Mumbai-Ahmedabad High Speed Rail (MAHSR C4)

L&T Construction
Heavy Civil Infrastructure

Waste Management
&
Resource Conservation

Presentation to

CII- Confederation of Indian Industry
National Award for Environment Best Practices 2024

Presented by –

Mr. Vinod Kumar Agrawal (Head –Environment)

Mumbai Ahmedabad High Speed rail Project package C4

LARSEN & TOUBRO

About MAHSR C4 Project

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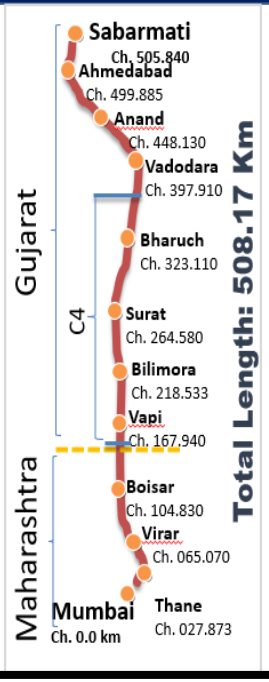

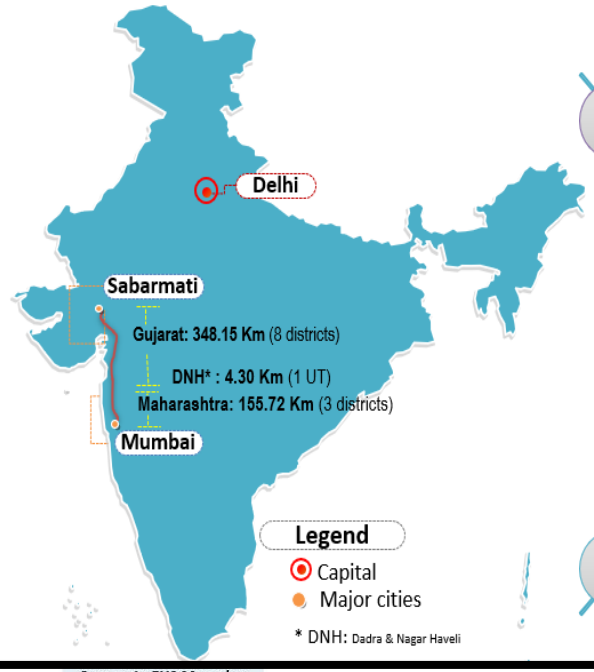

Customer	:	National High Speed Rail Corporation Limited (NHSRCL)	
Original Project Value	:	Rs. 24985 Cr. (Inclusive of GST – Rs. 2677 Cr.)	
Nature of Project	:	D&B – Lump Sum	
Project Duration	:	1460 days (48 months)	
NTP Date	:	10-Dec-2020	
Contractual / Actual start date	:	10-Dec-2020	10-Dec-2020
Contractual & Exp. finish date	:	09-Dec-2024	30-Aug-2025
Brief Scope	:	Design and Construction of Civil and Building Works including Testing & Commissioning for Double Line High Speed Railway involving Viaducts, Bridges, Maintenance Depots, Tunnel, Stations (Vapi, Bilimora, Surat and Bharuch), and Surat Depot for the Project for Construction of Mumbai-Ahmedabad High Speed Rail (Package No. MAHSR-C-4)	
Front End Engineering Design / PMC / DDC	:	TCAP (Tata-CEG-Aarvee-Padeco Consortium)	

Project EHS policy

Corporate EHS Magazine

Project Drug & Alcohol Policy

Project Zero Tolerance Policy

Project AIDS Policy

Corporate EHS policy

EHS Publications

EHS Strategy Planning

EHS Safety Pledge

Carbon Neutrality

If organization is carbon Neutral, it balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks. This can be achieved by -

- Reducing carbon emission
- Offsetting the carbon consumption

Water Neutrality

If organization is water Neutral, it balances their water use by both reducing their water usage and investing in projects which increase supplier of clean freshwater. This can be achieved by -

- Reducing water uses
- Reusing water
- Offset water by funding water efficient project.

Waste Management & Resource Conservation

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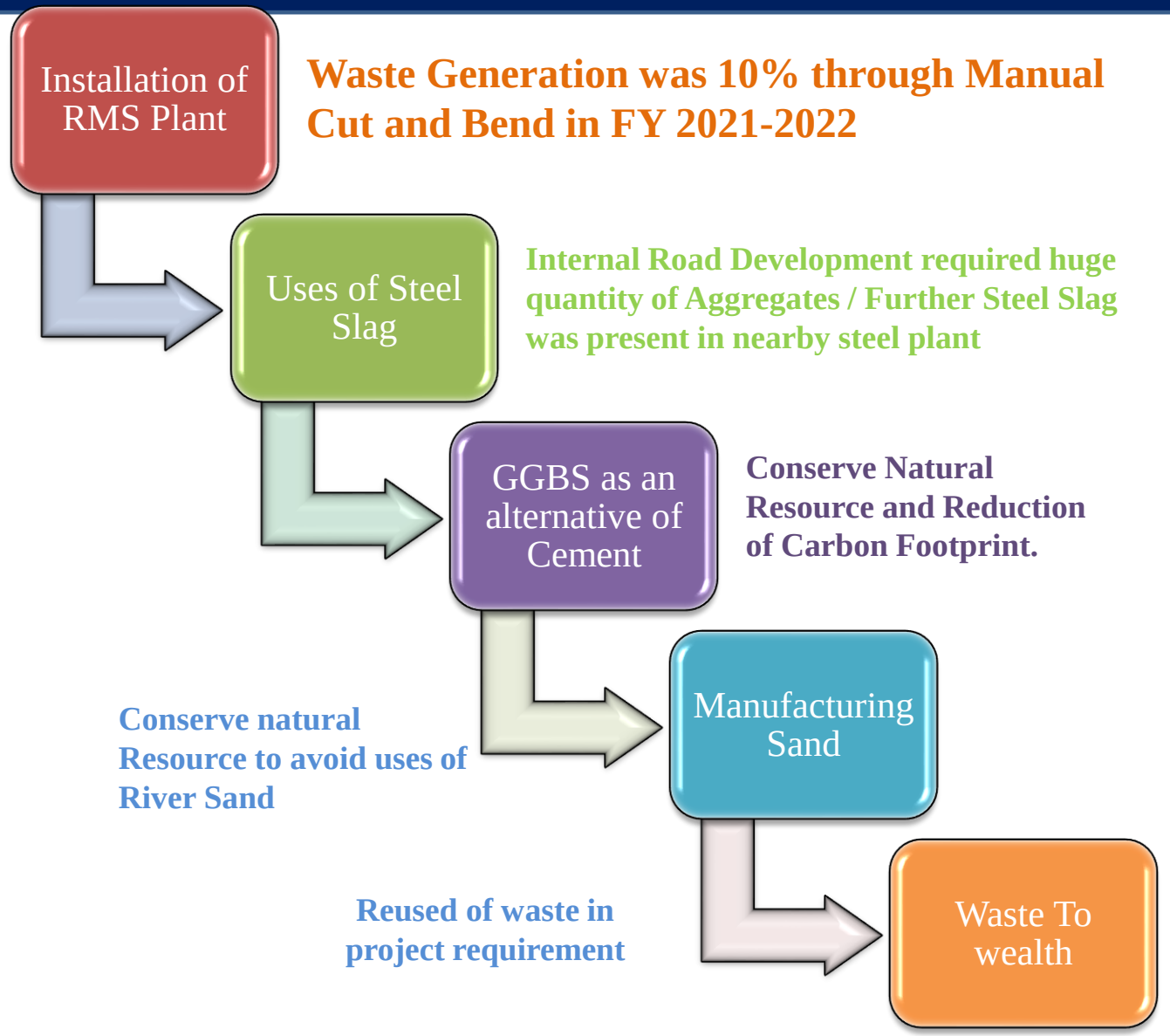

Uniqueness of the Project

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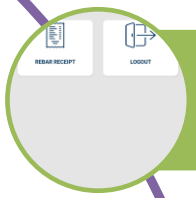

It is new application-wise

RMS plant installed along with RebarPro Digital Application

Reduction of Natural Resource by using GGBS and Steel Slag

Natural Resource Conservation by using M-sand

Waste to Wealth Initiative for Metals and Cementitious waste

Plan in 2021 -2022

Executed in 2022-2023

Completed and Review 2023-2024

Tangible Benefits

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Env Best Practices	Project Cost (In Lakhs)	Cost Saving (In Lakhs)	Waste Minimization (MT)	Reduction in Carbon Footprint (MT CO2e)	Natural Resource Conservation (In MT)	Pollution Reduction
RMS Plant	4200	1745	3173	4918.15	3363 Virgin Ore / Iron Ore	Reduction in Air Pollution / Water Pollution and Impact on Society can reduce. Save River Ecosystem river habitats, aquatic ecosystems, and the biodiversity Reutilizing cementitious waste reduces the volume of waste sent to landfills, mitigating environmental pollution and land use associated with waste disposal Reusing steel scrap decreases the need for new mining activities, which can have significant environmental consequences such as habitat destruction, soil erosion, water pollution, and biodiversity loss
Steel Slag Uses	-	720	75000	560.25	83250 Mined boulder	
GGBS (Ground Granular Blast Furnace Slag)	-	2360	118676.5	103296	189882.4 Raw materials like limestone, clay, shale, iron ore, and gypsum	
Manufacturing Sand	1620	600	1221545.99	-	1221545.99 River sand saved	
Waste to Wealth (Metal)	-	513	1168	1810.4	1238.08 Virgin Ore / Iron Ore	
Waste to Wealth (Cementitious)	-	333	95259	-	95259 Cements + Aggregates saved	
Total	**5820**	**6271**	-	**110584.82**		

In-Tangible Benefits

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RMS Plant & RebarPro Application

- *Commitment to sustainability and environmental responsibility,*
- *Enhancing the company's reputation and attractiveness to environmentally conscious stakeholders.*
- *Mitigate the negative impact on local ecosystems and wildlife habitats, contributing to biodiversity conservation.*
- *Lead to better air and water quality in surrounding communities, resulting in improved public health outcomes and quality of life for residents.*
- *Global efforts to mitigate climate change and achieve sustainability goals*
- *Commitment to innovation and adaptability, positioning the company as a leader in the Construction industry*

Steel Slag uses

- *Carbon sequestration by capturing carbon dioxide (CO2) through a process called carbonation, contributing to climate change mitigation efforts.*
- *Soil stabilization, Reduce erosion, improving the overall health and stability of ecosystems affected by construction activities.*
- *Reducing dust and particulate matter emissions, the use of steel slag can improve air quality in surrounding communities, leading to better respiratory health outcomes for residents.*
- *Embracing innovative and sustainable construction practices, Demonstrates environmental leadership and commitment to sustainable development, Enhancing the reputation and credibility of stakeholders involved in the project.*
- *Lower Green House gas Emission compared to traditional Road Materials*

In-Tangible Benefits

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GGBS (Ground Granular Blast Furnace Slag)

- *Enhanced durability and resistance to chemical attacks, reducing the need for maintenance and repair over the lifespan of structures. Reduces the environmental impact*
- *Reducing the urban heat island effect in built-up areas, thereby mitigating heat-related environmental issues.*
- *Improved workability and reduced water demand compared to conventional concrete mixes.*
- *Demonstrates a commitment to environmental stewardship and sustainable development, promoting awareness of eco-friendly construction practices and encouraging the adoption of green building standards.*
- *Utilize industrial by product and reduce demand of natural resources*

Manufacturing Sand

- *Protect natural landscapes and scenic areas associated with rivers and coastal regions, contributing to landscape conservation and ecotourism.*
- *Reducing to greenhouse gas emissions and energy consumption.*
- *Reduces carbon footprints and enhances climate resilience in construction practices.*
- *Improving water clarity and supporting healthy aquatic ecosystems.*
- *Lower environmental and social impacts, contributing to community well-being and safety.*

In-Tangible Benefits

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Waste to Wealth (Metal)

- *Avoided the generation of air pollutants, including greenhouse gases and particulate matter, improving air quality contributes to better respiratory health and environmental well-being.*
- *Reducing water consumption and minimizing the environmental impact on freshwater ecosystems, including habitat degradation and water pollution.*
- *Mitigate climate change by reducing carbon emissions associated with steel production.*
- *Promotes sustainable development by conserving natural resources, reducing environmental pollution, and fostering circular economy principles. Sustainable development encompasses social, economic, and environmental dimensions, ensuring a balance between present needs and future generations.*

Waste to Wealth (Cementitious)

- *Reduces the need for cement manufacturing,*
- *Reduces requirement of water compared to cement production from raw materials.*
- *Mitigate climate change by reducing carbon emissions associated with cement production. Carbon dioxide emissions from cementitious waste utilization are lower compared to emissions from primary cement production.*
- *Promotes sustainable development by conserving natural resources, reducing environmental pollution, and fostering circular economy principles. Sustainable development encompasses social, economic, and environmental dimensions, ensuring a balance between present needs and future generations.*

RebarPro – Digital Application

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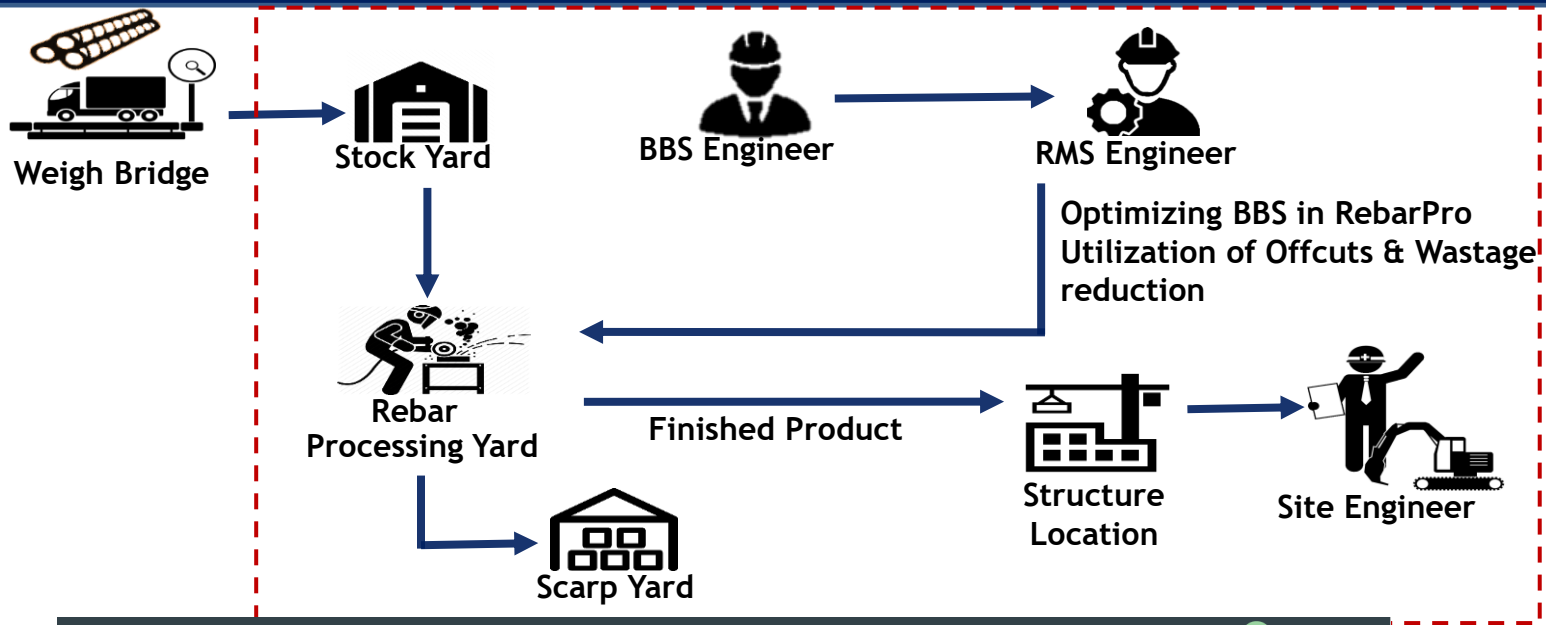
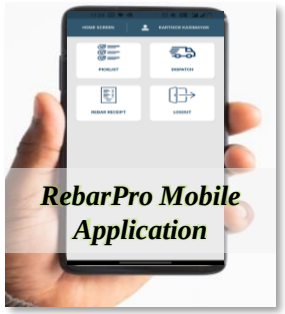
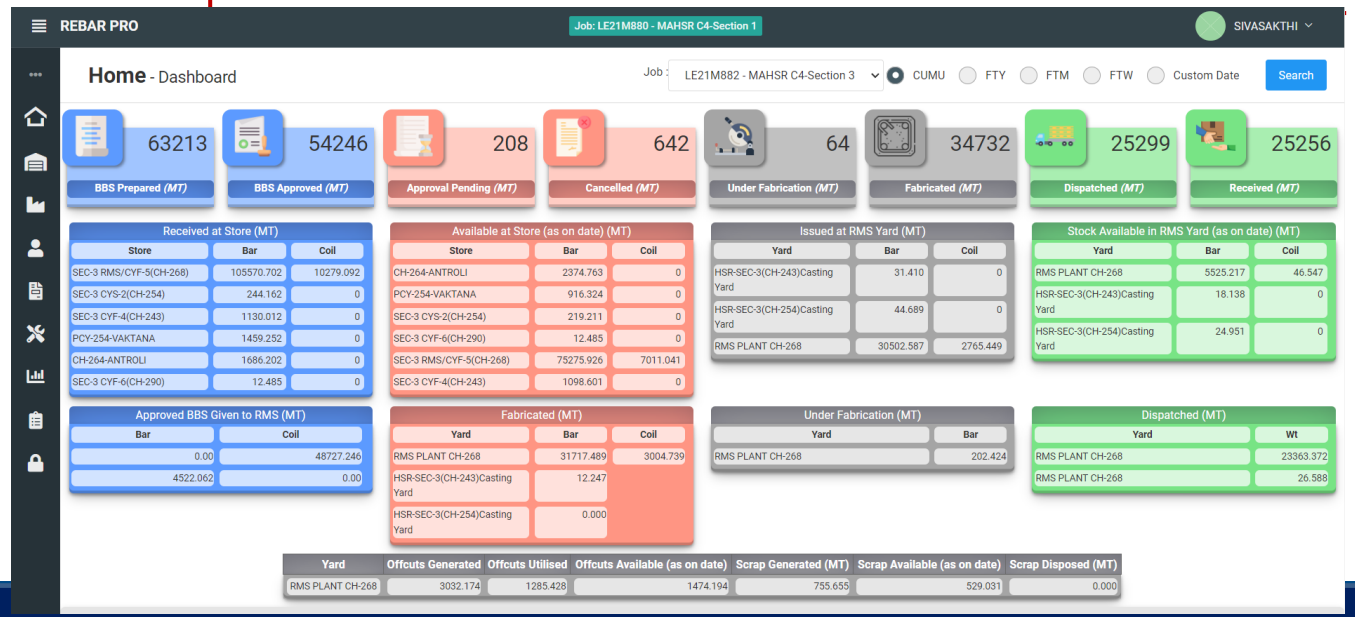


RebarPro Features:



- End to End tracking of rebar
- Digitize the entire Rebar Chain
- To reduce the Rebar wastage
- Bar Shape Master (IC and Site)
- Create Digital BBS with & without bend deductions
- Optimized cutting chart with graphical description
- Track of Full Length, Offcuts & Scrap
- Re-Usage of prevailing offcuts
- Auto Reconciliation
- Standard Bar and Specific Bar optimization& analysis



2% Wastage Reduction

RebarPro
A Digital Rebar Solution

OPTIMIZE YOUR REBAR WITH REBARPRO !!!

- End-To-End Tracking
- Offcut Re-utilisation
- Scrap reduction
- Reports

Optimized cutting chart with graphical description

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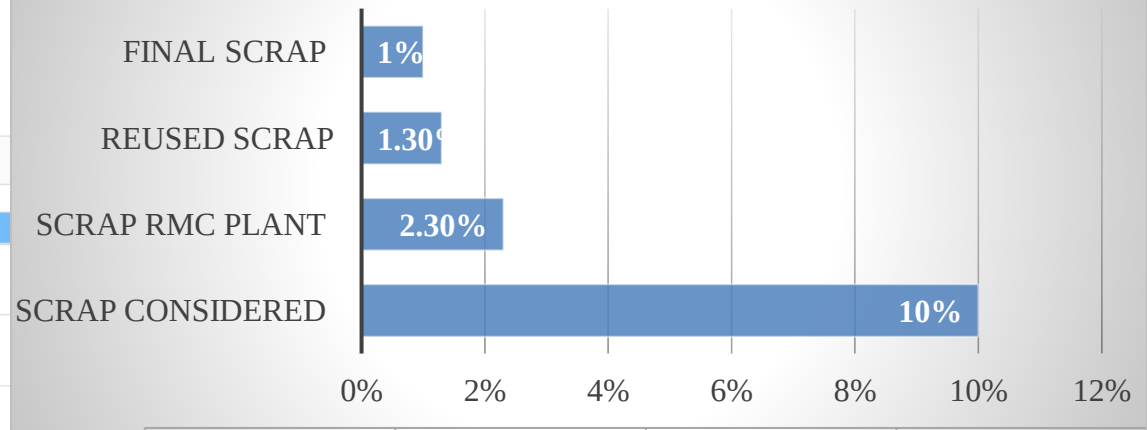
hcirebar.lntecc.com/CuttingChart/Cutter

Gmail | YouTube | L&T | REBAR PRO | Web Client | Mail - SIVASAKTHI... | Teams | EIP4 | MyZone | L&T-SSC | Create Infinity Abstr... | Google Translate | Mumbai-Ahmedab... | ConEase

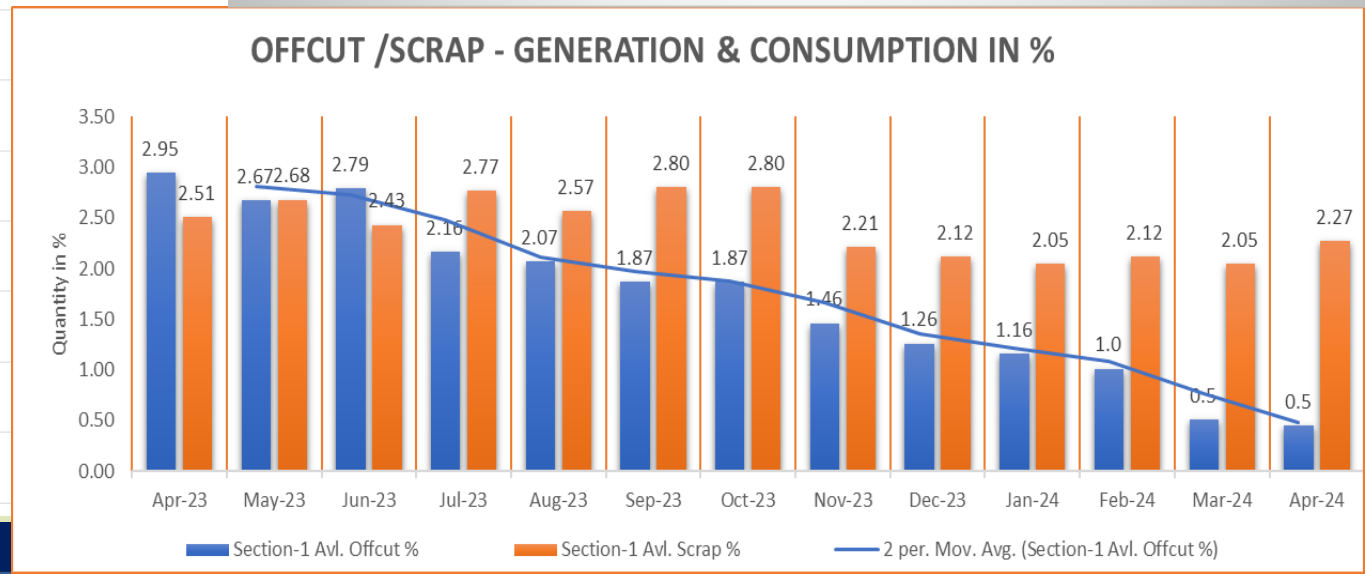
BBS No: LE21M881-000536
Bar Type: Both
Store: PCY-232- NAVSARI
Yard: RMS PLANT CH-232 - ARUNODAY
Project: LE21M881-MAHSR C4-Section 2
Ref. Drawing Nos: L-B3-7
Structure: Stretch-9 (227.400 to 235.274)
Member: 232P13

S.NO	Bar Dia(mm)	Bar Length(m)	Bar Type	Thread Type	Total Bars Cut	BarCut Breakup	Graphic
1	20	7000	Full Bar	No Thread	92	5.93 X 1	5930 (000536)-C04 + 1070
2	20	7000	Full Bar	No Thread	48	6.18 X 1	6180 (000536)-C03 + 820
3	20	7000	Full Bar	No Thread	62	6.57 X 1	6570 (000536)-C01 + 430
4	25	1285	Offcut	No Thread	3	1.28 X 1	1280 (000536)-C2 + 5
5	25	1285	Offcut	No Thread	2	1.28 X 1	1280 (000536)-C2 + 5
6	25	1285	Offcut	No Thread	1	1.28 X 1	1280 (000536)-C2 + 5
7	25	1285	Offcut	No Thread	1	1.28 X 1	1280 (000536)-C2 + 5
8	25	1285	Offcut	No Thread	1	1.28 X 1	1280 (000536)-C2 + 5
9	25	1285	Offcut	No Thread	1	1.28 X 1	1280 (000536)-C2 + 5
10	25	1285	Offcut	No Thread	1	1.28 X 1	1280 (000536)-C2 + 5
11	32	9000	Full Bar	No Thread	84	8.8 X 1	8800 (000536)-C1 + 200

Reinforcement Waste Conservation



	Scrap considered	Scrap RMC plant	Reused Scrap	Final Scrap
Series1	10%	2.30%	1.30%	1%



Resource Conservation - Waste to Wealth Initiative

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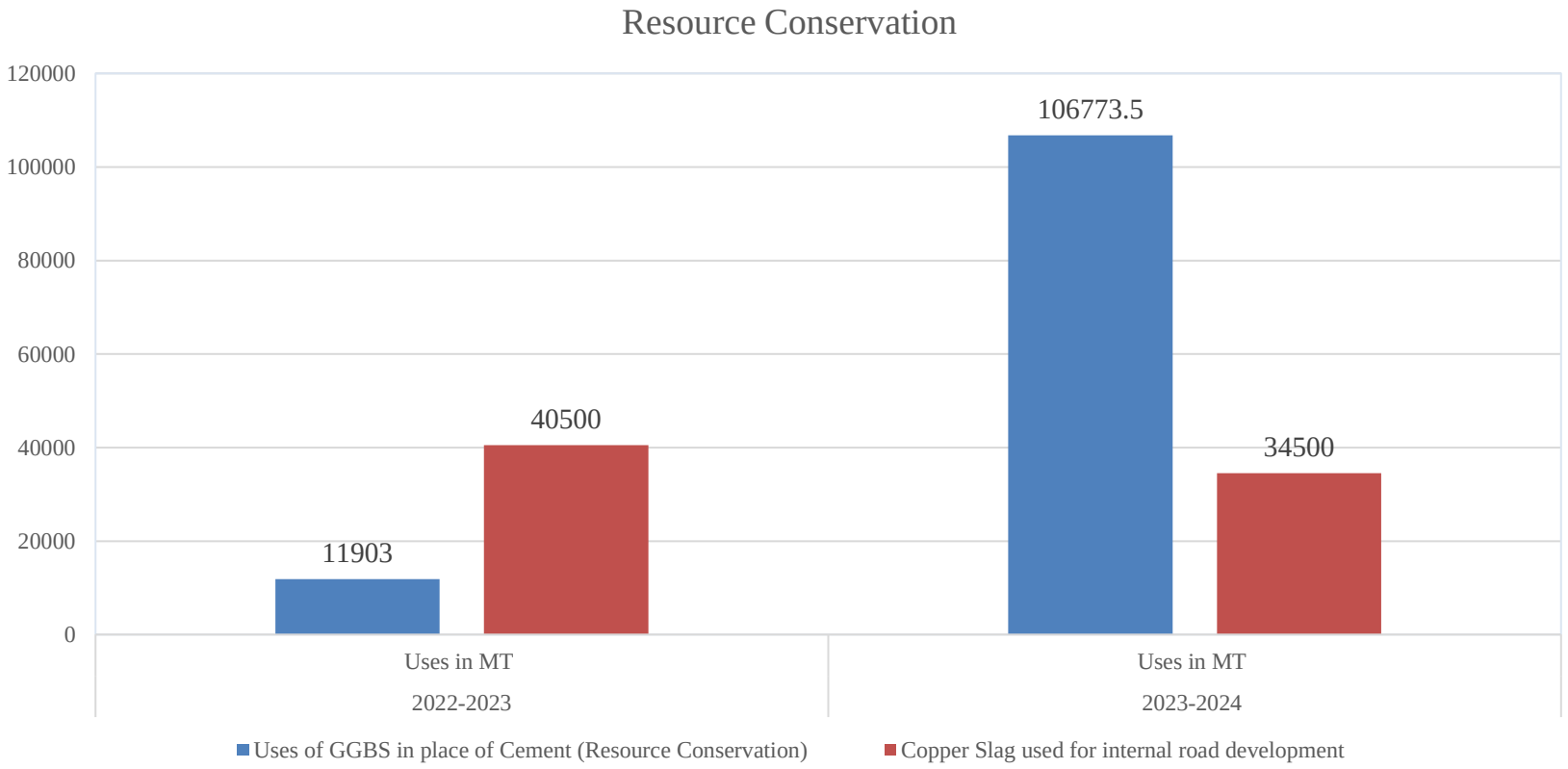

Indian specification allowing usage of iron / steel slag for various application:

- PMGSY- Pradhan Mantri Gram Sadak Yojana
- IRC-SP 121 2018- Indian Road Congress, new guideline for use of Iron, Steel & Copper slag in construction of Rural Roads
- IS 383 2016- Indian Standard Specification for Coarse and Fine Aggregate for concrete
- MORTH- Ministry of Road Transport and Highways- Specification for Road & bridge work

Resource Conservation - Waste to Wealth Initiative

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Resource Conservation - Waste to Wealth Initiative

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Replication potential of project within sector / Group Companies

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These initiative help to reduce the natural resource consumption, Waste minimization, technology improvement, Skill Development and reduction carbon footprint which help the organization to achieve their goal towards Carbon Neutrality

These Initiatives can be set as benchmark for future construction project under L&T

Theses initiative help to effective implementation of Organizational sustainable goal.

MAHSR C4 project is First in India, These initiatives will attract the international investor in India and overall economy growth will be increase of the organization as well India.

These initiative uses as Business Responsibility and sustainability reporting, which attract the stakeholders for further investment in India Industries.

Challenges Faced & L&T Benchmark

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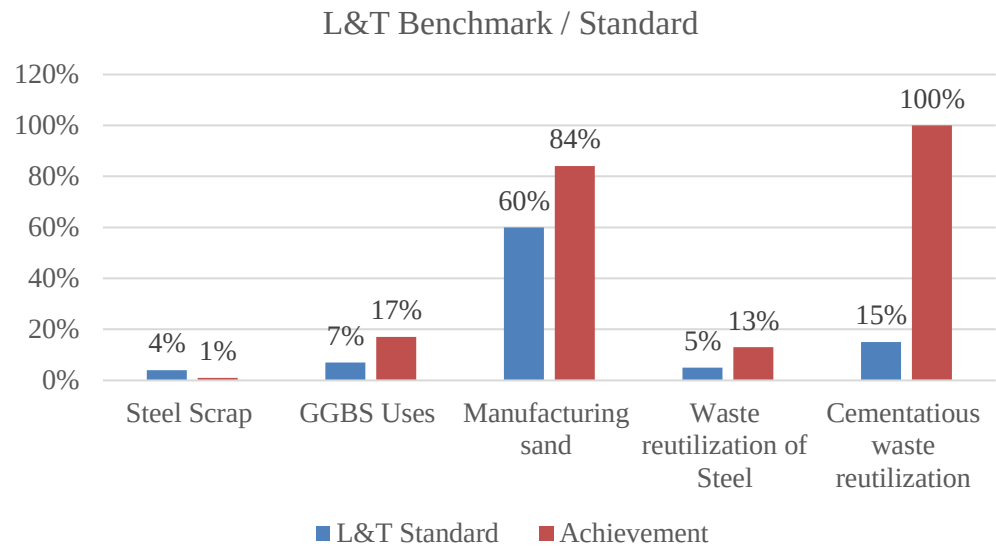
- RMS Plant require as capital investment, After giving all cost benefit analysis to management, it was approved
- Use of Digital application for digitization & Data integration had technical issue due to huge quantity of data storage on cloud-based application.
- Uses of GGBS required mix design for concrete, which took time to convey and get approved from Client.
- Steel Slag use for road development, was the challenge to take approval from client against the condition of contract, Which finally approved by client.
- M-Sand uses in place of river sand, create issue in quality of concrete but using different type of admixture help to resolved the quality issue and further we can use the M-Sand.
- Taking resource for reutilization of waste was the challenge, which amicably resolved with the management.
- Skilled Manpower for effective operation of RMS plant.
- Training and Knowledge transfer to workers and staff.
- Supply chain management – help in providing steel slag and GGBS in market



Priority Plan

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Priority Plan for +1 Year:

Objectives:

- Establish baseline data on resource consumption and waste generation.
- Implement initial resource conservation measures
- Conduct feasibility studies & Develop partnerships with stakeholders and suppliers to promote sustainability.

Activities:

- Conduct resource audit.
- Implement low-cost, high-impact conservation measures
- Develop training programs to promote awareness and adoption of conservation practices.
- Supplier engagement initiatives to encourage sustainable sourcing and procurement.

Resource Requirements:

- Personnel: Environmental specialists, project managers, data analysts.
- Equipment and Technology: Monitoring devices, energy meters, waste tracking software.
- Training and Education: Workshops, seminars, training materials.
- Partnerships: Collaborative agreements with suppliers, industry associations, and research institutions.

Priority Plan for +2 Years:

Objectives:

- Scale up successful conservation initiatives from the first year.
- Expand resource conservation efforts.
- Invest in long-term sustainability projects and Monitor and evaluate the effectiveness of conservation measures and make strategies.

Activities:

- Roll out conservation programs
- Invest in capital projects for energy efficiency upgrades, waste recycling infrastructure, or renewable energy systems.
- Establish targets and benchmarks and Explore opportunities for circular economy practices.
- Enhance stakeholder engagement and communication to promote sustainability.

Resource Requirements:

- Capital Investment: Funds for infrastructure upgrades, equipment purchases, and technology investments.
- Personnel: Expanded team of sustainability experts, project managers, and technical specialists.
- Partnerships and Collaborations: Continued engagement with suppliers, industry partners, and community organizations.
- Monitoring and Evaluation & Training and Capacity Building

Top 10 Best approaches

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- Data-Driven Decision Making:
- Cross-Functional Collaboration
- Continuous Improvement
- Employee Engagement and Training
- Technology Integration
- Waste Reduction and Recycling
- Energy Efficiency Measures
- Water Conservation Practices
- Supply Chain Sustainability
- Community Engagement and Outreach

Major leaning from the Project Implementation

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- Importance of Stakeholder Engagement
- Integration of Sustainability into Project Planning
- Holistic Waste Management Approach
- Regulatory Compliance and Risk Management
- Community Engagement and Social Responsibility
- Continuous Learning and Adaptation
- Lifecycle Assessment and Sustainable Procurement
- Use of Innovative Technologies and Practices
- Capacity Building and Knowledge Sharing

India's First and Fastest High Speed Railway

Thank You