in Figure 8.

Belite content increases in the clinker and stabilizes the most reactive polymorph of belite α'_H - C_2S phase with the addition of dopants. Laboratory trials at lower temperatures using different other dopants with varying concentration to produce reactive belite phase are also under progress.

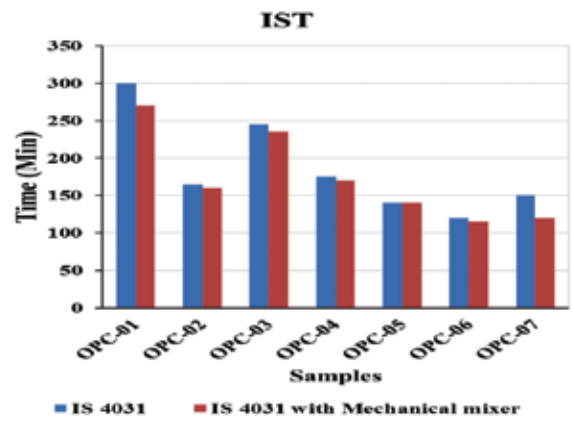


Figure 5 : Initial setting time of OPC samples

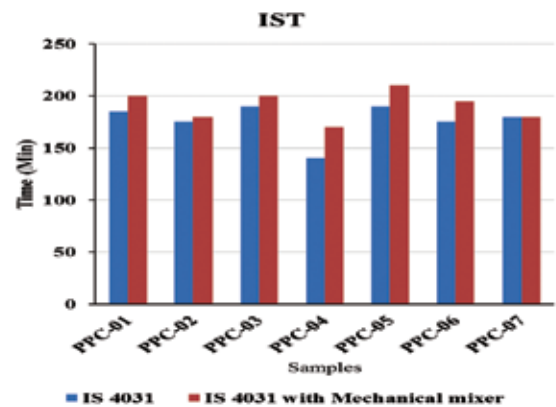


Figure 6 : Initial setting time of PPC samples

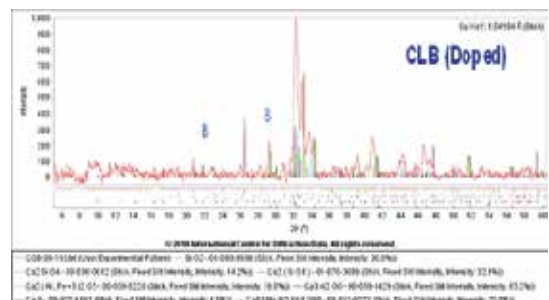
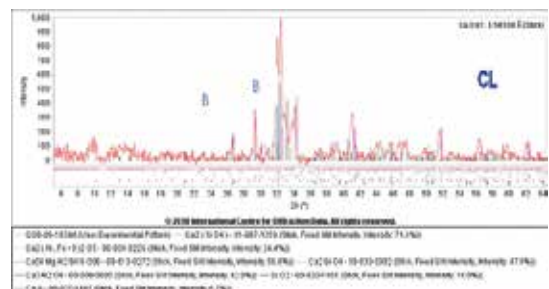


Figure 7 : X-ray Diffractometer of Belite Clinker fired at 1350°C *B is peak for beta phase

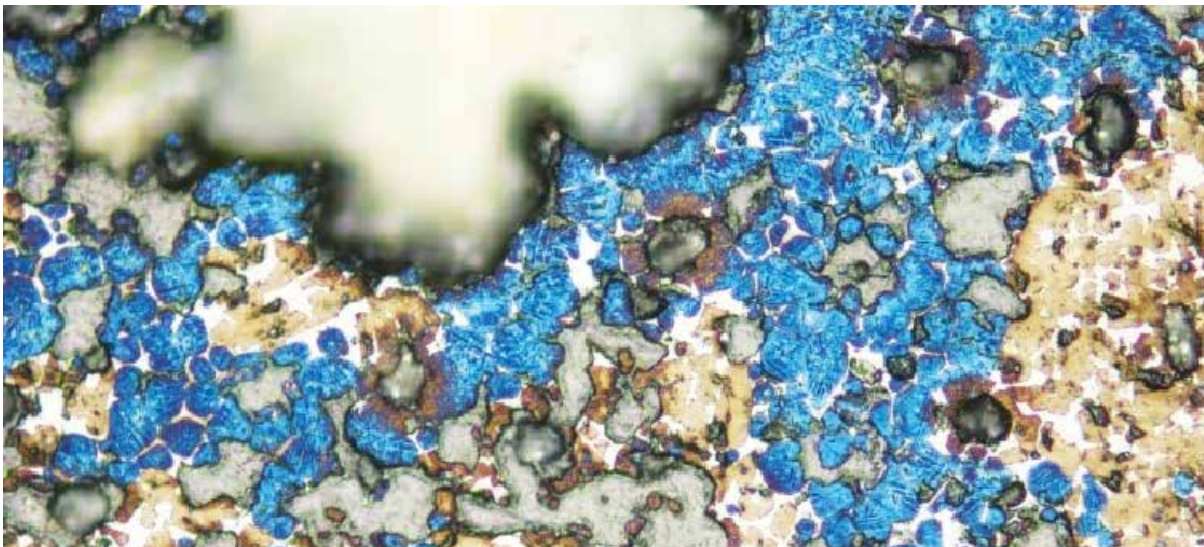


Figure 8 : Optical Microscopy - Distribution of Alite and Belite Grains in the Belite Clinker Fired at 1350°C (20x)

Development of Composite Cements

Investigations are taken up for preparation of composite cement blends as per the Indian Standard specification IS 16415 : 2015 containing clinker in the range 35-65%, Fly ash 15 – 35% and GBFS 20 – 50% by intergrinding as well as separate grinding using raw materials from four different regions of the country. Blends were prepared (10 Nos.) using raw materials like clinker, fly ash, GBFS and gypsum from northern portion of the country and intergrinding the constituents at two fineness levels of 350m²/kg and 400m²/kg. The fly ash content in the blends were varied as 15, 20, 25, 30 and 35% and GBF slag was fixed at 20% maintaining SO₃ at 3% in the prepared blends. Physical and chemical performances evaluation of the blends prepared by intergrinding at two different fineness levels are being taken up and is under progress. Figure 9 shows the compressive strength of composite cement blends prepared by intergrinding v/s separate grinding + blending at fineness of 340 ± 10 m²/kg.

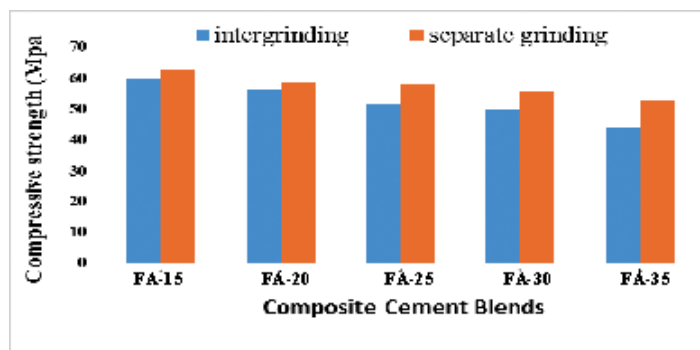


Figure 9 : Graph showing Intergrinding v/s separate grinding + blending at fineness of 340 ± 10 m²/kg

WASTE UTILIZATION

Investigations on Low Carbon Multi-component Cement Blends

Although, the cement production is one of the most sustainable materials known to man, the sheer quantity of its production puts it amongst the top contributors of CO₂ emission. Cement production is known to contribute ~9.5% of global CO₂ emissions. Multi-component blended cements are environmental friendly low carbon cements. European standard EN-197-1 specifies Portland composite cements

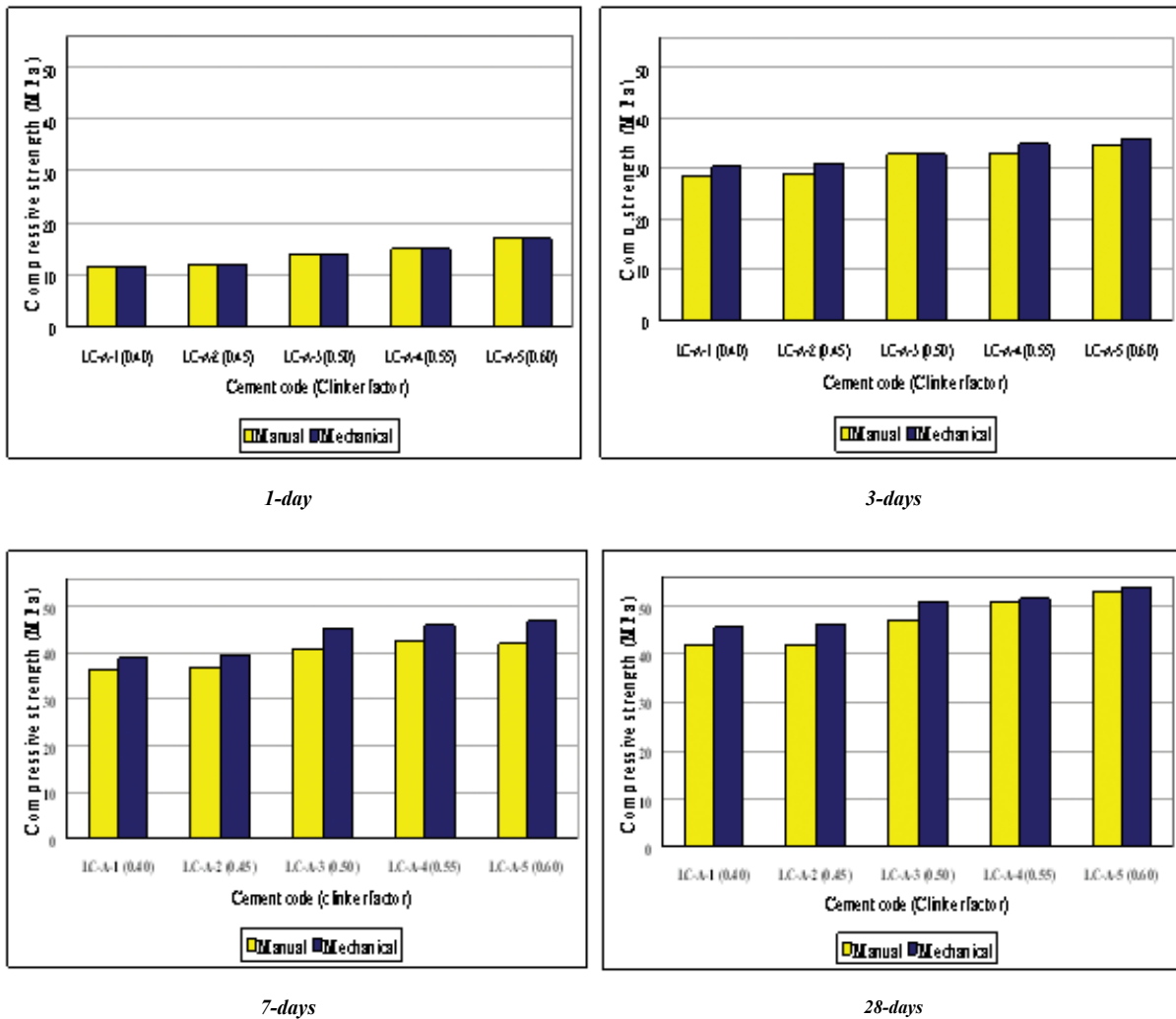


Figure 10 : Trend of Compressive Strength of Cement Blends Containing Different Clinker Contents

(CEM-II/A-M & B-M) with number of blending components, used simultaneously. Therefore, there is a large potential from cement industry in contributing towards sustainable development of emerging economies by switching over to blended cements using other mineral additions. In India, large amount of mineral resources and wastes such as ~27,000 billion tones of clay reserves, 35-40 billion tones of low grade limestone, 5-6 million tones of marble waste and 450 million tones of fly ash by 2020-21 are available and could be used in development of low clinker content cements. For this purpose, different cement blends were prepared using Portland clinker, limestone, calcined clay etc maintaining clinker factor 0.40, 0.45, 0.50, 0.55 and 0.60. The compressive strength of these cement blends at different ages were determined according to Indian standard test procedure as described in IS: 4031 and mechanical mixing of cement blends. Figure 10 shows the trend of compressive strengths of cements containing different clinker contents. It indicated (i) comparable strength at 1-day irrespective to clinker content, could be due to the presence of highly reactive calcined clay (ii) marginal reduction in strengths of cement blends containing low clinker contents up to 0.45 (ii) marginal increase in strength development in case of mechanical mixing. Studies on other cement systems such as fly ash-calcined clay, calcined clay-marble waste etc is underway.

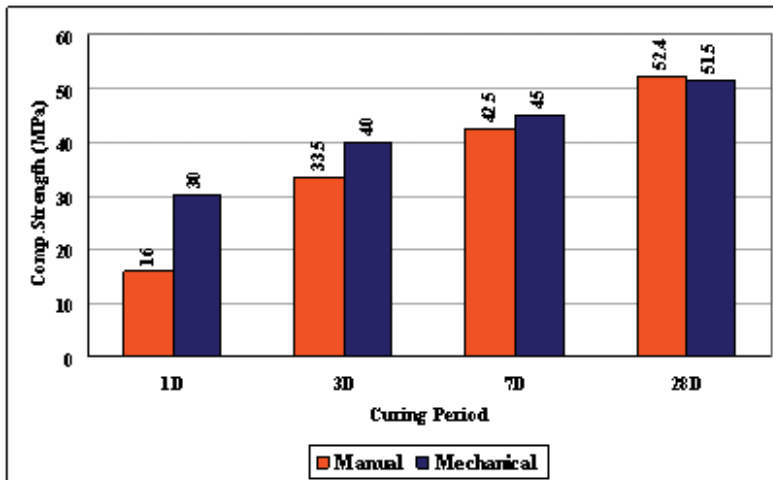


Figure 11 : Trend of Compressive Strength development of LC₃ cement blends

Investigations on Limestone Calcined Clay Cement (LC₃)

The use of Supplementary Cementitious Materials (SCMs) by lowering clinker content in cement is a viable option to conserve natural resources and to bring down CO₂ emissions during cement production. A collaborative study on “Evaluation of Limestone Calcined Clay Cement” is in progress at National Council for Cement and Building Materials

(NCB) in association with Indian Institute of Technology, New Delhi (IIT-D). Cement formulation containing about 50% Portland clinker, 15% limestone, 32% calcined clay and 3% gypsum was investigated for compressive as well as flexural strength development at different ages using Indian standard test procedure as described in IS:4031 and mechanical mixing of cement blends. The results indicated marginal improvement in strength development particularly at early ages in case of mechanical mixing. LC₃ cement blend was found to be resistant to different aggressive environmental conditions. Further studies are underway. Figure 11 shows the trend of compressive strength development of LC₃ cement blends performed by manual and mechanical mixing.

FUNDAMENTAL AND BASIC RESEARCH

Investigations on the Effect of Different Chemical Formulations on Enhancement of Cementitious Properties

The high performance cement is desired for high performance concrete production in the market. Chemical additives are added to the mill during cement grinding to reduce the energy required to grind the clinker into a desired fineness and enhance cement hydration for improving strength development. The aim of this project is to study the development and design of chemical formulations using different dosages of chemical additives to enhance cementitious properties. The studies have been carried out using different sources of clinker, gypsum and different functional moiety containing chemical additives.

As the fineness of the finished cement is one of the main factor that affects the early strength development, experimentations were performed in utilizing the chemical additives as grinding aids as well as performance improver to enhance the grinding efficiency and improved physical properties of clinker in cement production. During grinding the clinker, the free energy of the surface increases and the non-equilibrium become significant. The aggregation and agglomeration will therefore become increasingly significant and the efficiency of the mill is reduced. The use of optimized quantity of grinding aids reduces the formation of agglomerates in the cement mill resulting in reduced size. Higher dosages of chemical additives will lead to lubrication effects that will decrease the breakdown of the particles and the efficiency of the mill decreases.

The experimental results obtained by the addition of 0.02, 0.03 and 0.04 wt% of derivative of amine and glycol individually and their combinations have been studied for different sources of clinker. The results show that the addition of chemical additives in formulated 1:2 ratio of amine and glycol derivative improves the grinding efficiency by reducing grinding time by 14.2% for desired fineness of clinker and the compressive strength at all the ages from 1 day to 28 days compared to control sample. The increase in compressive strength observed was ~ 20% with the usage of formulated chemicals and is due to acceleration of hydration of both the silicate and aluminate phases. *Figure 12* shows the grinding efficiency of the formulation prepared from amine and glycol derivative and *Figure 13* depicts the compressive strength of cement samples influenced by chemical additives.

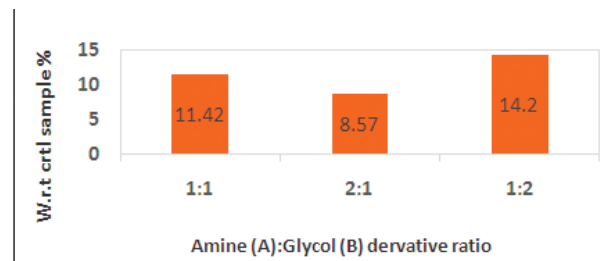


Figure 12 : Grinding Efficiency of the Formulation Prepared from Amine and Glycol Derivative

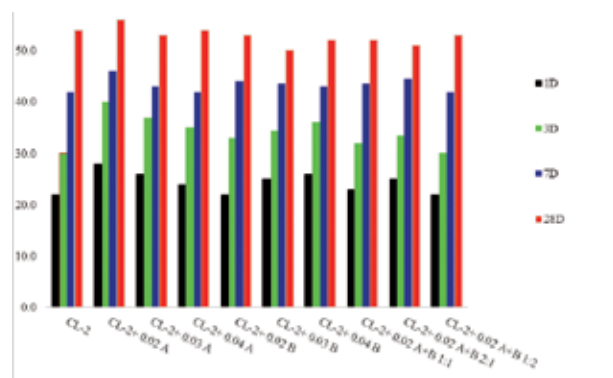


Figure 13 : Compressive Strength of Cement Samples Influenced by Chemical Additives

Technical Suitability of Utilization of E-cat in the Manufacture of Cement

Studies were conducted on the utilization of catalytic waste (FCC-E-Cat) from petroleum industry. The chemical constituents of this catalytic waste depicted its suitability as a raw mix component. Studies showed that the utilization of up to 3% of FCC-E-Cat with other set of raw materials in manufacture of OPC, was conforming to all the requirements for OPC laid down in Indian Standard Specification IS: 269-2015. The studies also indicated its utilization in the range of 5% as performance improver in OPC. Such replacement was beneficial keeping in view the reduction in greenhouse gas emissions, better utilization of industrial wastes, conservation of natural minerals, ecology and sustainability of cement industries.

Evaluation of White Portland Cement Containing upto 35% Dolomite as Additive

Studies were conducted on the utilization of up to 35% of dolomite as an additive for production of white portland cement. The present scenario depicts an urgent need to conserve the cement grade limestone reserves. Thus it become highly essential to utilize the available dolomite for cement production. The studies at NCB have showed that usage of up to 15% dolomite as an additive replacing equal quantity of clinker depicted cement performance similar to that of control cement prepared without dolomite. Studies showed that enhancement in dolomite utilization results in saving of natural resources without lowering on the performance of cement.

Evaluation of Paste Fills for Mine Backfilling

The mining of ore for Pb and Zn metal extraction leads to the formation of large underground voids in mines which need to be filled up before excavating the ore from the adjacent mining and extraction area.

The metal extraction process generate waste such as mine tailing and jarosite in significant quantities. These mine tailing and jarosite wastes contain elements such as Cd, As, Sr, and Pb. The handling and dumping of these generated wastes pertain to challenges affecting environment and policymakers in Govt. cemented paste backfills (CPB) method compose of non-homogenous material made by mixing water, waste tailings and cement. Generally, the waste solid proportion is between 70% and 85% water, which is either clean or mine waste water along with hydraulic binder such as cement usually between 5-15% of total weight depending on rock property. Currently, one of the zinc mines employs paste fill composition consisting of 7-10 % parts of cement and rest parts of mine tailings. The powder blend used to prepare a paste was using ~ 20-25% water. The balance of the paste consists of the powder blend of OPC and mines tailings. The cement backfill paste prepared as a result have slump in the range of 180-250 mm and was employed for mine backfilling. This study involved an evaluation of the feasibility of using waste materials namely fly ash and jarosite as partial replacement of cement in the currently employed composition of paste fill to economize application.

The paste fills prepared with 92% tailings and 8% OPC, the same as the paste fill currently employed by Hindustan Zinc Ltd., had a slump of 170-220 mm at 23% water, and compressive strength of 1.7-2.7 MPa at 28 days. Lowering of OPC content from 8 to 7-4 % and consequent increase in the tailings content from 92 to 93-96% percent did not have any significant effect on the slump of the paste fills, but the compressive strengths were lowered. At OPC content of 5, 6 and 7% the compressive strengths at 28 days were 1.11, 1.03 and 1.05 MPa, respectively. The results of the study indicated the feasibility of replacing up to 3 percent OPC with fly ash / jarosite and get the desired slump and strength development in the paste fills.

REFRACTORIES AND CERAMICS

Buildups and Coatings in the Cement Rotary Kiln

Studies were conducted on minimizing excessive kiln build-ups in rotary kiln. The composition of the ring samples, on ignited basis, indicated higher contents of sulphur and lower contents of silica compared to the content of these constituents in clinker. Ring samples had SiO_2 , Al_2O_3 , Fe_2O_3 , CaO and SO_3 contents in the range of 16.79 - 20.06, 3.10 - 4.04, 2.91 - 3.80, 54.09 - 63.01 and 4.04 - 17.36%, respectively. The liquid contents and sulphur to alkali ratio were in the range of 19.12 - 23.28% and 10.05 - 53.42%, respectively. However, liquid contents of ring samples were much lower and sulphur to alkali ratio is very high. Sulphur-induced rings are usually formed when the sulphur-to-alkali molar ratio in the system is more than 1.2. There was a considerable amount of free SO_3 circulating in the kiln. Plant data on clinker composition was summarized and the yearly average values of LSF, SM and AM were in the range of 0.93 - 0.96, 2.45 - 2.77 and 1.05 - 1.30, respectively. The average value of coating index was in the range of 28.21-29.96 with minimum and maximum values being 27.53 and 35.00, respectively. Coating index values higher than 30 lead to increased tendency for coating formation. The monthly average values variation in clinker LSF, SM and AM values was in the range of 0.90-0.94, 2.61-2.84 and 0.97-1.07, respectively. The alumina modulus of the clinker was considerably lower. The study recommended increasing the alumina modulus may lead to better granulation behavior of clinker.

INDEPENDENT TESTING

Independent Testing Laboratories of NCB undertake physical, chemical, mineralogical and micro-structural analyses of various types of raw materials, cement, clinker, pozzolana, aggregate, concrete, admixtures, water, refractory, bricks, coal, lignite etc as per National and International Standards.

NCB testing laboratories achieved a landmark when NABL accredited them in the year 1997 as per ISO 17025 quality system. The quality of testing services is maintained through complying with system criteria and accreditation. The laboratories are equipped with state-of-art instruments to carry out the tests as per National and International standards. A new and improved Laboratory Information Management System (LIMS) was installed in CRT for better and rapid report generation with advanced features. This new LIMS has improved features with increased number of terminals extended to all the NABL accredited laboratories of NCB viz. Analytical Laboratory Services, Environmental Laboratory, Mechanical and Physical Property including investigation laboratory which enables quick report generation.

During the year, assignments were carried out for samples from neighboring countries also. The number of samples tested during the year was more than 7650.



Laboratory Information Management System (LIMS)

CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING & OPERATION - CME

Centre for Mining, Environment, Plant Engineering & Operation (CME) carried out its activities through six Programmes viz Geology, Mining & Raw Materials; Environmental Management; Process Optimisation and Productivity; Energy Management; Plant Maintenance; and Project Engineering & System Design. The Centre completed 32 sponsored projects during the year.

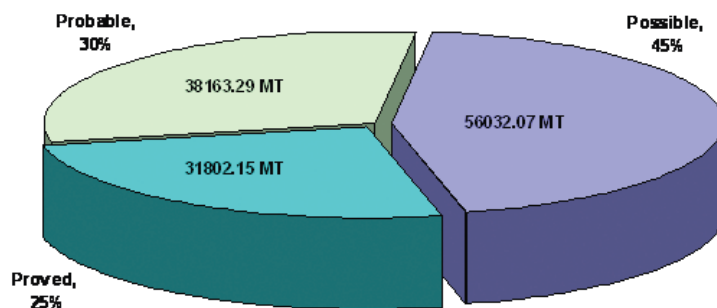
GEOLOGY, MINING AND RAW MATERIALS

Updating National Inventory of Cement Grade Limestone Deposits in India

NCB under its continuous activity *Updating of National Inventory of Cement Grade Limestone Deposits in India* is updating it through regular interaction with various Central and State Government departments including State DGMs. Exploration data and latest status of limestone resources are being collected and compiled. The total limestone resources of all categories is estimated at 125997.51 million tonnes as on 31st March 2018 out of which the proved, probable and possible categories are of 31802.15 million tonnes, 38163.29 million tonnes and 56032.07 million tonnes respectively.

Computer-aided Deposit Evaluation and Optimization of limestone resources for Sitapuram Mines

The Computer-aided Deposit Evaluation and Optimization of limestone resources for Sitapuram Mines (ML-1: 770.23, ML-2: 558.71 hectares) near Jagayapet, Dist: Suryapet, Telangana for M/s Zuari Cement Ltd (Heidelberg Cement Group) has been taken up. Exploration Bore hole data, drawings and relevant data have been received. The data has been reviewed and execution of the project is in progress.



National Inventory of Cement Grade Limestone Resources

Preliminary Investigation for Beneficiation on Laboratory Scale for Low / Marginal Grade Limestone

Preliminary Investigation for Beneficiation on Laboratory Scale for Low/ Marginal Grade Limestone for Singsar Limestone mines, Tehsil Kodinar, Dist. Gir Somnath, Gujarat for M/s Ambuja Cements Limited, (unit; Ambujanagar) has been taken up. Representative samples from the mines have been received at NCB and work is in progress.

ENVIRONMENTAL MANAGEMENT

Best Practices for Reduction of NO_x and SO₂ Emissions for Indian Cement Industry

Study on various technologies currently available and their efficacy in reducing the emissions of NO_x and SO₂ are being evaluated. Few plants having high SO₂ emissions in various parts of India have been identified and are being studied to identify appropriate technology to control them. Interacted with International experts on Best Available Techniques (primary and secondary measures) available worldwide for reduction of NO_x and SO₂ emission under UNIDO assistance.

Water Footprint Assessment for Cement Plants

Water footprint assessment (as per ISO 14046) of various cement plants have been done based on the data generated from the given data format. Four plants in different geographical areas of India were visited for collecting inventory on water consumption in different sections of cement plant carried out. Water foot prints for these regions have been calculated. Report is under preparation.

Process Measurements of Existing Air Pollution Control Equipment for Kiln and VRM

Process measurements of existing Air Pollution Control Equipment for kiln and VRM were carried out for the Cement Plant of Cement Corporation of India, Tandur, Telangana. Dust load on the current APCE and process flows in the pyro-processing circuit was measured. Based on the measurements design parameters for new RABH was given.

Pollution Load due to Operation of Fly Ash Dryer to be installed in a Grinding Unit

Study on pollution load due to operation of fly ash dryer to be installed in a grinding unit in Punjab was carried out. The pollution load due to particulate matter emissions from grinding of cement and power generation, water pollution and solid waste generation due to present operation and anticipated load after installation of flyash dryer was estimated. Also environmental benefits due to utilization of wet fly ash available to the plant from the ash dykes thermal power plant near the grinding unit were also highlighted.

Environment Monitoring Studies :

- Environment Monitoring Studies were carried out at two cement plants in Himachal Pradesh. Point source emissions viz., PM, SO₂ and NO_x in kiln stack and PM emission in other process stacks were measured.
- Environment Monitoring Studies were carried out for ambient air, construction water, soil quality and ambient noise for a construction site in Delhi during three seasons.
- Environment Monitoring Studies were carried out at 7 Thermal Power Plants of Haryana Power Generation Corporation Ltd located in various locations (Panipat, Hissar, Yamunanagar) of Haryana. Point source emissions viz., PM, SO₂ and NO_x in Boiler stacks were measured.

PROCESS AND PRODUCTIVITY

Diagnostic Study for Minimizing Excessive Kiln Build-ups

Diagnostic study for minimizing excessive kiln build-ups was carried out for M/s Star cements Ltd, Meghalaya and recommendations were given for reducing kiln build-ups and ring formation inside the kiln.

Capacity Assessment Study for :

- M/s Star Cement Meghalaya Ltd, Meghalaya.
- M/s Goldstone cements was carried out.

Feasibility Study for Co-processing of Alternate Fuels

Feasibility study for co-processing of alternate fuels was carried out for M/s JK Cements, Karnataka in which a suitable handling and firing system for both solid and liquid alternate fuels was proposed.

Diagnostic Study for Improving Productivity & Process Optimization

Diagnostic study for improving productivity & process optimization for M/s Hill Cement limited, Meghalaya was conducted to identify the reasons for low productivity and gave suitable recommendations for improving the same.

Technical Study of Feasibility of Used Tyres as Alternate Fuels in Preheater and Clinkerisation

Technical Study of feasibility of used tyres as alternate fuels in preheater and clinkerisation was carried out for M/s Oman Cement Company, Oman and a suitable system for utilization of used tyres will be proposed in this project.

Co-processing of Alternate Fuels & Resources of Cement Industry Phase-2 for SINTEF, Oslo, Norway

Co-processing of alternate fuels & resources of cement industry phase-2 for SINTEF, Oslo, Norway in which Draft on baseline report on C&D waste is prepared and submitted. Baseline report on inorganic waste is in progress.



Inspection of Ball Mill at M/s Oman Cement Company, Oman

Heat and Gas Balance Study

A Heat and gas balance study for M/s Hemadri cements was carried out and recommendations for reducing specific heat consumption were given.

Coating and Ring Formation Study

Coating and ring formation study for M/s Saurashtra Cements, Gujarat was carried out.

Application of CFD in Indian Cement Industry

Under the study *Application of CFD in Indian Cement Industry*, data compiled on CFD technologies related to energy, performance improvement of major process equipments, improving combustion efficiency and environmental improvement etc. and International practices on CFD technologies were studied.

ENERGY MANAGEMENT

Compressed Air Audit

Compressed air audit for Line-1 & 2 compressors -11 nos. compressors was carried out at M/s Heidelberg Cement India Ltd., Narsingarh, Damoh (M.P.).

Mandatory Energy Audit was carried out at

- M/s Gujarat Sidhee Cement Limited, Sidheeagram, Gujarat.
- M/s J K Cement Works, Jharli, Dist Jhajjar, Haryana (as per BEE energy conservation act 2001).
- M/s Saurashtra Cement Limited, Ranavav, Gujarat (as per BEE Energy Conservation Act 2001).
- M/s J K Cement works, Gotan, Rajasthan.

PROJECT ENGINEERING AND SYSTEM DESIGN

Project Monitoring and Control for Setting up a 600 tpd Cement Plant in Republic of Congo (RoC)

As a PMC for the Government of the Republic of Congo, NCB has provided its continual services by participating in bid opening, evaluating offers received and giving recommendations for the project. Recently contract was finalized for Package I- *Geological Prospecting Work, Mine Planning, Mine Development and Mining Equipment Supply on Turnkey Basis*.

TEF study for Coal & Petcoke Handling System at M/s Saurashtra Cement Limited, Ranavav, Gujarat

Project provides the solution to overcome all the disadvantage of Open Coal Storage and Mix Grinding of fuel (Coal & Petcoke). NCB proposed solution for Grinding & Conveying of Fuel, Unloading & Storage of Coal and Unloading & Storage of Petcoke.

Detailed Project Report (DPR) for Setting up a 600 tpd Green Field Cement Plant at Tao Tao, Louvakou District, Department of NIARI, Republic of Congo (RoC)

A multidisciplinary team from NCB visited the proposed site at Tao Tao village, Louvakou district, Deptt. of NIARI, RoC for DPR preparation. Report was prepared in time with coverage of various aspects like approvals / clearances required, raw materials, technical requirement, and market scenario and financial indicators for which a detailed market survey was carried out by the team. The site visit led to finalization of plant and non-plant buildings in layout and the interconnection of various production department.

Preparation of DPR for Expansion of Existing 2600 TPD Cement Plant to the Capacity of 2.0 MTPA for Meghalaya Cements Ltd, East Jaintia Hills, Meghalaya

The above project is being carried out in two phases. The report of the first phase shall cover project formulation strategy, availability of basic resources and infrastructure, project technical concept and implementation. The report for second phase shall cover industry scenario and market strategies for project development benefits.



NCB Team at Tao Tao, Republic of Congo

Preparation of DPR for Modernization of Malabar Cements Ltd, Walayar Cement Plant

DPR is prepared for the project with the objective for plant modernization, improving plant energy efficiency to meet PAT targets by improving the thermal efficiency, reducing electrical energy consumption, CO₂ emissions, upgrading plant capability to meet the stringent environment regulations and capacity enhancement.



NCB Team at Meghalaya Cement Ltd. (Meghalaya)

Feasibility Study Report for Installation of Pond ash Drying System at M/s Saurashtra Cements Ltd., Ranavav, Gujarat

A detailed report was prepared with the objective of Utilization of low cost pond ash in place of fly ash which is costly (~2.5 to 3 times) with utilization of waste process heat. A complete mechanized and dust free system for drying the pond ash is proposed with detailed technological evaluation of available dryers.

Preparation of Technical Due Diligence and Asset Evaluation Report of Plant and Machinery Available at Grinding Unit at Okhla (Delhi) and Bhatinda (Punjab)

A multidisciplinary team from NCB visited both the units located at Delhi and Bathinda respectively to assess the available life of equipment and machinery and evaluate the present cost of the equipment. The report covers inferences drawn from the inspections carried out at Delhi and Bathinda grinding unit of CCI and their valuation (based on Replacement Cost approach) to technically and financially evaluate the available technology at both these units.



Preparation of TEFR for Setting up a Cement Grinding Unit in RINL, Vizag

A multidisciplinary team from NCB visited RINL, Vizag to check the feasibility of installing a grinding unit where optimal utilization of available resources with CCI and RINL could be done (including but not limited to blast furnace slag and fly ash) for long term mutual benefits.



NCB Team at CCI Plant (Delhi)

CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH - CDR

Centre for Construction Development and Research (CDR) is contributing in developing durable and sustainable civil infrastructure for the nation. The Centre provides services to the cement, concrete and construction industries through four programmes namely Structural Assessment and Rehabilitation; Concrete Technology and Construction Technology and Management; and Structural Optimization and Design. The Centre conducted 313 sponsored projects during the year.

STRUCTURAL ASSESSMENT AND REHABILITATION

Structural Assessment and Rehabilitation Programme conducts in-situ quality assessment, durability investigation and residual life assessment of concrete structures. The growth of construction activity in India has been geometric recently. The gap between quality planned and quality achieved continues to become wider. Non-destructive evaluation (NDE) of concrete and components are well known and extensively used. They are very good tools for establishing quality levels in new construction and for assessing the condition of damaged/distressed structures.

The Centre has state-of-the-art NDT equipment like Rebound Hammer, Ultrasonic pulse velocity test, Impact Echo test, Bridge Diagnostic equipment, Structural Vibration measurement equipment, Core Extraction (25 to 300 mm dia) machine, Electrical Resistivity, Half Cell Potential Measurement, Profoscope & Carbonation test along with sample processing laboratory for detailed evaluation of Service life of structures. The Centre is equipped with ISO 17025:2005 accredited NDE laboratory and well experienced & trained personnel.

Under this programme, CDR is providing services of condition / health assessment for old & new structures like Turbo Generator, Cooling Towers, Chimneys, Coal Handling Structures, Machine Foundations, Dam Structures, Bridges, Water Reservoir Basins, Commercial, Industrial & Residential RCC buildings in different states of India as sponsored R&D assignments. The various R&D sponsored assignments were completed for reputed customers like NTPC, CPWD, NHPC, GAIL, DDA, AIIMS, RBI, RGPPL, APCPL etc.

The investigations are generally followed by recommendations for Repair, Restoration & Rehabilitation with the use of indigenously available state-of-the-art repair techniques & materials for distressed structures covering specifications, cost estimates and bill of quantities. Team of Scientists/Experts at Centre have multifarious abilities to provide adequate solution to distressed RCC structures for attaining sustainable & durable structures.



Extraction of Concrete Cores by NCB Team on Fire wall in 400KV Sub Station, Orai



Profoscope Test in progress at 70M Elevation of Chimney at NTPC, Vindhyachal



Using CO₂ Analyzer at 120M Elevation of Chimney at NTPC Vindhyachal.



Extraction of Concrete Powder sample from TG Deck Slab



UPV testing on RCC Column of TG Unit Capacity 500MW at NTPC



Inspection of TG Roof Slab Top by NCB team at NTPC Sipat



UPV Testing for 2200mm Diameter RCC Pipe Line at Varanasi

CONCRETE TECHNOLOGY

Evaluation of Concrete Making Materials and Mix Design

Concrete mix design involves testing of its constituent materials for their physical properties, analysis of those test results and their correlation with fresh, hardened and durability properties of concrete. The centre has conducted evaluation of wide range of concrete making materials such as natural coarse and fine aggregates, cement, flyash, GGBS, alternative aggregates like geo-polymer flyash sand etc. and has successfully carried out important projects for prestigious clients like NTPC, NHPC Ltd. The projects range from Thermal Power Projects for NTPC and its subsidiaries, NUPPL, KBUNL, Meja Urja Nigam Ltd., PGCIL, hydropower projects for UJVN Ltd., SJVN Ltd., to building and road projects for CPWD, PWD, Delhi Jal Board, SDMC, EDMC, RITES, NBCC, DRDO, Public Health Engg Division, IIM-Rohtak, HSCC Ltd., HUDA Division and various other RMC suppliers. More than 285 concrete mix designs have been carried out and 35 admixtures tested and evaluated. Concrete as high as M90 grade were designed successfully.

Petrographic and Mineralogical Analysis and Alkali Aggregate Reaction (AAR) studies of Aggregates

Alkali-aggregate reaction (AAR) is a reaction in concrete between the alkali hydroxides, which originate mainly from the Portland cement, and certain types of aggregate. Two types of AAR are currently

recognized and these are alkali-silica reaction (ASR) and alkali-carbonate reaction (ACR). ASR is far more widespread form of alkali-aggregate reaction (AAR) than ACR. Alkali-silica reaction is a reaction between the alkali hydroxides in the pore solution of concrete (or mortar) and certain types of silica minerals present in some aggregates. Over the years, NCB has developed expertise and competencies to evaluate aggregates for potential alkali aggregate reaction which includes both alkali silica reaction and alkali carbonate reaction. Fine and coarse aggregate samples from various organizations like NTPC and its subsidiaries, Meja Urja Nigam Ltd., NUPPL, SJVN Ltd. were evaluated for Petrographic and Mineralogical Analysis and Alkali Aggregate Reaction (AAR) studies by conducting accelerated mortar bar testing and long term testing like mortar bar testing and concrete prism test as per national and international standards. Notably, Potential Alkali reactivity of carbonate rocks as concrete aggregate (rock cylinder method) & length change of concrete due to alkali carbonate rock reaction were conducted for NHPC Ltd. More than 75 numbers of aggregates have been evaluated using Petrographic Analysis and Accelerated Mortar Bar Test.

Concrete Mix design for Special Applications

- **Self-compacting Concrete**

More than 10 numbers of Self-Compacting Concrete (SCC) were designed by NCB for various clients such as Central Public Works Department, Delhi Development Authority and private agencies, with grades varying from M25 to M50.

- **Abrasion Resistant Concrete with and without Steel Fiber**

When concrete is used for hydraulic structures such as dam spillways, abrasion resistance properties are also important apart from strength properties. NCB has designed concrete mixes for high performance concrete for M60 and M90 grade with and without steel fiber for Ichari and Maneri dam projects of UJVNL to repair the spillway glacis and spillway bucket. Abrasion resistance has been evaluated by revolving disk method test and under water abrasion resistance test.

Concrete Mix Design of Various Grades done in year 2017-18

Grade	M10 and 15	M20-M35	M40 –M55	M60-M80	M90
Nos.	27	202	50	06	1

Evaluation of Corrosion Inhibitors

Centre has developed the facility for evaluation of corrosion inhibitors through Modified Accelerated Corrosion Test as per JIS Z 1535, Rebar Weight loss by Immersion method as per ASTM G-1 and Polarization Test as per ASTM G-3. The Centre has evaluated 19 samples of different brands of corrosion inhibitors being used in construction.

Experimental Study on use of Bottom Ash as Replacement of Fine Aggregate

NCB has completed a sponsored project for NTPC NETRA Ltd. where *Bottom Ash* has been used as partial replacement of fine aggregate for making concrete. The project involved material evaluation for its various physical and chemical properties and study for fresh, hardened concrete and its durability properties, with

bottom ash as partial replacement of fine aggregate. Based on this study, 50% replacement of crushed/natural sand with “as such” fraction of Bottom Ash is technically feasible in the designed mixes of concrete for RCC work. However, these mixes shall only be designed with an increased dosage of chemical admixture, depending upon the quality and quantity of Bottom Ash because the addition of Bottom Ash as a replacement of fine aggregate increases the water demand of concrete for same level of workability. The study was carried out on Bottom Ash collected from two sources i.e. NTPC Korba and NTPC Vindhyachal. However, these results need to be validated on 10-15 samples of Bottom Ash collected from other sources for formulation of guidelines for usage of Bottom Ash as replacement of crushed / natural sand.

Development of Guidelines for Design of High Performance Concrete Mixes for specified long Service Life using latest available Ultrafines and Admixtures

In the field of construction, concrete performance has been specified and evaluated in terms of compressive strength - the higher the compressive strength, the better the expected performance. However, experience has shown that durability considerations become more important for structures exposed to hostile environments (e.g. marine structures and structures exposed to carbonation). To achieve longer service life for concrete structures such as bridges and pavements, special type of concrete with high durability characteristics needs to be adopted. This is generally achieved using High performance concrete.

According to American Concrete Institute (ACI), High Performance Concrete is a concrete that meets special performance and uniformity requirements that cannot be achieved by using conventional materials and normal mixing, placing and curing practices.

The aim of the study is to develop High Performance Green Concrete mixes with the optimum utilization of the scarce materials and exploitation of different type of industrial wastes that are cementitious in nature. The present study investigates the role of available ultrafine materials like ultrafine fly ash, ultrafine ground granulated blast furnace slag, metakaoline, silica fume in concrete as a durability and service life enhancer.

Initial short term durability results have indicated positive role of these ultrafine materials when added in concrete as a replacement to Ordinary Portland Cement whereas long term performance study under different type of aggressive environment like chloride and carbonation on different concrete mixes namely M40, M60 and M80 is under progress. The end product of the study will be the design guidelines that will include different formulations of ultrafine materials in concrete for long service life.

Development of Ultra High Performance Concrete (UHPC)

In last few decades, research has been conducted on Ultra High Performance Concrete (UHPC). While there are several definitions available for describing UHPC, most commonly acceptable definition among researchers and concrete technologist is *Ultra High Performance Concrete (UHPC) is defined as cementitious based composite material with compressive strength above 150 MPa, pre and post-cracking tensile strengths above 5 MPa, and enhanced durability via their discontinuous pore structure.* UHPC offers unique advantages and higher performance levels that justify the increased initial cost. Such factors include strength, ductility, flexibility and toughness, impact resistance, dimensional stability, durability/increased useful life, impermeability, corrosion resistance, abrasion resistance, aggressive environment resistance and chemical resistance. High-strength properties of UHPC allow the design of slender structures, leading to reduction in self-weight of the structure due to reduction of material quantity.

Conceptual Guidelines for developing UHPC are as following:

- Elimination of coarse aggregates for enhancement of homogeneity.
- Utilization of the pozzolanic properties of silica fume and other ultrafine cementitious materials.
- Optimization of the granular mixture for the enhancement of compacted density. (Maximization of Particle Packing Density).
- The optimal usage of superplasticizer to reduce w/b (water binder ratio) and improve workability.
- Application of pressure (before and during setting) to improve compaction.
- Post-set heat-treatment for the enhancement of the microstructure. (Curing Regimes – Standard curing, Hot water / Steam Curing and Autoclaving).
- Addition of small-sized steel fibres to improve ductility.

Several countries including Australia, Austria, Croatia, Italy, Japan, Malaysia, Netherland, New Zealand, Slovenia, South Korea, and Switzerland have already incorporated the UHPC technology into their construction and building projects. Therefore, it is imperative to study and further develop the UHPC technology for production and usage in India.

The objective of this projects is to prepare guideline for developing the UHPC in India based on various internationally adopted procedures, accepted research theories and experimental research. The project focuses deeply on the materials comprising UHPC and the mechanical behaviour of the end product based on the production methodology adopted and the constituents involved. The project shall be carried in two stages. Firstly, the project study shall include the design of concrete mixes for strength and secondly, the mixes shall be studied for durability performance.

Enhancing the Utilization of Construction & Demolition (C&D) Waste and Other Waste Based Aggregates in Concrete Structures & Pavements

The amount of C&D waste generated in the country has increased considerably in recent years due to rapid pace of development. The generation of C&D waste is in range of 165-170 million tonne / annum.

The management of C&D waste is of major concern due to the shortage of dumping sites and increase in transportation costs. Recycling of C&D waste has important implication on natural sources and environment. Partial replacement of building materials by use of C&D waste would lead to reduction of sand mining from river beds or cutting rocks.

In C&D waste, issues related to porosity, fines content, mechanical properties of the parent aggregate and water absorption were found critical. NCB is implementing research project on increasing the utilization of C&D waste in concrete structures and pavements. Aim of this project is to improve the characterization of C&D waste by different methods such as treatment by fly ash-cement slurry, mechanical grinding, heat treatment, acid treatment etc so that the percentage utilization of C&D waste can be enhanced more than the prescribed limit in IS:383-2016.



Inspection of Flyover project at Barapulla



Checking Reinforcement at Flyover, Barapulla



NDT at Western Court Annex MP Hostel, Janpath



Floor Level checking at AIIMS

CONSTRUCTION TECHNOLOGY AND MANAGEMENT

During the year, the Inspection Body for Third Party Quality Assurance / Audit (TPQA) of the Centre has achieved ISO/IEC 17020:2012 Type 'A' Inspection Body Accreditation Certificate from National Accreditation Board for Certification Bodies (NABCB) with a validity period of three years. The Centre has taken up highest ever number of TPQA of construction projects works as compared to previous year. Services are provided to various organizations to ensure quality workmanship to meet their specified quality standards in delivering quality constructed facilities. TPQA was carried out for Construction of Buildings (Residential and Non-residential), Roads, Bridges & Tunnels, Construction Utility Projects, other Civil Engineering Projects, Special Construction activities etc. for various clients viz, Govt. of India, State Govt. organizations, Autonomous units, Undertakings etc. on pan India basis. During the year, the Centre has executed prestigious projects, which include works for AIIMS, CPWD, Delhi PWD, Power Grid Corporation of India Limited at Hyderabad & Kolkata. The Centre entered into MOU with All India Institute of Medical Sciences (AIIMS), Uttarakhand State Planning Department, Govt. of Uttarakhand during this year for TPQA services of their construction projects.

The methodology of Third Party Quality Assurance / Audit (TPQA) is as per project specific Quality Assurance Plan which includes physical inspection of work at various stages, Final inspection; in-service inspection, review of reports, review of documents, measurements on site by the inspector or witnessing the tests, random sampling and testing of materials for verifications as per contract specifications / relevant codes / standards such as IS codes, CPWD, IRC & MORTH specifications, limited non-destructive testing as and when needed,



Checking Reinforcement at Incubation Centre, IDCO



Straightness checking at AIIMS

review of quality system & quality assurance measures. Performance testing of RCC structures with NDT included ultrasonic pulse velocity (UPV) test, Rebound Hammer Test (RHT), Core testing, Rebar locator, cover meter, etc. The Centre continued to provide specialized services in the area of quality assurance/control. Recently, the Centre has been entrusted with the following projects of national importance:

1. Integrated exhibition cum convention Centre (IECC) at Pragati Maidan, New Delhi.
2. Integrated transit corridor development in and around Pragati Maidan, New Delhi.

Cost-effective Technology for Low Traffic Volume Concrete Roads

A typical concrete road consists of three component layers *viz* Sub grade, Base and Sub-base. Each component layer serves an important role in the quality and functionality of roads. Current scenario warrants innovation in all of these layers to come up with an optimum and economical solution. The coming of the new perception provides an excellent time to pause and consider where the low-volume road (LVR) community is headed. Low volume roads are an integral part of transportation network of our country and its development and maintenance projects a better future. However, cost and uneven distribution of natural aggregates, their availability has become a road block in the development.

According to the published literature for utilization of Construction and Demolition waste (C&D), production of C&D waste is 165-170 million tonnes / annum. In the context of India, limited research work has been carried out in the area of usage of C&D waste in road work. Secondly, the planning of rural roads network in India has not been taken seriously.

In the present research work, use of locally available materials like Construction and Demolition waste (C&D) and OPC blended with optimized percent of slag and fly ash has been given main emphasis. Base / Sub base layer composed of varying percentage of coarse as well as fine recycled aggregate is being tested. Casting and testing of demonstration stretch of rigid pavement with base / Sub-base using C&D waste and testing of demonstration stretch for performance and quality parameters is being done. Data on performance of sub-base/ base & pavement quality concrete (PQC) composed of C&D waste and performance of demonstration stretch using different construction joint systems and varying PQC thicknesses is being studied.

Use of Advanced Electronics in Construction and Condition Assessment of Structures

Use of advanced electronics being the keynote in construction industry, this project is taken up to introduce 3D printing to Indian construction industry and usage of drones in condition assessment of structures. 3D Printing is one of the most promising developments of today. 3D Concrete printing results in a low cost and high speed construction method, which allows for a greater freedom in both architectural and structural design. Despite these clear benefits shown by a handful of pioneering companies and institutes spread around the world, the building industry is still behind in the development of 3D printing. This

may be attributed to the lack of fundamental research on the structural behavior of the to-be-printed shapes and materials. The main objective behind this research is to introduce 3D printing construction technology to Indian construction industry. A very little about the printing techniques, mix design and several parameters related to it has been brought into light. So the motive behind the research is to develop mix design of 3D printable concrete by using appropriate 3D printer by establishing essential interrelationships between several parameters related to it. A comparative study will be done on time, cost between the traditional concreting method and 3D concrete printing. It is obvious that printable concrete differs from conventional concrete not only in mechanical properties like bond strength and overall strength development, but also the printing behavior. Experimental research will have to be carried out to find the relation between mixture design, mechanical properties, rheological properties and printing behavior of concrete. The mixture does not restrict itself to cement and smaller particles, but may also incorporate large size aggregates which can be harvested from recycled concrete.

Unmanned aerial systems (UAS), also referred to as unmanned aerial vehicles or drones, are innovative technology that can be very useful in different applications in the construction industry. In civil engineering areas, the drones could be applied as a tool for condition assessment process through inspection of tall structure and to locate defects and cracks. Ageing infrastructures have become a major concern especially for elevated highway and bridges, chimneys etc. A thermal imaging camera can identify problems early, allowing them to be documented and corrected before becoming more serious and more costly to repair. Condition assessment of structures with a thermal imaging camera can help to detect construction failures and weak spots in concrete during curing, locate water infiltration in flat roofs, moisture detection, monitoring the drying of buildings etc. Inspecting buildings using a drone along with thermal imaging camera is a powerful and noninvasive means of monitoring and diagnosing the condition of buildings. The aim of this research is to study and explore the drone technology in construction for structural / construction inspection through visualization approach. To achieve the aim of this research, objectives identified were condition assessment of few selected structure like tall chimneys, silos, dams etc. Development of method for assessment based on investigation done using drone and validation of method for assessment with traditional distress assessment techniques.

Development of Geopolymer Concrete for Application in Pavements and Precast Concrete Construction

Geopolymers are a relatively newer class of building material. Owing to increased environmental concerns as well as diminishing natural resources, geopolymers are spotted as a valuable alternative for Portland cement. Geopolymers can have similar cementing characteristics as Portland Cement, but they can be produced out of by-products from other industry (e.g. fly ash) or less energy craving and less CO₂-emitting materials (eg calcined clay, alkali activators).

The study of the alkali activation process of aluminosilicate sources (e.g. fly ash and calcined clay) as a method for synthesizing new cementitious materials is gaining relevance in the scientific community. The increasing number of scientific publications as well as international events dedicated to this topic is a proof of it. Currently, there are, however, not that many practical applications.

NCB has taken up project on development of geopolymer concrete for its application in pavements and other precast concrete construction. Paver blocks and other precast products have been developed and project is in progress for developing usage guidelines for this product. Cost of the developed products are comparable with cement concrete blocks in use. Field trial is also being carried out to check the field performance of the product. The concerns regarding handling of geopolymers and production process will also be addressed.

STRUCTURAL OPTIMIZATION AND DESIGN

Experimental Study on Shear & Compression Design of High Strength Concrete including Effect of Fibre on Enhanced Ductility & Fire Resistance

Worldwide research on High Strength Concrete is going on since about one and half decade or more. Still, the structural design parameters in various international codes are different. In current Bureau of Indian Standard (BIS) code IS: 456-2000, for concrete with compressive strength greater than M55 the design parameters given in the standard may not be applicable and the values may be obtained from specialized literatures and experimental results.

In the absence of design parameters in the codes, designers are not able to use high strength concrete, even though the laboratories and RMC plants in the country have the expertise to design and produce high strength concrete. Therefore, this research is intended to develop design parameters for high strength concrete so that designers can use high strength concrete in design of structures with confidence. The Model proposed in European design standard EC: 02-2004 have been analysed to compare the experimental and theoretical moment capacities obtained from the flexural test done. Based on the study done on flexural behaviour of RCC beams, revision of Stress Block Parameters and strain limits for High Strength Concrete and strain limits for reinforcement Steel will be recommended to Bureau of Indian Standard (BIS). The outcome of the studies completed would be disseminated through Seminars and Journals.

Further beams were tested in shear to understand the shear behaviour of the reinforced high strength concrete beams with and without shear reinforcement with respect to parameters such as strength, shear span to depth ratio a/d , the amount of shear reinforcement etc. The study on Compression Behaviour of High Strength Concrete RCC members including strength and ductility performance using fibre under axial compression on three different concrete grades is being taken up under this project. The effect of aggregate type, concrete strength and fibre reinforcement on fire resistance behaviour of HSC is also being studied.

Test Set up for Shear Study on Reinforced High Strength Concrete Beams

Effect of Supplementary Cementitious Material (SCM's) (Single and Multi Blends) on Service Life of Concrete Structures including Studies to Improve Green Cements to meet Durability / Service Life Requirements

Reinforcement corrosion is the primary cause of premature failure of RCC structures world-wide and has become of great interest among concrete technologists and structural designers. During early 1990's when it posed serious challenge to country's financial assets, a paradigm shift with regard to the existing construction methodology was seen and concepts like durability, design life came up and thereafter, the research started focusing on studying the durability aspect of different type of construction materials. By the end of twentieth century, terms like service life and durability design of concrete structures were evolved.

Durability and service life of a concrete is basically defined in terms of its resistance against mechanical and environmental loading. At macro-level, it's the permeability characteristic of the concrete that coherently governs its durability aspect. Impermeability against the attack by deleterious acids, gases are considered to be one of the main driving criteria for the durability design of concrete structures. Designing concrete structures against the aggressive environment, use of materials like fly ash, ground granulated blast furnace slag, silica fume, metakaolin etc. are found to be advantageous. These materials are generally called as Supplementary Cementitious Materials (SCMs) as they exhibit

binding property similar to that of cement. Worldwide extensive research has been done on the use of SCMs. However, some of the research gaps in existing studies are listed below:

- User friendly design guidelines w.r.t durability and service life;
- Corrosion model for multi bends of SCM's;
- Effect of ultrafine materials as durability enhancer in conjunction to SCM's, and
- Meso-macro scale behaviour of multi bends.

The presently available international durability design code and guidelines are not able to address these issues holistically.

In the current project, effect of SCMs on resistance to carbonation, resistance to chloride ingress and corrosion rates are being studied. The project emphasises use of SCM's in high proportion as a replacement to Ordinary Portland Cement. The end product will be the design guidelines that will ensure greater acceptability of these waste cementing materials among engineering fraternity. The investigation is broadly categorized into two areas : a) laboratory studies and b) field studies. Results will be co-linked and generated coefficients will serve as inputs for the design models.

Effectiveness of Different Repair Systems for Repair of Corrosion Damaged Structures

Internationally, the study of effectiveness of concrete repair system are going on from last one decade or more. In India the repair of concrete structures are going on from last two or three decades, but there is no specific guidelines for effective system of repair in the structure. The question regarding repair strategy and its effectiveness is still not clear and there are no specific guidelines or Indian standards available. Though the repairs and rehabilitation of concrete structures are going on in various parts of the country based on types of distress in the structures, there is a need to develop an effective system containing decision making process and effectiveness of concrete repair.

The objective of this project is to evaluate the effectiveness of the range of concrete repair system as applied in practice, in order to improve practices for maintain and improving the integrity of operational structures and, therefore, achieve higher standard of structural safety and reliability and better whole-life structural management.

The present study focuses on using polymer modified mortar (PMM) systems, protective systems such as corrosion inhibitors and surface applied/penetrating protective coatings and strengthening measures such as fiber reinforced plastics (FRP) wrapping of reinforced concrete (RC) member.

Experimental studies are being carried out to evaluate repair system to determine various parameters such as effect of corrosion on load carrying capacity, restoration of load carrying capacity through repair system, improvement in corrosion protection through repair system (passivity restoration), and robustness of repair system. Few additional field study on corrosion repair structures will also be done to check the effectiveness of repair system.

The project output will include the production of guidelines covering decision making process and effectiveness of concrete repair to extend service life of existing structures.

CENTRE FOR INDUSTRIAL INFORMATION SERVICES - CIS

The Centre pursued its activities through six programmes viz. Industrial Information and Data Bank; Integrated IT Solutions; Publications; Seminars and Conferences; International and National Linkages; and Image Building. CIS collects and disseminates information to cement, building materials and construction industries. Besides other facilities, the Centre includes a modern library and a computer centre.

INDUSTRIAL INFORMATION AND DATA BANK

NCB Library at Ballabgarh Unit serves as the national information centre for cement, building materials and construction industries. The holdings of the Library have grown to 46,593 documents. The library has a bibliographic data base consisting of about 42,265 entries derived from the journals received. NCB scientists as well as cement plants and other user industries utilize it for interactive searches. A library automation system called 'LIBSYS' has been installed. The system is user-friendly and compatible to network communication. Memberships of Indian and Overseas professional institutions, as listed below, were served.



NCB Ballabgarh Library

MEMBERSHIP	
Indian	Overseas
<ul style="list-style-type: none"> Construction Industry Development Council (CIDC), New Delhi 	<ul style="list-style-type: none"> The American Concrete Institute (ACI), USA
<ul style="list-style-type: none"> Indian Roads Congress (IRC), New Delhi 	<ul style="list-style-type: none"> Precast/ Pre-stressed Concrete Institute (PCI), USA
<ul style="list-style-type: none"> Indian Mining & Engineering JI, Bhubaneswar 	
<ul style="list-style-type: none"> Materials Research Society of India, Bengaluru 	

INTEGRATED IT SOLUTIONS

The Website was uploaded with Technical Papers published by NCB Officials in various seminars / workshops and distribution of e-Abstracts (monthly) and e-NCB News (quarterly), including promotional information about NCB's activities was done from time-to-time. The following services were continued:

- Indexing Services from Library, through Intranet site and www.ncbindia.com site.
- Announcements on 15th NCB International Seminar, Workshops, Training Courses and quality related schemes.
- Employment opportunities & RTI related documents.
- Maintenance of hardware and software for whole of the institute including LIMS and LIBSYS.
- E-book in CD Form of NCB Seminar on Durability and Service Life Design of Concrete Structures, 07 April 2017, Ballabgarh and 15th NCB International Seminar 05-08, December 2017, New Delhi containing the papers published and distributed amongst the delegates.
- Digital Payment facility of E-Registration through SB Collect was made on website : ncbindia.com for the first time.
- Storage and retrieval of seminar and workshops technical papers / abstracts segregation through new software development within NCB.
- Bulk e-mailing services was continued for promotional information.

PUBLICATIONS

Information on technologies and services of NCB is disseminated through NCB Publications regularly. Efforts to widely popularize and promote NCB activities, technology and consultancy services amongst the cement and related building materials industries were continued. The following publications were brought out during the year are as follows:

- NCB Annual Report 2016-17 in English and Hindi versions separately
- Bulletin - 2 of 15th NCB International Seminar on Cement, Concrete and Building Materials, 05-08 December 2017, New Delhi
- Brochure on Centre for Quality Management, Standards and Calibration Services (CQC)
- Brochure on NCB Seminar on Durability and Service life design of Concrete Structure, 07 April 2017, Ballabgarh
- NCB Training Programme 2018-19
- Proceedings containing Abstracts of the discussion papers in 15th NCB International Seminar on Cement, Concrete and Building Materials, 05-08 December 2017, New Delhi
- Programme Booklet of 15th NCB International Seminar on Cement, Concrete and Building Materials, 05-08 December 2017, New Delhi
- NCB Rules and Regulations (February 2017 revised)
- NCB e- Abstracts June 2017.



A few NCB Publications

SEMINARS AND CONFERENCES

NCB SEMINAR ON DURABILITY AND SERVICE LIFE DESIGN OF CONCRETE STRUCTURES, 07 April 2017, Ballabgarh, Haryana

- About 250 delegates from cement and construction industries, and academic institutions participated in the event.
- 18 technical papers (out of which 6 invited papers from eminent experts in the field) on Chemistry and Quality, Manufacture and Performance & Durability Aspects and Sustainability were presented. An e-book of the full technical papers was published in the CD form and distributed amongst the participants at the Symposium venue.



The Director General NCB Shri Ashwani Pahuja delivering Inaugural Address on the occasion of NCB Seminar on Durability and Service Life Design of Concrete Structures, 07 April 2017 at NCB Ballabgarh

15TH NCB INTERNATIONAL SEMINAR ON CEMENT, CONCRETE AND BUILDING MATERIALS, 05-08 December 2018, New Delhi

The 15th NCB International Seminar on Cement, Concrete and Building Materials was held from 05-08 December 2017 at Manekshaw Centre, New Delhi. It drew participation of about 1,200 delegates, including 90 overseas delegates from 21 countries like Austria, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, Turkey, UK and USA. About 197 technical papers were deliberated in 25 sessions. Five special lectures from internationally renowned experts were delivered in two special technical sessions during the seminar.

The seminar was inaugurated through Video Conferencing by Shri Suresh Prabhu, Hon'ble Minister of Commerce & Industry, Government of India. The minister drew the attention of the participants towards depleting limestone and other resources. He called for conservation of natural sources and inventing / developing alternative building materials. Further, he exhorted the industry captains to make use of alternative fuels and raw materials in cement production and contribute towards *Swachh Bharat*.



Shri Ajay Kapur, Managing Director & CEO Ambuja Cement Ltd lighting lamp on the occasion of 15th NCB International Seminar on Cement, Concrete and Building Materials at New Delhi. Shri Mahendra Singhi CEO & Whole time Director Dalmia Cements (Bharat) Ltd is standing on his left and Dr S Chouksey is on his right. Shri Ashutosh Saxena DG (Actg) NCB is in between them.



Shri Suresh Prabhu, Hon'ble Minister of Commerce & Industry, Government of India, inaugurating 15th NCB International Seminar on Cement, Concrete and Building materials on 05 December 2018 at Manekshaw Centre, New Delhi

During the seminar, the Technical Exhibition also received overwhelming response, with the participation of 79 companies, which booked 119 stalls to showcase their products and services. The Technical Exhibition was inaugurated by Dr S Chouksey, Chairman NCB and Whole time Director, J K Lakshmi Cements Ltd. Dr S Chouksey also gave *Presidential Address* and released Seminar Proceedings. Shri Ajay Kapur, Managing Director and CEO, Ambuja Cements Ltd delivered a talk on *Cement Industry perspective* at the inaugural session. In the Presidential Address, Dr Chouksey said the cement industry was burdened with substantial idle capacity of over 100 million tonnes, amidst a low demand scenario. He expected that policy measures envisaged by the Government such as Make in India, Clean India mission, 100 Smart cities, Housing for all would lead to spur in cement demand in the coming years and the projected demand for cement in 2022 would be in excess of 600 million tonnes. About the quality of cement, he said that country produced cement was one of the best in international market and India was moving towards low carbon cements. However, Shri Ajay Kapur expressed satisfaction with the Government declared policies directed towards economic and infrastructure growth. He highlighted NCB and its R&D services were



Dr S Chouksey, Chairman NCB and whole time Director J K lakshmi Cements Ltd inaugurating the Technical Exhibition at Manekshaw Centre, New Delhi on 5th December 2017. Shri Mahendra Singhi CEO & Whole time Director, Dalmia Cement (Bharat) Ltd (left) and Shri Ashutosh Saxena, DG (Actg) NCB, are on his right



A release of Seminar Proceedings on the occasion of 15th NCB International Seminar on Cement, Concrete and Building Materials at New Delhi. The dignitaries seen on dais are (left to right): Dr S K Breja (Seminar Organising Secretary), Shri Ajay Kapur, Dr S Chouksey, Shri Ashutosh Saxena (DG-NCB Actg) and Shri Mahendra Singhi



Shri Ajay Kapur, Managing Director and CEO, Ambuja Cements Ltd delivering talk on 'Cement Industry perspective' at the inaugural session of 15th NCB International Seminar at New Delhi

Technical Session in Progress

one of the best resources for the cement industry to adopt quality innovations at par with the best international practices in cement manufacture. On the occasion, Shri Mahendra Singhi, CEO and Whole time Director, Dalmia Cement (Bharat) Ltd presented cement industry's *Future Outlook and Challenges*. In his speech, he illustrated about different environmentally hazardous materials like fly ash produced by thermal power plants. He said, about 50% of total generated fly ash was being utilized in cement industry while around 100 million tonnes per year remained unused. This could be utilized to a large extent in cement plants with increase in blended cement and composite cement production.

The seminar was sponsored by Ambuja Cements Ltd & Dalmia Cement (Bharat) Ltd (*Jointly Chief Patrons*), Cement Manufacturers' Association & J K Lakshmi Cement Ltd (*Jointly Patrons*), Shree Cement Ltd (*Platinum Sponsor*), Ghorahi Cement Industry Pvt Ltd, J K Cement Ltd, Star Cement Ltd (*Jointly Gold Sponsors*), My Home Industries Pvt Ltd, The India Cements Ltd, World Business Council for Sustainable Development (WBCSD) (*Jointly Silver Sponsors*), Calderys India Refractories Ltd, JSW Cement Ltd (*Jointly Bronze Sponsors*), Saurashtra Cement Ltd & Gujarat Sidhee Cement Ltd (*Jointly Other Sponsors*). Govt Departments / Bodies, namely Department of Industrial Policy & Promotion (DIPP), Department of Science & Technology (DST) and Bureau of Indian Standards (BIS) supported the event.



The deliberation were enriched by two invited lectures by Dr Kare Helge Karstensen on *Formation and Control of Dioxins in Dry Pre-heater/Pre-calciner Kilns Co-processing Wastes* and by Philippe Ponta (WBCSD) on *Low Carbon Transitions for the Cement and Concrete sector – A Global Partnership Approach* in the Panel Discussion.

The Valedictory Address was delivered by Dr S Chouksey, Chairman NCB and Whole time Director J K Lakshmi Cements Ltd at Concluding



A group photograph of Awardees on Concluding Day of 15th NCB International Seminar on Cement, Concrete and Building Materials in New Delhi

Session of the Seminar. Dr Chouksey also gave away the National Awards to the winners for Energy Efficiency, Environmental Excellence and Quality Excellence in the Indian Cement Industry for the year 2014-15 and 2015-16 and also the Awards for ten best technical papers presented.

WORKSHOP ON ENVIRONMENTAL SUSTAINABILITY THROUGH SCIENCE-BASED TOOLS AND APPROACHES GETTING STARTED WITH THE LIFE CYCLE ASSESSMENT, 05-08 February 2018, NCB Ballabgarh.

A two days workshop on 'Environmental Sustainability through Science-based Tools and approaches Getting started with Life Cycle Assessment' was organized by FICCI at NCB Ballabgarh. The workshop was focused on Life Cycle Thinking (LCT) in Practice at production sites and manufacturing processes

to include environmental, social and economic impacts of a product over its entire life cycle. In his Welcome Address, Shri Ashotosh Saxena DG (Actg), said that the impact of CO₂ emissions on the global climate was continue increasing and such workshop was very relevant and important for NCB as well as National interest. He explained that approximately 6% of Global CO₂ emissions originate from the manufacturing of Cement and Life Cycle Assessment (LCA) was rapidly emerging as an useful environmental management tool worldwide for many process industries including cement manufacture. NCB was working to overcome such problem seriously.



Shri Ashotosh Saxena DG (Actg) delivering Inaugural Address in the opening of Workshop at NCB Ballabgarh. On dias (Left to Right) Shri AVS Manian, General Manager CIS, Dr (Ms) Sanjeevan Bajaj (FICCI) and Dr Amir Safaei (Ecoinvent Centre).

The workshop was attended by 53 delegates from different parts of the country and addressed by three eminent experts i.e. Dr (Ms) Mireille Faist, Dr (Ms) Sanjeevan Bajaj and Dr Amir Safaei. 10 technical papers in three sessions were presented. The programme was very successful.

OTHER INSTITUTIONAL EVENTS

National Technology Day: NCB celebrated the *National Technology Day* by organizing technology related programmes on 11 May 2017 at its Ballabgarh and Hyderabad units. On this occasion at Ballabgarh Dr Shri Harsh, DG (Actg) delivered his lecture and Dr S K Breja (HoC-CIS) concluded the celebration.

World Environment Day: Special functions were organized on 5 June 2017 to celebrate *World Environment Day* at Ballabgarh and Hyderabad Units. Dr Shri Harsh DG NCB (Actg.) planted a sapling as mark of Environment Day celebration at Ballabgarh unit.

Hindi Pakhwada: Hindi Pakhwada was organized during 14-28 September 2017 at Ballabgarh. In the opening ceremony of Pakhwada, Shri Ashutosh Saxena DG NCB (Actg.) expressed his satisfaction on growth and development of Hindi in the organization. He exhorted NCB officials to further promote



Dr Shri Harsh DG NCB (Actg), delivering lecture on the occasion of National Technology Day at Ballabgarh Unit. On right Dr Harsh planted Mango sapling on the eve of 'World Environment Day' in the premises of NCB Ballabgarh

use of Hindi in their day-to-day interactions. During the Pakhwada, four competitions, like; *Sulekh*, *Nibandh Lekhan*, *Hindi Shabd Kosh Gyan*, and *Kahani Lekhan Pratiyogita*, were organized and a large number of officials participated. The winners' names were declared in the closing ceremony of the Pakhwada. In the Closing Ceremony, Dr Devendra Yadav, Adhyaksh-NCB Rajbhasha Samiti welcomed Director General (Actg) Shri Ashutosh Saxena and delivered his Presidential Address. Shri Saxena addressed Staff Members and congratulated the winners and organizers for their efforts who made the event successful. Shri Vinod Kumar, Hindi Officer, summarized the activities organized for promoting the use of Hindi in NCB during the year in the concluding celebration. On this occasion, NCB staff members also presented their views on the importance of Hindi language. The Best two speakers Shri Kapil Kukreja and Ms Jyotsna Panchal were declared as first and second winners, respectively. The other winners of four competitions held during Pakhwada were also awarded on the occasion of *NCB Day 2017* by the Director General (Actg.) Shri Ashutosh Saxena. Shri Mohd Iqbal presented Vote of Thank in the Closing Ceremony.



Hindi Pakhwada Celebration at NCB Ballabgarh in progress. In right, Dr Devendra Yadav, Adhyaksh NCB Rajbhasha Karyanvayan Samiti is delivering Presidential Address and sitting on dais Shri Vinod Kumar (Hindi Officer) and Shri Ashutosh Saxena DG (Actg) extreme right on the Concluding Day of the Hindi Pakhwada.

Quami Ekta Week: *Quami Ekta Week* was observed during 19-25 November 2017 and National Integration Pledge was administered to the staff as a part of it.

NCB Day 2017: *NCB Day 2017* was celebrated on 22 December 2017. NCB Scientists delivered their lectures on the occasion. Sh Ashutosh Saxena, Director General (Actg) NCB, addressed the staff on the occasion. He gave away Awards to NCB officials who made outstanding contributions during the year in their respective fields of their activities. The *Best Scientist Award* was given to Dr (Ms) Varsha Liju, Shri Lalit Yadav & Shri Naga Kumar *jointly* and the *Best Supporting Staff Award* was given to Shri Kamal Sabharwal & Shri Ravendra Singh *jointly* in the Technical Stream and Sh Rajat Ghosh in the Administrative Stream.



Awardees of NCB's Best Scientist and Best Supporting Staff Awards (2017) including winners of various competitions held during 'Hindi Pakhwada' at Ballabgarh Unit are with Shri Ashutosh Saxena DG (Actg) in Centre. Dr S K Breja HoC-CIS is standing to the right.

PARTICIPATION IN WORKSHOPS, SEMINARS AND CONFERENCES

The following NCB officials participated in Seminar & Conferences shown against their names during the period.

SI No.	Participant(s)	Event
1.	Sh Sanjay Mundra Sh Brijesh Singh Sh LalitYadav	Conference on Criteria for Earthquake Resistant Design of Structure – General Provisions for all Structures and Specific Provisions for Building (Sixth Revision) -11 May 2017, New Delhi, Organized by IAStructE
2.	Sh T V G Reddy Sh P N Ojha Sh Brijesh Singh Sh Lalit Yadav Sh Ankit Sharma	National Workshop on NBC 2016 & Recently Revised Seismic Codes-Impact on Structural Design Construction & Safety of Buildings, 27 - 28 June 2017, New Delhi, Organised by IAStructE& BIS
3.	Dr S K Breja Sh V Naga Kumar Sh Abhishek Agnihotri	Conference on Proficiency Testing Providers (PTP) and Reference Materials Producers, 30-31 August 2017, Delhi, Organised by National Accreditation Board for Testing and Calibration Laboratories NABL
4.	Sh S K Agarwal	Conference on Advances in Construction Materials and Systems (71st RILEM Annual Week & ICACMS 2017), 03-08 September 2017, Chennai, Organised by IIT Madras
5.	Sh V V Arora Sh Amit Trivedi Sh Puneet Kaura	Conference on Advances in Construction Materials and Systems, 4 - 8 September 2017, Madras, Organised by IIT-Madras in Association with ACI, ICI, RILEM
6.	Sh Manish Kumar Mandre Sh Nikhil Kaushik	International Conference on Innovations in Concrete for Infrastructure Challenges - IFRACON-2017, 06-07 October 2017, Nagpur, Organised by Indian Concrete Institute, Nagpur Centre.
7.	Dr S K Breja	14 th TÇMB International Technical Seminar and Exhibition 2017, 10-13 October 2017 Organised by Turkish Cement Manufactures' Association, Belek, Turkey.
8.	Sh V V Arora Sh Amit Trivedi Sh Suresh Kumar Sh NitinChoudhary ShVaibhav Chawla Sh Lalit Kumar Sh T V G Reddy	Infrastructure Conclave-2017, 12 October 2017, PHD House, New Delhi, Organised by PHDCCI, New Delhi.
9.	Sh Vaibhav Chawla Sh Nikhil Kaushik	National Workshop on Processing and use of Construction & Demolition Waste, Theme: Deconstruction & in-situ processing for Ecology and Economics, 21 November 2017, New Delhi Organised by Building Materials & Technology Promotion Council (BMTPC), New Delhi.
10.	Sh V V Arora Sh P N Ojha	7 th International Conference on Solid Waste Management, 15-17 December 2017, Hyderabad.
11.	Sh B PanduRanga Rao ShVaibhav Chawla Ms Sahara Adhikari	2 nd Conference on Affordable Housing in India, 15-16 January 2018, The Lalit, New Delhi, Organised by India Infrastructure.
12.	Sh S K Agarwal	5 th Stakeholder meeting on Limestone Calcined Clay Cement (LC ³), 06 February 2018, New Delhi.
13.	Dr S K Breja	Brain Storming Session on Reference Materials and its Traceability through Unbroken Chain of SI Units at CSIR NPL meeting with reference materials producer along with NABL on 12 February 2018.

SI No.	Participant(s)	Event
14.	Sh T V G Reddy Sh Amit Trivedi Sh Ankur Mittal Sh Puneet Kaura	Workshop on National Building Code of India 2016, 20-21 February 2018, New Delhi, Organised by Bureau of Indian Standards and Indian Building Congress in association with CPWD, New Delhi.
15.	Dr S K Breja Sh P Srikanth Sh A Agnihotri	National Vendor Development Programme Cum Industrial Exhibition 2018, 07-08 March 2018 Organized by Ministry of Micro, Small & Medium Enterprises (MSME) jointly with Association of Indian Laboratories (AOIL), Manesar, Gurugram, Haryana.
16.	Dr S K Breja Sh V Naga Kumar Sh A Agnihotri Sh Suresh Kumar Shaw Sh S C Sharma	One day Seminar on Roadmap for the production & Certification of Certified Reference Materials in India, 16 March 2018 Organised by CSIR-NPL and supported by Ministry of Commerce, Govt. of India at CSIR-NPL, New Delhi.

PAPERS PRESENTED IN WORKSHOPS, SEMINARS AND CONFERENCES

The following papers were contributed / presented by NCB experts to / in different National and International Seminars, Workshops etc. :

SYMPOSIUM ON DURABILITY AND SERVICE LIFE DESIGN OF CONCRETE STRUCTURES, 7 APRIL 2017, BALLABGARH, HARYANA

1. *Service Life Design of Concrete Structures Subjected to Carbonation* by V V Arora and Puneet Kaura
2. *Condition Assessment and Restoration of Distressed RCC Structure in Coal Handling Plant* by Satish Sharma, T V G Reddy and Ankit Sharma
3. *Durability Studies on Prestressed Concrete made using PPC Cement* by Brijesh Singh and V V Arora
4. *Improvement in Abrasion Resistance & Other Engineering Characteristics of Concrete using Low Grade Coarse Aggregates by Introducing Silica Fume & Steel Fiber* by Satish Sharma, Suresh Kumar, Y N Daniel and V V Arora
5. *Durability Studies on Concrete made with Alternate Fine Aggregate – Bottom Ash, Copper Slag and C&D Waste* by P N Ojha, Amit Trivedi, Nikhil Kaushik and Manish Mandre
6. *Durability Study of Concrete Made with Alternate Coarse Aggregate - Sintered Fly Ash Based Light Weight Aggregate* by V V Arora, P N Ojha and Mantu Gupta

15TH NCB INTERNATIONAL SEMINAR ON CEMENT, CONCRETE AND BUILDING MATERIALS 05-08 DECEMBER 2017, MANEKSHAW CENTRE, NEW DELHI

1. *Feasibility Study for Enhancement of Liquid Alternate Fuels in Indian Cement Plants* by M V Ramachandra Rao, Ashutosh Saxena, Rabindra Singh and Akashneel Banerjee
2. *Feasibility Study for Enhancement of Solid Alternate Fuels in Indian Cement Plant* by Suresh Kumar Shaw, Ashutosh Saxena, Kapil Kukreja, M V Ramachandra Rao and V Venkatesh

3. *Utilization of Industrial Waste Products as a Pozzolana Material in Cement Paste Backfill for Lead Zinc Mine* by T M Rajan, S K Chaturvedi and Manish Mandre, NCB and Ashish Kumar and Akhilesh Shukla, Hindustan Zinc Ltd, India
4. *Investigations on Role of Minor Constituents in Portland Slag Cement* by S K Agarwal, M N K Prasad Bolisetty and S K Chaturvedi
5. *Performance of High Volume Fly Ash Cements* by Suresh Vanguri, G J Naidu, G Ahamed and S K Chaturvedi
6. *Influence of Chemical Additives and their Formulations on the Clinker Grindability to Improve Performance of Cement* by A K Dikshit, S Palla, T M Rajan, and S K Chaturvedi
7. *Investigations on Thermal Behaviour of Grey and White Cement Raw Mixes by Differential Thermal Analyser (TG/DTA) and Heating Microscope* by Giasuddin Ahamed, Varsha Liju and S K Chaturvedi
8. *Separate Grinding of Petcoke & Coal vs Mix Grinding* by Kapil Kukreja, Ashutosh Saxena and Ankur Mittal
9. *Performance Evaluation of Granulated Blast Furnace Slag - Steel Slag Based Portland Slag Cement* by S K Agarwal, Suresh Vanguri, and S K Chaturvedi
10. *Investigations on Portland Limestone Cement Compositions and their Performance Characteristics* by Pinky Pandey, B M N K Prasad, R S Gupta, D Yadav and S K Chaturvedi
11. *Understanding Gas Flow Behavior in Kiln Bag House Chimney through Computational Fluid Dynamics* by Prateek Sharma, K R P Nath, Rayees Ahmed and Anupam, NCB and Vivek Vitankar, Flui Dimesions, India
12. *Optimization of Productivity and Clinker Quality through Kiln Process Optimization* by Ankur Mittal, Rabindra Singh, Akashneel Banerjee and Prateek Sharma
13. *Effect of Aggregate Types and Supplementary Cementitious Materials on Mechanical Properties of High Strength Concrete* by V V Arora, Brijesh Singh and Shubham Jain
14. *Service Life Prediction of RC Structures using Short Term Durability Testing Methods / Techniques* by V V Arora and Puneet Kaura
15. *Plant Performance Improvement through Optimization of Pyro-process* by Akashneel Banerjee, O P Grover, Prateek Sharma and K P K Reddy
16. *Diagnostic Study of Kiln Baghouse Chimney Corrosion in Cement Plant* by Anupam, Rabindra Singh, Ankur Mittal and Prateek Sharma
17. *Diagnostic Study of Minimizing Excessive Coating in Kiln – Case Studies* by Anil Kumar Popuri, V Naga Kumar, G J Naidu, Anupam and Rabindra Singh, NCB and S P Shrimali, B L Suthar and Y K Singh, Star Cement Limited, India
18. *Investigations on Preparation of Brick Shaped Bodies by Alkali Activation of Fly ash Mixed with Bottom Ash* by R S Gupta, S Vanguri, V Liju, M N K P Bolisetty and S K Chaturvedi
19. *Experimental Studies on High Yield Strength Deformed (HYSD) Bars Used in Indian Construction Industry from Seismic Point of View* by V V Arora, Brijesh Singh, LalitYadav and Amit Trivedi
20. *Third Party Quality Assurance for Structural Repair of RCC Structure* by T V G Reddy, Rizwan Anwar, Ankit Sharma and B S Rao
21. *Experimental Studies on Flexural Behaviour of High Strength Reinforced Concrete Beams* by V V Arora, Brijesh Singh, Lalit Yadav, Shubham Jain and Suhaib Khan

22. *Bottom Ash as An Alternative to Natural Sand in Concrete* by P N Ojha, Amit Trivedi, Nikhil Kaushik, Nitin Chowdhary and V V Arora
23. *Copper Slag and Blast Furnace Slag as an Alternative to Natural Sand in Concrete* by V V Arora, P N Ojha, Nikhil Kaushik and M K Mandre
24. *Diagnosis of Dust Nuisance and System Design Improvement* by Kapil Kukreja, Anil Kumar and Anupam
25. *Method of Determination of Acoustic Resistance of Aerated Concrete Developed at NCB* by Narendra Kumar Tiwary and K R P Nath, NCB and Ashok N Bhaskarwar, Indian Institute of Technology Delhi, India
26. *Quality Management Systems Approach to Managing Risks and Stabilizing Organizations in Uncertain Business Environment: A Case Study in R&D and Customer Service Setting* by S K Breja, V Naga Kumar, P Srikanth and A Agnihotri
27. *Independent Quality Assurance Monitoring System in Construction-A Case Study for Delhi* by Vikas Patel, Mohd Ali Saifi, B Pandu Ranga Rao, Brijesh Singh and Pritam Rawat
28. *Testing of Cement and Construction Materials: A Reality Check on Performance of Testing Laboratories in Cement and Construction Sector* by S K Breja, V Naga Kumar, A Agnihotri, Nikhil Kaushik and V K Kandhari
29. *Water Footprint Assessment Study of Cement Plants* by M Selvarajan, Anand Bohra, K R P Nath, M V R Rao, N K Tiwary and A Saxena
30. *Study on Alkali Activated Slag and Flyash Based Composite Concrete System* by Lalit Yadav, Amit Trivedi, V V Arora and P Hemasree
31. *Effect of Use of Mechanical Mixer on the Physical Performance of OPC, PPC and PSC* by Suresh Vanguri, G J Naidu, G Ahamed and S K Chaturvedi
32. *Impact of Mining on Salinity Intrusion, Ground Water Level and Its Quality – A Case Study* by Anand Bohra, K R P Nath, M Selvarajan, N K Tiwary, K V Kalyani and A Saxena, NCB and P K Deshpande, Saurashtra Cement Ltd, India
33. *BCFC Wagons, The Future of Flyash Transport in India* by Kapil Kukreja, Ashutosh Saxena and Saurabh Bhatnagar, NCB and Abdul Samad, Malabar Cement Ltd, India
34. *Flyash Based Geopolymer Sand: An Alternative to Fine Aggregate* by P N Ojha, Vaibhav Chawla and V V Arora, NCB and Swapnil Wanjari, VNIT, India

PAPERS PUBLISHED

The following papers were contributed by NCB scientists to outside technical journals :

1. V V Arora, Satish Sharma, Brijesh Singh & Y N Daniel: *Application and Performance Evaluation of High Strength Steel Fibre Reinforced Concrete for Improving the Abrasion Erosion Resistance of Dam Structures*. **Dam Engineering Journal, Volume XXVII Issue-3, 2017**
2. S K Agarwal, S K Chaturvedi and Ashutosh Saxena, *Investigations into the Role of Marble Dust as Mineral Additive in Cement Manufacture*. **World Cement, Page. 49-60, March 2018**
3. *Satish Sharma, V V Arora, Suresh Kumar, Y N Daniel and Ankit Sharma: Durability Study of High Strength Fiber Reinforced Concrete*. **American Concrete Institute Materials Journal**



A group of CSIR-NPL visitors in NCB Ballabgarh library with Dr S K Breja, HoC-CIS

IMPORTANT VISITORS

Date	Name of the Visitor	Organisation
19 May 2017	Mr. Bernard A. Pekor	ACI Director Business Development
08 June 2017	Dr. Alamusime Mr. Samuel Halala	State Minister of Trade of Ethiopia General Director, CCIIDI
18 January 2018	Dr D K Aswal Shri V N Ojha Dr R P Pant	Director, CSIR-NPL Chief Scientist, CSIR-NPL Chief Scientist, CSIR-NPL

INTERNATIONAL LINKAGES / COLLABORATION PROGRAMMES

NCB has been actively interacting and liaising with a number of international bodies and exchanging knowledge and experience particularly in the area of cement and building materials industries.

Training / Study Tour of NCB Team

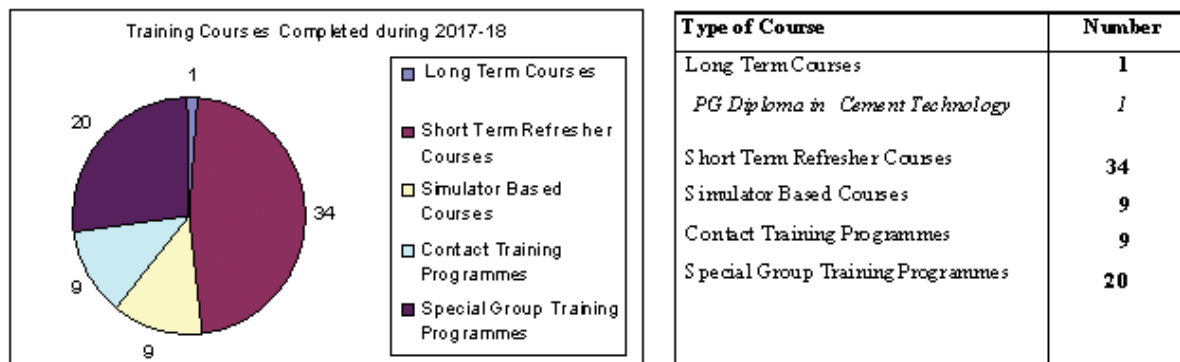
- UNIDO Project *Development and Adoption of Appropriate Technologies for Enhancing Productivity in the Cement Sector*, FLSmidth, Copenhagen, Denmark (17-29 September 2017)
- Ciments Molins Industrial Cement Plant, Barcelona, Spain (27 September 2017)
- Department of Chemical and Biochemical Engineering, Danish Technical University, Copenhagen, Denmark (29 September 2017)

CENTRE FOR CONTINUING EDUCATION SERVICES - CCE

Centre for Continuing Education Services (CCE), has been organizing variety of need-based, industry-oriented training programmes at entry and post-entry levels, for the participants from cement, concrete and construction industries since its inception in 1972. So far, 2533 training programmes have been organized. A total number of 42,239 participants comprising of industry professionals and fresh graduates/post-graduates in science and different disciplines of engineering have been benefited. A number of Govt./Semi-govt./Private organizations both from India and abroad have availed the training services of NCB for their engineers and professionals.

During the year under report, 73 training courses were successfully organized with a total of 1249 participants attending the programmes.

The highlights of the training programmes conducted are as under:



LONG TERM COURSES

Post-Graduate Diploma in Cement Technology

In its efforts to develop technological talent for the cement industry, NCB has been regularly conducting Post-Graduate Diploma in Cement Technology since 1983. The course is duly approved by All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Govt. of India.

Four self-sponsored participants admitted for 2016-17 session, comprising of one chemical engineer and three post graduates in chemistry, have successfully completed the course in July 2017. As in the past, all these students were placed in the cement industry. In the session 2017-18, five students were admitted in the course.

One Year Course in Cement Technology

Twenty-seven participants have successfully completed the course in August 2017.

SHORT TERM REFRESHER COURSES

During the year, 34 Short Term Training Courses were organized wherein 755 professionals from cement and construction industries participated. In Cement Technology related area, special emphasis was given to courses such as Technologies for Reducing PM, NO_x, SO_x and CO₂ in Cement Industry, Calibration of Laboratory Equipment and Quality Assurance in Cement, Construction and Process Industries; Optimisation of Pyroprocessing Systems in Cement Industry; Energy Efficient Technologies in Cement Industry and Co-Generation of Power; Optimisation of Raw Mix to Improve Clinker and Cement Quality; Instrumental Methods of Analysis; Sampling and Testing of Cement as per BIS Standards; Modern Grinding Practices in Cement Industry; Optimisation of Grinding Systems; Safety Practices in Cement Industry.

In Concrete and Construction related areas, the training programmes on specific topics such as Sampling, Testing and Evaluation of Concrete making Materials and Concrete; Cracks and Leakages in Concrete Structures: Causes, Prevention and Repair; Concrete Mix Design and Acceptance Criteria of Concrete for Different Types of Mixes; Corrosion in RCC Structures: Prevention and Repair; Quality Control and Quality Assurance in Concrete Construction including Extreme Weather Concreting; Green Building: Design & Construction; Precast Construction Practices including Long Span Segmental Construction; High Performance Concrete and its Application; Non-Destructive Testing and Evaluation of Concrete Structures; Concrete Mix Proportioning and Quality Control; Modern Construction Practices; Repair and Rehabilitation of Concrete Structures including Water roofing Materials and Techniques were organized.



A lecture session in progress in Training Hall at NCB-Ballabgarh Unit



Participants of M/s DMRC Ltd. during a Special Group Training Programme visiting Concrete Laboratory at NCB-Ballabgarh Unit

SIMULATOR BASED COURSES

With the aim of providing comprehensive training on various aspects of kiln and mill operation, nine training courses on Advanced Simulator trainer were organized at NCB's Ballabgarh and Hyderabad units for 41 professionals from cement plants in India and neighbouring countries and 24 participants from educational institutions. The participants were trained on Operation, Control and Optimization of Modern Grinding System based on Vertical Roller Mills, Roller Press and Ball Mills; Operation, Control and Optimization of kilns.

CONTACT TRAINING PROGRAMMES

On the request of industry, nine tailor-made practice oriented contact training programmes for the professionals from cement and construction industries were organized to suit the specific requirement covering following areas:

- Mechanical Testing of Cement
- Chemical Testing of Cement
- Calibration of CTM by Proving Ring and Blaine's Cell Volume
- Estimation of Major Oxides in Limestone
- Force (CTM/UTM)
- Calibration of Lab Equipment
- EDTA Methods of Analysis for Cement Raw Materials



Participants after successful completion of Training Programme at NCB- Hyderabad Unit



Participants of TANCEM after completion of a Special Group Training Programme at NCB- Hyderabad Unit

SPECIAL GROUP TRAINING COURSES

Twenty special group training courses on specific topics for the group of engineers / professionals were organized for the following organizations either at NCB's units or sponsors' sites:

Sl No.	Organization	Topics of the Courses Organized
1	TANCEM	Cement Plant Operation and Maintenance Practices
2	NCL Ltd.	Cement Grinding System
3	Military Engineering Services (MES)	Energy Audit and Conservation
4	JSW Ltd.	Application and Testing of Cement and Concrete
5	AKS University	Simulator based course on Operation, Control and Optimization of Kilns for the students
6	WAPCOS Ltd	Contract Management in Construction Projects
7	Hindustan Petroleum Corporation Ltd (HPCL)	Quality Control & Quality Assurance in Concrete Structure
8	Rengali Irrigation Project, Odisha	Quality Control and Quality Assurance in Concrete Construction
9	National Dairy Development Board (NDDB), Anand	Quality Assurance and Quality Control in Concrete Structures
10	Power Grid Corporation of India Ltd. (PGCIL) (7 training programmes on 7 different sites)	Quality Control in Construction & Durability Assessment in Concrete Structures
11	National Buildings Construction Corporation Ltd (NBCC)	Quality Control & Quality Assurance in Concrete Structures
12	Indian Air Force (IAF)	Concrete Construction, Project Management, Quality Assurance and Quality Control
13	Delhi Metro Rail Corporation Ltd (DMRC)	Quality Control and Quality Assurance in Concrete Construction
14	GAIL India Ltd	Repair and Rehabilitation of Concrete Structures including NDT & Water Proofing Techniques

TRAINING/ RETRAINING OF NCB PERSONNEL

SI No	Name of the Official	Title of Course	Name and Address of Training Organisation	Duration and Period
1	Sh V Naga Kumar	General Requirements of Proficiency Testing as per ISO/IEC 17043:2010	NABL, Gurgaon	4 days 25-28 April 2017
2	Sh Jaimin Bhavsar	(CTP) Physical and Mechanical Testing of Building Materials and Awareness on ISO IEC 17025:2005	Centre for Continuing Education Services (CCE)	3 days 02-04 May 2017
3	Sh Yatin Vyas			
4	Sh Amar Moyal			
5	Ms Pooja Pandey	Instrumental Methods of Analysis & Quality Control	Centre for Continuing Education Services (CCE)	3 days 06 - 08 June 2017
6	Ms Madhumita Biswas			
7	Ms Deepa Kumari			
8	Ms Meenu Verma			
9	Sh Ravendra Singh			
10	Sh Praveen Kumar			
11	Sh Piyush Mittal	Sampling, Testing and Evaluation of Concrete Making Materials	Centre for Continuing Education Services (CCE)	4 days 04-07 July 2017
12	Ms Sakshi Batra			
13	Sh Love Goel			
14	Sh Suhaib Nasir Khan			
15	Ms Sahara Adhikari			
16	Ms Puvvula Hemashree			
17	Ms. Harshita			
18	Sh Mohd Ali Saifi			
19	Ms Rekha Rani			
20	Ms Manju Sharma			
21	Sh Ajay Rana			
22	Sh T Mohan Rao	Calibration of Laboratory Equipment and Quality Assurance in+ Cement, Construction, Process and Power Industries	Centre for Continuing Education Services (CCE)	3 days 02 - 04 August 2017
23	Ms V Rama			
24	Sh P Janardhan			
25	Ms Sushmitha			
26	Sh G Jayaramudu			
27	Ms Suruchi			
28	Ms Kshama Rani			
29	Ms Anita			
30	Sh K K Gangar			
31	Sh Vishnu Dutt			
32	Ms Jyotsna Panchal			
33	Sh Ashish Goyal			
34	Ms Kalpna Sharma			
35	Sh B B Nayak			
36	Ms Anita Rani			
37	Sh Gagan Sharma			
38	Ms Vijalaxmi Vishwakarma			
39	Md Firoz Ahmed			
40	Ms Beauty Chopra			

41	Sh Naman Agarwal	Application and Testing of Cement and Concrete	Centre for Continuing Education Services (CCE)	5 days
42	Sh Anil Agrawal			07-011 August 2017
43	Sh Dinesh Kumar	Concrete Mix Design and Acceptance Criteria of Concrete for Different Types of Mixes	Centre for Continuing Education Services (CCE)	3 days
44	Sh Vipin Rana			08 – 10 August 2017
45	Ms Pallavi			
46	Sh T V G Reddy	Earthquake Resistant Design of Buildings	Indian Association of Structural Engineers (IASE), New Delhi	26 Aug – 14 Oct 2017
47	Sh B Pandu Ranga Rao			14 days
48	Sh Ankit Sharma			(14 lectures of 2 Hrs. each on Saturday)
49	Sh Vikas Patel	Quality Control & Quality Assurance in Concrete Construction	Centre for Continuing Education Services (CCE)	5 days 04-08 Sept 2017
50	Sh Munish Kumar	Technologies for Reducing PM, NO _x , SO _x and CO ₂ in Cement Industry	Centre for Continuing Education Services (CCE)	13 – 14 September 2017
51	Sh Gaurav Bhatnagar			
52	Sh Madhusudan Prasad	Sampling & Testing of Cement as per BIS Standards	Centre for Continuing Education Services (CCE)	3 days
53	Mrs Mithlesh Sharma			04-06 Oct 2017
54	Sh Gagan Sharma			
55	Sh Jitendra Kumar			
56	Ms Richa Anand			
57	Sh Chanderpal			
58	Sh Gautam			
59	Sh Jitender Kumar			
60	Sh Amit Trivedi	Workshop on Aiming for Excellence: Pathways to Institutional Advancement through Research	All India Council for Technical Education (AICTE), New Delhi	1 Day
61	Dr (Ms) Varsha Liju			01 Nov 2018
62	Sh T V G Reddy	Bridge Foundation Design	Indian Association of Structural Engineers (IASE), New Delhi	06 Jan to 10 Feb 2018
63	Sh Ankit Sharma			(12 lectures of 2 Hrs. each on Saturday)

CENTRE FOR QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES - CQC

The activities of the Centre for Quality Management, Standards and Calibration Services were organised under four programmes: Total Quality Management; Interlaboratory Services, Standard Reference Materials; and Calibration Services; These activities address all aspects of quality management and provide the entire range of Standardization and Calibration services to cement industry, R&D institutions, Concrete and allied building materials laboratories in India and abroad. The activities of Interlaboratory Services were given a boost and ten new proficiency testing (PT) schemes were completed in accordance with ISO17043:2010. Five sponsored projects were completed by the centre.

TOTAL QUALITY MANAGEMENT

Under this programme, Centre for Quality Management, Standards and Calibration Services (CQC) took up projects relating to quality improvement and accreditation etc. Assistance was provided in ISO 17025 accreditation of quality control laboratories of two cement plants. Laboratory assessment and proficiency improvement study was carried out for three testing laboratories. The scope of work included assessment of facilities and manpower skills and calibration check of equipment. One cement plant laboratory received training for skill upgradation of physical laboratory personnel. These studies resulted in improvement of quality control system, proficiency and infrastructure of the laboratories.

During the year, surveillance audit of quality management system based on ISO 9001:2015 of NCB was successfully carried out. The scope of certification covers all the three units of NCB.

INTERLABORATORY SERVICES

In 2013, Interlaboratory Services (ILS) programme of Centre for Quality Management, Standards and Calibration Services (CQC) of NCB received first NABL accreditation for PT provider as per ISO/IEC 17043: 2010 in the country, and successfully completed several PT schemes thereafter.



Dr S K Breja (HoC-CQC) delivering lecture during Training Session on ISO 17025 Accreditation at a Cement Plant



Practice Session at a Cement Plant under the Supervision of NCB Scientists, under Skill Upgradation and Proficiency Improvement Project

ILS implemented QMS in line with ISO 17043:2010 as per accreditation norms. ILS was reassessed for reaccreditation by NABL in February 2017 with enhanced scope. The present scope of accreditation covers: limestone, clinker, cement, fly ash, concrete admixture, water for concrete & coal/pet coke in chemical field and cement, fly ash, aggregate, mortar/concrete, tile (ceramic), burnt clay building brick & steel bar in mechanical field. In 2017-18, ILS completed 10 PT schemes. These schemes were implemented in accordance with ISO 17043:2010.

Of the 10 new schemes, 2 concrete cubes schemes have been conducted for the first time in India. Owing to wide participation, this scheme had to be repeated. Of the 3 PT schemes on concrete cube, 2 have been completed and 3rd one is under implementation. The participating laboratories were provided homogenized samples of PT items for testing in their laboratories. The test data reported by the laboratories were statistically evaluated for central tendency, spread and Z-score. The robust average and standard uncertainty for each parameter were calculated after normalizing the data as per ISO 13528:2015(E). Laboratories were evaluated on the basis of Z-Scores based on robust average and robust standard deviation.

Z-scores/Z'-scores of sample 'A' and sample 'B' for all the parameters in all schemes were calculated on the basis of results provided by the participant laboratories. N represents number of results considered in evaluation. As per the above standard, performance of the laboratories with $|Z| \leq 2.0$ is considered satisfactory. The laboratories getting $|Z| \leq 3.0$ are considered outliers and those getting $2.0 \leq |Z| < 3.0$ score are considered questionable performers. Outliers are encountered due to lack of statistical control and increase in variation in data.

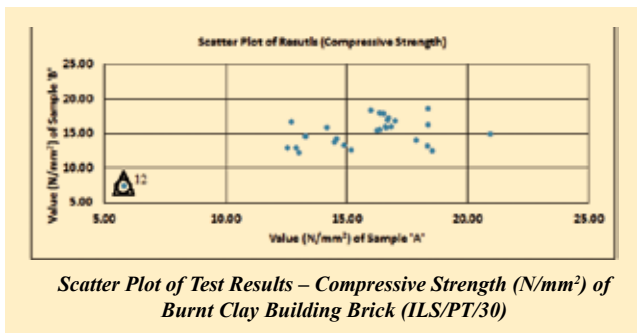
PT Schemes Completed During 2017-18

Sl. No.	PT Item	Field	Parameters	Method of Test	No. of Participating Labs
1.	OPC	Mechanical	Specific surface (Blaine fineness) Normal Consistency; Initial setting time; Final setting time; 3-day (72 hrs.) CS; 7-day (168 hrs.) CS; 28-day (672 hrs.) CS	IS 4031:1999 IS 4031:1988	20
2.	Coarse Aggregate	Mechanical	Apparent Specific gravity; Water absorption; Crushing value; Impact value; Flakiness Index; Elongation index	2386 (Part III): 1963 2386 (Part III): 1963 2386 (Part IV): 1963 2386 (Part IV): 1963 2386 (Part I): 1963 2386 (Part I): 1963	49
3.	Fine Aggregate	Mechanical	Sieve analysis (ROS 300 μ m); Apparent Specific gravity; Water absorption; Bulk density (loose)	2386 (Part I): 1963; 2386 (Part III): 1963; 2386 (Part III): 1963; 2386 (Part III): 1963	34

4.	Burnt clay building brick	Mechanical	Water absorption; Compressive strength	IS 3495 (Part 2): 1992; IS 3495 (Part 1): 1992	29
5.	Fly ash	Chemical	Loss on Ignition (LOI); Silicon Dioxide (SiO ₂); Iron Oxide (Fe ₂ O ₃); Aluminium Oxide (Al ₂ O ₃); Calcium Oxide (CaO); Magnesium Oxide (MgO); Sulphur Trioxide (SO ₃); Sodium Oxide (Na ₂ O); Potassium Oxide (K ₂ O); Chloride (Cl)	IS 1727:1967; IS 1727:1967; IS 1727:1967; IS 1727:1967; IS 1727:1967; IS 1727:1967; IS 1727:1967; NCB standard procedure, MS-14-2010; NCB standard procedure, MS-14-2010; IS 4032:1985/ MS-14-2010	9
6.	Mortar cube	Mechanical	Mass; Density; Area; Compressive strength	- - - IS 4031 (Part 6):1988	12
7.	Concrete cube	Mechanical	Mass; Density; Area; Compressive strength	- - - IS 516:1959	14
8.	Concrete cube	Mechanical	Mass; Density; Area; Compressive strength	- - - IS 516:1959	13
9.	PPC	Chemical	Loss on Ignition (LOI); Magnesium Oxide (MgO); Sulphur Trioxide (SO ₃); Insoluble Residue; Sodium Oxide (Na ₂ O); Potassium Oxide (K ₂ O)	IS 4032:1985 IS 4032:1985 IS 4032:1985 IS 4032:1985 NCB standard procedure, MS-13-2010	20
10.	PPC	Mechanical	Specific surface (Blaine fineness); Normal consistency; Setting time (Initial and Final); 3 day (72 hrs.) comp. strength; 7 day (168 hrs.) comp. strength	IS 4031 (Part 2):1999 IS 4031 (Part 4):1988 IS 4031 (Part 5):1988 IS 4031 (Part 6):1988 IS 4031 (Part 6):1988	27

Data received from the laboratories were studied for distribution and scatter. The scatter of results in burnt clay building brick scheme show presence of bias. In the scatter plot of results, code number of the outlier laboratory is mentioned along with the data point. Z_A outliers are put in circle and Z_B in triangle. The scatter of results for compressive strength test of burnt clay building brick is shown in the following *Figure*.

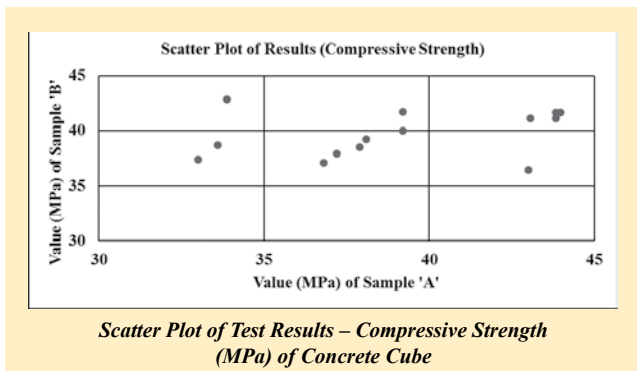
The number of questionable performers are 2, one each in water absorption and compressive strength in sample 'A'. The number of outlying performers are 2, one each in water absorption and compressive strength in sample 'A'. The number of questionable performers is 2 in water absorption in sample 'B'. The number of outlying performers are 2, one each in water absorption and compressive strength in sample 'B'.



Performance Status in Burnt Clay Building Brick PT Scheme

Parameter	N	No. of Questionable performers ($2 < Z < 3$)		No. of Outlying performers ($ Z \geq 3$)	
		Z_A	Z_B	Z_A	Z_B
Water absorption (%)	27	1	1	1	1
Compressive strength (N/mm ²)	27	1	0	1	1

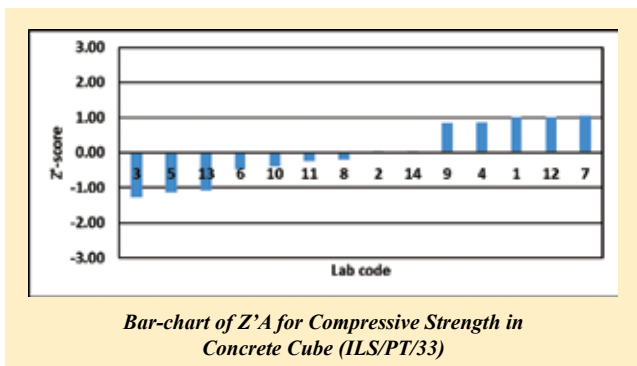
14 laboratories participated in first and 13 in second PT scheme on concrete cube. Data distribution for compressive strength in first concrete cube scheme are presented in the following *Figure*. The distribution shows presence of bias and correlation in results of two samples, 'A' and 'B', received from participating labs.



Ordered Bar charts presenting Z_A and Z_B laboratory Z-scores were prepared for all the parameters in all schemes and included in the study report. The charts show code-wise location of the laboratories in terms of performance. Laboratories were given the feedback of their performance. Bar chart of Z_A for compressive strength in concrete cube is presented in the following *Figure*.

STANDARD REFERENCE MATERIALS

CQC / SRM developed and commercialized 2 new types of certified reference materials (CRM) during the year. These CRMs can be used for checking proficiency of analysts,



monitoring the quality of testing in the laboratories, maintaining product quality to manufacturing standards and maintaining accreditation as per ISO/IEC 17025 requirements.

During the year, 2 new types of CRMs – White Portland Cement and Oil Well Cement for chemical parameters were developed. These have now been commercialized. In addition, thirteen CRMs were developed for replenishing exhausted stock. Now, NCB has a wide range of CRMs for chemical and mechanical parameters of cement, fly ash and other materials. So far, 79 types of CRMs have been developed. NCB provides metrological traceability to SI units for all its CRMs and meets the requirement of ISO 17043. Many of NCB CRMs are quoted in IS codes for reference, application and calibration.

New CRMs Developed and Commercialized During the Year

Sl. No.	Material	CRM Code	Parameters
1.	White Portland Cement	1013	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, SO ₃ , Na ₂ O, K ₂ O and Cl
2.	Oil Well Cement	1014	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, SO ₃ , Na ₂ O, K ₂ O and Free lime

CRMs Developed for Replenishing Exhausted Stock

Sl. No.	Material	CRM Code	Parameters
1.	OPC	1001A	Blaine fineness
2.	OPC Higher Fineness	1001A-400	Blaine fineness
3.	PPC	1002A	Blaine fineness
4.	Fly Ash	1001FC	Blaine fineness
5.	OPC Clinker	1015F2	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, SO ₃ , Na ₂ O, K ₂ O, Mn ₂ O ₃ , TiO ₂ , P ₂ O ₅ and Cl
6.	Raw Meal	1022A2	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, SO ₃ , Na ₂ O, K ₂ O, Cl, Mn ₂ O ₃ , TiO ₂ and P ₂ O ₅
7.	Hydrated Lime	1010	CaO, MgO, SiO ₂ , Insoluble residue, Specific gravity and Residue on 212 µm sieve
8.	Fly Ash	1023C	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, SO ₃ , Na ₂ O, K ₂ O and Cl
9.	Clay	1011	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, TiO ₂ , Mn ₂ O ₃ , P ₂ O ₅ , Na ₂ O and K ₂ O
10.	Coal	1031A1	Ash, Volatile Matter, Sulphur and Gross Calorific Value
11.	Coal	1031B1	Ash, Volatile Matter, Sulphur and Gross Calorific Value
12.	Composite Cement	1002E	Blaine fineness
13.	Composite Cement	1043	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, SO ₃ , IR, Na ₂ O, K ₂ O and Cl

Supply of developed Certified Reference Materials (CRMs) was continued to the cement and construction industry laboratories. A total of 8744 vials of different CRMs and 1883 sets of standard lime were supplied to 684 customers from cement plants, testing laboratories and R&D institutions.

Satisfaction of customers showed very good excellent satisfaction. White cement standard for chemical parameters was developed for this cement plant.

Under this programme, one sponsored study relating to development of reference standards based on material provided by user plants was completed. Standard was developed for calibration of X-ray analyzer for a cement plant. The sponsor was provided standard meeting traceability requirements for calibration of equipment.

CALIBRATION SERVICES

The calibration laboratories continued to implement Quality Management System as per ISO 17025:2005 requirements. 1600 equipment / apparatus including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers, environmental chambers, ovens, furnaces, balances, rebound hammers etc. were calibrated. Satisfaction of customers from the calibration services showed very good to excellent satisfaction on timeliness, work quality and interaction dimensions.

Calibration services have ensured traceability of the laboratory equipment to SI units and reliability of the results of various tests carried out using these equipment. New facilities like Measuring Tape and Steel Scale calibration equipment upto 1000mm range and Liquid Baths, with high degree of stability and uniformity, for calibration of thermometers in -80 to 300°C range have also been installed during the year in Calibration laboratories.



A View of Measuring Tape Calibration Equipment



Liquid Baths for Calibration of Thermometers

PATENTS

NCB has been filing applications for patents on processes, products, systems, machinery, equipment and accessories developed by it from time to time. Details of NCB patents presently in force and the applications filed, which are in different stages of processing, are given in Appendix V.

ORGANISATIONAL FORUMS

SOCIETY

General Meeting

The Annual General Meeting of the Society for the year 2017 was held on 02 August 2018 in New Delhi when it ratified the approval and adoption of the Annual Report, the audited accounts and balance sheet for the year 2016-17.

BOARD OF GOVERNORS

The composition of the Board for the year 2018 is given in the beginning of the report.

CORPORATE ADVISORY COMMITTEES

Research Advisory Committee

To advise on all aspects pertaining to Programmed R&D and industrial support services in NCB, with particular reference to technology forecasting, technology planning, programmes, strategies and methodologies and the overall project programme of NCB.

Infrastructure Development Committee

To advise the Board of Governors on various aspects of land, building services, equipment and facilities at the various NCB Units and to cause these infrastructural developments to be carried out at the various NCB Units and to assist in conducting the affairs of the unit in such a manner as to fulfill the set objectives with the programmes, policies and guidelines laid down by the board.

Administration & Finance Committee

To advise the Board of Governors on issues relating to financial planning, budgets, accounts, manpower growth plan and service matters including various rules of NCB. To take decisions on behalf of the Board of Governors on individual personnel cases and on issues of administrative nature as may be referred to it by the Board or by the Director General-NCB. All such decisions shall be reported to the Board at its immediate next meeting through the relevant status report.

REGIONAL ADVISORY COMMITTEE

Advisory Committee for NCB Hyderabad

To advise the Board of Governors and RAC, AFC and IDC on various aspects of development of NCB Hyderabad and its activities, and in particular on matters concerning the development and utilization of infrastructural facilities of the Unit and the industrial services rendered by it, and to assist in conducting

the affairs of the Unit in such a manner as to fulfill the set objectives within the programmes, policies and guidelines laid down by the Board.

EXECUTIVE COMMITTEE

With a view to achieve the objectives of collegiate management and to assist the Director General to deal with the various functions, the Executive Committee, comprising Heads of various Divisions of Activities with the Director General as its Chairman, held 03 meetings and deliberated upon important issues including approving proposals for 331 sponsored projects.

FORUM FOR SCIENCE AND TECHNOLOGY (FST) / SCIENTIFIC & TECHNOLOGICAL INTERACTIVE MEET

During the period, one meeting of FST was held. The meeting provided interactive discussion among the scientific staff of NCB. The meeting had served very well for keeping the scientists and engineers informed on the latest developments in the area.

Sl. No.	Date	Topic of Lecture	Speaker
1	12 April 2017	Geopolymer Composite Technology	Sh Suresh Vanguri, Dy Manager-CRT Sh Lalit Yadav, Dy Manager-CDR Sh Ankit Sharma, CDR

ORGANISATIONAL MATTERS

STAFF PARTICULARS

NCB had strength of 179 Cadre Officials comprising of engineers, scientists and technical and administrative support staff as on 31 March 2018 engaged in the activities of the organization.

STAFF WELFARE

NCB continued to look after the welfare of its staff through several activities. During 2017-18, 73 NCB officials availed facility of staff quarters in NCB Housing Colony. The Group Personal Accident Insurance Policy to cover risks arising out of accidents was continued for the year 2017-18.

Activities of NCB Staff Club, working for fostering social and fraternal relations amongst the officials, included maintenance of library, indoor games and other cultural activities. The Club also involved the family members of staff, especially children, in celebration of Independence Day and Republic Day.

INFRASTRUCTURE

NCB - Ahmedabad

Ahmedabad unit of NCB has essential facilities for testing of cement, concrete, steel and soil in order to provide Quality Assurance and Quality Control (QA-QC) and Third Party Quality Assurance (TPQA) services to the construction industry. Facilities includes Universal Testing Machine (UTM), Automatic Compression Testing Machine (ACTM), Digital Thermo Hygrometer, Physical Testing Laboratory, CBR Testing Machine, Bomb Calorimeter, Marshal Stability Apparatus, Ductility Testing Apparatus and Non-Destructive Testing equipment such as Rebound Hammer, Ultrasonic Pulse Velocity, Corrosion Analyzer (Half Cell Potential), Core Cutting Machine, Cover Meter (Profometer) etc. The unit is using these facilities to provide QA-QC and TPQA services to various government agencies of Gujarat, Daman & Diu and Dadra & Nagar Haveli. During the year Testing and Calibration laboratories of NCB Ahmedabad got NABL accreditation in the field of Mechanical Testing.

NCB - Ballabgarh

The technical infrastructure at NCB's Ballabgarh Unit, developed in a planned manner and upgraded over the years, makes it one of the most modern R&D laboratories for cement and building materials. Major equipment facilities available here are : Scanning Electron Microscopy & Energy Dispersive Analysis of X-rays (SEM & EDX) Laboratory, Advanced X-ray Diffractometer, Multi-dispersive X-ray Fluorescence Spectrometer with large auto sample changer, Fused Bead Making Machine and sample preparation unit, Inductive Coupled Plasma Spectrometer for minor heavy elements, Fourier Transform Infrared Spectroscope, fully automatic CHNS Analyser, Computerized Bomb Calorimeter, Optical Microscope with image analysing system, Pyrometric Cone-Equivalent Furnace, equipment for non-destructive evaluation of concrete structures, Flexural and Transverse Strength Testing Machine for concrete samples, Abrasion Testing Machine, Automatic Compression Testing Machines (various capacities), Universal Testing Machines, Permeability Tester, Heavy Test Floor for testing of large size structural elements and light weight concrete elements, Computerized Laser Beam Particle Size Analyser, Ultrasonic Pulse Velocity Apparatus, Concrete Pile Integrity Tester, Endoscopic Test Apparatus for Hardened Concrete, Bridge Testing Equipment, Impact Echo Test, and Underground Radar Equipment, Computer Aided Image Analyser System for satellite imageries, Global Positioning System, high temperature testing for clinkerisation and refractories, Differential Thermal Analyser, pollution monitoring equipment facility including High Volume Air Samplers, Respirable Dust Samplers, Multi-gas Analyser, Portable Flue Gas Analyser, Opacity Monitor, Noise Measurement System, CO₂ Gas Analyser, Ultrasonic Gas Leak Detector and Low Level BTX Hydrocarbon Analyser for ambient air etc. Servo Controlled Compression Testing Machine, Ultrasonic Pulse Velocity Testing equipment and Flexural Testing Machine for RCC beam (as per ASTM C 1609) with displacement rate control upto 0.025mm/min. Simulator based training system for kiln and mill operation of cement plants with two PC-based trainer stations and five trainee stations each.

NCB has an Independent Test House equipped with an extensive range of sophisticated analytical instruments and a computer based Laboratory Information Management System (LIMS).

Construction of a new laboratory block for test house and new hostel building with cafeteria for trainees has been completed. The test house has now been shifted in the new building and work was smoothly running therein. The hostel for trainees and cafeteria were utilized by the centre during the year.

During the year, important equipment facilities added were : Constant Temperature Water Bath, Digital Concrete Hammer, Hot Air Oven, Ion Analyzer, Mercury Porosity Meter, Rebar Detector, Ductility Apparatus, Pressure Meter, Mandrel for bend and re-bend test and Elemental Analyzer. Besides these, other facilities added in different testing laboratories in Ballabgarh unit like, Sound Level Meter, Fine Particulate Sampler, Flue Gas Analyser, Portable Compressed Air Flow Meter, Isothermal Calorimeter, BET Apparatus, Core Drilling Machine (150-200mm), Pull Off Tester, Half Cell Potential (Digital), Strain Controlled ACTM-3000 KN, Flectural Frame along with ACTM 3000 KN, Direct Shear Stress Apparatus, Marshall Test Equipment etc including MS Project Software.



NCB - Hyderabad

The range of equipment facilities at NCB's Hyderabad unit cover testing and evaluation facilities for cement, cement raw materials, coal, concrete making materials besides calibration facilities for related physical and mechanical testing equipment.

The advanced instruments laboratory of the unit is equipped with XRF Spectrometer, X-Ray Diffractometer, DTA-TG-DSC equipment, CHNS elemental analyser, laser beam (based) particle size analyser and optical microscope with image analyser. The unit also has a concrete laboratory with a wide range of equipment facilities for testing of cement and concrete making materials and conducting concrete mix proportioning.



X-ray Fluorescence Spectrometer

The unit has modern instruments and equipment for in-plant studies including gas analysers, pyrometers and velocity/pressure measuring instruments for energy audit and process diagnostic studies. A modern PC based simulator trainer covering different grinding and pyro-processing systems is available in the unit for providing hands - on training to mill and kiln operators of cement plants.

The unit is equipped with a training complex including training block, hostel and canteen to facilitate residential programmes.

NCB - Odisha

During the year, important equipment facilities were continued *ie* Servo Controlled Compression Testing Machine, Ultrasonic Pulse Velocity testing equipment and Flexural Testing Machine for RCC beam (as per ASTM C 1609) with displacement rate control upto 0.025mm/min.

LIAISON AND CO-ORDINATION

NCB maintained liaison with a large number of overseas and Indian organizations, through membership or otherwise. The Director General and other officials continued to serve on a number of committees constituted by the Government of India, the Bureau of Indian Standards and other organizations as follows:

Sh Ashutosh Saxena **Director General (Actg.)**

- a) Member, Working Group on Technical Sector of Standard Promotion and Consumer Affairs Deptt. (SP & CAD), Bureau of Indian Standards, New Delhi.
- b) Member, Laboratory Advisory Committee (LAC), Bureau of Indian Standards, New Delhi.
- c) Member, Panel for Building Materials (CED 46:P3), Bureau of Indian Standards, New Delhi.

Dr S K Chaturvedi **Joint Director**

- a) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
- c) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
- d) Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
- e) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.
- f) Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi.

Sh Rabindra Singh **Joint Director**

- a) Member, Coal Benefication & Lignite Sub Committee (PCD 7:6 & PCD 7:9), Bureau of Indian Standards, New Delhi.
- b) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.
- c) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.
- d) Member, Solid Mineral Fuels Sectional Committee (PCD 7), Bureau of Indian Standards, New Delhi.

Dr S K Breja
Joint Director

- a) Member, Sieves, Sieving and other Sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi.
- b) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi.

Sh V V Arora
Joint Director

- a) Chairman, Cement Matrix Products Sectional Committee, Bureau of Indian Standards, New Delhi.
- b) Member, Civil Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi.
- c) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
- d) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
- e) Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
- f) Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
- g) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
- h) Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.
- i) Member, Panel for Revision of IS : 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
- j) Convenor, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
- k) Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi.
- l) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
- m) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.
- n) Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.
- o) Member, Panel for Fire protection (CED 46 :P2), Bureau of Indian Standards, New Delhi.
- p) Member, Panel for Building Materials (CED 46:P3), Bureau of Indian Standards, New Delhi.
- q) Member, Panel for Load, Forces and Effects (CED 46:P4), Bureau of Indian Standards, New Delhi.

- r) Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Prestressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi.
- s) Member, Panel for Masonry (CED 46:P7), Bureau of Indian Standards, New Delhi.
- t) Member, Panel for Plain Reinforced & Prestressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi.
- u) Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi.

Dr D Yadav
General Manager

- a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
- b) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
- c) Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
- d) Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi.

Dr N K Tiwary
General Manager

- a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi.
- b) Member, Solid Waste Management Sectional Committee (CHD:33), Bureau of Indian Standards, New Delhi.
- c) Member, Environmental Management Sectional Committee (CHD 34), Bureau of Indian Standards, New Delhi.
- d) Member, Life Cycle Assessment Sub Committee (CHD 34:P7), Bureau of Indian Standards, New Delhi.
- e) Member, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.

Sh Anupam
General Manager

- a) Member, Coal Beneficiation & Lignite Sub Committee (PCD 7:6 & PCD 7:9), Bureau of Indian Standards, New Delhi.

Sh Amit Trivedi
General Manager

- a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
- c) Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi.
- d) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi.
- e) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi.
- f) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi.
- g) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi.
- h) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.
- i) Member, Sieves, Sieving and other Sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi.

Sh B P Ranga Rao
General Manager

- a) Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.
- b) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi.

Sh B S Rao
General Manager

- a) Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi.

Dr D K Panda
General Manager

- a) Member, Stones Sectional Committee (CED 6), Bureau of Indian Standards, New Delhi.

Sh P N Ojha
General Manager

- a) Member, CIVIL Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
- c) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
- d) Member, Panel for Revision of IS : 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
- e) Member, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.
- f) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.

Sh M Selvarajan
General Manager

- a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi.
- b) Member, Environmental Management Sectional Committee (CHD:34), Bureau of Indian Standards, New Delhi.
- c) Member, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.

Dr R S Gupta
General Manager

- a) Member, Building Limes Sectional Committee (CED 4), Bureau of Indian Standards, New Delhi.

Sh T V G Reddy
General Manager

Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.

- a) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for Administration, Development Control Rules and General Buildings (CED 46 :P1), Bureau of Indian Standards, New Delhi.

Sh N K Sharma
General Manager

- a) Member, Stones Sectional Committee (CED 6), Bureau of Indian Standards, New Delhi.

Sh P Anil Kumar
Group Manager

- a) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

Sh Sanjay Mundra
Group Manager

- a) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Prestressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi.

Sh Ankur Mittal
Manager

- a) Member, Solid Mineral Fuels Sectional Committee (PCD 7), Bureau of Indian Standards, New Delhi.

Sh Akashneel Banerjee
Manager

- a) Member, Working Group on Technical Sector of Standard Promotion and Consumer Affairs Deptt. (SP & CAD)

Sh Brijesh Singh
Manager

- a) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi.
- c) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.
- d) Member, Panel for Masonry (CED 46:P7), Bureau of Indian Standards, New Delhi.

Sh Kapil Kukreja
Manager

- a) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi.
- b) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi.

Sh S K Agarwal
Manager

- a) Reviewer of International British Journal “Advances in Cement Research”
- b) Member, Building Limes Sectional Committee (CED 4), Bureau of Indian Standards, New Delhi.
- c) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.

Sh Suresh Kumar Shaw
Manager

- a) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.

Sh Suresh Kumar
Manager

- a) Member, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
- b) Member, Panel for Revision of IS 2386 (CED 2:2/P10), Bureau of Indian Standards, New Delhi.
- c) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi.

Sh Mantu Gupta
Manager

- a) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi.

Sh Anand Bohra
Deputy Manager

- a) Member, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.

Sh Saurabh Bhatnagar
Deputy Manager

- a) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi.
- b) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi.

Appendix - I

Rolling Plan of Missions within the Framework of Centres

A. CENTRE – CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)

- Mission 1 : Utilization of Marginal Grade Raw Materials in the Manufacture of Cement and Building
- Mission 2 : Development of Newer Cements, Composites and Alternate Binding and Building Materials
- Mission 3 : Development of Newer Processes of Manufacturing Cement and other Binding and Buildings Materials
- Mission 4 : Raw Mix Design Optimization
- Mission 5 : Utilization of Industrial and other Wastes for Cement and Building Materials
- Mission 6 : Development of Newer Refractories
- Mission 7 : Improved Refractory Engineering Practices
- Mission 8 : Study of Fundamental Concepts in Material Science and Fundamental Studies relating to Areas of Fuel Combustion, Pyro-processing, Size Reduction, etc
- Mission 9 : Independent Testing

B. CENTRE – MINING, ENVIRONMENT, PLANT ENGINEERING AND OPERATION (CME)

- Mission 1 : Compilation and Updating of National Inventory of Cement Grade Limestone Deposits
- Mission 2 : Identification, Exploration, Evaluation and Assessment of Limestone Deposits and other Cement Raw Materials
- Mission 3 : Upgradation and Quality Establishment of Limestone (at Quarries) and Mineral Conservation
- Mission 4 : Application of Remote Sensing Techniques
- Mission 5 : Advanced Survey Techniques including Geographical Information System (GIS) and Global Positioning System (GPS)
- Mission 6 : Application of Geophysical Techniques for Mineral Exploration, Ground Water Investigation, etc.
- Mission 7 : Mine Planning and Scheduling
- Mission 8 : Improved Machinery Application and Improved Technological Upgradation for Mining Practices
- Mission 9 : Sustainable Development through Environmental Improvement including Survey of Land and Water Resources
- Mission 10 : Pollution Control Technologies for Particulate Gaseous Emissions and Liquid Effluents
- Mission 11 : Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for Industrial Projects and Mines
- Mission 12 : Environmental Management System (EMS) and ISO - 14001 Certification for Process Industries
- Mission 13 : Utilization of Hazardous Wastes as Supplementary Fuel
- Mission 14 : Monitoring of Environmental Parameters for Water, Ambient Air Quality, Noise and Vibration Studies
- Mission 15 : Rehabilitation and Reclamation of Mined out Areas
- Mission 16 : Improving Capacity Utilization and Increasing the Rate of Production in Kilns and Mills towards Improving Total Factor Productivity in Cement Industry through Process Optimization, Diagnostic Studies and Trouble Shooting and Improvement in Operation

- Mission 17 : Benchmarks, Best Practices, Operational Norms and Technical Audit including Plant Monitoring
- Mission 18 : Productivity Enhancement Programme (PEP)
- Mission 19 : Technological Upgradation
- Mission 20 : Improving Utilization of Coals
- Mission 21 : Utilization of Alternate Fuels such as Lignite, Natural Gas, Combustible Wastes etc.
- Mission 22 : Improvements in Fuel Combustion Efficiency
- Mission 23 : Optimization of Energy (Both Thermal and Electrical) Consumption
- Mission 24 : Energy Auditing, Management and Monitoring
- Mission 25 : Waste Heat Utilization including Cogeneration
- Mission 26 : Creating Awareness and Motivation for Energy Conservation
- Mission 27 : Total Productive Maintenance (TPM)
- Mission 28 : Preventive/Predictive Maintenance Programme, Condition Monitoring Techniques and Tribology including Computerised Maintenance
- Mission 29 : Inventory Control and Spare Parts Management
- Mission 30 : Risk Analysis and Improving Safety in Cement Plants
- Mission 31 : Turnkey Consultancy for Setting up Modern Medium and Large Cement Plants from Concept to Commissioning including Fund Sourcing
- Mission 32 : Establishing Modern Energy Efficient CRI-MVSK and Rotary Kiln based Mini Cement Plants from Concept to Commissioning
- Mission 33 : Improvements in System Design and Engineering of Plant and Machinery (including CRI designed indigenous Precalculator System, Burners for High Ash Coals, Refractory Lining System and Coal Quality Modulation System)
- Mission 34 : Modernization and Technological Upgradation in Cement Plants
- Mission 35 : Upgradation and Modification of VSK based Cement and Lime Plants
- Mission 36 : Developing Systems Designs for Bulk Movement of Cement by Rail, Road and Waterways
- Mission 37 : Marketing Strategies and Logistics
- Mission 38 : Improvements in Packaging of Cement

C. CENTRE – CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)

- Mission 1 : Analysis and Design of Structures for Safety and Economy and Development of Related Software Packages
- Mission 2 : Rationalizing Designs of Structures and Foundations in Cement Plants and Other Constructions
- Mission 3 : Performance Evaluation of Structures including Machine Foundations through Site Inspection and Testing
- Mission 4 : Formulation and Evaluation of Protective System for Enhancing the Service Life of Concrete Structures
- Mission 5 : Evaluation of Concrete Construction through Non-Destructive Investigations
- Mission 6 : Improving Durability of Concrete Construction through Distress Investigations and Rehabilitation Procedures
- Mission 7 : Improved Quality Control Procedures for Enhancing Durability
- Mission 8 : Rational Utilization of Cement and other Ingredients in Concrete, including Admixtures
- Mission 9 : Promotion of Ready Mix Concrete Technology in India
- Mission 10 : Development of Concrete for Special and Newer usages such as Underwater Concreting, Special Concrete Exposed to Extreme Temperature etc
- Mission 11 : Development and Evaluation of Prefab Systems Appropriate for Housing Programmes
- Mission 12 : Application of Alternative Building Materials and Development of Construction Techniques for Low Cost Housing
- Mission 13 : Improvements in Construction Technology of Cement Concrete Pavements and Canal Linings

- Mission 14 : Development of Precast Architectural Concrete Elements and Concrete Finishes
 Mission 15 : Preventive Maintenance Programme for Enhancing Service Life of Buildings
 Mission 16 : Extended Application of Concrete for Non-Structural Usage
 Mission 17 : Improvement in Construction Management Techniques

D. CENTRE – INDUSTRIAL INFORMATION SERVICES (CIS)

- Mission 1 : Collection, Documentation and Retrieval of Information for Development of Cement and Building Materials Industries
 Mission 2 : Establishing National Data Bank for the Cement and Building Materials Industries
 Mission 3 : Providing Library Services
 Mission 4 : Establishing Display Centre and Sample Museum and Participation in Exhibition and Trade Fairs
 Mission 5 : Publication of R & D Projects, Technology Digests, R & D Journals, Trend Reports, Promotional Literature etc
 Mission 6 : Organising Workshops and Seminars at National and International Levels on Topical Subjects in the Areas of Cement and Building Materials
 Mission 7 : Promoting International Linkages for Development of Technologies in the Field of Cement and Building Materials

E. CENTRE – CONTINUING EDUCATION SERVICES (CCE)

- Mission 1 : Improving the Talent of Personnel at Entry Level to Cement Industry
 Mission 2 : Improving Technical and Managerial Skills/Knowledge of NCB Officials through Inhouse/ External Programmes
 Mission 3 : Manpower Planning and Human Resource Development Strategies for Cement and Building Material Industries
 Mission 4 : Upgrading Technological Talent of Personnel in the Cement and Building Materials Industries
 Mission 5 : Improving Operational Skills of Personnel in the Cement Industry through Simulator Based Courses
 Mission 6 : Training of Personnel in Computer Programming, Application and Information Technology at Different Levels of Participation
 Mission 7 : Training of Personnel in Software Development, System Analysis and Information Technology Applicable to Cement Manufacturing Process Industry, Structural Design and Investigations

F. CENTRE – QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES (CQC)

- Mission 1 : Providing Traceable Calibration Services to the Industry for Ensuring Manufacture of Quality Product
 Mission 2 : National and International Standardization
 Mission 3 : Quality Management, Quality Assessment and Quality Improvement in Cement and Building Materials Industries
 Mission 4 : Development of Improved Methodologies for Testing and Quality Control including Rapid Methods of Testing and Quality of Cement and Other Building Materials in the Field
 Mission 5 : Inter-Laboratory Proficiency Testing
 Mission 6 : Quality Related Services
 Mission 7 : Development of New Standard Reference Materials
 Mission 8 : Providing Standard Reference Materials (SRMs), Developed by NCB, to the Industry for Ensuring Accuracy of Testing for Quality Control
- These Programmes and Missions are proposed to be achieved through the pursuit of specific projects with specified targets of time, cost and assured end products

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Appendix – II

Programmed Projects Completed During the Year 2017-18

Sl. No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
1	COB-07	Investigations on Portland Limestone Cement and their Performance Characteristics	April 2016	March 2018
2	COB-08	Performance Evaluation of Cement Samples by Mechanical Mixing and Keeping Fixed W/C Ratio for Compressive Strength Determination <i>vis a vis</i> as per Indian Standards Test Procedures	April 2016	March 2018
3	FBR-14	Development of Chemical Formulation for Enhancing and Achieving Desired Properties of Cements	April 2016	March 2018
4	CON-12	Development of Guidelines for Design of High Performance Concrete Mixes for Specified Long Service Lives Using Latest Available Ultrafine and Admixtures	April 2016	March 2018
5	ENV-18	Water Footprint Assessment Study for Cement Plants	April 2016	March 2018
6	COB-06	Investigation on High Volume Flyash Blended Cement	July 2015	March 2018
7	ENV-17	Best Practices for Reduction of NO _x and SO ₂ emissions for Indian Cement Industry	April 2016	March 2018

Appendix - III

Sponsored Projects Completed During the year 2017-18

Sl. No.	SP No	Title of the project	Name of the Sponsor
CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)			
1.	4458	Establishing limestone consumption factor	M/s J K Cement, Nimbahera Rajasthan
2.	4631	Burnability evaluation of raw mix and bond work index of limestone and clinker,	M/s Ambuja Cement Ltd,
3.	4632	Burnability investigations of raw mix samples and testing of limestone and coal samples	M/s ACC, Madukkarai, Tamil Nadu
4.	4644	Technical suitability of utilization of E cat in the manufacture of cement	M/s Reliance Industries Limited, Jamnagar, Gujarat
5.	4655	Burnability evaluation of raw mix,	M/s J K Cement, Nimbahera, Rajasthan
6.	4718	Establishing limestone consumption factor	M/s Maihar Cement, Unit-II, Maihar, Madhya Pradesh
7.	4719	Establishing limestone consumption factor	M/s Maihar Cement, Maihar, M.P
8.	4720	Burnability evaluation of raw mix,	M/s Binanai Cement Ltd, Binanigram, Sirohi, Rajasthan
9.	4723	Establishing limestone consumption factor	M/s Diamond Cement Works, Damoh, Madhya Pradesh
10.	4792	Establishing limestone consumption factor,	M/s The Ramco Cements Ltd, Jaggayyapet
11.	4837	Establishing limestone consumption factor	M/s Birla Cement Work, Satna, MP
12.	4892	Establishing limestone consumption factor	M/s Sewagram Cement Works , Vayor, Gujarat
13.	4929	Burnability evaluation of raw mix	M/s Ultratech Cement Ltd,
14.	4930	Burnability evaluation of raw mix	M/s Wonder Cement Ltd,
15.	4933	Establishing limestone consumption factor	M/s Vikram Cement Works, Khor, M.P.
16.	4950	Establishing limestone consumption factor	M/s Reliance Industries Limited , Damoh, Madhya Pradesh
17.	4994	Establishing limestone consumption factor	M/s Ultratech Cement, Awarpur, Chandrapur
18.	4995	Establishing limestone consumption factor	M/s KJS , Maihar, Madhya Pradesh
19.	4996	Establishing limestone consumption factor	M/s Ramco Cement, Mathod, Karnataka
20.	5040	Preparation and evaluation of white Portland cement containing upto 35% dolomite as additive	M/s Ultra Tech Cement Ltd, Unit: Birla White, Jodhpur, Rajasthan
21.	5070	Burnability investigations of raw mix samples	M/s Maihar Cement, Maihar, M.P.
22.	5071	Burnability investigations of raw mix samples	M/s Maihar Cement, Unit-II, Maihar, M.P.
23.	5072	Burnability evaluation of raw mix,	M/s J K Cement, Muddapur, Karnataka

Sl. No.	SP No	Title of the project	Name of the Sponsor
24.	5117	Establishing limestone consumption factor	M/s ACC Cements Ltd, Kymore, M.P.
25.	5160	Establishing limestone consumption factor	M/s Dalmia Cement(Bharat), Belgum
26.	5199	Buranbility investigations of raw mix samples	M/s Reliance Cement Limited
27.	5263	Buranbility investigations of kiln feed and raw mix samples	M/s KHD Humbolt
28.	5331	Buranbility investigations of raw mix samples	M/s Wonder Cement Limited Nimbahera, Rajasthan
29.	5386	Burnability evaluation of raw mix	M/s J K Cement, Mangrol
CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING & OPERATION (CME)			
30.	4637	TEF study for Coal & Petcoke Handling System	M/s Saurashtra Cement Ltd., Ranavav, Gujarat
31.	4638	Diagnostic study for baghouse chimney corrosion	M/s Saurashtra Cement Ltd
32.	4648	Feasibility study for handling, storage and feeding system for co-processing of liquid hazardous waste	M/s Saurashtra Cement Ltd., Gujarat
33.	4699	Feasibility study for capacity upgradation	M/s Saurashtra Cement Ltd., Gujarat
34.	4770	Plant optimization study	M/s Purbanchal cement Ltd., Assam
35.	4793	Diagnostic study for dust nuisance in Wagon tippler and transfer towers 1 & 2	M/s Ultratech Cement Ltd, Jhajhar
36.	4891	Capacity Assessment Study	M/s Calcom Cements Ltd
37.	4922	Compressed air audit for Line-1 & 2 compressors -11 nos. compressors	M/s Heidelberg Cement India Ltd., Narsingarh, Damoh (M.P.)
38.	4962	Diagnostic study for minimizing excessive kiln build-ups	M/s Star Cements Ltd., Meghalaya
39.	4966	CFD study for chimney corrosion	M/s Saurashtra Cement Ltd., Gujarat
40.	4971	Feasibility Study for Co-processing of Alternate Fuels	M/s JK Cements, Karnataka
41.	4986	Capacity Assessment Study	M/s Star Cement Meghalaya Ltd
42.	4999	Detailed Project Report (DPR) for setting up a 600 tpd green field cement plant at Tao Tao, Louvakou district, department of NIARI, Republic of Congo (RoC)	Government of The Republic of Congo
43.	5041	Process measurements of Existing air pollution control Equipment for kiln and VRM	M/s Cement Corporation of India Ltd., Tandur, Telangana
44.	5051	Diagnostic Study for Improving Productivity & Process Optimisation	M/s Hill Cement Ltd, Meghalaya
45.	5068	Preparation of DPR for modernization of Malabar Cements Ltd, Walayar Cement Plant	M/s MCL, Kerala
46.	5084	Environmental Monitoring at M/s South Asian University, Maidan Garhi, Delhi (Winter Season)	M/s Ahluwalia Contracts (India) Ltd
47.	5105	Mandatory energy audit study	M/s J K Cement works, Gotan, Rajasthan
48.	5124	Mandatory energy audit study (As per BEE Energy Conservation Act 2001)	M/s Saurashtra Cement Limited, Ranavav, Gujarat

Sl. No.	SP No	Title of the project	Name of the Sponsor
49.	5116	Feasibility study report for installation of Pond ash drying system at	M/s Saurashtra Cements Ltd., Ranavav, Gujarat
50.	5132	Monitoring of Environmental Parameters at Rauri & Suli Plants,	M/s Ambuja Cement Ltd, Darlaghat, Himachal Pradesh
51.	5152	Mandatory energy audit for cement plant	M/s Gujarat Sidhee Cement Limited, Sidheeagram, Gujarat
52.	5184	Testing of SO _x & NO _x and SPM in RGTTP, HPGCL, Khedar, Hisar	Haryana Power Generation Corporation Limited
53.	5185	Measurement of SO _x , NO _x and SPM for Stack emission levels of 250 MW Boiler, Unit-7, PTPS, HPGCL, Panipat	M/s Haryana Power Generation Corporation Limited
54.	5191	Study on pollution load due to operation of flyash dryer to be installed	M/s Ambuja Cements Ltd., Ropar, Punjab
55.	5198	Mandatory energy audit in cement plant (as per BEE energy conservation act 2001)	M/s J K Cement Works, Jharli, Dist Jhajjar (Haryana)
56.	5213	Measurement of SO _x , NO _x , and SPM for Stack emission levels of 250 MW Boiler, Unit-8, PTPS, HPGCL, Panipat	M/s Haryana Power Generation Corporation Limited
57.	5228	Measurement of SO _x , NO _x , and SPM for Stack emission levels of 250 MW Boiler, Unit-6, PTPS, HPGCL, Panipat	M/s Haryana Power Generation Corporation Limited
58.	5230	Capacity Assessment Study	M/s Goldstone Cements
59.	5235	Environmental Monitoring at M/s South Asian University, Maidan Garhi, Delhi (Monsoon Season)	M/s Ahluwalia Contracts (India) Ltd
60.	5294	Testing of SO ₂ & NO _x for stack emissions at DCRTPP, HPGCL, Yamuna Nagar	M/s Haryana Power Generation Corporation Limited
61.	5442	Stack Emission Measurement for PM, SO ₂ & NO _x at Unit 7 & 8 of PTPS, HPGCL, Panipat	M/s Haryana Power Generation Corporation Limited

CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)

62.	2523	Third Party Quality Assurance/Quality Audit for Widening/Improvement/Strengthening of Karawal Nagar Road from Wazirabad Road Shiv Nihar Tiraha Phase-I from Wazirabad Road to Sherpur Chowk Phase-II SH: Wid/Imp. and Stg of Karawal Nagar Road from Chand Bagh Culvert to near Sr. Sec. School Dayalpur	Executive Engineer (Project (Shah.-N)-II, Municipal Corporation of Delhi, New Usmanpur, Delhi
63.	2604	Third Party Quality Assurance/Quality Audit for the Work of Construction of Approaches of Road Over Bridge and RUB/Underpass at Railway Level Crossing on Najafgarh Bijwasan Road at Bijwasan s	Executive Engineer (Pr) West-I, Municipal Corporation of Delhi, Moti Nagar, New Delhi
64.	3887	Third Party Quality Assurance/Audit for Work of "Construction of Two Nos. RCC Box underpass (26m long, 8m wide & 5.20m height) including widening of existing slip roads on either sides of main carriageway of ROB-36 by using RE Panels from Ganesh Nagar Chowk to School Block Shakarpur Red Light, Delhi"	Executive Engineer, Flyover Project Division F-122, Public Works Department, Govt. of Delhi, Ramesh Park, Near Shakarpur Police Station, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
65.	3895	Third Party Quality Assurance/Audit for Work of "Finishing and Interior Works at Auditorium at Traffic Training Part, Punjabi Bagh, New Delhi".	Executive Engineer (Pr-I) West Zone, South Delhi Municipal Corporation, Moti Nagar, Delhi
66.	3983	Third Party Quality Assurance/Audit for Work of "Construction of Gym Centre at Farash Bazar, Shahdara Ward No. 237 AC-62 Shahdara South Zone"	Executive Engineer (Pr-I) Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
67.	4002	Third Party Quality Assurance/Audit for Work of "Construction of Zonal Office Building at Shivaji Place, Rajouri Garden in West Zone".	Executive Engineer (Pr-II), West, South Delhi Municipal Corporation, Zakhira, Delhi
68.	4119	Third Party Quality Assurance/Audit for Work of "Rejuvenation of Shahdara Jheel near Shahdara North Zonal office in AC-64 Shahdara North Zone". SH: Providing waste water treatment by Phytoid Technology and diversion of existing rising main.	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
69.	4173	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at MC Pry. School D-2 Block, Nand Nagri in Ward No. 243 at Shahdara (North Zone)	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
70.	4175	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at MC Pry School M Block Nand Nagri (Sunder Nagri) in Ward No. 244 at Shahdara (North) Zone	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
71.	4177	Third Party Quality Assurance/ Audit for work of Widening of road along Mpl. Flats at Usmanpur from gate no. 2 to Gali No. Usmanpur by shifting of existing compound wall of EDMC Staff Quarters Usmanpur in Ward No. 251 Shah (N) Zone	Executive Engineer [M Shah (N)-IV], East Delhi Municipal Corporation, Shahdara, Delhi
72.	4190	Third Party Quality Assurance/audit for Work of Construction of Veterinary Hospital cum Sterilization Centre at Sector-27 Rohini PSP Pocket (FC-9) Narela Zone	Executive Engineer (Project) Narela, North Delhi Municipal Corporation, Narela, Delhi
73.	4245	Third Party Quality Assurance/Audit for the of Construction of East Delhi Municipal Corporation Central Medical Store in Campus of SDN Hospital Shahdara (North) Zone	Executive Engineer (Pr)-I, East Delhi Municipal Corporation, Shyam Lal College, Delhi
74.	4263	Consultancy Services for Third party Technical Supervision, Monitoring & Quality Assurance For construction of new yard including building, road, earth works, fire Hydrant System, Water supply, Strom Water Drain, Electro Mechanical Works, Landscaping and ancillary works at Shri Sardar Vallabhbhai Patel Agricultural Produce Market Committee-Amreli, Savarkundla Road, Amreli	M/s The Agricultural Produce Market Committee, Amreli
75.	4276	Third Party Inspection and Monitoring of Quality for "Construction of protection Wall for Anti-Sea Erosion from Ch. 350 Mt to 1850 Mt from Jampore Beach towards Light House at Moti Daman	M/s Omni bus Industrial Development Corporation of Daman & Diu and Dadra & Nagar Haveli Limited Moti Daman

Sl. No.	SP No	Title of the project	Name of the Sponsor
76.	4277	Third Party Inspection and Monitoring (TPI&M) for the work of Construction of Pedestrian Bridge connecting Nani Daman & Moti Daman across Damanganga River near Old Damanganga Bridge.	M/s Public Works Department, Moti Daman
77.	4302	Evaluation of Materials and Concrete Mix Design for the work of Inland, Transportation, Installation, Testing & Commissioning of Switchyard Package for Darlipali STPP, NTPC Ltd. Odisha	M/s NTPC Limited, Darlipali Super Thermal Power Project, Odisha
78.	4303	Third Party Quality Assurance / Audit for Work of "Imp./Stg. of internal roads in Shastri Nagar in SP Zone" SH: Imp. of Drainage System C/o Footpath, Imp. of berms & Imp. of roads by pdg. RMC".	Executive Engineer (Project) SPZ, North Delhi Municipal Corporation, Kashmere Gate, Delhi
79.	4313	Third Party Quality Assurance / Audit for work of "Construction of 30 Nos. of GPRA Type-IV flats at Sector-4 in DIZ area, New Delhi". SH: All Civil work internal and external electric works, firefighting, DG Set and lifts	M/s Central Public Works Department, Development Project Division-2, Indraprastha Bhawan, New Delhi
80.	4318	Third Party Quality Assurance/Audit for Work of "Construction of Type II 36 Nos and Type III 36 Nos, Quarters at G-Point in Lieu of Quarters at Block 7 & 12 in the Redevelopment Scheme of President Estate" SH: Civil Works Including Development Works & Electrical Works such as Internal & External Electrical Installation, Fire Alarm, Fire Fighting, Substation, DG Sets, Lifts, CCTV and Solar Water Heating System	Executive Engineer, Central Public Works Department, President's Estate Project Division, Rashtrapati Bhavan, New Delhi
81.	4324	Third Party Quality Assurance / Audit for Work of "Construction of Hall and Development of Open Ground in M C Pry. School A Block Vivek Vihar Ph-II in Ward No. 238, AC-62 Shahdara South Zone	Executive Engineer (Pr-I), East Delhi Municipal Corporation, Krishna Nagar, Delhi
82.	4350	Third Party Quality Assurance / Audit for Work of "Improvement and Strengthening of roads in Pocket 1(Paschim Puri), Pushkar Enclave and DG-S Block & Back lanes of Pushkar enclave, state Bank Nagar, Reserve Bank Colony, B1,B2, B3, B4 and B5 Block in C-57 Paschim Vihar (South) Rohini Zone".	Executive Engineer (Project)-I Rohini Zone, North Delhi Municipal Corporation, Rohini Delhi
83.	4369	Third Party Quality Assurance / Audit for Work of Construction of 27 Class Room, 1 Hall, 1 Staff Room, 1 Science Room, 1 Library Room and 2 Toilet Block (Boys and Girls) in M.C. Pry. School at Burari (Boy) in C-06/CLZ.	Executive Engineer (Project), C.L. Zone, North Delhi Municipal Corporation, Sawan Park, Delhi
84.	4378	Third Party Quality Assurance / Audit for Work of Construction of 23 Nos. Class Rooms, One Store, One Computer Room, One Office, One Library Room, One Science Room, One Hall and Toilet blocks at M.C. Pry School Bijwasan (G), NGZ	Executive Engineer (Project) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
85.	4381	Third Party Inspection And Monitoring Of Quality For The Work Of Construction Of Wharf Wall With Deeping Of Existing Bed Level Of Creek From Vadisheri To Saudwadi Jetty At Vanakbara, Diu	M/s Public Works Department, Diu
86.	4385	Third Party Quality Assurance / Audit for Work of Construction of Recreation Centre, Library and Gym at Samaspur Village in Ward No. 224/ AC-58 Sh(S) Zone	Executive Engineer (Pr.)-II, East Delhi Municipal Corporation Shakarpur, Delhi
87.	4391	Third Party Quality Assurance / Audit for Work of Construction of Primary Urban Health Centre (PUHC) at Rani Bagh in Ward No. 59 in Rohini Zone	Executive Engineer (Project)-I, Rohini Zone, North Delhi Municipal Corporation, Delhi
88.	4398	Evaluation of Coarse and Fine Aggregate Samples for Accelerated Mortar Bar Test for the Work of NDCT Package of NTPC Tanda TPP, Stage-II (2x660 MW)	M/s NTPC Limited, Tanda Thermal Power Station, Ambedkar Nagar, U.P
89.	4401	Third Party Quality Assurance / Audit for Work of R/R Charges for Laying Optical Fibre Cable along the route from Park Corner to Oriental Trimax Limited in Ward No. C-149 A/KBZ SH: Rest. Of Road Cut from Park Corner to Oriental Trimex Limited, Improvement of Lane in Full Width from 10/76, to 5/24, 6/1 and Road Berm from 7/58 to Mother Dairy, 35/4 to 37/1, 47/8 to 39/2, 11B/12 to 21/48 Old Rajinder Nagar C-149/KBZ	Executive Engineer (Division) M-II/KBZ, North Delhi Municipal Corporation Shakarpur, Delhi
90.	4403	Third Party Quality Assurance/Audit for Work of "Construction of Residential Complex for Judicial Staff at Sector-26, Rohini, Delhi SH: Construction of 32 Nos Type-V Quarters (basement, stilt + 8), 16 Nos Type-VI Quarters (basement + stilt + 8) and Sub-Station Building including Civil, Electrical, E&M Services and Development Works	Executive Engineer (Housing-3), Public Works Department, Vikash Bhawan, New Delhi
91.	4418	Third Party Quality Assurance / Audit for Work of Construction of 14 Nos of Dhalaos at different Locations in the Jurisdiction of Shahadara South zone" SH: 1. Opp. Dharam Kanta Ghazipur Dairy Farm and RUB NH-24 Ghazipur 2. At Right Bank Opp. Balmiki Mandir in Block No. 30 Extra, Trilokpuri Kondli-Chilla Road 3. At Right Bank Opp. CDR, MRF, Hero Tyres Shop Chilla Village Kondli to Chilla Road	Executive Engineer (Pr)-II, East Delhi Municipal Corporation, Shahadara South zone, Delhi
92.	4421	Third Party Quality Assurance/Audit for Work of Providing and Installation of Effluent Treatment (ETP) at Girdhari Lal Hospital	Executive Engineer (Project), City Zone, North Delhi Municipal Corporation, Delhi
93.	4422	Third Party Quality Assurance / Audit for Work of Providing and Installation of Effluent Treatment Plant (ETP) at Kasturba Hospital	Executive Engineer (Project) CLZ, North Delhi Municipal Corporation, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
94.	4428	Third Party Quality Assurance / Audit for Work of Construction of M C Pry. School at Mangal Bazar by Pdg. 0 from in W. No. 222/AC-58 Sh (S) Zone in Laxmi Nagar	Executive Engineer (Pr)-II, East Delhi Municipal Corporation, Shakarpur, Delhi
95.	4430	Third Party Quality Assurance / Audit for Work of Construction of Semi Pucca M.C. Pry. School Building at Amar Puri, Ward No. 87 SPZ	Executive Engineer (Project) SPZ, North Delhi Municipal Corporation, Kashmere Gate, Delhi
96.	4434	Third Party Quality Assurance / Audit for Work of Construction of New School Building at Multani Dhanda, Gali No. 10 in SP-Zone	Executive Engineer (Project) SPZ, North Delhi Municipal Corporation, Kashmere Gate, Delhi
97.	4435	Third Party Quality Assurance / Audit for Work of Construction of M. C. Pry. School at Nigam Pratibha Vidhyala, C-1, Yamuna Vihar, Ward No. 256, Shah (N) Zone	Executive Engineer (Pr)-II, East Delhi Municipal Corporation, Delhi
98.	4436	Third Party Quality Assurance / Audit for Work of Construction of New Building for Ward Level Office by Pdg. From Place of Existing Office/Store of Works Department in Old Seemapuri in Ward No. 240 Shahdara (North) in Dilshad Colony	Executive Engineer (Pr)-I, Shah (North) East Delhi Municipal Corporation, Delhi
99.	4442	Third Party Quality Assurance/Audit for Work of Construction of Pucca School Building at M. C. Pry. School, Ghonda, North (Urdu) in Yamuna Vihar in Ward No. 256, Shah (N) Zone	Executive Engineer (Pr-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
100.	4444	Third Party Quality Assurance/Audit for Work of Construction of M. C. Pry. School (Urdu) at Shri Ram Colony in Ward No. 269 Shah (N) Zone	Executive Engineer (Pr-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
101.	4447	Third Party Quality Assurance/Audit for Work of I/S Balraj Khanna Marg and adjoining Roads in Karol Bagh Zone, SH: Improvement of Drainage System and Strengthening of C/way by Providing RMC	Executive Engineer (Project), KBZ, North Delhi Municipal Corporation, Delhi
102.	4451	Third Party Quality Assurance/Audit for Work of Construction of 6 Classroom, 1 office, 1 Store and 2 Toilet Blocks in M. C. Pry. School (Nursery) at C-7, Suraj Kunj Keshav Puram in C-67/CLZ	Executive Engineer (Project), CLZ, North Delhi Municipal Corporation, Delhi
103.	4454	Third Party Quality Assurance/Audit for Work of Improvement & Development of Drain from H. No. 26/57 to 30/189 in Trilokpuri y Pdg. RCC Box Drain in W. No. 211/AC-55 Shah (S) Zone	Executive Engineer (Pr-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
104.	4460	Third Party Quality Assurance / Audit for Work of Construction of School Building having 24 Class Rooms, One Computer Room, One Library Room, One Hall one Science Room, One Principal Room, Toilets for Boys & Girls and Arrangement of Drinking Water at SDMC Pry. School Pkt. 6 Nasirpur Ward No. 130 in NGZ	Executive Engineer (Project)NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
105.	4461	Third Party Quality Assurance / Audit for Work of Improvement Development of Janak Cinema Complex on Pankha Road in C-118/WZ by Pdg. RCC item from Construction of Strom Water RCC Drain from Community Centre to Pankha Road Drain, Shop No. 64 to Pankha Road Drain C-31 Community Centre to Pankha Road in Janak Cinema Complex in C-118/WZ Janakpuri South	Executive Engineer (M-III) West Zone, South Delhi Municipal Corporation, Vishal Enclave, Delhi
106.	4468	Third Party Quality Assurance / Audit for Work of Construction of Dhobi Ghat at Jhilmil Ward No. 239 AC-62 Shahdara South Zone	Executive Engineer (Pr)-I, East Delhi Municipal Corporation, Krishna Nagar, Delhi
107.	4473	Third Party Quality Assurance / Audit for Work of Pay and Use JSC SH: Construction of 34 Seater JS Complex in JJ Cluster Dairy Wala Bagh, Paschim Vihar	Executive Engineer, C-12, Delhi Urban Shelter Improvement Board, Malka Ganj, Delhi
108.	4477	Third Party Quality Assurance / Audit for Work of Construction of 14 Nos of Dhalaos at Different Locations in the Jurisdiction of Shahdara South Zone	Executive Engineer (Pr)-I, East Delhi Municipal Corporation, Shakarpur, Delhi
109.	4484	Evaluation of Materials and Concrete Mix Design for the work of CHP Package for Tanda Thermal Power Plant, Stage-II (2X660MW)	M/s NTPC Limited, Tanda Thermal Power Plant, Ambedkar Nagar, UP
110.	4539	Third Party Quality Assurance / Audit for Work of Construction of M. C. Pny. School at Surakhpur in NGZ	Executive Engineer (Project) NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
111.	4543	Third Party Quality Assurance / Audit for Work of Improvement and Development of Community Center in Old Seemapuri by Pdg. 0 from in Ward No. 240 Shah – N-Zone	Executive Engineer (M Shah (N)-I, East Delhi Municipal Corporation, SDN Hospital, Delhi
112.	4544	Third Party Quality Assurance / Audit for Work of Construction of Community Hall at Qutab Road, Ward No. 87, SP	Executive Engineer (Project) SPZ, North Delhi Municipal Corporation, Old Hindu College, Delhi
113.	4546	Third Party Quality Assurance / Audit for Work of Construction of Additional Class Rooms at M C Primary School, Harijan Basti Gharoli by Pdg. 0 from in Ward No. 216 Shahdara South Zone in Gharoli	Executive Engineer (Pr-II) SSZ, East Delhi Municipal Corporation, Delhi
114.	4552	Third Party Quality Assurance / Audit for Work of Imp. & Std. of Roads & Drain of Kirari Village Approach Road from Sector-20 Rohini to Kirari Flood Drain via Nithari Road in Kirari Suleman Nagar in Ward No. 35 in Rohini Zone SH: Construction of Road by Pdg. RMC & SW Drainage System	Executive Engineer, (Project)-II, Rohini Zone, North Delhi Municipal Corporation, Delhi
115.	4554	Third Party Quality Assurance / Audit for Work of Improvement Strengthening of Roads & Drain of Mubarakpur Road from Railway Crossing to Kirari Flood Drain and H-2/25, Furniture Market to Mubarakpur Road to Kirari Village in Kirari Suleman Nagar in Ward No. 35 in Rohini Zone SH: C/o Road by Pdg. RMC & SW Drainage System	Executive Engineer, (Project)-II, Rohini Zone, North Delhi Municipal Corporation, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
116.	4564	Third Party Quality Assurance / Audit for Work of Construction of Construction of M C Primary School at Kalyanpuri No. 3 by Pdg. 0 from Ward No. 213 Shah South Zone in Kalyan Puri	Executive Engineer (Pr-II) SSZ, East Delhi Municipal Corporation, Delhi
117.	4570	Concrete Mix Design (50 Nos) of M30, M35 & M40 Grade for RCC Work using OPC 43 Grade	Chief Engineer (East Zone), Delhi Development Authority, IP Estate, New Delhi
118.	4571	Third Party Quality Assurance / Audit for Work of Construction of 07 Dhalao at Various Locations nearby of I and FC drains in Shahdara North Zone	Executive Engineer (Pr-II) Shahdara North, East Delhi Municipal Corporation, , Delhi
119.	4576	Third Party Quality Assurance / Audit for Work of Restoration of cut Made by DJB for Laying Sewer line in Ward No. 205, CNZ SH: Pdg/ Laying RMC in Lanes over Cutting made by DJB in Zakir Nagar Ward No. 205/CNZ	Executive Engineer (M-II) Central Zone, South Delhi Municipal Corporation, Delhi
120.	4579	Third Party Quality Assurance / Audit for Work of Construction of Sump Well and Pump House Near STP and Providing Waterlines for Maintenance Park in different Pockets in Ward No. 171 and 172 South Zone	Executive Engineer (Pr-II) South, South Delhi Municipal Corporation, Delhi
121.	4585	Third Party Quality Assurance / Audit for Work of Improvement and Development of Drains in Khera village by Pdg. 0 from in Dilshad Garden Ward No. 241 Shah N Zone	Executive Engineer (M. Shah. (N)-I, East Delhi Municipal Corporation, Shahdara, Delhi
122.	4587	Third Party Inspection and Monitoring for the Work of "Construction of Pile Jetty for length of 92.0mts at Vanakbara, Diu	M/s Public Works Department, Diu
123.	4599	Third Party Quality Assurance / Audit for Work of Construction of M.C. Pry. School at Maujpur in Ward No. 525, Shah (N) Zone	Executive Engineer (Pr-II) MCD Staff Quarters, East Delhi Municipal Corporation, , Delhi
124.	4608	Third Party Quality Assurance / Audit for Work of Improvement and Development of Goswami Marg and Bhumia Gali etc. in Khichripur Village by Pdg. RMC from in W. No. 219/AC-57 Sh (S) Zone in Mayur Vihar Phase-I	Executive Engineer (M)-IV Shah. (S)-Zone, East Delhi Municipal Corporation, Shahdara, Delhi
125.	4619	Third Party Quality Assurance / Audit for Work of Road Cutting Permission for (Providing and Laying Sewer Line Colonies of Mehrauli, Chhatarpur, and Lado Sarai Falling under Mehrauli WWTP Catchment area in Delhi SH: Restoration of Road Cut made by DJB for Laying Sewer Line in 1 st Phase in Mehrauli in Ward No. 170/South Zone	Executive Engineer (M-III), South Zone, South Delhi Municipal Corporation, Delhi
126.	4621	Use of Bottom Ash as Replacement of Fine Aggregate in Cement Concrete	M/s NETRA – NTPC Limited, Greater Noida, UP
127.	4623	Third Party Quality Assurance / Audit for Work of Construction of Road by Pdg. of RMC from Plot No. 18 Khasra No. 58/12 to Main PWD Road in Rithala Village in Ward No. C-22 M-IV/RZ	Executive Engineer (M-RZ)-IV, North Delhi Municipal Corporation, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
128.	4629	Third Party Quality Assurance / Audit for Work of Construction of East Delhi Municipal Corporation Pucca School Building at Block C-II Nand Nagri Shahdara (North) Zone in Durgapuri	Executive Engineer (Pr)-II), SNZ, East Delhi Municipal Corporation, Delhi
129.	4640	Third Party Quality Assurance / Audit for Work of Providing / Laying Internal and Peripheral Sewer lines in Batla House Sub Drainage Zone (Phase-I) Okhla WWTP Catchment Area in Delhi (Part-A Sewerage Network) SH: Providing/Laying RMC in Road/Lanes over Cutting made by DJB in Gaffar Manzil in Ward No. 206, Okhla, Central Zone	Executive Engineer (M-II), CZ, South Delhi Municipal Corporation, Delhi
130.	4641	Third Party Quality Assurance / Audit for Work of Providing / Laying Internal and Peripheral Sewerlines in Batla House Sub Drainage Zone (Phase-I) Okhla WWTP Catchment Area in Delhi (Part-A Sewerage Network) SH: Providing/Laying RMC in Road/Lanes over Cutting made by DJB in Okhla Village in Ward No. 206, Okhla, Central Zone	Executive Engineer (M-II), CZ, South Delhi Municipal Corporation, Delhi
131.	4642	Testing and Evaluation of Seven Corrosion Inhibiting Admixtures for the Work of Construction of Elevated Road over Barapullah Nallah starting from Sarai Kale Khan to Mayur Vihar, New Delhi	Executive Engineer, Flyover Project Division F-121, Public Works Department (GNCTD), New Delhi
132.	4654	Third Party Quality Assurance / Audit for Work of Improvement of Road by Pdg. RMC at Y-121 to Police Booth in Loha Mandi Naraina Industrial Area Phase-II, Ward No. 150/KBZ	Executive Engineer, (Project) North Delhi Municipal Corporation, Under Zakhira Flyover, New Delhi
133.	4659	Third Party Quality Assurance / Audit for Work of Construction of 19 Nos Class rooms at M C Pry. School Sector-7A, Rohini in Ward No. 52 in Rohini Zone	Executive Engineer, (Project-I) Rohini Zone, North Delhi Municipal Corporation, Rohini, New Delhi
134.	4661	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at Sector-18 Pocket-E Adjoining to Lal Path Lab Rohini in Ward No. 49 in Rohini Zone	Executive Engineer, (Project-I) Rohini Zone, North Delhi Municipal Corporation, Rohini, New Delhi
135.	4662	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at M C Pry. School in Rithla Village Ward No. 22 in Rohini Zone	Executive Engineer, (Project-I) Rohini Zone, North Delhi Municipal Corporation, Rohini, New Delhi
136.	4663	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at M C Pry. School EU-Block, Pitampura in Ward No. 54 in Rohini Zone	Executive Engineer, (Project-I) Rohini Zone, North Delhi Municipal Corporation, Rohini, New Delhi
137.	4664	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at M C Pry. School SP-Block, Pitampura in Ward No. 53 in Rohini Zone	Executive Engineer, (Project-I) Rohini Zone, North Delhi Municipal Corporation, Rohini, New Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
138.	4668	Third Party Quality Assurance / Audit for Work of Restoration of Road Cut made by Indraprastha Gas Limited for Laying of Natural Gas Pipe Line at Sector-18 and Sector-17, Rohini in C-21, M-IV/RZ by Pdg. RMC and Cement Concrete Interlocking Pavers	Executive Engineer, (M-RZ)-IV, North Delhi Municipal Corporation, Pitampura, New Delhi
139.	4672	Third Party Quality Assurance / Audit for Work of Making Good the Deficiency of Road, Path and SW Drains in Pkt, 1-9, Sector-16 in Ward No. C-21, M-RZ-IV Handed Over by DDA to MCD vide Code No. RZ-10-05-48	Executive Engineer, (M-RZ)-IV, North Delhi Municipal Corporation, Pitampura, New Delhi
140.	4673	Third Party Quality Assurance / Audit for Work of R/R Charges for Laying Optical Fibre Cable along the Route from Axion Institute of Opp. Rudra Castle in Ward No. C-149/KBZ (Under Deposit and Dig Policy, AC-39) SH: Restoration of Cut, Pits and Improvement of Lanes n Old Rajinder Nagar, C-149/KBZ	Executive Engineer, (Division) M-II/KBZ, North Delhi Municipal Corporation, Old Rajinder Nagar, New Delhi
141.	4677	Evaluation of Materials and Concrete Mix Designs for the Work of Muzaffarpur Thermal Power Plant, Stage-II (2 X 195 MW), Coal Handling Package (Balance of Work)	M/s Kanti Bijlee Utpadan Nigam Limited (KBUNL), Muzaffarpur, Bihar
142.	4678	Condition Assessment using Non Destructive Evaluation Technique and Providing Repair/ Restoration Measures including preparation of Material Specifications for Total 1047 Quarters of Type-I, Type-II, Type-III & Type-IV at Krishi Kunj Colony of Indian Agricultural Research Institute (IARI), Inderpuri, New Delhi	Central Public Works Department CD-IV, Pusa, New Delhi
143.	4679	Distress/Condition Assessment, Preparation of BOQ/Specifications of items for repair & restoration works of 02 no. RCC Chimney at NTPC, Vindhyachal	M/s NTPC Limited, Vindhyachal Super Thermal Power Station, Vindhyachal, Singrauli, MP
144.	4686	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building for M. C Pry. School at B-1 Jawalapuri n Ward No. 42 in Rohini Zone	Executive Engineer, (Pr)-III/Rohini Zone, North Delhi Municipal Corporation, Sector-17, New Delhi
145.	4687	Third Party Quality Assurance / Audit for Work of Making good the Deficiency in Plotted Pockets of Sector-24, Rohini Handed Over by DDA to MCD in Sector-24 in Ward No. C-25, M-IV/RZ	Executive Engineer, (M-RZ)-IV, North Delhi Municipal Corporation, Pitampura, New Delhi
146.	4688	Third Party Quality Assurance / Audit for Work of Construction of Toilet Block in Shahdara (North) Zone, (i) Opposite, JB-6, Welcome. (ii) 215, Bus Stand. (iii) Entrance of Babu Kishan Lal Marg from G.T. road. near Shahdara Police Station	Executive Engineer, (Pr)-I/Shahdara North Zone, East Delhi Municipal Corporation, Shahdara, Delhi
147.	4689	Third Party Quality Assurance / Audit for Work of Construction of M. C. Pry. School at Jafferpur (B) in Najafgarh Zone	Executive Engineer, (Project) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
148.	4691	Evaluation of Concreting Materials & Concrete Mix Proportions (2 Nos)” civil works of Material Entry Road package awarded to M/s Sangeeta Engineering	NTPC Ltd – Telangana STPP (2x800MW), PO.: Jyothi Nagar, Ramagundam
149.	4693	Evaluation of Concreting Materials & Concrete Mix Proportions (6 Nos)” civil works of TG island package awarded to M/s Alstom Bharat Forge Power Pvt. Ltd	M/s NTPC Ltd – Telangana STPP (2x800MW), PO.: Jyothi Nagar, Ramagundam
150.	4694	Third Party Quality Assurance / Audit for Work of Improvement Development of road and drain from H. No. 8/273 to 17 block mother dairy and H. No. Extra 8/20 to extra 8/1 in Trilok Puri by pdg. RCC box drain by covering Pre-cast RCC Slab in ward no.210	Executive Engineer, (Pr)-II/Shahdara South Zone, South Delhi Municipal Corporation, Shakarpur, Delhi
151.	4697	Third Party Quality Assurance / Audit for Work of (i) Providing and laying of RMC and drain in village Jaffarpur from Ishwar HS to Ram Singh Hs, Rajkumar HS to Sikhdev HS, Satish HS, to Jagpal Hs, Raj Singh HS to Bhagwan Hs, Ramphal to Chowk and 5 Lanes in Bagadi Panna in Village Jaffarpur in C-140 NGZ. By pdg.. from in Khera. (ii) Providing and laying of RMC and drain in village Bakargarh from Vijay HS to Mahavir HS, Ranbeer HS to Sh. Bhagwan HS, Jaswant HS to to Jainrain HS to Shastri HS to Issapur road, Baljeet Hs to Balwaan HS, Mahavir Singh HS to Satish HS, Mandir to Vijay Ram in Village Bakargarh in C-140 NGZ. (iii) Improvement Development of unauthorized colony at S.No. 1564/1639 in C-137 NGZ SH: Construction of road by providing Bituminous road and Interlocking tiles drain from H.No.99 to 122, H.No. 98 to 87A, 70 to 59, 43 to 46, 42 to 31, 15 to 27, 14 to 1 in Prem Nagar F and G Block in C-137 NZG. (iv) Improvement Development of U/A colony at S. No. 690-C Mitraon Ext. Main Dhansa Road Najafgarh (Behind Bharat Patroliam, and Indian Oil Patrol Pump) in C-140 NGZ. SH: Construction of Road and Drain by PDG. SDBC and Interlocking tiles in C-140 NGZ. (v) Construction of road by PDG. RMC and Drain from Mundhela Pond to Flood Drain in Village Mundhela Khurd in C-140 NGZ.	Executive Engineer, (M-I) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi
152.	4698	Third Party Quality Assurance/Audit for Work of (i) Improvement Development of Unauthorized colony at S. No. 170/1639 Saraswati Kunj, CRPF Road, Jharoda Kalan, Najafgarh in C-139, NGZ. SH:- Construction of road and drain by pdg.. SDBC and Interlocking Tiles in C-139, NGZ by pdg. from in Dichaon Kalan. (ii) Improvement Development of Unauthor	Executive Engineer, (M-I) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
		<p>ized colony at S. No. 685/1639 Krishna enclave Part-II, Dichaon Kalan Road, New Delhi-72 in C-139, NGZ. SH:- Construction of road and drain by pdg.. SDBC and Interlocking Tiles in C-139, NGZ by pdg. from in Dichaon Kalan.</p> <p>(iii) Providing and laying of RMC and Const of drain from Pond to Jairam Pardhan to Phirni Road, Rampat HS to Rajpal HS, Sultan Singh HS to Phool Singh HS, Rajpal HS to Phirni Road, Prakash Hs to Phirni Road, Lochan Shop to Sish Ram Hs, Ramnath HS, to Naresh HS, Durga Mandir to Phirni Raod, Parbhathi Wali Gali Mahender HS to Phirni Raod, Omdutt HS to Papal Mal in Village Paprawat in C-133 NGZ.</p> <p>(iv) Construction of outfall drain from M. C. Pry. School to Dhansa Road to Pond in Kazipur village in C-140 NGZ. (v) Improvement Development of Road by PDG. RMC from Surhera Village Chopal to Khera Dabar Mandir in Surhera Village in C-140 NGZ.</p>	
153.	4701	<p>Third Party Quality Assurance / Audit for Work of (i) Providing and laying RMC from Balaji Mandir to Jaiveer, Rajewnder HS to Vinod HS, Vinod Hs to Ramkishan HS, Shanti HS to Jagdish HS, Pappi HS to Dharamveer, Tiwari HS to Shiv Kumar, Naresh HS to Harpal HS, Surender HS to Shyan Hs, Vedu Tyagi HS to Krishan HS, Lalal HS to Mahender, Jai Parkash HS to Hari Parkash in village Jhatikra in C-133.</p> <p>(ii) Providing and laying of RMC and Const of drain from Sukh Dev HS to Brahm Hs, Ram Narayan HS to Jaspal HS, Ram Niwas Hs to Ajit Hs, Sukhbir Hs to Jagamal, Rupchand HS to Rammehar, Ramanad HS to Randhir HS, Shyam HS to Nathu Ram HS, Shrikrishan to Vijaypal, Satish Wali Gali, Chiranjeev Lal HS to Somdutt HS, Mukesh HS to Randhir HS, Dulichand Wali Gali, Sultan Wali Gali, Mata Chowk to Panchyat Ghat, Fatheh Singh Wali Gali in Paindwala in C-133 NGZ. (iii) Providing and laying of RMC and drain in village Khaira from Old Khaira road to Ram Kisah HS, Jagram to Gas Godown, Hukami HS to Bank, Chattar HS to Post office, Ratan HS to Genral Shop VIA Pandit Panna and Holi Chowk to Manjeet Kumar and Harizon Panna in village Khaira in C-140 NGZ by Pdg. from in Khera.</p> <p>(iv) Construction of outfall drain from Manohar Lal HS Main Road in Village Dariyapur Khurd in Ward No. C-133 NGZ.</p>	Executive Engineer, (M-I) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
154.	4704	Material Evaluation & Concrete Mix Design for work of Construction of Concrete Road in Temporary Stock Yard of Ash Mound at NCPS Dadri	M/s NTPC Limited, National Capital Power Station Dadri, Gautam Buddha Nagar, UP
155.	4705	Condition Assessment using Non Destructive Evaluation Technique of (a) Staff Quarters & (b) OH RCC Tank at RTRM Hospital Complex, Delhi	Executive Engineer, Health (South West), Maintenance M-123, Public Work Department, Dwarka, Delhi
156.	4706	Condition Assessment using Non Destructive Evaluation Technique of Residential Quarters at Deen Dayal Upadhyay Hospital Complex, Delhi	Executive Engineer, Health (South West), Maintenance M-123, Public Work Department, Dwarka, Delhi
157.	4710	Third Party Quality Assurance / Audit for Work of (1) Improvement Development of Unauthorized colony at S. No. 82/1639 in C-137 NGZ Construction of road by pdg Bituminous Road and Interlocking Tiles and Darin in Dwarka Vihar, Kakrola Road, Najafgarh Delhi-43 in C-137 NGZ. (2) Imp. Dev. of U/A Colony at S.No. 1158 Durga enclave Jaffarpur Kalan Najafgarh in C-140 NGZ. SH: Const of road and drain by Pdg. SDBC and Interlocking Tiles in C-140 NGZ. (3) Imp. Dev of U/A Colony at S. No. 1159 Jaffargarh Ext. Jaffarpur Kalan Najafgarh in C-140 NGZ. SH: Const. of Road and drain by pdg. SDBC and Interlocking Tiles in C-140 NGZ. (4) Improvement Development of Unauthorized Colony at S. No. 09/1639 Krishna Enclave Opp. CRPF Camp, Dichaon Road, Jharoda Kalan in C-139, NGZ. SH: Construction of road and drain by pdg.. SDBC and Interlocking tiles in C-139 NGZ. by PDG. from in Dichaon Kalan. (5) Construction of outfall drain from Atar Singh HS to Azad Singh and Rajesh HS to FC drain in Village Badusarai in C-133 NGZ.	Executive Engineer, (M)-I, NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
158.	4714	Third Party Quality Assurance / Audit for Work of Construction of Community Toilet Complex Near C-483 in C Block Gokulpuri in Ward No. 262 Shahdara (North) Zone	Executive Engineer, (Pr)-I, North, East Delhi Municipal Corporation, Shahdara, Delhi
159.	4717	Third Party Quality Assurance / Audit for Work of (1) Providing and laying of RMC and Const. of drain from Phirni to Hari Ram Hs and Phirni to Bal Mukund and Nursery to Phirni to Bal Mukund and Nursery to Phirni in Village Pandwala Khurd in C-133 NGZ. (2) Imp. Dev of U/A Colony at S. No. 314 Vatasta Enclave (Kashmiri Colony) Prem Nagar, Z Block Najafgarh in C-140 NGZ.	Executive Engineer, (M-I), NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
		SH: Const. of Road and drain by pdg. SDBC and Interlocking Tiles in C-140 NGZ. (3) Imp. Dev of road by Pdg. RMC from main Dhansa road to Bhyram House in village Surhera in c-140 NGZ. (4) Construction of road by providing RMC from Dharampal Dharmshala to Flood drain in Village Galibpur in C-133 NGZ.	
160.	4721	Third Party Quality Assurance / Audit for Work of P/F Stone Pitching from Sanjay Amar Colony to Ring Road (Colony Side) at Nallah No. 12 Om Ward Mp. 154, Central Zone	Executive Engineer, (M)-I, Central Zone, South Delhi Municipal Corporation, Defence Colony, New Delhi
161.	4724	High Performance Concrete Mix Design for M65A20 for Spillway/Glacier at Dul Dam DPS-Kishtwar	NHPC Limited, Dul Hasti Power Station, Kishtwar, Jammu & Kashmir
162.	4729	Third Party Quality Assurance / Audit for Work of Construction of Hall (Covered Area 28.08 mtr x 9.1 mtr) in M C Pry School (Girls) at Mahipalpur in Ward No. 144/NGZ	Executive Engineer, (Pr) NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
163.	4731	Third Party Quality Assurance / Audit for Work of Providing and Laying of RMC from RZ-L/26 to RZ-L/41, RZ-A/49 to Karni Medical Store, RZ-2/275A to DK Store, RZ-31A to Gupta Properties, RZ-44/271 to RZ 37/271 and RZ-420 to RZ-11/394 (for the length of 1000 mtr, avg. Width of 5.00 mtr. and Thickness of RMC and 0.15 mtr) in Sagarpur Ward No. 131 NGZ	Executive Engineer, (Pr) NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
164.	4732	Third Party Quality Assurance / Audit for Work of Providing & Laying of RMC from RZ 10A to RZ11B/233, RZ I-39 to Jiddi Footware and RZ I-15 to RZ I-29 (for the Length of 850 mtr, width of 6m and Thickness of RMC 0.15m) in Ward No. 132, NGZ in Sagarpur West Ward No. 132/NGZ	Executive Engineer, (Pr) NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
165.	4738	Third Party Quality Assurance / Audit for Work of Improvement/Development of Drain (length 1469 mtr., clear width 0.45m, avg. height 0.50m and Covering Width Precast RCC Slab) and providing RMC (Grade M30, Total Area 7500 sqm and Thickness of RMC 0.15m) in DDA Pocket-7, Durga Park Dabri Road in Ward No. 129, NGZ	Executive Engineer, (Pr) NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
166.	4740	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building in M C Pry. School at J J Colony 2 Raghbir Nagar in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
167.	4741	Third Party Quality Assurance / Audit for Work of Construction of 6 Nos Additional Class Rooms, 1 Nos Hall (Equivalent to 3 rooms) and 2 Toilet Blocks in M C Pry. School at D-Block, Chand Nagar in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
168.	4742	Third Party Quality Assurance / Audit for Work of Construction of 13 Nos, Class Room, 4 Nos, Toilet Block and 1 Hall (Equivalent to Three Rooms) in M C Pry School at Barapraulla No. 1 Jai Vihar in West	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
169.	4744	Third Party Quality Assurance / Audit for Work of Construction of 9 Nos Additional Class Rooms and 6 Nos Toilet Block in M C Pry School at Budhella Village in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
170.	4746	Third Party Quality Assurance / Audit for Work of Construction of Gym at Ground Floor & Underground Water Storage Tank, Pump House, Boundary Wall and Rain Water Harvesting System by using RCC, CC 1:2:4 Brick Work, Stone Work, Marble Wash Plaster etc. at Hari Nagar in C-111 in WZ	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
171.	4747	Third Party Quality Assurance / Audit for Work of Construction of 9 Nos, Additional Class Room, 1 Hall (equivalent to 3 Rooms) and 6 Nos Toilet Block in M C Pry. School at Uttam Nagar No. 2 in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
172.	4748	Third Party Quality Assurance / Audit for Work of Construction of 1 Class Room, 1 Computer room, 1 Library Room, 1 Toilet Block, 1 Sports Room, 2 Principal Room and 1 Hall (equivalent to 3 Rooms) in M C Pry. School at Hastsaall Village No. 2 in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
173.	4749	Third Party Quality Assurance / Audit for Work of Construction of Multipurpose Hall at Pratap Nagar in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
174.	4750	Third Party Quality Assurance / Audit for Work of Construction of Nursery School Building In M C Pry. School at Basai Darapur in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
175.	4751	Third Party Quality Assurance / Audit for Work of Construction of Community Hall at Milap Nagar in West Zone	Executive Engineer, (Pr-II) West Zone, South Delhi Municipal Corporation, Under Dadri Flyover, New Delhi
176.	4752	Third Party Quality Assurance / Audit for Work of Improving/Beautification of Market Complex in B-6 Safdarjung Enclave by Providing Improved Flooring, Drainage, Signages, Construction of Toilet etc. in Ward No. 163 South Zone	Executive Engineer, (Pr-1) South Zone, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
177.	4756	Condition assessment and recommendation on Repair & Restoration/Strengthening measures of RCC structures at NTPC Tanda	M/s NTPC Limited, Tanda Thermal Power Project, Vidyut Nagar (PO), Ambedkarnagar
178.	4759	Third Party Quality Assurance / Audit for Work of Upgradation Services in MVID Hospital SH: Reconstruction of Boundary Wall on Kingsway Camp Road of MVID Hospital in C-282/CLZ	Executive Engineer (M-II)/CLZ, North Delhi Municipal Corporation, Kashmere Gate, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
179.	4760	Third Party Quality Assurance / Audit for Work of Pay and Use JSC SH: Renovation of Existing 60 Seater JSC at Shahbad Daultpur, Phase-I (Block-C)	Executive Engineer, C-12, Delhi Urban Shelter Improvement Board, Rana Pratap Bagh, Delhi
180.	4762	Mix Design of M65A20 and M50A10 Grade of Concrete	M/s NHPC Limited, Tanakpur Power Station, Champawat, Uttarakhand
181.	4763	Third Party Quality Assurance / Audit for Work of Restoration of Road but Made by DJB for Laying of Internal Sewer Line in B-Block Gharoli Dairy Colony and Restoration of Road Cut Made by DJB for Laying of Internal Sewer Line Rajveer Colony from EDMC Community Hall to PWD Road in Ward No. 216 (Sh(S) Zone by Pdg. RMC from Entire B-Block in Gharoli	Executive Engineer, (M-III) Shahdara (South) Zone, East Delhi Municipal Corporation, Shakarpur, Delhi
182.	4764	Third Party Quality Assurance / Audit for Work of Restoration of Road But Made by DJB for Laying of Water Line in A-Block Gharoli Dairy Colony in Ward NO. 215 Sh(S) Zone [--] by Pdg. RMC from Entire A-Block in Kondli	Executive Engineer, (M-III) Shahdara (South) Zone, East Delhi Municipal Corporation, Shakarpur, Delhi
183.	4765	Evaluation of Materials and Concrete Mix-Design for the work of Township Package in NTPC-Khargone (2X 660 MW) Super Thermal Power Project	M/s NTPC Limited, Khargone Super Thermal Power Project, Khargone (MP)
184.	4769	Third Party Quality Assurance / Audit for Work of Taking Over the Services of 3 Colonies/Pkts from DDA, SH: Improvement Development of Roads, Internal Lanes, Dhalaos etc in Resettlement Squatters in Block C Pkt 2 Sector-27 Rohini in Ward No. 3 in Narela Zone	Executive Engineer, (M-I) Narela, North Delhi Municipal Corporation, Narela, Delhi
185.	4772	Distress Assessment of RCC Stacker/ Reclaimer-2 Foundation Covering RCC Column/Longitudinal Beams/Cross Beams of CHP at IGSTPP	M/s NTPC Limited, Aravali Power Company Private Limited, Distt. Jhajjar, Haryana
186.	4773	Condition Assessment of TG Deck Slab & Supporting Beam/Column of Unit#2 at IGSTPP	M/s NTPC Limited, Aravali Power Company Private Limited, Indira Gandhi Super Thermal Power Project, Distt. Jhajjar, Haryana
187.	4776	Third Party Quality Assurance / Audit for Work of Checking of Work of Construction of RUB on Existing Railway Level Crossing Near Mundka No. 16 on Delhi Bhatinda Section SH: Water Proofing of Joints of Raft and Wall of Railway Box	Executive Engineer, (Project) Narela, North Delhi Municipal Corporation, Narela, Delhi
188.	4777	Third Party Quality Assurance / Audit for Work of Improvement of Existing Drain from Hr. Sec. School to Sewerage Treatment Plant in Metro Vihar Phase-II Holambi Kalan in Ward No. 3 Narela Zone	Executive Engineer, (M-I) Narela, North Delhi Municipal Corporation, Narela, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
189.	4780	Third Party Quality Assurance / Audit for Work of Improvement Development of Kabristan at Buland Masjid Shastri Park by Pdg. 0 from in Ward No. 233 AC-61 in Dharampura	Executive Engineer, (Pr)-I Shahdara South Zone, East Delhi Municipal Corporation, Krishna Nagar, Delhi
190.	4783	Third Party Quality Assurance / Audit for Work of "Construction of Gazipur internal drain by pdg. 0 from remodeling of Nagar Dairy (Transformer near park) to NH-24 ward no. 227, AC-59, Shahdara South Zone in IP Extn."	Executive Engineer, (Pr)-I Shahdara South Zone, East Delhi Municipal Corporation, Krishna Nagar, Delhi
191.	4786	Third Party Quality Assurance / Audit for Work of Construction of M. C. Pry. MEA Channa Market in KBZ	Executive Engineer, (Project) KBZ, North Delhi Municipal Corporation, under Zakhira Flyover, Delhi
192.	4788	Condition Assessment of RCC Members and Preparation of Guidelines for Repair Items, for Repairs & Restoration Works for Main Building, Annexe Building & Canteen Block of CAG Bhawan at 10 Bahadur Shah Zafar Marg, New Delhi	M/s Central Public Works Department, A Division, Indraprastha Bhawan, New Delhi
193.	4789	Third Party Quality Assurance / Audit for Work of Construction of Pucca School Building at M.C. Pry. School New DCM Ward No. C-91 in KBZ	Executive Engineer, (Project) KBZ, North Delhi Municipal Corporation, under Zakhira Flyover, Delhi
194.	4796	Third Party Quality Assurance / Audit for Work of "EIUS" SH: Remodeling of drains and laying of CC pavement and construction of drains at JJ Cluster near Railway Colony, Shakur Basti (Block-C).	Executive Engineer, C-12, Delhi Urban Shelter Improvement Board, Rana Pratap Bagh, Delhi
195.	4799	Third Party Quality Assurance / Audit for Work of "EIUS" SH: Providing and laying CC pavement construction of drains at Shaheed Bhagat Singh JJC Paschim Puri near Shamshan Ghat.	Executive Engineer, C-12, Delhi Urban Shelter Improvement Board, Rana Pratap Bagh, Delhi
196.	4802	Third Party Quality Assurance / Audit for Work of "Improvement and Development M C Pry. School East Old Seelampur in ward No. 235 Shahdara South"	Executive Engineer, (Pr)-I Shahdara South Zone, East Delhi Municipal Corporation, Krishna Nagar, Delhi
197.	4806	Construction of 24660 LIG & 4855 EWS houses by using prefab technology (having Structural RCC members i.e. columns, beams & slabs all precast) in Narela & Rohini, Delhi. (A TURNKEY PROJECT)	Executive Engineer, ND-12, Delhi Development Authority, Narela, New Delhi
198.	4807	Third Party Quality Assurance / Audit for Work of "Construction of 4 nos. class rooms, one hall, one store room, one computer room & one toilet block(each for girl & boys) in M C Pry. School Qutub Vihar (G) in ward no. 134/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
199.	4808	Third Party Quality Assurance / Audit for Work of "Construction of one class room, one office room, one nursery room and one computer room in M C Pry. School Kharkhari Nahar in ward no. C-134/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
200.	4809	Third Party Quality Assurance / Audit for Work of "Construction of 5 rooms & one Hall in M C Pry. School Samalkha (Boy) in ward no. 143/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
201.	4810	Third Party Quality Assurance / Audit for Work of "Construction of 10 class rooms, 6 toilet block, one hall (equivalent to 3 rooms) in M C Pry. School Kakrola no. 2 in ward no. 135/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
202.	4811	Third Party Quality Assurance / Audit for Work of "Construction of boundary wall in M C Pry. School Nanakheri (length 400 mtr width 0.23 mtr) in ward no. 133/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
203.	4812	Third Party Quality Assurance / Audit for Work of "Construction of one store rooms, one library room, one hall, one science lab, one principal room & two toilet blocks & construction of boundary wall including leveling of play ground in M C Pry. School Kanganheri in ward no. 133/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
204.	4815	Third Party Quality Assurance / Audit for Work of "Construction of 4 Nos. class rooms & 2 toilet blocks in M C Pry. School Jharoda Kalan (B) in Ward no. 139 NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
205.	4816	Third Party Quality Assurance / Audit for Work of "Construction of additional stair and canopy at ground floor and C/o additional hall over Hardayal Municipal Library by pdg brick, RCC reinforcement, Kota stone work, ceramic glazed tiles, wood work, land sanitation and drainage work etc. in J-Block Rajouri Garden in C-105/WZ"	Executive Engineer (M-I), WZ, South Delhi Municipal Corporation, Rajouri Garden, New Delhi
206.	4818	Evaluation of Materials and Concrete Mix Designs for the work of TG Island package at NTPC-Ramagundam	M/s NTPC Limited, Telangana Super Thermal Power Project, Ramagundam
207.	4819	Third Party Quality Assurance / Audit for Work of "Construction of addl. Class Room in M C Pry. School at Ghazipur Village in Ward no. 227 AC-59, Shahdara South Zone".	Executive Engineer, (Pr)-I Shahdara South Zone, East Delhi Municipal Corporation, Krishna Nagar, Delhi
208.	4820	Third Party Quality Assurance / Audit for Work of "Construction of SW drainage and improvement of road berms by RMC in Nizamuddin (West) in ward no. 154, Central Zone".	Executive Engineer, (Pr)-II, Central, South Delhi Municipal Corporation, Under Sewa Nagar Flyover, New Delhi
209.	4822	Third Party Quality Assurance / Audit for Work of "Improvement & Dev. Of block market Saket" SH: (i) Improvement of SW drainage system by providing peripheral drains in J-Block Market, Saket in Ward no. 169/SZ (ii) improvement to drainage system by providing peripheral drains in J-Block Market, Saket in ward no. 169/SZ (iii) providing and fixing 60 mm thick coloured paver block in the parking area of J-Block market, Saket in ward no. 169/SZ.	Executive Engineer (Pr)-II, South Zone, South Delhi Municipal Corporation, Sewa Nagar, New Delhi

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210.	4825	Third Party Quality Assurance / Audit for Work of "Construction of grade separator at Rani Jhansi Road" SH: Construction for relocation of 20 nos. Shops from Azad Market Chowk.	Executive Engineer (Pr.), SPZ, North Delhi Municipal Corporation, Kashmere Gate, Delhi
211.	4826	Third Party Quality Assurance / Audit for Work of "Improvement and development of Kundan Lal Marg by providing ready mix concrete from house no. A-251 to A-67 in Hari Nagar in C-111/WZ".	Executive Engineer (M)-I, WZ, South Delhi Municipal Corporation, Rajouri Garden, New Delhi
212.	4827	Third Party Quality Assurance / Audit for Work of "Construction of RCC drain of both sides to road from Govt. Sr. Secondary School Khichripur Block 13 Kalyanpuri to Kotla road adjoining to DJB office in ward no. 213 Shahdara South Zone".	Executive Engineer (Pr)-II, Shahdara South Zone, East Delhi Municipal Corporation, Shakarpur, Delhi
213.	4829	Third Party Quality Assurance / Audit for Work of "Construction of RCC drain of both sides of road from house no. 500 block-17 to house no. 80 block-15 Kotla road in ward no. 213 Shahdara South Zone".	Executive Engineer (Pr)-II, Shahdara South Zone, East Delhi Municipal Corporation, Shakarpur, Delhi
214.	4831	Third Party Quality Assurance / Audit for Work of "Construction of boundary wall from CV Raman Marg to DJB Pipe line on both side along Taimoor Nagar Nallah in W. No. 205, CNZ"	Executive Engineer (M-II), Central, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
215.	4833	Third Party Quality Assurance / Audit for Work of "widening of Kishan Ganj RUB" SH: balance work for construction of approaches of 01 box of RUB, retaining walls, service roads and drainage system.	Executive Engineer (Pr.), SPZ, North Delhi Municipal Corporation, Kashmere Gate, Delhi
216.	4836	Third Party Quality Assurance / Audit for Work of "Construction of one hall (equivalent to 3 rooms) in M C Pry. School Palam Enclave ward no. 146/NGZ".	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
217.	4845	Third Party Quality Assurance / Audit for Work of "(i) Providing and laying of RMC and drain in village Samaspur in C-140, NGZ. by pdg. from in Khera. (ii) Improvement development of road by pdg. RMC from Sr. Sec. School to main Dhansa road in village Kazipur in C-140, NGZ. by pdg. from in Khera."	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi
218.	4846	Third Party Quality Assurance / Audit for Work of "(i) Construction of Phirmi Road in village Ghummanhera in C-133, NGZ. (ii) Construction of road by providing RMC from Ratiram HS to Anil Sharma HS in village Rewla Khanpur in C-133, NGZ (iii) Construction of road by providing RMC and drain from Devender HS to Ram Niwas HS in village Kanganheri in C-133/ NGZ".	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi

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219.	4847	Third Party Quality Assurance / Audit for Work of “(i) Construction of Phirmi road in village Kharkhari Jatmal in C-133, NGZ. (ii) C/o Phirini road in Village Khera Dabar in C-133/ NGZ”.	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi
220.	4848	Third Party Quality Assurance / Audit for Work of “(i) Construction of road in Nangli Dairy in Nangli Sakrawati C-134 NGZ (main n.g. road to dairy no. 592 in Nangli dairy) by pdg. RMC from main NG road to dairy no. 592 in Nangli dairy in Nangli Sakrawati. (ii) Construction of road by providing RMC and drain from Santram HS to M C Pry. School in village rawta in c-133, NGZ. (iii) providing and laying RMC on Phirmi road from Chopal to M C Pry. School in village Ghasipura and RMC from park near temple to Delhi road on approach road to village Nangli Sakrawati.	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi
221.	4850	Third Party Quality Assurance / Audit for Work of “(i) Construction of road by providing RMC from chaupal to M C Pry. School in village Daurala in C-133, NGZ. (ii) Remodeling and covering of outfall drain and providing RMC from Dhansa road to pole no. 316 in village Mitraon in C-140, NGZ (iii) Construction of road by providing RMC from Dhansa road to Bhardwaj Clinic in village Mitraon in C-140, NGZ.	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi
222.	4851	Third Party Quality Assurance / Audit for Work of “(i) Construction of outfall RCC drain from Ishwar HS to main Jhatikra road in village Rewla Khanpur in c-133/NGZ. By pdg. From in Chhawla. (ii) Improvement development of road by pdg RMC from M C Pry. School Ujwa to Shiv Mandir in Ujwa village in c-140, NGZ”.	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi
223.	4852	Third Party Quality Assurance / Audit for Work of (i) Construction of outfall drain from Temple to Holi chowk in village Ghumenhera in C-133, NGZ. (ii) Construction of outfall drain from along Phirmi road in village Kheda Dabar in c-133/ NGZ. by pdg. from in Chhawla.	Executive Engineer (M-I), South Delhi Municipal Corporation, Najafgarh, New Delhi
224.	4853	Condition Assessment of Structural Concrete using Non Destructive Evaluation Technique including preparation of Bill of Quantities (BOQ), Cost Estimate of TG Deck Roof Slabs (Stage 1 & Stage) in TTPS, Talcher	M/s NTPC –Talcher Thermal Power Station, Talcher, Angul Dist, Odisha.
225.	4854	Third Party Quality Assurance / Audit for the Work of “Improvement/Development of Drainage system from TATA motors to H.No P-53. P-5 to P-20 (both Side), P-28 to L- 19 (Both Side), M-17 to M-11 (Both Side), L-1 to L-6, L-7 to L-12, L-1/11 to L-1/1 and P-1 to P-4 in NDSE-II in Ward no 159, Central Zone.”	Executive Engineer (M-I), South Delhi Municipal Corporation, Defence Colony, New Delhi

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226.	4855	Third Party Quality Assurance / Audit for Work of "Improvement / Development of Shahid Hawaldar Mukhtyar Singh Marg from Narela road to Auchandi road in village Bawana in ward No. 28 in Narela Zone."	Executive Engineer, (M-II) Narela, North Delhi Municipal Corporation, Narela, Delhi
227.	4857	Concrete Mix Design of M30, M35 & M40 Grade for RCC Works using OPC-43 Grade Cement for DDA Housing Project Narela, Delhi	Executive Engineer, ND-9, Delhi Development Authority, Pitampura, New Delhi
228.	4858	Third Party Quality Assurance / Audit for Work of "construction of 10 Nos. class rooms in M C Pry. School Tikri Khurd in ward no. 4 in Narela Zone".	Executive Engineer, (Project) Narela, North Delhi Municipal Corporation, Narela, Delhi
229.	4890	Third Party Quality Assurance / Audit for Work of "Construction of 22 classroom, 1 hall, 2 toilet blocks(boys & girls) and const. of Boundary wall in M C Pry. School in Kadipur Kushak in C-5/CLZ" SH: Construction of Boundary wall, stage and development of ground and Misc work in building.	Executive Engineer (Pr.) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
230.	4893	Third Party Quality Assurance / Audit for Work of "Improvement development of unauthorized colony at S.No. 1113/1639 in Suryan Kunj Part-I, Dichkaon Road, NGZ Delhi in C-139". SH: C/o road and drain by PDG SDBC and interlocking tiles in C-139 NGZ by pdg from in Dichaon Kalan.	Executive Engineer (M-I), NGZ, South Delhi Municipal Corporation, Near Delhi Gate, Delhi
231.	4894	Third Party Quality Assurance / Audit for Work of "(i) Improvement development of unauthorized colony at Suryan Kunj Part-I, Dichaon Road, Najafgarh Delhi in C-139 NGZ". SH: C/o Road and drain by PDG SDBC and interlocking tiles in Dichaon Kalan (ii) Imp. Dev. Of Unauthorized colony in Gopal Nagar Extn. EFGH Block Main Dhansa Road North Side in C-139 NGZ. SH: C/o drain and road PDG SDBC main Dhansa Road North Side in C-139 (NGZ)	Executive Engineer (M-I), NGZ, South Delhi Municipal Corporation, Near Delhi Gate, Delhi
232.	4896	Third Party Quality Assurance / Audit for Work of "Imp. Dev. Of outfall drain of Baprolla village LHS from Shani Mandir to Mangeshpur drain in ward no. C-122/WZ in Hastal".	Executive Engineer (M-IV) West, South Delhi Municipal Corporation, Moti Nagar, Delhi
233.	4900	Evaluation of Materials and Concrete Mix Designs for the Work of Steam Generator TG Island Package by M/s Bharat Heavy Electricals Limited (Contractor: M/s Simplex Infrastructures Limited) at NTPC-Ramagundam	M/s NTPC Limited, Telangana Super Thermal Power Project, Ramagundam
234.	4901	Material Evaluation and Concrete Mix Designs for the work of NDCT Package (2X660 MW), NTPC Tanda	M/s NTPC Limited, Tanda Super Thermal Power Project, Vidyutnagar, Ambedkar Nagar-UP

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235.	4902	Evaluation of Materials for the work of 2X 880 MW-(Stage-I) at NTPC-Gadarwara	M/s NTPC Limited, Gadarwara Super Thermal Power Project, Gadarwara, Distt. Narsinghpur
236.	4903	Evaluation of Materials and Concrete Mix Designs for the work of 400/132 KV Switch Yard Package for NTPC Kahalgaon	M/s NTPC Limited, Kahalgaon Super Thermal Power Project, Bhagalpur, Bihar
237.	4904	Evaluation of Fine Aggregate (River Sand) Sample for the work of Cooling Tower Package at NTPC Gadarwara	M/s NTPC Limited, Gadarwara Super Thermal Power Project, Gadarwara, Distt. Narsinghpur (MP)
238.	4906	Third Party Quality Assurance / Audit for Work of "Construction of boundary wall, store, pump room water tank, foot path and providing interlocking tiles in prayer ground in M C Pry. School Garhi Randhala in ward no. 29 Karala Narela Zone".	Executive Engineer, (Project) Narela, North Delhi Municipal Corporation, Narela, Delhi
239.	4907	Third Party Quality Assurance / Audit for Work of "Development of racing track, ground, raising of boundary wall, const. of Kabaddi hall side wall and ETC in Jaingli Ram Stadium in Village Nizampur C-30 in Narela".	Executive Engineer, (Project) Narela, North Delhi Municipal Corporation, Narela, Delhi
240.	4911	Conditional Assessment and recommendation on repair & restoration /strengthening measures of TG Roof slab of stage I,II&III at NTPC Farakka	M/s NTPC Limited, Farakka Super Thermal Power Station, PO Nabarun, Murshidabad
241.	4915	Third Party Quality Assurance / Audit for Work of "Improvement of road by providing RMC from RZ-16A/15B to RZ-E-27(for the length of 750 mtr and avg. width of 6.50 mtr) in Sagarpur main, ward no. 131, NGZ".	Executive Engineer (Project) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi
242.	4916	Third Party Quality Assurance / Audit for the Work of "Restoration of roads cutting by Delhi Jal Board for laying underground sewer lines for the work of "Providing sewer facilities in the area under the command of Ghitorni WWTP covering Rangpuri Pahari, Nangal Dewat Ghitorni village Ghitorni Extension and Ghitorni Enclave, New Delhi South Zone (AC-46) vide permission by SDMC." SH: Restoration of. R/R cut being done by DJB in the jurisdiction of South Zone by providing RMC & dense carpeting on roads in Ghitorni village & Ghitorni Enclave in ward No. 174, South Zone.	Executive Engineer (Pr)-II, South Zone, South Delhi Municipal Corporation, Sewa Nagar, Delhi
243.	4918	Third Party Quality Assurance / Audit for the Work of "Improvement Development of Road by providing RMC and raising of the RCC drain from Prince Properties to Sharma K K Properties, Lalman Chowk(for the lenth of 1200.00 mtr and avg. width of 6.00 mtr) at Pandit Lalman Sharma Marg in Ward no. 134, NGZ by pdg. RMC from Shyam Vihar in Nangli Sakrawati".	Executive Engineer (Project) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

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244.	4919	Carry out Civil Design Audit of Existing structure Adjacent to Packing Plant structure for additional Loading of Steel Storage Silo at CCI Tandur	M/s Cement Corporation of India (CCI) Karankote, Telangana
245.	4921	Third Party Quality Assurance / Audit for Work of "Improvement Development of Dallapura road[---] by pdg. 0 from T-point Kundli to Vasundhra Enclave (upto PWD road) in ward no. 214 SSZ in Khichripur".	Executive Engineer (Pr.)-II, Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
246.	4923	Third Party Quality Assurance / Audit for Work of "Lavotray near Community Hall in Kasturba Nagar in Ward no. 226 Shah. South"	Executive Engineer (Pr.)-I, Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
247.	4926	Condition assessment of Distress RCC structures of 'F' type blocks (2no's) and OPD building (1no) at BHC Ballabgarh of AIIMS.	Assistant Engineer, All India Institute of Medical Science, Engg. Service Department, Ansari Nagar, New Delhi
248.	4927	Ultrasonic Pulse Velocity (UPV) Testing of TG Deck Slab (1x800 MW) of Unit#2 of NTPC Darlipali STPP at Darlipali, Distt. Sundargarh, Odisha as per IS:13311 (Part-I)-1992	M/s NTPC Limited, Darlipali Super Thermal Power Project, Sundargarh, Odisha
249.	4934	"Evaluation of Concrete Materials and Conducting Concrete Mix Proportions of different Grades (4 Nos)" civil works of TSTPP Phase-1(2X800MW)-Balance of Plant (BOP) Project Telangana STPS Ramagundam (civil Works awarded to M/s TATA Projects Limited).	M/s NTPC Ltd. Telangana STPP (2X800MW), Ramagundam Karimnagar, Telangana.
250.	4935	Third Party Quality Assurance / Audit for Work of "Improvement & Strengthening of internal roads in A,B,D,E,G,H,I & J blocks and improvement of drainage system in D,E, between E and F, between G and H and G Block in Chitranjan Park in Ward no. 190, Central Zone". SH: Improvement to drainage system in DE, between E&F, between G&H and G Block in Chitranajan Park in Ward no. 190, Central Zone	Executive Engineer (Pr.)-I, Central, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
251.	4936	Third Party Quality Assurance / Audit for Work of "Improvement Development of road and raising of Nallah at main Nangli Dairy Road in Nangli Sakrawati in C-134/NGZ".	Executive Engineer (M-I), NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
252.	4937	To carrying out Non Destructive Evaluation of concrete structure for Reserve Bank of India La Gajjar Chambers, Ahmedabad.	M/s Reserve Bank of India, Ahmedabad
253.	4940	Third Party Quality Assurance / Audit for Work of "P/L/J peripheral water mains of dia 150 mm to 1600 mm emanating from Karala ward no. 29." SH: "Restoration of road by providing RMC from road no. 3 to Aanand Vatika on Phirni road in village Ladpur in ward no. 29 (Karala) in Narela Zone".	Executive Engineer (M-II), Narela, North Delhi Municipal Corporation, Narela, Delhi

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254.	4941	Third Party Quality Assurance / Audit for Work of "Improvement of road by pdg. RMC pavement from M S Model School Chowk to Sh. Surender House in ward no. 29(Karala) in Narela Zone".	Executive Engineer (M-II), Narela, North Delhi Municipal Corporation, Narela, Delhi
255.	4942	Third Party Quality Assurance / Audit for Work of "Improvement of road from Shamshan Ghat to culvert at Geeta Colony drain in ward no. 229 AC-60 Shahdara South".	Executive Engineer (Pr.)-I, Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
256.	4943	Third Party Quality Assurance / Audit for Work of "Restoration of road from Geeta Colony grid (Raja Ram Kohili Marg) to C block (Lal quarter road) Krishna Nagar grid [--] by pdg. RMC from restoration of F/P cut made by BSES in ward no. 229 AC 60 Shah-S Zone in Krishna Nagar".	Executive Engineer (M-I), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
257.	4944	Third Party Quality Assurance / Audit for Work of "Improvement Development of lane near H. NO. A-1 and A-38 in A-Block Pandav Nagar in W.NO 224/AC-58 Shah(S) Zone by pdg. O from in Pandav Nagar".	Executive Engineer (M-IV), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
258.	4946	Third Party Quality Assurance / Audit for the Work of "Construction of M C Pry. School at Bharat Nagar in C-66/CLZ"	Executive Engineer (Pr.), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
259.	4947	Third Party Quality Assurance / Audit for Work of "Improvement/Development of LSC in D-Block Vivek Vihar by pdg. K/S flooring in Plaza Area interlocking tiles in parking area in ward no. 225 Shah-S Zone"	Executive Engineer (M-II), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
260.	4953	Third Party Quality Assurance / Audit for Work of "Construction of Recreation Centre for Senior Citizen Recreation at Rani Bagh, Ward No. C-59."	Executive Engineer, (M)-I Rohini, North Delhi Municipal Corporation, Keshav Puram, Delhi
261.	4955	Third Party Quality Assurance / Audit for Work of "Improvement Dev. of gali no. 12 from H.No. B-258 to B-267/12 in B-Block Bhajanpura by pdg. RMC from in Bhajanpura". SH (i). Imp. Dev. of links from near B-284 B-271 and B-28/B in B-Block Bhajanpura by pdg. RMC from in Bhajanpura (ii). Imp. Dev. of gali no. 4 from H.No. B-69 to B-51/3 [H.No. B-69 – B-51/3] by pdg. RMC from in Bhajanpura (iii). Imp. Dev. of link near H.No. B-71/5[--] by pdg. RMC from in Bhajanpura (iv). Imp. Dev. of link near B-59 i B-Block Bhajanpura [--] by pdg. RMC from in Bhajanpura (v). Imp. Dev. of gali no. 8 from H.No. B-152 to B-123/5 [--] by pd. RMC from i Bhajanpura (vi). Imp. Dev. of link-I near H.No. B-128/2 and link-II near B-18 in B-Block Bhajanpura [--] by pdg. RMC from in ward no. 253, Shah(N) Zone.	Executive Engineer [M-II], Shah-N, East Delhi Municipal Corporation, Yamuna Vihar, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
262.	4956	Third Party Quality Assurance / Audit for the Work of "Construction of 6 class rooms and 3 toilet blocks in M.C. Primary School L-Block Sangam Vihar in ward no. 177 South Zone."	Executive Engineer (Pr)-I, South Zone, South Delhi Municipal Corporation, Sewa Nagar, Delhi
263.	4961	Third Party Quality Assurance / Audit for the Work of "Imp. Dev. of Dada Chhatri Marg Road by pdg. RMC pavement from D-1/1 to RZ-215 in Raj Nagar-I in Palam in C-145/NGZ."	Executive Engineer (M)-III, NGZ, South Delhi Municipal Corporation, Dwarka, Delhi
264.	4963	Evaluation of Materials (Coarse Aggregate) for the Work of Goriganga-III A HE Project (165 MW) in Pithoragarh District of Uttarakhand	M/s NHPC Limited, Goriganga-III A HE Project, Distt. Pitoragarh, Uttarakhand
265.	4967	Third Party Quality Assurance / Audit for the Work of "C/o 8 class rooms and toilet blocks in M C Pry. School C-Block Sangam Vihar in ward no. 177 South Zone".	Executive Engineer (M)-II, West Zone, South Delhi Municipal Corporation, Moti Nagar, Delhi
266.	4968	Third Party Quality Assurance / Audit for the Work of "Imp. and Dev. of drainage system and road by Pdg RCC from H.No. B-44 to B-36, H.No. B -34 to B -54, H.No. B -25 to B -33 (back lane) and A-76 to A-72 in Shish Ram Park in Ward No C-127/WZ in Uttam Nagar."	Executive Engineer (M)-II, West Zone, South Delhi Municipal Corporation, Moti Nagar, Delhi
267.	4969	Third Party Quality Assurance / Audit for Work of "Const road by Pdg RMC on Phirni road at Village Mundka in C-30 Narela zone."	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
268.	4970	Third Party Quality Assurance / Audit for the Work of "SH:-1) Imp of lane by pdg RMC and both side drain from H.No.117 to H.No. -118 in Nawada village in ward C-126/WZ SH:- 2) Imp of lane by pdg RMC and one side drain from 118 to Shop No. -2 in Nawada village in ward C-126/WZ SH:- 3) Imp of lane by pdg RMC and both side drain from Inderparastha School to Bhoop Singh House in Nawada village in ward C-126/WZ SH:-4) Imp of lane by pdg RMC and both side drain from H.No.19 to H.No. -31 in Nawada village in ward C-126/WZ SH:-5) Imp of lane by pdg RCC from H.No.192 to Saruppa house in Nawada village in ward C-126/WZ SH:-6) Imp of drain by pdg RCC from H.No.223 to Hargyan Singh house in Rama Park Nawada road in village Nawada in ward No. C-126/WZ."	Executive Engineer (M-IV), West Zone, South Delhi Municipal Corporation, Narela, Delhi
269.	4973	Third Party Quality Assurance / Audit for Work of "Improvement/Development of road by providing RMC from main Najafgarh Dhansa road to Dada Buddha Mandir(length 651 width=7m avg, depth 0.20m avg.) in Village Dhansa in ward no. 140/NGZ".	Executive Engineer (Pr)-I, NGZ Zone, South Delhi Municipal Corporation, Dhansa Stand, Najafgarh, Delhi
270.	4978	Evaluation of Materials and Concrete Mix Designs for the work of construction of Steam Generator & Auxiliaries Package (GA 1) for 3 X660 MW Ghatampur Thermal Power Project.	M/s Neyveli Uttar Pradesh Power Limited Ghatampur, Kanpur, UP

Sl. No.	SP No	Title of the project	Name of the Sponsor
271.	5009	Third Party Quality Assurance / Audit for Work of "Construction of M C Pry. School at Bhalaswa Village in C-19/CLZ"	Executive Engineer (Pr.), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
272.	5013	Third Party Quality Assurance / Audit for Work of "Improvement and development of Gurudwara road west Guru Angad nagar by pdg. o from pdg. RMC and drainage in C-222/AC-58 in Laxmi Nagar".	Executive Engineer (M-IV), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
273.	5014	Third Party Quality Assurance / Audit for Work of "Imp. Dev. of drain B-3 Block [--] by pdg. RCC item from B-3/481 to B-4/481 in Nand Nagri in W. No. 243 Shahdara North Zone".	Executive Engineer (Shah-N)-M-I, East Delhi Municipal Corporation, SDN Hospital, Delhi
274.	5015	Third Party Quality Assurance / Audit for Work of "Construction of EDMC CTC at Anand Vihar Shah-S in Ward no. 227 IP Extn.".	Executive Engineer (M-II), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
275.	5016	Third Party Quality Assurance / Audit for Work of "Remodeling and covering of drain from Gali No. 1 to Gali No. 11 at Pandav Road Vishwas Nagar [--] by pdg. RCC item from in Ward No. 226 Shah. South in Vishwas Nagar".	Executive Engineer (M-II), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
276.	5019	Third Party Quality Assurance / Audit for Work of "P/L rising main storm water drainage from Pump House to Najafgarh Drain in Rana Pratap Bagh in C-70/CLZ."	Executive Engineer (Pr.), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
277.	5022	Evaluation of Materials and Concrete Mix Designs for the work of 3 X660 MW NUPPL, Ghatampur Thermal Power Project.	M/s Neyveli Uttar Pradesh Power Limited Ghatampur, Kanpur, UP
278.	5024	Third Party Quality Assurance / Audit for Work of "Improvement and development of drain at Mayur Vihar Ph-II by pdg. RCC item from in between pkt F and Pkt B Mayur Vihar Ph-II in ward no. 219 AC-57 Sh(S) Zone"	Executive Engineer (M-IV), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
279.	5027	Third Party Quality Assurance / Audit for Work of "Const Senior citizen recreation centre at Nangloi ward no. 31 in Narela Zone & for part B Providing of EI & allied work."	Executive Engineer (Pr.),Narela, North Delhi Municipal Corporation, Narela, Delhi
280.	5028	Condition and health assessment study of Ahiran bridge, Laxman Nala bridge and other 4 bridges including repair methodology and schedule of items for repair & restoration Technique at NTPC Korba	M/s Korba Super Power Thermal Station, NTPC Limited, Jamnipali, Chhattisgarh
281.	5029	Condition assessment Study using Non Destructive Evaluation Technique including repair methodology of TG foundation of Unit#12 at NTPC Vindhyachal.	NTPC Limited, Vindhyachal, P. O: Vindhyanagar, Distt- Singrauli, Madhya Pradesh
282.	5036	Evaluation of Hardened Concrete Cores of 150mm dia from Hardened Concrete of the Concrete Road (PQC) at NTPC Vindhyachal.	NTPC Limited, FAQ, NTPC-Vindhyachal, Singrauli, Madaya Pradesh

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283.	5042	Third Party Quality Assurance / Audit for Work of “imp. and stg of roads and drainage system of Colony, GH-4, GH-1, A,2/B(Ekta Aptt.) A-2/4B to A-2/61 and police station road Paschim Vihar in C-57/RZ(Paschim Vihar) SH: Imp and stg. of roads and drainage system by pdg. RMC in Paschim Vihar in Ward no. C-57/ RZ, Paschim Vihar South”	Executive Engineer (M-I), RZ, North Delhi Municipal Corporation, Keshav Puram, New Delhi
284.	5044	Third Party Quality Assurance / Audit for Work of “Imp. Dev. Of road by providing RMC from RZ-26/284 to RZ-122B (for the lenth of 400 mtr and width of 6.50 mtr) in Sagarpur, Ward no. 131/NGZ”	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Dhansa Stand, New Delhi
285.	5045	Third Party Quality Assurance / Audit for Work of “Restoration of road for P/L Sewer Line in Sai Baba Enclave, Deepak Vihar, Laxmi Garden, Najafgarh Extn. Etc Colonies in Najafgarh, Constituency in Najafgarh Zone”.	Executive Engineer (M-I), NGZ, South Delhi Municipal Corporation, Near Delhi Gate, Delhi
286.	5049	Technical Guidance and Quality inspection during execution of repair & strengthening work of the RCC Chimney Stage-II at Badarpur Thermal Power Station, New Delhi	NTPC Limited, Badarpur Thermal Power Station, Badarpur, New Delhi
287.	5054	Third Party Quality Assurance / Audit for Work of “Imp. Dev. of Kachhipur Village [-] by pdg.0 from Ch. Manoj House to Vishal House, Bhrampal House to A-2, Recreation Center, Geeta House to Ganga Sharan, Dilip House to Radha Kishan Temple, Lalit House to Kalawati House, Fathey Singh House Nanak Chand House, Khemchand House to Ratansingh, Khemchan House to Rambharose House, Ikbal House to Omprakash House, Kalu House to Dhaniram House, Nanak Chand House to A-2 Block Mkt Road in Nand Nagri W. No. 243”.	Executive Engineer [M-Shah(N)]-I, East Delhi Municipal Corporation, SDN Hospital, Delhi
288.	5055	Third Party Quality Assurance / Audit for the Work of “Imp. of drainage system by reconstructing the existing damaged / deteriorated drain (both side) from RZ-I Indira Park to RZ-120 (length=250m width=1m) in Prajapati Colony by Pdg RCC slab 1:2:4, CC 1:5:10, Precast Slab and reinforcement etc in Ward No. C-127/WZ in Uttam Nagar.”	Executive Engineer (M-II), WZ, South Delhi Municipal Corporation, Moti Nagar, New Delhi
289.	5059	Condition assessment for the residential RCC framed structure of Stilt plus 6 floors at NEWGHS, Sonapat, Haryana	Nationalist Ex-Servicemen Welfare Gr Housing Society, Sonapat, Haryana
290.	5063	Third Party Quality Assurance / Audit for the Work of “Construction of Community Hall at Sanwal Nagar Ward no. 159, Central Zone”.	Executive Engineer (Pr-I), Central, South Delhi Municipal Corporation, Jal Vihar, New Delhi
291.	5065	Non-Destructive evaluation of RCC members of Punjab National Bank Building located at plot no.1, Nehru Ground, NIT Faridabad, Haryana	M/s KLA Const. Technologies Pvt. Ltd. D-160/2, 2nd Floor, Okhla Industrial Area, Phase-I, New Delhi

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292.	5073	Carbonation Study on OPC, PPC, PSC and Composite Cement	M/s ACC Limited, Director Quality and Product Development Thane, Mumbai
293.	5076	Evaluation of Materials and Concrete Mix Designs for the work of Construction of Central Armed police Force Institute of Medical Science at Maidan Garhi New Delhi.	M/s L&T Construction Ltd, International Trade Tower, Nehru Place, New Delhi
294.	5077	Evaluation of Materials and Concrete Mix Designs for the work of System Work Package CP-104-Third Party Testing of Aggregate Sample for Source Approval and Mix Design for OCC.	M/s Simplex Infrastructure Limited, SAI-TYPSA, Firozabad Road, Tundla
295.	5080	R&D Study on the Use of Ground Granulated Blast Furnace Slag (GGBFS) as part Replacement or Ordinary Portland Cement (OPC) in Concrete Making for JSW Cement	M/s JSW Cement Limited, JSW Centre, Bandra (East), Mumbai
296.	5085	Condition Assessment and recommendations on repair & restoration/strengthening measures of Towers 1A, 1B, 2A, & 2B (2X500 MW), Stage-I, NTPC Mouda	M/s NTPC Limited, Mouda Super Thermal Power Station, Nagpur, Maharashtra
297.	5088	Third Party Quality Assurance / Audit for Work of "Construction of Pucca School Building by pdg. from MC Pry School at Mansarover Park (East) Ward No. 247 Shahdara (North) Zone in Ram Nagar". SH: Improvement Development of MCPS Mansarover Park (East) by Pgd. From Providing Marble Wash of outer building surface and raising of B/wall in Ward No. 247 in Ram Nagar.	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shyam Lal College, Delhi
298.	5090	Carry out Ultrasonic Pulse Velocity (UPV) Testing of TG Deck of Unit#2 and its supporting RCC Columns of 3X600MW North Karanpura STPP, Jharkhand as per IS:13311 -1992 (Part-1).	M/s Shankarnarayana Constructions Pvt. Ltd, SNC House, 4th Floor, No.7, Residency Road, (Old No.9, Raja Ram Mohan Roy Road), Bangalore
299.	5091	Third Party Quality Assurance / Audit for Work of "Construction of fixed compactor transfer station (FCTS) at Aurobindo Place Market in ward no. 163 South Zone"	Executive Engineer (Pr-II), South, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
300.	5094	Condition assessment on existing RCC FARS Antenna Pedestal at DIPAC, New Delhi	M/s National Remote Sensing Centre, Balanagar, Hyderabad
301.	5101	Third Party Quality Assurance / Audit for Work of (i) C/o Civil Structure for providing Fixed Compactor Transfer Station (FCTS)/ Type-III(A) locations/wards for Municipal Solid Waste and street sweeping waste in West Zone at 9 locations (ii) C/o Civil Structure for providing Fixed Compactor Transfer Station (FCTS)/Type-IV and Type-V at locations/wards for Municipal Solid Waste and street sweeping waste in West Zone : Type IV at 4 locations & Sita Puri in Ward No. 120, Type-V at 4 locations in Ward No. 115 and (4) Lajwanti Chowk in Ward No. 110.	Executive Engineer (Pr-II), WZ, South Delhi Municipal Corporation, Under Dabri Flyover, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
302.	5108	Third Party Quality Assurance / Audit for the Work of "Improvement Development of 45ft. road by pdg. RMC from H.NO 1 to 48A(Near invitation Mkt.) in A-Block, Ashok Vihar, Ph-II in ward no. 66, Sawan Park".	Executive Engineer (M-IV), CLZ, North Delhi Municipal Corporation, Shakti Nagar Extn., New Delhi
303.	5109	Carrying out Concrete Core Testing for the work of Constructing 311.75m Concrete Spillway at Anwar.	Executive Engineer, Kanhar Const. Division-III, Pipari, Sonbhadra
304.	5111	Condition Assessment study of "DM Plant and Administrative building, repair methodology and schedule of items for repair" in CPP-II at NSPCL, Durgapur.	M/s NTPC SAIL Power Company Private Limited, CPP-II, DSP Complex, Durgapur
305.	5112	Third Party Quality Assurance / Audit for the Work of "Covering of Maharani Bagh drain by providing and laying Precast RCC slabs over steel beams in Maharani Bagh in Ward No. 193, Central Zone".	Executive Engineer (Pr-I), Central, South Delhi Municipal Corporation, Lajpat Nagar-I, New Delhi
306.	5113	Carrying out UPV, Rebound Hammer & Core Tests on Transmission line from Bhivani to Meerat Near Rohtak Location	M/s Power Grid Corporation of India Limited, Kutub Industrial Area, Katwaria Sarai, Delhi
307.	5118	Third Party Quality Assurance / Audit for Work of "Improvement Development of main Mandawali Road from MCD store to Ram Gali in w.no. 223/AC-58 Shah (s) zone".	Executive Engineer (M-IV), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
308.	5120	Third Party Quality Assurance / Audit for Work of "Remodeling of outfall drain from Britania Chowk to near CNG Station Shakurpur JJ Colony in Ward No. 64/CLZ."	Executive Engineer (M-IV), CLZ, North Delhi Municipal Corporation, Shakti Nagar Extn., New Delhi
309.	5121	Third Party Quality Assurance / Audit for Work of "Construction of RCC drain from opposite H.no. 10/63 Geeta Colony to Culvert in Ward No. 229 Shahdara South Zone in Krishna Nagar".	Executive Engineer (M-IV), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
310.	5123	Third Party Quality Assurance / Audit for Work of "Imp. Dev. of Road from Maharaja Agarsain Public School to Mother Dairy in Ashok Vihar Ph-IV, C-65/CLZ."	Executive Engineer (M-IV), CLZ, North Delhi Municipal Corporation, Shakti Nagar Extn., New Delhi
311.	5126	Third Party Quality Assurance / Audit for the Work of "Remodeling of drain of both sides from Community Hall Gharoli Village to Police Station New Ashok Nagar in ward no. 216 Shahdara South Zone"	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
312.	5130	Evaluation of Materials and Concrete Mix Designs for the work of Ghatampur Project	M/s Neyveli Uttar Pradesh Power Limited C/o Kuber Enterprises, New Delhi
313.	5136	Evaluation of Materials and Concrete Mix Design for the Additional Work of 3X660 MW NUPPL, Ghatampur Thermal Power Project	M/s BGR Energy System Limited, Teynamet, Chennai, Tamil Nadu

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314.	5137	Evaluation of Hardened Concrete Cores After 28days, which will Handed Over to NCB by NTPC, Vindhyachal	M/s NTPC Limited, Vindhyachal Super Thermal Power Station, Singrauli, Madhya Pradesh
315.	5138	Third Party Quality Assurance / Audit for Work of "Construction of Jaunti-Kanondha Road on both sides in village Jaunti in ward no. 29(Karela) in Narela Zone"	Executive Engineer (M-II), Narela, North Delhi Municipal Corporation, Narela, New Delhi
316.	5139	Third Party Quality Assurance / Audit for Work of "Construction of lanes by providing CC pavement and OSD from Sh. Mahabeer house to Sh Jagdish house to Sh. Dayanand house. Sh. Yashpal house to Sh. Mahabeer house in village Tatesar --- in ward no. 29 (Karala) in Narela Zone"	Executive Engineer (M-II), Narela, North Delhi Municipal Corporation, Narela, New Delhi
317.	5140	Carrying out Condition Assessment of RCC TG Deck of TG Foundation Unit # 1 (1x600 MW) of Jhabua Power Ltd., Village Barela, Distt. Seoni, Madhya Pradesh	M/s Jhabua Power Limited-600MW, Village Barela-Gorakhpur, P.O- Attaria, Tehsil Ghansore
318.	5143	Third Party Quality Assurance / Audit for Work of "Improvement Development of road lanes and drains of 1174 MIG, 210 LIG and 623 EWS houses at Kondli Gharoli Ph-III [--] by pdg. 0 from in Kondli"	Executive Engineer (M-III), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
319.	5144	Third Party Quality Assurance / Audit for Work of "Restoration of road cut made by DJB for laying of Sewer line in Dallupura Village in ward no. 214(005E), Shah(S) Zone [---] by pdg. RMC from in Khichripur".	Executive Engineer (M-III), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
320.	5145	Carry out Condition Assessment using Non Destructive Evaluation Technique including preparation of typical BOQ and Specifications for 5no's Mixing Tanks of HCSD Ash Silos at APCPL, Jharli.	M/s APCPL – IGSTPP, Jharli, Dist-Jhajjar, Haryana
321.	5147	Third Party Quality Assurance / Audit for the Work of "Const. of five nos. civil structure for fixed compacted Transfer Station (FCTS) at different location in various wards in SZ (i) Q. No. 96 Aditya Mandir in Sec.-7 RK Puram Dhalao No. A/142/168 in W.No. 168/ SZ (ii) opp. 85 Sec.-12 RK Puram Dhalao No. D/126/167 in W. No. 167/SZ (iii) Opp. Masjid Moth Dhalao No. A/34/164 in W.No. 164/ SZ (iv) near Sec.5 Pushp Vihar Dhalao No. A/334/184 in W. No. 184/SZ (v) Near Radha Krishan School Sec.-4 Pushp Vihar Dhalao No. A/314/184 in W. No. 184/SZ."	Executive Engineer (M-II), South, South Delhi Municipal Corporation, Gulmohar Park, Delhi
322.	5148	Third Party Quality Assurance / Audit for the Work of "C/o five nos. civil structure for fixed compactor Transfer Station (FCTS) at different location in various wards in SZ (i) Near Chirag Delhi Nalla Soami Nagar Dhalao	Executive Engineer (M-II), South, South Delhi Municipal Corporation, Gulmohar Park, Delhi

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		No. A/361/191 in W.No. 19/SZ (ii) Near Panchsheel Club Dahalo No. A/357/191 in W. No. 191/SZ (iii) A Block Near Sr. Sec. School Panchsheel Enclave Dhalao No. B/362/191 in W. No. 191/AZ (iv) Near Bhagat Singh College Dhalao No. A/472/189 in W. No. 189/SZ and (v) Near W-130 GK-II Dhalao No. A/330/189 in W.No. 189/SZ”	
323.	5151	Evaluation of Materials and Concrete Mix Designs for “Civil Works for Construction & Commissioning of Waste Water Conservation Scheme” for NTPC Korba	M/s NTPC Limited, Korba Super Thermal Power Station, Jamnali, Distt, Korba, Chhattisgarh
324.	5157	Third Party Quality Assurance / Audit for Work of “Construction of Dog Sterilization Centre in Dwarka Sector-29 in NGZ”.	Executive Engineer (Pr.), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
325.	5161	Third Party Quality Assurance / Audit for Work of “Imp. Dev. of road opp. Shiv Mandir of Gali No 2 and Remodeling of drain from Shiv Mandir to Kali Mandir in Tahirpur village by pdg. 0 from in W.No. 242 Shahdara North Zone”.	Executive Engineer (M-I), Shah-N, East Delhi Municipal Corporation, SDN Hospital, Shahdara, Delhi
326.	5162	Third Party Quality Assurance / Audit for Work of “Improvement Development of road from H.No. 252-253/3 to A244, A247, 353 to 358 to 7/320 in Anaj Mandi in AC-62 Shahdara South Zone”.	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
327.	5165	Third Party Quality Assurance / Audit for the Work of “Construction of fixed compacter transfer station (FCTS) at Saket near Dahalo no. 179/169/SZ in ward no. 170 South Zone”.	Executive Engineer (Pr-I), South, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
328.	5167	Evaluation of Materials and Concrete Mix Designs for the work of Supply, installation, testing & commissioning of EPC PACKAGE for NTPC North Karanpura STPP (3X660MW) on M/s Bharat Heavy Electricals Limited	M/s NTPC Limited, North Karanpura Super Thermal Power Project, Hazaribagh, Jharkhand
329.	5176	Third Party Quality Assurance / Audit for Work of “Construction of additional class rooms by Pdg. from Grills, Toilet Block in MC Pry School Jyoti Colony, Ward no. 258, Shahdara (North) Zone in Kardampuri”.	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shyam Lal College, Delhi
330.	5177	Condition assessment using Non Destructive Testing techniques of One Pylon segment of Stadium Building at Indira Gandhi Stadium Complex, New Delhi	M/s SAI Civil Maintenance Sub-Division CPWD, MDC National Stadium, New Delhi
331.	5179	Third Party Quality Assurance / Audit for the Work of “Landscaping and beautification work of open space under Ring Road Flyover near Ber Sarai (Africa Avenue) in Ward No. 161/ South Zone (New Ward No. 66-S)”	Executive Engineer (M-I), South, South Delhi Municipal Corporation, Gulmohar Park, Delhi

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332.	5186	Evaluation of One Chemical Admixture and One Corrosion Inhibiting Admixture Sample	M/s Asian Laboratories, DSIDC Shed, Phase-II, New Delhi
333.	5189	Third Party Quality Assurance / Audit for the Work of “Beautification and Landscaping works under Bijwasan Flyover (Civil and Horticulture work) in NGZ SDMC”.	Executive Engineer (M-II), NGZ, South Delhi Municipal Corporation, Mangla Puri, New Delhi
334.	5190	Third Party Quality Assurance / Audit for the Work of “Beautification and Landscaping works under Palam Flyover (Civil and Horticulture work) in NGZ SDMC”.	Executive Engineer (M-II), NGZ, South Delhi Municipal Corporation, Mangla Puri, New Delhi
335.	5192	i) Condition assessment using Non Destructive Testing techniques for NP4 class pipe of 2000mm & 2200mm diameter RCC Pipelines at Varanasi, Uttar Pradesh ii) Cross Checking of Design details for same Pipelines in accordance with IS 458:2003 and IS 783:1985.	M/s VA Tech Wabag Ltd., New Delhi
336.	5195	Third Party Quality Assurance / Audit for the Work of “Improvement and development of courtyard, passage, toe wall and ramp at entry / exit by providing red sand stone, granite stone, tactile tiles and SS grills at ramps around J-block market, Saket ward no. 169 South Zone”.	Executive Engineer (Pr-I), South, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
337.	5197	Third Party Quality Assurance / Audit for Work of “(i) Improvement Development of Naveen Shahdara Main Market [from GT Road to Shanti Nursing Home Panchsheel Garden – from Namkeen Chowk to Gali No. 14 Subhash Park] by pdg.0 from RMC Pavement in C-247 and 248, AC-64 Shahdara (North). (ii) Improvement Development of Rani Jhansi Road from Gali No. 8 to Gali No. 4 Subhash Park Extn. by Pdg. RMC pavement in C-248 Shahdara (North). (iii) Improvement Development of Subhash Park Main road from Namkeen Chowk to Gali No. 14 Subhash Park by Pdg. RMC pavement in C-248 Shahdara (North) in Welcome Colony”.	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Shyam Lal College, Delhi
338.	5200	Evaluation of Concreting Materials & Concrete Mix Proportions (2 Nos)” civil works of Additional Ash Water Re-Circulation from Ash Pond to Plant ETP, NTPC-RSTPS-Ramagundam, Awarded to M/s Raunaq EPC International Ltd	M/s NTPC Ltd – Telangana STPP (2x800MW), Ramagundam, Peddapalli
339.	5204	Third Party Quality Assurance / Audit for the Work of “Beautification beneath Nehru Place flyover (Outer ring road) in Div (M)-I, Central Zone.”	Executive Engineer (M-I), Central, South Delhi Municipal Corporation, Defense Colony, Delhi
340.	5205	Third Party Quality Assurance / Audit for the Work of “Facelifting of space beneath Ring road flyover Sarai Kale Khan in Ward No. 56 S, Sidharth Nagar, Central Zone.”	Executive Engineer (M-I), Central, South Delhi Municipal Corporation, Defense Colony, Delhi

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341.	5207	Third Party Quality Assurance / Audit for Work of "Supply of PPC Cement at Central Store North DMC at Kanchan Puri Near Vijay Ghat, New Delhi"	Executive Engineer (Central Store), North Delhi Municipal Corporation, Delhi Gate, Delhi
342.	5208	Third Party Quality Assurance / Audit for the Work of "Beautification of beneath Kalka Ji Flyover (opposite Kalka Ji Mandir), Central Zone."	Executive Engineer (M-I), Central, South Delhi Municipal Corporation, Defense Colony, Delhi
343.	5210	Condition assessment using Non Destructive Evaluation Technique including preparation of Bill of Quantities (BOQ), Cost Estimate for Foundations of 8 PA Fans, 4 FD Fans and 4 ID Fans (Total 16 Nos.) of Captive Power Plant – II of NSPCL Durgapur	M/s NTPC SAIL Power Company Private Limited, CPP-II, DSP Complex, Durgapur
344.	5212	Evaluation of materials and concrete mix design for the work of Supply, Installation, Testing & Commissioning of EPC PACKAGE for NTPC North Karanpura STPP (3X660MW) on M/s BHEL for the execution of Civil Works	M/s NTPC Limited, North Karanpura Super Thermal Power Project, Tandwa, Chatra, Jharkhand
345.	5218	Conducting Concrete mix proportions (2 nos.) for civil works of BOP Works, NTPC-RSTPS, Ramagundam awarded to M/s TATA Projects Ltd.	M/s NTPC Limited, Jyothi Nagar, Ramagundam
346.	5221	Third Party Quality Assurance / Audit for the Work of "Restoration of cut made for laying Natural Gas Pipe Line by pdg. RMC from in S-Block, G.K.-II. Chirag Delhi in ward No. 189/South Zone."	Executive Engineer (M-II), South, South Delhi Municipal Corporation, Gulmohar Park, Delhi
347.	5233	Third Party Quality Assurance / Audit for work of "Construction of Outfall drain from Anand Rathi House to Anil Rathi House in Rajpur Village in ward no. 173 South Zone"	Executive Engineer (Pr-II), South, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
348.	5244	Third Party Quality Assurance / Audit for the Work of "Improvement of Drainage System and side berms by providing RMC on roads in Nehru Nagar, in Ward no. 155, Central Zone."	Executive Engineer (Pr-I), Central, South Delhi Municipal Corporation, Jal Vihar, Delhi
349.	5245	Third Party Quality Assurance / Audit for Work of "Imp. Dev. of lanes by pdg. Drainage System and RMC from H.No. 1/1 to 1/16 and adj. in 1 and 3 Block East Patel Nagar in Ward No. C-95/KBZ."	Executive Engineer (M-II), KBZ, North Delhi Municipal Corporation, Old Rajinder Nagar, Delhi
350.	5247	Third Party Quality Assurance / Audit for Work of "Imp. Dev. of Lane Geeta colony by pdg. RMC Ward No. 24E/AC 60 Shah (South) (4 Roads)	Executive Engineer (M-I), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
351.	5251	Condition Assessment using Non-Destructive Evaluation Technique including Repair and Rehabilitation measures for Janpath Bhawan, Cannaught Place, Janpath, Delhi	Executive Engineer, Central Public Works Department, Science Building Circle, Science Bhawan Annexe, New Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
352.	5254	Carry out Condition Assessment Studies of TG Foundation of Unit#6 (500MW) at Ramagundam Super Thermal Power Station, Ramagundam	M/s NTPC Ltd. Ramagundam STPS, Peddapalli
353.	5255	Carry out Condition Assessment of TG Deck Slab of Unit#1 at Feroz Gandhi Unchahar Thermal Power Station, NTPC Unchahar, Raebareli, Uttar Pradesh	M/s Feroz Gandhi Unchahar Thermal Power Station, Raebareli
354.	5257	Carrying out Concrete Core Extraction & Testing on Basement PCC at National Council of Applied Economic Research Building at New Delhi.	M/s MW high Tech Projects India Pvt Ltd Nanakramguda, Hyderabad
355.	5258	Evaluation of Materials and Concrete Mix Designs for the Additional Work of 3X660MW NUPPL, Ghatampur Thermal Power Project	M/s BGR Energy System Limited, Teynampet, Chennai, Tamil Nadu
356.	5266	Evaluation of Materials and Concrete Mix Designs for the work of Construction of Central Armed Police Force Institute of Medical Science at Maidan Garhi, New Delhi	M/s Central Public Works Department, CAPFIMS Project Division-1, Vidhut Bhawan, New Delhi
357.	5270	Third Party Quality Assurance / Audit for Work of "Construction of drain along road from pocket B-1 to B-3, Janta Flat, Mayur Vihar Phase-III (along Gharoli Dairy Colony) in Ward No. 216, Shah (S) Zone [---] by pdg. RCC item in Gharoli".	Executive Engineer (M-III), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
358.	5271	Third Party Quality Assurance / Audit for Work of "Imp. Dev. of Flyover opposite Samachar Apptt. On Noida Link Road [--] by pdg. 0 from M.S.Grill below flyover in Kishan Kunj Shahdara South Zone.".	Executive Engineer (M-IV), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
359.	5280	Abrasion Testing of 7 Concrete Samples using Revolving Disk Method	M/s Fosroc Chemicals (India) Pvt. Ltd. Rural District Dobespet, Bangalore
360.	5285	Evaluation of Materials for the Work of Construction of Elevated Road over Barapullah Nallah Starting from Sarai Kale Khan to Mayur Vihar, New Delhi (Phase-III)	M/s Public Works Department, Opp. IP Park, Ring Road, Sarai Kale Khan, Delhi
361.	5291	Evaluation of Rock Sample from Hurla Rock Quarry, Parbati ST-II Project, NHPC Limited	M/s NHPC Limited, Parbati HE Project, Stage-II, R&QC Complex, Nagwain, Mandi
362.	5293	Concrete Mix Design of 10 Nos for Redevelopment of Pragati Maidan Complex	M/s NBCC (India) Limited, ITPO Project Site, Pragati Maidan, Near Gate No. 2, New Delhi
363.	5295	Third Party Quality Assurance / Audit for Work of "Improvement development of lanes by pdg. RMC in Jogi Mohalla in Mandi Village in ward no. 175/SZ"	Executive Engineer (M-IV), SZ, South Delhi Municipal Corporation, Pushp Vihar, Delhi

Sl. No.	SP No	Title of the project	Name of the Sponsor
364.	5303	Carrying out Distress Assessment Using Non Destructive Evaluation Technique including Preparation of Bill of Quantities (BOQ), Cost Estimate of G#5, G#6, Crusher House and Junction Gallery #2 in PP-II at NSPCL, Bhilai	M/s NTPC SAIL Power Company (P) Ltd. (NSPCL), Bhilai, Chhattisgarh
365.	5323	Third Party Quality Assurance / Audit for Work of "Construction of damaged boundary wall [] by pdg. 0 from and stage for prayer and drinking water platform and development of back side of building in M.C. Pry. School Harijan Basti in ward no. 6E SSZ in Gharoli".	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
366.	5332	Carrying out Rebound Hammer Test and Concrete Core testing on various equipment foundations of 765KV GIS Substation at Orai (Jalaun) Uttar Pradesh.	M/s Power Grid Corporation of India Limited, 765/400KV GIS Substation, Ksheersagar Building, Patel Nagar, Orai, Uttar Pradesh
367.	5355	Third Party Quality Assurance / Audit for Work of "Improvement development of drainage system and berms by pdg. Precast Slab from flat No. 129 to 132 in Pocket-I Mayur Vihar Ph-I in ward no. 209 SSZ".	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
368.	5356	Third Party Quality Assurance / Audit for Work of "Improvement development of drainage system and berms by pdg. Precast Slab from flat No. 201 to 197 in Pocket-I Mayur Vihar Ph-I in ward No. 209 SSZ".	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
369.	5358	Third Party Quality Assurance / Audit for Work of "Improvement development of front portion of main gates of M.C. Pry School Harijan Basti by Pdg. From in ward no. 06/E SSZ in Gharoli".	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
370.	5366	Third Party Quality Assurance / Audit for the Work of "Imp./ Dev. of road and footpath from Gate of GB Pant College to Indraprastha Institute of Information Technology (IIIT) in Kalkaji in Ward No. 90-S), Central Zone".	Executive Engineer (M-II), Central, South Delhi Municipal Corporation, Jal Vihar, Delhi
371.	5368	Carrying out Rebound Hammer, UPV Testing and Concrete Core testing on TJ Tower RCC Raft Size (9Mx8M) -1 no for STATCOM work at 765/400Kv substation, Lucknow Uttar Pradesh	M/s RongXin Power Electronic India Pvt. Ltd., 25A Shakespeare Sarani, The Legacy Building, Unit no 41A/46, 4th Floor, Kolkata
372.	5373	Third Party Quality Assurance / Audit for the Work of "Beautification and Landscaping works under Mahipalpur Flyover in SDMC/ NGZ". SH: Beautification and Landscaping work of intersection near A-Block under Mahipalpur Flyover in SDMC/NGZ.	Executive Engineer (M-II), NGZ, South Delhi Municipal Corporation, Manglapuri, Delhi
373.	5380	Carrying out Ultrasonic Pulse Velocity (UPV) Testing of TG Deck of Unit#3 and its supporting RCC Columns of 3x660MW North Karanpura STPP, Jharkhand as per IS: 13311 – 1992 (Part-1)	M/s Sunil Hitech Engineers Ltd., 97, East High Court Road, Ramdaspath, Nagpur

Sl. No.	SP No	Title of the project	Name of the Sponsor
374.	5410	Evaluation of aggregates for potential Alkali Aggregates Reactivity	M/s Meja Urja Nigam (P) Ltd. Allahabad Allahabad, UP
Centre for Quality Management, Standards and Calibration Services (CQC)			
375.	4888	Laboratory Assessment and Proficiency Improvement Study	M/s Export Promotion and Marketing (EP&M) Testing Laboratory, Cuttack
376.	5248	Development of White Portland Cement Standard for Chemical Parameters	M/s UltraTech Cement Limited (Unit: Birla White), Jodhpur
377.	5339	Skill Upgradation and Proficiency Improvement of Physical Testing Laboratory Personnel and Gaugers	M/s JSW Cement Limited, Nandyal Plant, Kurnool, AP
378.	5384	Laboratory Assessment and Proficiency Improvement Study for Quality Control Laboratory	M/s Sree JayaJyothi Cements Ltd. (SJCL), Yanakandla Cement Works, Kurnool Dist., Andhra Pradesh
379.	5385	Laboratory Assessment and Proficiency Improvement Study for Quality Control Laboratory	M/s My Home Industries Pvt. Ltd. (MHIPL), Mellacheruvu Cement Works (MCW), Nalgonda, Telangana

Appendix - IV

Research and Development Programme 2018-19

Sl.No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
PROJECTS UNDER DCCI				
1.	COB-09	Development of Reactive Belite Cement using Low Grade Lime Stone and different dopants	April 2017	March 2020
2.	COB-10	Improving the Performance of Composite Cement by Separate Grinding of Constituents	April 2017	March 2020
3.	WAU-14	Improvement of Fly Ash Quality, through Chemical / Mineral Doping in Coal During its Generation in Thermal Power Plant and Study its Effects in Cement and Concrete.	April 2017	March 2022
4.	WAU-15	Investigations of Multi-Component Blended Cements using Limestone, Calcined Clay and other Mineral Additives	April 2017	March 2020
5.	PRP-06	Application of CFD in Indian Cement Industry	April 2017	March 2019
PROJECTS UNDER PROJECTS BASED SUPPORT TO AUTONOMOUS INSTITUTION				
6.	SOD-09	Effectiveness of Different Repair Systems for Repair of Corrosion Damaged Structures	April 2016	March 2019
7.	CTM-01	Cost Effective Technology for Low Traffic Volume Concrete Roads	April 2016	March 2019
8.	CTM-02	Development of Geopolymer Concrete for Application in Pavements and Precast Concrete Construction	April 2017	March 2020

Sl.No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
9.	CON-14	Development of Ultra High Performance Concrete (UHPC) including use of Nano Technology for UHPC	April 2017	March 2020
10.	CON-15	Enhancing The Utilization of Construction and Demolition Waste and Other Waste Based Aggregates in Concrete Structures and Pavements	April 2017	March 2020
11.	SOD-10	Effect of Supplementary Cementitious Materials (SCM's- Single and Multi Blends) on Service Life of Concrete Structures including Studies to Improve Green Cements to Meet Durability/Service Life Requirements	April 2017	March 2020
12.	CTM-03	Use of Advanced Electronics in Construction and Condition Assessment of Concrete Structures	April 2017	March 2020
13.	CTM-04	Model low cost housing sustainable technology for Mass EWS & LIG/MIG housing schemes using precast / prefab systems with emphasis on maximization of waste based materials	April 2017	March 2020
14.	SOD-11	Experimental study on shear and compression design of high strength concrete including effect of fibre on enhanced durability and fire resistance	April 2017	March 2019
15.	CLS-02	Development of calibration methodologies with improved accuracy	April 2017	March 2020
PROJECTS UNDER SWATCHHATA ACTION PLAN				
16.	ENV-19	Impact of Ammonia on Environment due to use of Ammonia for secondary abatement of NO _x Control in Cement Industries in India	April 2018	September 2019
17.	FBR-15	Improving the Reactivity of Fly Ash and their Effect on Cement and Concrete Performance	April 2017	March 2019

Appendix –V

NCB Patents Filed / Granted During 2014 - 2018

Sl.No	Application / Patent No.	Title	Name of Inventors
1.	2598/DEL/2014	Marble dust as mineral additive in the manufacture of ordinary Portland cement	Shri A Pahuja Dr M M Ali Shri P S Harma Shri S K Aggrawal Shri Ashish Goyal
2.	2599/DEL/2014	Mineralizing effect of “barium sludge- an industrial byproduct” in the manufacture of ordinary Portland cement	Shri A Pahuja Dr M M Ali Dr V P Chatterjee Shri S K Chaturvedi Shri S K Aggrawal
3.	634/DEL/2015	Rationalizing formulations and curing conditions for improving properties of hardened Geopolymeric Cement	Shri Ashwani Pahuja Dr M M Ali Dr R S Gupta Dr S Vanguri Dr (Ms) V Liju
4.	1195/DEL/2015	Investigations on the use of limestone mine reject on the properties of OPC clinker and resultant cement	Shri Ashwani Pahuja Dr M M Ali Dr V P Chatterjee Shri S K Chaturvedi Shri S K Agarwal
5.	1194/DEL/2015	Process for the Preparation of sulphoaluminate - belite cement utilizing high magnesia / dolomitic limestone	Shri Ashwani Pahuja Dr M M Ali Shri P S Sharma Dr V P Chatterjee
6.	1196/DEL/2015	Nanosilica blended ordinary Portland cement compositions with improved performance characteristics and a process thereof	Shri Ashwani Pahuja Dr M M Ali Dr S Harsh Shri Suresh Vanguri Dr (Ms) Varsha Liju
7.	1964/DEL/2015	Method for rapid estimation of Na ₂ O and K ₂ O in different types of cement and raw materials	Shri Ashwani Pahuja Dr M M Ali Shri S K Chaturvedi Shri S. C. Sharma
8.	201611029136	Fast process for determining expected 28-day compressive strength of concrete made with Portland Pozzolana Cement (PPC)	Shri V V Arora Shri Suresh Kumar Shri Manish Kumar Mandre
9.	201711000524	A process for preparing tiles	Shri Ashwani Pahuja Dr S K Chaturvedi Dr S Harsh Dr R S Gupta Shri S Vanguri Dr (Ms) V Liju Dr MNK Prasad Bolisetty

FINANCE AND ACCOUNTS

FINANCE

CONTRIBUTIONS

Ministry of Commerce & Industry Grant

During the year 2017-18, Plan Grant of NIL, Non-Plan Grant from Cement Cess of 2,916 lakhs were received.

FOREIGN EXCHANGE

During the year 2017-18, the Council earned Foreign Exchange amounting to US\$ 60,700 towards Training Fee, Testing Charges, Sponsored R & D Contribution, Seminar Delegate Fee, Technical Exhibition etc.

AUDITORS

M/s K S Aiyar & Co., Chartered Accountants, Mumbai were the Auditors of the Council for the year 2017-18.

ACCOUNTS

The Accounts for the year 2017-18 duly audited by the Auditors of the Council are given at Annexure (Balance Sheet as at 31st March 2018 and Income & Expenditure Account for the year ended 31st March 2018).

INDEPENDENT AUDITOR'S REPORT

To the members of National Council for Cement and Building Materials

Report on the Financial Statements

We have audited the accompanying financial statements of National Council for Cement and Building Materials, which comprise the Balance Sheet as at March 31, 2018 and the Income and Expenditure account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

The Council's Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance in accordance with the Accounting Principles generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to the Council's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion and to the best of our information and according to the explanations given to us, except for the effects of the matters described in the emphasis of matter paragraph, the financial statements give a true and fair view in conformity with the accounting principles generally accepted in India:

- a) in the case of the Balance Sheet, of the state of affairs of the Society as at March 31, 2018; and
- b) in the case of the Income and Expenditure, the excess of Income over Expenditure of the Society for the year ended on that date.

For K. S. Aiyar & Co.
Chartered Accountants
Firm Registration No. 100186W

Raghuvir M. Aiyar
Partner
Membership No. 038128

Place: Mumbai
Date: 24/10/2018

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
BALANCE SHEET AS AT MARCH 31, 2018

Schedules	As at March 31, 2018	As at March 31, 2017
SOURCES OF FUNDS		
Capital Fund	A 68,076,146	68,076,145
Reserves and Surplus	B 664,362,854	421,539,218
Building Fund	4,500,000	4,500,000
Gratuity Fund	202,212,171	219,705,145
Provision For Leave Encashment	180,828,115	170,476,514
Capital Grant from Govt of India	C 442,383,777	42,383,777
Current Liabilities & Provisions	D 277,749,917	210,428,733
	-	-
Total	1,840,112,980	1,537,109,532
APPLICATION OF FUNDS		
Fixed Assets		
Gross Block	E 809,951,630	759,384,244
Less : Depreciation	410,345,954	399,605,676
Net Block		400,893,646
		358,490,598
Gratuity Fund Investment		
(Fixed Deposit / Savings Bank / Interest Accrued)	197,049,916	128,801,232
Leave Fund account	61,893,708	132,224,078
		-
Current Assets Loans & Advances		
R&D Contribution Outstanding	8,056,771	6,521,808
Sundry Debtors	F 19,632,505	17,005,791
Loans and Advances (unsecured and considered good)	129,225,915	103,350,588
Cash and Bank Balances	G 888,736,590	755,692,160
FDR In lien	14,572,765	15,785,039
Investments	100,000,000	
Interest Accrued on Bank Deposits	21,339,132	19,238,238
Total	1,840,112,980	1,537,109,532
Significant Accounting Policies	M	
Notes on Accounts	N	

The Schedules referred to above form an integral part of the Balance Sheet.

This is the Balance Sheet referred to in our report of even date.

For and on behalf of
K. S. Aiyar & Co.
Chartered Accountants

Dr. S K Chaturvedi
Joint Director (Finance & Accounts)

Ashutosh Saxena
Director General
-Actg.

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date: 24/10/2018

Mahendra Singhi
Chairman -NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2018

		For the Year ended March 31,2018	For the Year ended March 31,2017
INCOME			
Research & Development Contribution	H	323,940,093	281,063,236
Other Income	I	86,553,699	89,165,822
Grant-in-Aid (Revenue) from Ministry of Commerce & Industry	J	291,600,000	206,000,000
		702,093,792	576,229,058
EXPENDITURE			
Employee's Cost	K	370,526,841	446,244,074
Travelling & Conveyance (Including Overseas Travelling)		10,671,929	8,279,130
Laboratory Stores, Raw Materials		15,621,306	11,411,820
Symposia & Seminars		11,553,483	1,524,989
Training Programmes		2,702,441	3,441,857
Repairs and Maintenance		5,556,526	8,876,256
Other Expenses	L	33,255,466	37,332,325
Depreciation		9,382,164	
Add. Provision of Depreciation of previous Year		-	
Less : Transfer from Capital Grant from Govt of India		-	19,133,290
		459,270,156	536,243,741
Surplus for the year transferred to Reserve Fund		242,823,636	39,985,317
Significant Accounting Policies			
Notes on Accounts		-	

The Schedules referred to above form an integral part of the Income and Expenditure Account.

This is the Income and Expenditure Account referred to in our report of even date.

For and on behalf of
 K. S. Aiyar & Co.
 Chartered Accountants

Dr. S K Chaturvedi
 Joint Director (Finance & Accounts)

Ashutosh Saxena
 Director General
 -Actg.

Raghuvir M. Aiyar
 Partner
 M.No. 38128
 Mumbai
 Date: 24/10/2018

Mahendra Singhi
 Chairman -NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2018

Particulars	As at March 31, 2018 (Amount in Rs.)	As at March 31, 2017 (Amount in Rs.)
<i>SCHEDULE - A</i>		
Capital Fund		
As per the last Balance Sheet	68,076,146	68,076,146
Includes UNIDO Equipment valued at Rs 20,187,535 (Previous Year Rs 20,187,535) (Refer Note 3 (b) of Schedule M)	<u>68,076,146</u>	<u>68,076,146</u>
 <i>SCHEDULE - B</i>		
Reserves and Surplus		
As per the last Balance Sheet	421,539,218	381,553,901
Add: Surplus for the year	242,823,636	39,985,317
	<u>664,362,854</u>	<u>421,539,218</u>
 <i>SCHEDULE - C</i>		
Capital Grant from Govt of India		
As per the last Balance Sheet	442,383,777	477,147,079
Add : Plan Grant received during the year	-	-
	<u>442,383,777</u>	<u>477,147,079</u>
Less : Grant transferred to Income & Expenditure Account to the extent depreciation charged during the year on assets purchased out of capital grant	-	34,763,302
	<u>442,383,777</u>	<u>442,383,777</u>

SCHEDULE E
NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS DEPRECIATION AS AT 31 MARCH 2018

Particulars	GROSS BLOCK										DEPRECIATION										NET BLOCK	
	Cost upto March 31, 2001	Cost from April 1, 2001 to March 31, 2017	Total cost March 31, 2017	Addition During the Year 2017-2018	Disposal/ Adjustment out of cost before 2001	Disposal/ Adjustment out of cost after 2001	Total cost as at 31/03/2018	On Old Assets upto 31/03/2018	On Assets from April 1, 2001 to March 31, 2017	Op. Bal as at April 1, 2017	Rate %	On Assets Prior to 1 April 01 during the year 2017-18	Rate %	On Additions after 1 April 01 2017-18	Depreciation/ Adjustment on cost before 2001	Dep. / Adj. on cost after 2001	Dep. / Adj. on cost before 2001	Total Depreciation as at 31/03/2018	WDV As at March 31, 2018	WDV As at March 31, 2017		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20		
LAND (FREE HOLD)	3,924,748	-	3,924,748	-	-	-	3,924,748	-	-	-	-	-	-	-	-	-	-	-	3,924,748	3,924,748		
VEHICLES	833,717	5,365,103	6,198,820	-	-	-	6,198,820	767,151	4,355,054	5,122,205	20.0	13,313	20.0	235,358	166,743	166,743	-	5,204,134	994,686	1,076,615		
COMPUTER INCLUDING ACCESSORIES	10,263,037	44,724,017	54,987,054	3,600,460	-	-	48,324,477	-	44,263,986	44,263,986	60.0	-	60.0	2,436,295	-	-	-	46,700,281	1,624,196	460,031		
FURNITURE AND OFFICE EQUIPMENTS	79,479,641	7,754,819	87,234,460	7,236,317	-	-	25,254,173	9,465,665	(3,142,519)	6,323,146	10.0	79,737	10.0	1,915,996	1,026,304	1,026,304	-	7,292,575	17,961,598	11,694,710		
LABORATORY EQUIPMENT	251,920,097	331,399,738	583,319,835	31,477,467	-	-	362,947,348	73,169,461	206,219,365	279,388,827	10.0	631,018	25.0	24,262,027	19,869,910	19,869,910	-	284,482,105	78,465,243	52,010,911		
MOBILE Quality Control Laboratory	-	5,268,489	5,268,489	-	-	-	5,268,489	-	5,138,150	5,138,150	20.0	-	20.0	26,068	-	-	-	5,164,218	104,271	130,339		
CENTRE FOR CONTINUING EDUCATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
BUILDINGS	1,922,707	42,119,827	44,042,534	-	-	-	44,042,534	1,126,673	6,720,815	7,847,489	2.5	19,901	2.5	886,177	48,068	48,068	-	8,705,499	35,337,035	36,195,045		
OTHER SERVICES	535,144	24,826,311	25,361,455	-	-	-	25,361,455	521,711	1,245,231	1,766,943	10.0	1,343	2.5	589,861	13,379	13,379	-	2,344,768	23,016,687	23,594,512		
<u>LABORATORY PROJECTS</u>																						
BUILDINGS	27,973,919	84,961,934	112,935,853	8,183,000	-	-	121,118,853	16,699,689	12,023,380	28,523,069	2.5	286,856	2.5	2,045,523	699,348	699,348	-	30,156,099	90,962,754	84,412,784		
CAPITAL WORK IN PROGRESS BLDG (PG) UNDER CONST.	-	142,148,598	142,148,598	-	-	-	142,148,598	-	-	-	-	-	-	-	-	-	-	-	142,148,598	142,148,598		
OTHER SERVICES	10,046,554	5,849,746	15,896,300	-	-	-	15,896,300	9,782,138	6,853,227	16,640,365	10.0	26,442	25.0	375,789	2,511,638	2,511,638	-	14,530,958	1,365,342	(744,065)		
STAFF HOUSING	8,386,427	-	8,386,427	-	-	-	8,386,427	4,928,368	209,661	5,138,028	2.5	86,451	2.5	-	209,661	209,661	-	5,014,818	3,371,609	3,248,399		
<u>PILOT PLANT FACILITIES</u>																						
BUILDINGS	778,010	-	778,010	-	-	-	778,010	448,179	-	448,179	2.5	8,246	-	-	-	-	-	456,425	321,585	329,831		
Equipment	301,399	-	301,399	-	-	-	301,399	293,261	-	293,261	10.0	814	-	-	-	-	-	294,075	7,324	8,138		
Total	144,445,303	614,938,941	759,384,244	50,497,244	-	-	809,951,630	117,002,296.4	283,891,350	400,893,647	1,154,121	170	32,773,094	-	24,545,051	-	-	410,345,954	399,605,676	358,890,597		

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2018

Particulars	As at March 31, 2018 (Amount in Rs.)	As at March 31, 2017 (Amount in Rs.)
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SCHEDULE - D

Current Liabilities and Provisions

Retention & Security Money	19,081,854	15,960,028
Other Liabilities	258,668,063	194,468,705
	277,749,917	210,428,733

SCHEDULE - F

Sundry Debtors (Unsecured and Considered Good)

More than three years

Others	19,632,505	17,005,791
	19,632,505	17,005,791

SCHEDULE - G

Cash and Bank Balances

In Fixed Deposits	753,195,096	715,772,465
In Saving Accounts	134,975,261	39,890,966
Cash in hand including postage imprest	565,096	27,593
UNESCO Coupons (US Dollar 132.10)	1,137	1,137
	888,736,590	755,692,161

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2018

Particulars	As at March 31, 2018 (Amount in Rs.)	As at March 31, 2017 (Amount in Rs.)
<i>SCHEDULE - H</i>		
Research and Development		
Sponsored Research and Development Contribution	217,541,737	198,482,443
Standardisation and calibration	66,246,127	68,544,661
Symposia & Seminars	36,038,229	10,267,532
NCB PROFICIENCY TESTING PROG	4,114,000	3,768,600
	323,940,093	281,063,236

SCHEDULE - I

Other Income

Interest	68,836,681	73,430,690
Sale of Publications	1,295	8,150
Training Programmes	16,549,668	15,170,085
Miscellaneous Receipts	86,484	610,346
Licence Fee (Housing Colony)	931,315	559,057
National Awards for Energy Efficiency	-	-
Foreign Exchange Fluctuation	148,257	(612,506)
	86,553,699	89,165,822

SCHEDULE - J

Grant from Ministry of Commerce & Industry

Towards Plan Grant	-	60,000,000
Less : Towards Capital Expenditure	-	-
	-	60,000,000
Towards Non-Plan Grant from Cement Cess	291,600,000	146,000,000
Grants from Ministry of Environment	-	-
	291,600,000	206,000,000

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2018

Particulars	As at March 31, 2018 (Amount in Rs.)	As at March 31, 2017 (Amount in Rs.)
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SCHEDULE - K

Employee's Cost

Establishment Charges	331,989,667	350,164,711
Contribution to Provident Fund & other Fund	23,201,501	18,742,597
Gratuity (Refer Note 4 of Schedule - M)	12,059,052	74,788,654
Social Security & Welfare	3,276,621	2,548,112
	370,526,841	446,244,074

SCHEDULE - L

Other Expenses

Rent, Rates and Taxes	3,102,839	3,161,083
Electricity and Water Charges	10,351,901	11,025,791
Postage, Telegrams & Telephones	2,213,037	2,100,003
Publications	217,766	289,942
Stationery & Miscellaneous Stores	3,264,934	2,604,726
Books, Periodicals and Membership Fee	1,170,846	924,369
Exhibition, Publicity and Advertisements	284,892	1,954,506
Legal Expenses	601,314	224,688
Patents	474,800	78,100
Audit Fees - Statutory Auditors	75,000	75,000
Bank Charges	191,183	61,042
Insurance of Assets	228,341	810,461
Sundry Expenses	6,686,416	10,679,259
Collaborative Assistance in R&D and	4,392,197	3,343,355
Exchange Programmes & Consultants Fee		
	33,255,466	37,332,325

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Schedules forming part of the Accounts as at March 31, 2018

SCHEDULE – M

SIGNIFICANT ACCOUNTING POLICIES

1. The accounts are prepared on a going concern basis as per the historical cost convention.
2. **Recognition of Income:**
 - a) Income from Sponsored Research & Development Contribution is accounted for on the basis of the percentage of work completed during the year.
 - b) Other Incomes, other than Technical Services Fees, are accounted for on accrual basis.
3. **Fixed Assets:**
 - a) Fixed Assets are recorded at cost and for the better presentation of financial statements, the Council has decided to change the depreciation rates prospectively i.e., new rate will be applied only to the additions made from the financial year 2001-02 onwards and are depreciated on written down value basis at the following rates:

	Old Rates	New Rates
	% p.a.	% p.a.
* Vehicles	20	20
* Office Furniture and Equipment	10	10
* Laboratory Equipment	10	25
* Laboratory Projects Services	10	25
* Building including Staff Housing	2.5	2.5
* Computers	-	60

Depreciation has been provided on assets for whole year irrespective of the date of addition.

- b) Fixed Assets include Laboratory Equipment and Energy Bus received free of cost & custom duty from the United Nations Industrial Development Organisation (UNIDO). The value adopted in the accounts is as per customs CIF assessment upon import or at value advised by UNIDO and the corresponding credit for this amount is included under Capital Fund (Refer Schedule A) ` 19,564,057 for Laboratory Equipment and ` 623,478 for Energy Bus. The title to these assets has been transferred to Government of India and the further transfer of these fixed assets from the Ministry of Commerce & Industry, Government of India to the Council is pending. However, the Council provides depreciation on these fixed assets in accordance with the rates noted in para 3 (a) above.
4. Liability for Gratuity and Leave Encashment is provided for on the basis of actuarial valuation.
5. **Accounting for Government Grants:**

Government Grant of Revenue nature received from the Government have been accounted for as Income for the year under the Income and Expenditure Account.

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Schedules forming part of the Accounts as at March 31, 2018

SCHEDULE – N

NOTES ON ACCOUNTS

1. Purchases made during the year in respect of laboratory stores, raw materials, miscellaneous consumable stores, publications, tools and accessories are charged to the Income and Expenditure Account and closing stock of these items has not been ascertained or accounted for, as per the decision of the Board of Governors.
 2. Fixed Asset Register is being updated with the complete details along with value which is to be reconciled with the Accounts. Physical verification of the Fixed Assets has been carried out in each Centre/Group.
 3. Contingent liabilities not provided for in respect of:
 - a. Claims not acknowledged as debts by the Council, the liability of which is not ascertainable as pending in various Courts.
 - b. Claim for interest by the Andhra Pradesh State Government. in 1998, for delay in payment for purchase of Land (amount not intimated).
 4. Gratuity Fund Investment has a balance of Rs. 19,70,49,196 (Rs. 12,88,01,232). There is a shortfall of Rs. 51,62,255 (Rs.9,09,03,913) in the “Gratuity Fund Investment Account” as compared to the “Gratuity Fund account” as at 31st March 2018.
 5. The Council has got an actuarial valuation of the leave encashment for and upto the year ended 31st March 2018 and the liability computed is Rs. 18,08,28,115 (Rs. 17,04,76,514).
 6. An amount of Rs. 6,31,976 has been deposited with Hon’ble Delhi High Court in connection with a case filed by a former employee. Necessary adjustment will be made after the decision of the Hon’ble Court.
 7. The encashment of valuation of UNESCO Coupons of US \$ 132.10 are subject to ascertainment and confirmation.
 8. R&D Contribution has been arrived after adjusting R&D Contribution received in advance of Rs. 12,05,96,000 (Rs. 17,02,26,000).
 9. Previous year’s figures have been regrouped and rearranged wherever necessary so as to conform to this year’s classification.
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NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

34 Km Stone, Delhi-Mathura Road (NH-2), Ballabgarh-121 004, Haryana, INDIA