

# Initiatives for Optimum Utilization of Fly Ash

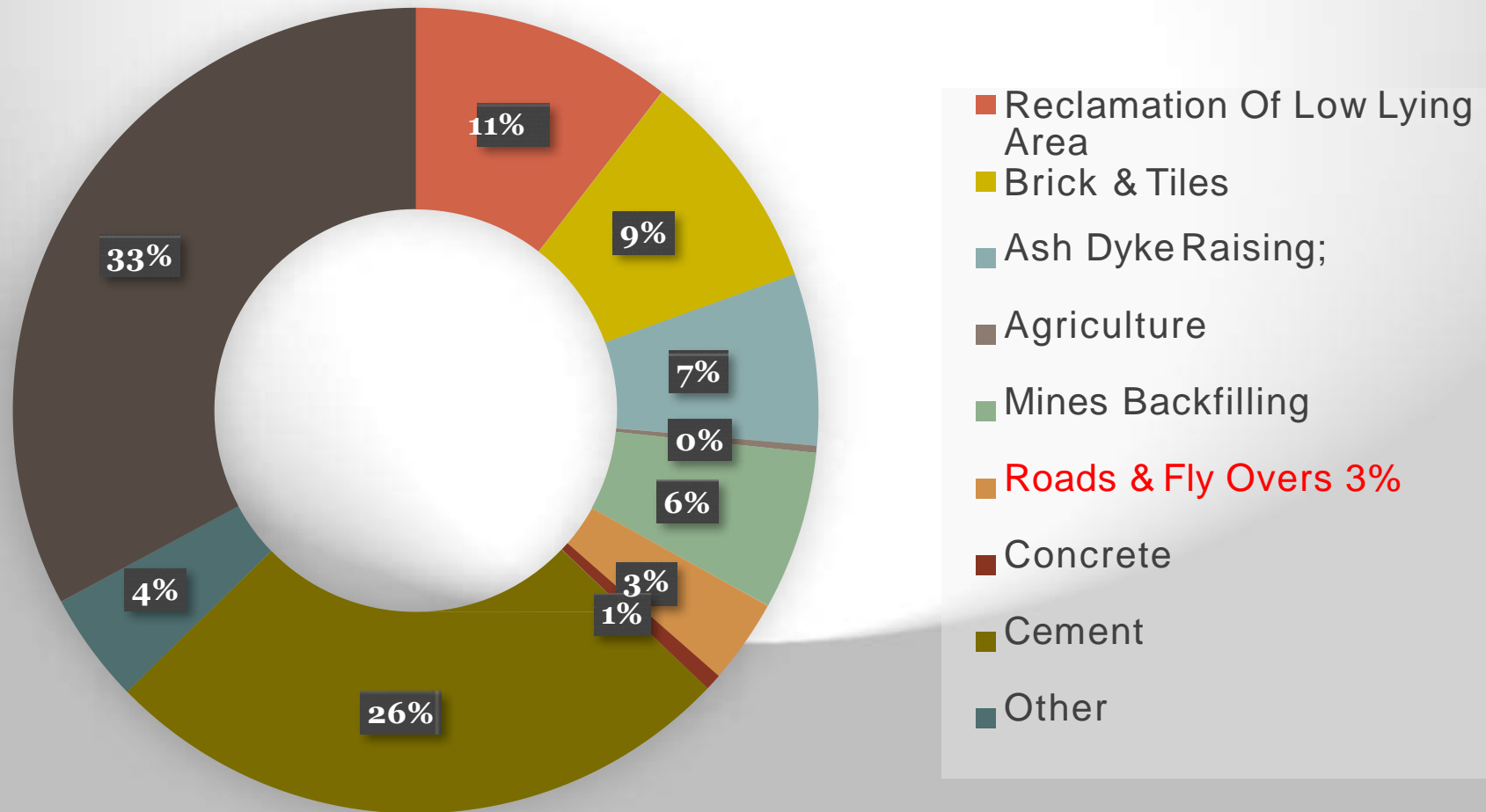
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# OVERALL UTILIZATION OF FLY ASH in India



# Existing initiative for use of flyash in NH projects since 1999

- Support Ministry of Power's initiative in formulation of Gazette notification for utilization of flyash in Highway construction
- Mandatorily using flyash in highway projects if situated in 300 km radius from a power plant
- Allowed Portland pozzalana cement (PPC) usage apart from Ordinary Portland cement (OPC) in highway projects
- Entered into MOU with power producers for using flyash
- Agreed to include use of flyash , if applicable , as final condition for forest clearance ( stage 2 )
- Bringing out IRC code (IRC 58) for use of flyash in Highways
- Bringing out internal guidelines for promoting usage of flyash and its monitoring

# MoRTH Circulars on flyash

Government of India  
Ministry of Road Transport & Highways  
Zone-S&R (P&B)  
Transport Bhawan, 1, Parliament Street, New Delhi -110001.

Dated: 23<sup>rd</sup> October, 2020

To,

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

**Subject: Use of Fly-ash in road/flyover embankment construction on NH works - reg...**

**Reference:**

- i. Ministry's Letter No- RW/NH-24028/14/2018-H dated 27.08.2018 (copy enclosed)
- ii. Ministry's Letter No- RW/NH-35014/20/2017-H dated 07.01.2019 (copy enclosed)

Fly-ash is causing environmental pollution, creating health hazards and requires large areas of precious land for disposal. Due to increasing concern for environmental protection and growing awareness of the ill effects of pollution, disposal of ash generated at thermal

No. 24028/14/2018-H  
Government of India  
Ministry of Road Transport & Highways  
S&R(P&B) Section  
Transport Bhawan, No.1, Parliament Street, New Delhi-110001

Dated: August 27, 2018

To

1. The Chairman, National Highways Authority of India, G-5 & 6, Sector-10, Dwarka, New Delhi-110 075.
2. The Managing Director, NHIDCL, PTI Building, New Delhi-110001
3. All CE-ROs of the Ministry

**Subject: Use of fly ash in road/ flyover embankments construction.**

The use of fly-ash in road construction is permitted as per the Standards & Specifications evolved by the Indian Road Congress/ Ministry. The physical and chemical properties of fly ash and the design methodology to be adopted for embankment construction has been specified in IRC:SP:58:2001 "Guidelines for use of fly-ash in road construction". Section 305 i.e. "Embankment Construction" of MoRTH Specifications for Road and Bridge works lays down the specifications for use of fly-ash in embankment construction.

2. There is a huge generation of fly ash in the country and substantial portion of it remains unutilized which is an environmental concern, creating health hazards apart from occupation of large areas of precious land for its storage/disposal. Disposal and utilization of ash generated at the thermal power plants has become a pressing and urgent task. Bulk utilization of the fly-ash is possible in the field of civil engineering applications, especially construction of road embankments.

# Existing practice of using flyash in NH projects

- In Construction of embankment for highways
- Use of PPC type cement for structures in highways
- Use of flyash for rigid pavement

# Full spectrum of use of flyash in NH projects

<b>S.No</b>	<b>Likely usage area</b>	<b>Major benefits</b>
1	Fly Ash in Portland Cement Concrete	Improved strength and workability of concrete , cost effective
2	Fly Ash in Stabilized Base Course pozzolanic-stabilized mixtures (PSMs)	Use of local material , improved strength , cost effective
3	Fly Ash in Flowable Fill	Better backfill , Fills around/under structures inaccessible , faster , less labour cost
4	Fly Ash in Structural Fills/Embankments	Cost-effective , eliminates borrow pit requirement, usable in low strength soils , ease of compaction , reduce construction time and equipment costs

# Full spectrum of use of flyash in NH projects

S.No	Likely usage area	Major benefits
5	Fly Ash in Soil Improvements	Eliminates need for expensive borrow materials , Expedites construction by improving excessively wet or unstable subgrade , improved subgrade reduces pavement thickness and hence cost
6	Fly Ash in Asphalt Pavements	When used as mineral filler in asphalt mix , it reduces stripping , lower cost than other mineral fillers like cement /lime
7	Fly Ash in Grouts for Pavement Sub sealing	used for correcting settlement of pavement slab without removing it , can be done quickly with minimum disturbance to traffic, develops high ultimate strength fast
8	In paver block tiles , pre casted drain slab covers , bricks , kerbs	Cost effective , durable with strength
9	Median and avenue plantation soil	Flyash has proven benefits in agriculture in terms of soil productivity improvement

# METHODS OF FLYASH UTILIZATION

<b>Sl. No.</b>	<b>Building Materials or products</b>	<b>Minimum % of fly ash by weight &amp; related Indian Standards</b>
1	Fly ash bricks, blocks, tiles, etc. with fly ash, [lime, gypsum, stone dust etc. (without clay)]	50% of total input materials (IS -12894)
2	Paving blocks, paving tiles, checker tiles, mosaic tiles, roofing sheets, pre-cast elements etc. wherein cement is used as binder	Use in Portland Pozzolana Cement: PPC (IS-1489: Part-I or Portland Slag Cement: PSC (IS-455) or 15% of Ordinary Portland Cement: OPC (IS-269/8112/ 12269) - content.



# METHODS OF FLYASH UTILIZATION

<b>Sl. No.</b>	<b>Building Materials or products</b>	<b>Minimum % of fly ash by weight &amp; related Indian Standards</b>
3	Cement	15% of total raw materials
4	Clay based building materials bricks, blocks, tiles, etc.	25% of total raw materials ( IS- 137570)
5	Concrete, mortar and plaster	Usages of PPC(IS-1489: Part I) or PSC (IS-45S1 or 15% of OPC (IS-269 /8172/12269) content.

# SAMPLE POTENTIAL USE OF FLYASH IN ONE KM 4 LANE HIGHWAY

<b>Bituminous Pavement</b>				
<b>S.No</b>	<b>Component</b>	<b>Quantity (Cum)</b>	<b>use of flyash (cum)</b>	<b>Remarks</b>
1	Embankment ( avg ht 3 m)	90000	54000	60% volume use
2	Sub base/ Base	10800	2160	20% volume use
3	DBM/BC	3000	600	20% volume use
4	Kerb	150	30	20% volume use
5	drain covers	60	12	20% volume use
6	footpath tiles/paver block	120	24	20% volume use
7	Avenue and median plantation soil	4500	900	20% volume use
	Total (cum)	108630	57726	
	Total ( Wt in tons)	217260	115452	

# SAMPLE POTENTIAL USE OF FLYASH IN ONE KM 4 LANE HIGHWAY

<b>Rigid/concrete Pavement</b>				
<b>S.No</b>	<b>Component</b>	<b>Quantity (Cum)</b>	<b>use of flyash (cum)</b>	<b>Remarks</b>
1	Embankment ( avg ht 3 m)	90000	54000	60% volume use
2	Sub base/ Base	10800	2160	20% volume use
3	DBM/BC	6000	1200	20% volume use
4	Kerb	150	30	20% volume use
5	drain covers	60	12	20% volume use
6	footpath tiles/paver block	120	24	20% volume use
7	Avenue and median plantation soil	4500	900	20% volume use
	Total (cum)	111630	58326	
	Total ( Wt in tons)	223260	116652	

# SAMPLE POTENTIAL USE OF FLYASH BHARATMALA PROGRAM IN NEXT 5 YEARS

- Length to be developed = 34800 km new 4/6 lanes
- Length coming in 300km radius of PP = 20% x34800  
= 6960 km  
= say 7000 km

Potential Qty of fly ash usage = 7000 km x 115000 tons  
= 805000000 ton  
= 805 million ton

Avg per year usage = 161 million ton

# Challenges

- Power plants are not able to provide free of cost fly ash at source as flyash are in demand in other industries also
- Power plants are not able to provide free transportation till Highway projects ( upto 100 km)
- Projects are to be completed in time bound manner and supply schedule/cycle of flyash do not match
- Lack of training of contractors / consultants for using flyash
- Providing assistance to secondary suppliers like paver blocks , hume pipe culverts , tiles , kerb stones , drain cover slabs

# Support required

- Use of flyash should be established due to inherent cost and performance benefits and not by mandatory mechanism
- Making use of flyash mandatory in NH projects some time delays project completion in case flyash are not available . This increases cost and claims from contractors
- Agree to pay transportation cost to road contractors on same rate as fixed by TPPs for their suppliers so that adoption is easier in NH projects without fear of supply disruption
- Share flyash availability status for NH use exclusively

**THANK YOU**