Innovative Works

- **Cold Mix Technology.**
- **Warm Mix Technology.**
- **Use of Recycle Pavement Material.**
- **Use of Waste Plastic.**
- **Soil Stablisation Techniques.**

Cold Mix Technology -

Relevant Code **IRC:SP-100-2014 Use of Cold Mix Technology in Construction and Maintenance of Roads Using Bitumen Emulsion**

Advantages of Cold Mix Technology

- 2-3 times faster progress using existing facilities at site without any extra investment in capacity building or equipment.
- Green Technology: Nonpolluting process, no heating, saves fuel and 90% energy efficient.
- Highly durable : contains anti-stripping properties, performing better than Hot Mix roads.
- All weather construction during monsoons and cold winters on dry days.

Warm Mix Technology

Relevant Code **IRC:SP-101-2014 Interim Guidelines for Warm Mix Asphalt**

The advent of warm mix enables to gain the full benefit of hot mix but at a reduced production and placement temperature. There are many benefits to reducing the production and placement temperatures while maintaining the quality of the asphalt pavement. Warm Mix Asphalt (WMA) is the generic term for a variety of technologies that allow producers of Hot Mix Asphalt (HMA) pavement material to lower temperatures at which the material is mixed and placed on the road. It is a proven technology that can:

- Reduce paving costs.
- Extend the paving season.
- Improve asphalt compaction.
- Allow asphalt mix to be hauled longer distances.
- Improve working conditions by reducing exposure to fuel emissions, fumes and heat.

Use of Recycle Pavement Material

Relevant Code **IRC:120-2015 Recommended Practice for Recycling of Bituminous Pavements**

Benefits of Asphalt Recycling

1. The recycled version is just as good as the original. This is one instance where recycling doesn't lose any quality. Some even argue that the recycled asphalt pavement or RAP is of a higher quality than the original pavement, being more durable and sturdy. RAP is also renewable - something traditional asphalt can't claim.
2. It saves everybody money. Recycled asphalt is also a cheaper material to produce and purchase, often used to lower construction costs. Costs are also lower than traditional asphalt as many processes, such as the mining of materials, are eliminated.
3. Asphalt increases the use of other recyclables. Materials from other industries are recycled into asphalt materials instead of winding up in landfills. Everything from glass, and asphalt roofing shingles finds a home in new asphalt.
4. Increased use of RAP as a percentage of the total asphalt mix can significantly reduce greenhouse gas emissions by eliminating the significant fuel consumption required to acquire and process raw materials for virgin mix.
5. Stone, sand and gravel, the aggregates of asphalt are actually a limited resource. Preserving these resources through recycling is essential to keeping roads safe and comfortable into the future.

Use of Waste plastic

Relevant Code **IRC:SP-98 2013 Guidelines for the use of Waste Plastic in Hot Bituminous Mixes (Dry Process) in Wearing Courses**

The roads constructed using waste plastic, popularly known as Plastic Roads, are found to perform better compared to those constructed with conventional bitumen. The Indian Centre for Plastics in the Environment (ICPE) has been promoting the use of plastic waste to construct asphalt roads. Many roads have been paved successfully by combining waste plastic with bitumen. Plastic roads mainly use plastic carry bags, disposable cups, and bottles that are collected from garbage dumps as an essential ingredient of the construction material. When mixed with hot bitumen, plastics melt to form an oily coat over the aggregate and the mixture is laid on the road surface like a normal tar road.

Advantages of using plastic in making roads:-

1. Stronger road with increased Marshall Stability Value.
2. Better resistance towards rainwater and water stagnation.
3. No stripping and no potholes.
4. Increase binding and better bonding of the mix.
5. Reduction in pores in aggregate and hence less rutting and raveling.
6. No effect of radiation likes UV.
7. The strength of the road is increased by 100%.
8. For 1km X 3.75m road, 1 ton of plastic (10 lakh carry bags) is used, and 1 ton of bitumen is saved.
9. Value addition to the waste plastics.
10. The cost of road construction is also decreased.
11. The maintenance cost of the road is almost nil.
12. Disposal of waste plastic will no longer be a problem.
13. The use of waste plastics on the road has helped to provide the better place for burying the plastic waste without causing disposal problem.
14. Employment for unskilled laborers will be generated.

Soil Stablisation Techniques

Geosynthetics are synthetic products used to stabilize terrain. They are generally polymeric products used to solve civil engineering problems.

This includes eight main product categories are geotextiles, geogrids, geonets, geomembranes, geosynthetic clay liners, geofoam, geocells and geocomposites. The polymeric nature of the products makes them suitable for use in the ground where high levels of durability are required. They can also be used in exposed applications.

Geosynthetics are available in a wide range of forms and materials. These products have a wide range of application and are currently used in many civil, geotechnical, transportation, geoenvironmental, hydraulic and private development applications including roads, airfields, railroads, embankments, retaining structures, reservoirs, canals, dams, erosion control, sediment control, landfill, liners, landfill covers, mining, aquaculture and agriculture .