CII National Award for Environmental Best Practices 2023

HPCL Hoshiarpur LPG Plant

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Hoshiarpur LPG Plant - Overview

- Hoshiarpur LPG Plant was commissioned in Sep 1989.
- Plant is situated on Jalandhar- Hoshiarpur Road, Punjab.
- Total Land area is 47 Acres. Greenbelt – 12 Acres
- Plant is designed as per OISD 144 standards.
- Plant Capacity is 180 TMT with 1500 MT Bulk Storage capacity.
- 2 Nos of 24 Head Electronic Carousals are installed for filling of Cylinders.
- Plant is receiving Bulk LPG from Bhatinda and Loni through Bulk Tankers.
- Plant is catering to Punjab and part of Himachal Pradesh.
- Plant is provided with Fully Automatic Fire Fighting System with 5400KL water storage capacity and 5 Nos of Fire Engines

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Project Details

- Project Title: **Development of Truck parking Area with Geo cell and Geo textile sheet with paver block**
- Project conceived at Zonal Level.
- Project is application wise new concept.
- Project started Date: 10.12.2020
- Project Completion Date: 24.05.2021

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Project Details –Trigger Point

- In Hoshiarpur District , Water levels are declining in some areas on a long term basis. During the last 10 years the ground water level has declined in most of the area of the district and the rate of decline is in the range of .073m/yr to 0.68 m/yr.
- Quality of ground water is fresh but in some areas Iron and Arsenic contents have been detected more than the permissible limit.
- During the Study of CGWA 2013 recommend the protection of Ground top surface for recharging of Ground water. After Research, It is observed that In developing countries, the use of geosynthetics with Pavers blocks relatively new but gaining widespread popularity in construction. They are becoming popular due to their ability to perform certain functions which are necessary while offering practical advantages. The geotextile is permeable because the geotextile is made of plastic fibre, the gap between the fibers can make the water flow, and the fiber itself will not absorb water.
- During the Augmentation Project of the Plant, Plant was extending the Parking area upto 8000 Sq.meter. Plant entire Parking area including roads were being constructed using conventional method of RCC construction. Concrete Roads causes damage to the most fertile layer of the earth, the topsoil. Concrete is used to create hard surfaces which contribute to surface runoff that may cause soil erosion, water pollution and flooding.
- Geotextile sheet has very good water permeability and will not absorb water. Hence it was decided to Provide the Paver Block Road with Geo textile Sheet in the construction of Plant Parking area to recharge the ground water naturally.

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About Geo-Textile

- Geotextiles are specialized synthetic fabrics used in civil engineering and environmental engineering applications. The material is designed to have a high strength-to-weight ratio and provide erosion control, filtration, drainage, and reinforcement for soil structures. Geocells were first developed in the early 1990s as a way to improve the stability of roads and bridges.
- Geotextile is a permeable material used in civil engineering and construction projects in order to offer reinforcement to weak surfaces or aid drainage. It comes in many forms, including woven or non-woven fabrics, made from synthetic fibers such as polypropylene that are designed to last for many years with minimal maintenance.
- Geotextiles have a wide range of applications, such as waterway linings and banking reinforcement as well as control of sedimentation and erosion to separate soil layers. Geotextile are ideal materials used for Construction & infrastructure like roads, buildings, dams and many more.
- Its unique properties have allowed geotextile to become a valuable asset for sustainable development since it offers increased stability around engineering structures while also promoting better water retention rates and limiting the impact of run-off on natural environments.
- Geocells are used in construction to reduce erosion, stabilize soil, protect channels, and provide structural reinforcement for load support and earth retention.
- It improve & stability and decreases the process of wind & water erosion. It helps to prevent the erosion of soil but allows the water to drain off.

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Tangible & Intangible Benefits

- Tangible Benefit
  - Saving of Money- saving of approx. (Rs. 100 Lakhs saving was achieved with the project).
  - Increase in Water Level.

- Intangible Benefit
  - Soil Stabilization
  - Load Support
  - Preventing water from pooling or causing damages
  - Reduced Maintenance of Roads
  - Increase the durability, lifespan, stability of roads,
  - Geosynthetic materials are an inexpensive and sustainable way to reduce aggregate and preserve the quality of unpaved surfaces, diminishing the need for frequent maintenance. Furthermore, when fewer loads of aggregate are needed, less gas is burned by haul trucks

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Replication Potential

- Modern geotextiles are usually made from synthetic polymers- polypropylenes, polyesters, polyethylene's, and polyamides - which do not decay under biological and chemical processes. This makes them useful in road construction and maintenance. The system can be easily replicated in the industry for the following purposes :-

Road construction :- Road Construction: Geotextiles can be used as an underlayment for roads to provide support against heavy traffic loads while also allowing water to pass through without compromising the road structure's integrity. It can also be used as a separation layer between different layers of pavement to prevent cracking due to differences in stiffness between the layers.

Landfill Construction: Geotextiles can also be used for landfill construction projects where it acts as filter fabric on top of waste materials before being covered with dirt or rockfill materials. This helps keep smaller particles from escaping into the environment while still allowing water to flow freely through the waste material layer below so that it does not become saturated and cause instability issues with any overlying soil layers.

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Replication Potential

Soil Erosion Control: Geotextiles can be used to help stabilize slopes in areas prone to soil erosion by providing extra reinforcement for the underlying soils. The fabric helps protect against surface runoff by creating a physical barrier between the surface soils and any underlying ones that may not be as stable against erosion forces such as rainfall or wind. Additionally, they can also be used in combination with other forms of erosion control such as vegetation or engineered structures like retaining walls.

Geosynthetic Clay Liners (GCL): GCLs are composite materials consisting of a thin layer of bentonite clay sandwiched between two layers of geotextile fabric which can then be used as liners for landfills or containment ponds where it prevents contaminants from seeping into surrounding groundwater supplies or leaching out into nearby streams or rivers.

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Challenges Faced

- Technical
  - New Concept
  - High Risk Factor
  - Very low case study
- Administrative
  - Project approved with conventional RCC road
  - Approval for change in scope of Project
  - Very low case study

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Achieving national benchmarks/Standards

- Geocell technology is a visionary 3D honeycomb Cellular Confinement System particularly designed for soil stabilization and assists to prevent geohazards(s). IRC:SP:59also contain the design methodology for use of Geo-synthetics as a reinforcement in the pavements.
- In order to encourage locally available materials and use of green technologies, guidelines were issued by the Ministry in May 2013, wherein the State Governments are required to propose minimum 15% of total length of annual proposals under Pradhan Mantri Gram Sadak Yojana (PMGSY) under new technologies such as lime stabilization, cold mix, waste plastics, cell filled concrete, fly ash, coir geo-textiles, etc.
- Coir geo textile is being used for construction in PMGSY-III roads.96.69 Km roads constructed using coir geo-textiles in Karnataka, Kerala, Andhra Pradesh and Tamil Nadu.

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Government Promotion

F. No. RW/NH-33044/64/2018-S&R(P&B)
GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
S&R(P&B) ZONE
Transport Bhawan, 1, Parliament Street, New Delhi-110001

July 16, 2018

To

1. Chief Secretaries of all the State Governments/ UTs
2. Principal Secretaries/ Secretaries of all States/ UTs Public Works Department dealing with National Highways, other centrally sponsored schemes.
3. All Engineers-in-Chief and Chief Engineers of Public Works Department of States/ UTs dealing with National Highways, other centrally sponsored schemes.
4. Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi-110 010.
5. Chairman, National Highways Authority of India, G-5 & 6, Sector-10, Dwarka, New Delhi-110 075.
6. Managing Director, NHIDCL, PTI Building, New Delhi-110001
7. All ROs and ELOs of the Ministry

Subject: Geo-synthetics and their use in Road Construction.

There are several Guidelines/ Standards published by the Indian Road Congress for use of Geo-synthetics in highway construction. The Ministry's Specifications for Roads and Bridges also contain the Specifications of various Geo-synthetic products for their application in the construction of highways. Even though the Ministry has issued directions/ guidelines on several occasions to promote use of Geo-synthetics in the road construction, yet it has not been receiving encouraging response from the project engineers, designers. Therefore, pro-active steps need to be taken for their incremental adaptation.

2. Geo-synthetics is a general classification for all synthetic materials used in geo-technical engineering applications. It includes geo-texiles, geo-grids, geo-membranes, geo-nets, geo-composites, geo-cell, geo-mats, paving fabric and paving grid etc. The Geo-synthetics are generally used as separation, filtration, drainage, erosion control, reinforcement in pavement and impermeable barriers/ capillary cut off in waterlogged areas.

3. The Geo-synthetics considerably improve the strength of the weak soil strata. The use of Geo-synthetics in pavement layer also reduces the requirement of aggregate especially in the stretches where the soil is weak. As such, use of Geo-synthetics is also beneficial from the point of view of conservation of natural resources and environmental angles.

4. The Indian Roads Congress (IRC) has formulated various Guidelines/ Standards where use of Geo-synthetics for various applications has been prescribed. Some of the IRC Guidelines/ Standards which stipulate use of Geo-synthetics in construction of roads are as follows:

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(i) IRC: SP:48-1998 "Hill Road Manual"
(ii) IRC:SP:59-2002 "Guidelines for use of geotextiles for road pavement and associated works"
(iii) IRC:56:2011 titled "Recommended Practice for Treatment of Embankment and Roadside Slopes for Erosion Control"
(iv) IRC:SP:106-2015 titled "Engineering Guidelines on Landslide Mitigation for Indian Roads"

5. IRC:SP:59, which contains only the use of geo-textiles, has recently been revised/ modified by including various other Geo-synthetics. The revised IRC:SP:59 also contain the design methodology for use of Geo-synthetics as a reinforcement in the pavements.

6. There is adequate capacity in the country for production of various types of Geo-synthetics, which may further be improved to a large extent by promoting more use of Geo-synthetics in various applications of infrastructure. As per the details submitted by the Ministry of Textiles, the details of production of various types of Geo-synthetics in the country are enclosed at **Annexure-I** and list of various types of Geo-synthetics manufacturers are indicated in **Annexure-II**.

7. It has, therefore, been decided by the Competent Authority in the Ministry that all the implementing agencies and State Governments have to use Geo-synthetics in a bigger way as per the existing IRC codes/ guidelines and Ministry's Specification/ Guidelines. All the State Governments are also advised to include various types of Geo-synthetics in their Schedule of Rates so that the estimated cost of the project can be worked out by including Geo-synthetics.

8. The feasibility of using Geo-synthetics in any project should be explored by all the executing agencies/ State Governments at the DPR stage itself and, accordingly, its usage should be included in the Scope of the Work/ Schedule B of the Contract Agreement.

9. All the Project executing agencies/ State Governments are also requested to give their feedback on the use of Geo-synthetics in already implemented/ executed projects and also on the new projects to be taken up in future on a half-yearly basis in the following format:-

Sr. No.	Name of the Project/ NH No. _____	Length of the Project	Quantity of **Geo-systhetics** used in sq.m or other unit	Application of Geo-synthetics	Time of use	Performance

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Priority plans on fast track for +1 year and +2 year

- Construction of Drainage in the Plant using Geo textiles in next year.
- In future, construction of Plant roads using Geo textile
- Construction of Mounded Storage Vessels using Geo Textile in upcoming Plants.

- Railway Wagon Gantry: In this woven and nonwoven geotextiles are used to separate the soil from the sub-soil without implementing the ground water circulation where ground is unstable. Construction of Railway Wagon Gantry in upcoming Plants.

- River canals and coastal works: Geotextiles protect the river banks from erosion due to current or lapping.

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Best practices which will form the core of approach for +1 and +2 year

Sustainable development projects are becoming increasingly important around the world as climate change continues to be a pressing issue. One way these projects can be made more efficient and effective is through the use of geotextiles. Geotextiles have numerous applications, including soil stabilization, drainage, and erosion control :-

- **Geotextiles for Erosion Control :-** One of the most common uses for geotextiles is erosion control. As part of a sustainable development project, they can be used to protect existing surfaces from erosion caused by wind or water. Geotextiles act as a barrier between the ground and any moving elements such as water or wind, preventing any damage caused by these moving elements. They are also highly permeable which allows them to absorb rainwater and prevent soil erosion due to runoff. This makes them an ideal choice for areas with steep slopes or areas that are prone to flooding.

- **Geotextiles for Drainage :-** Another application of geotextiles in sustainable development projects is drainage. The permeability of geotextile fabric allows it to serve as a filter between two layers of soil, which helps reduce runoff and increase infiltration into the ground below it. This helps keep surface water from pooling on top of the fabric, reducing flooding and improving drainage in a given area. It also helps improve groundwater recharge rates, allowing for more efficient water usage during dry spells when water resources may become scarce. Furthermore, using geotextile fabric in drainage systems reduces strain on other infrastructure such as sewers or storm drains since it will help divert excess surface water away from these systems before it becomes too much for them to handle.

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Best practices which will form the core of approach for +1 and +2 year

- **Geotextiles for Soil Stabilization :-** Finally, geotextile fabrics can also be used for soil stabilization purposes within sustainable development projects. As its name implies, soil stabilization involves reinforcing soils with fibers or particles so that it does not move around when exposed to external forces such as winds or heavy rains. Geotextile fabrics provide a layer of reinforcement that prevents the movement of soil particles while still allowing water to drain through them effectively due to their permeability properties mentioned earlier. This helps reduce slope instability issues caused by landslides or mudslides since the fabric acts like a net holding everything together despite external forces trying to move it around otherwise.

In summary, geotextiles play an important role in sustainable development projects due to their ability to provide erosion control, drainage solutions, and soil stabilization capabilities all at once without causing any environmental damage whatsoever because they are 100% biodegradable materials with no toxic chemicals involved in their production process either directly or indirectly making them excellent options for green construction sites everywhere! Their flexibility and versatility combined with long-term durability even when exposed to harsh environmental conditions make them ideal choices for any kind of construction project which requires sustainability both now and into the future!

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Major learnings

- This is the first kind of Project used by HPCL for the construction of roads in Truck Parking area. With this method We could save approx. Rs. 1.0 Crore as compared to the conventional RCC parking. Geosynthetic materials are an inexpensive and sustainable way to reduce aggregate and preserve the quality of unpaved surfaces, diminishing the need for frequent maintenance.

- **Environment Impact :-** Once installed, geotextiles serve as a physical barrier between soil and water, preventing contaminants from entering waterways and protecting fragile ecosystems. This helps reduce runoff into nearby rivers, lakes, streams, and other bodies of water. In addition to protecting against pollutants, geotextiles also reduce erosion by reducing soil displacement due to wind or hydrological forces. This helps protect landforms and prevents sedimentation buildup in nearby waterways.

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Thank you

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