



ON-SITE CLEAN CONSTRUCTION MANUAL

**HOW TO CONTROL DUST EMISSIONS
DURING CONSTRUCTION**



CONTENTS

1	Introduction	4
	1.1. Key Factors Impacting Implementation	4
	1.2. Benefits of Effective Dust Control	5
2	Air Pollution Mitigation Approach at Construction Sites	6
	2.1. Ambient Air Quality Monitoring	6
	2.2. Air Pollution Control Measures	6
	2.2.1. Demolition	7
	2.2.2. Excavation or Backfilling	8
	2.2.3. Concreting	9
	2.2.4. Finishing	9
	2.2.5. Movement of Building Materials	10
	2.2.6. Site Commissioning and Cleaning	11
	2.2.7. Construction and Demolition (C&D) Waste Management	11
3	Monitoring the Implementation of Clean Construction Practices	14
	Annexure-1	16
	Annexure-2	17

1. INTRODUCTION

Surat, Gujarat's second-largest city, is making strides across different infrastructure sectors to reduce pollution. However, construction and road dust remain major sources of air pollution in the city.

The On-Site Clean Construction Manual offers guidelines to help reduce dust from construction activities such as the construction of buildings, roads, and bridges, as well as the laying of pipelines, sewers and underground electricity lines. These guidelines are designed to be used by a wide range of stakeholders including contractors, builders, engineers, construction workers, and other associated stakeholders.

1.1 | KEY FACTORS IMPACTING IMPLEMENTATION

CLIMATE

- ▶ Plan daily dust mitigation activities, according to the weather forecast.
- ▶ Carry out mitigation within the micro-boundaries of the project to prevent dust from escaping due to windy conditions.

SOIL TYPE

- ▶ The deep black soil prevalent in Surat is advantageous, as it generates comparatively lesser amounts of Particulate Matter (PM10 and PM2.5) when disturbed.
- ▶ The transfer of these particles to roads should be prevented at all costs, as they can turn into finer particles and lead to higher air pollution from resuspension.

LIMITED KNOWLEDGE

- ▶ There is a critical need for capacity building of stakeholders, such as builders, contractors, engineers, and construction and sanitation workers, that is focused on dust mitigation activities and associated health.
- ▶ Creating a proof of concept through a clean construction demo site for builders, engineers, supervisors, and other relevant stakeholders.

1.2 | BENEFITS OF EFFECTIVE DUST CONTROL



To the builder/owner

- Builds a strong reputation as a responsible builder among the local community and with authorities.
- Reduces damage to the plant and machinery, and subsequently, less expenditure is incurred during cleaning and commissioning of the site.



To the staff working on-site

- Creates safer working conditions.
- Reduces health impacts due to on-site exposure with the additional benefit of increased working-day wages.



To the community

- Enhances quality of everyday living.
- Reduces health risks due to air pollution.
- Reduces risk of property damage.



To Surat

- Improves air quality, reduces water pollution, and improves biodiversity.
- Lowers health impacts and subsequent economic losses.
- Lowers economic losses from construction activity bans during high air pollution episodes.



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2. AIR POLLUTION MITIGATION APPROACH AT CONSTRUCTION SITES

2.1 | AMBIENT AIR QUALITY MONITORING

The National Building Code of 2016 mandates ambient air quality monitoring of various pollutants at construction sites, depending upon the project size, location, and type of activities involved. Selecting the monitoring location depends upon the predominant wind directions, land use patterns, and height of pollutant release. Ambient air monitoring informs air quality management at construction sites by rationalizing the dust control measures being used. This allows the concerned stakeholders to assess the effectiveness of the pollution control measures over some time and carry out clean construction more effectively.

2.2 | AIR POLLUTION CONTROL MEASURES

2.2.1. Demolition

Demolition is used to either retrofit/restructure a planned building or for creating space for a new plan. Dust-generating activities during demolition include cutting, hammering, crushing, and drilling.

- ▶ To reduce exposure to air pollution and to ensure safety, use proper **personal protective equipment (PPE)** such as face masks, gloves, eye protection, and helmets during demolition and other activities that generate high dust.





- ▶ Dust generation is significantly reduced by regularly sprinkling water during demolition activities.
- ▶ During interior demolition activities, cover the open areas of the site to prevent dust from escaping.





2.2.2. Excavation or Backfilling

Here, natural soil is dug up or filled back while removing an existing structure or during the construction of a new plan. Digging the top surface of the soil and carrying it from one place to another generates a lot of dust.

- ▶ Spraying water on exposed surfaces during excavation and backfilling can help prevent dust from becoming resuspended. Sprinkle water before beginning excavation on the exposed surface, and again during excavation when the moisture content is low and the excavated soil is dry. Sprinkle water till the dust clouds visibly settle.
- ▶ Cover excavated material piles and construction materials to protect them from being disturbed by the wind.
- ▶ During work requiring roadside excavation, proper isolation of the site is necessary to reduce dust accumulation on roads.



- ▶ After completing the work, the dust around the area should be properly managed and the patch of road should be properly repaired. Proper repair can be ensured by defining the scope of the work. This includes mandating the agency carrying out the work to properly repair the patch and remove the dust once their work is completed.



2.2.3. Concreting

Concreting is used while laying the foundation of a building or road. During this process, activities such as mixing and manual batching, movement of construction materials, surface cleaning, and crushing and grinding increase dust in the environment.

- ▶ The use of ready-mix concrete (RMC) significantly reduces dust emissions at construction sites. As storage and mixing are done in closed chambers at a remote location, it eliminates the need for onsite construction material.



2.2.4. Finishing

After the preparation of the concrete structure, auxiliary cementing plays a vital role in protecting the building from wear and tear. However, dust is generated from stone cutting, plaster mixing, plastering, surface cleaning etc.

- ▶ Cover or isolate the area where stone-cutting and grinding is happening. Staff must wear proper PPE to reduce their exposure to dust during these activities. Exhaust ventilation may also be provided to reduce the pollution exposure risk to personnel.

2.2.5. Movement of Building Materials

Workers and the surrounding community may be exposed to high pollution from the movement of construction and demolition materials. Resuspended dust from vehicles moving on paved and unpaved surfaces and construction materials moving without a proper covering are the main causes of pollution in construction areas.

- ▶ Pave the vehicle path connecting the construction site to the main road, as it will reduce the amount of dust that the vehicles will carry (on their tires) to the main road.
- ▶ Keep the construction material covered properly while transporting it from one place to another. Apart from this, a controlled speed limit will help in reducing dust resuspension from the road.
- ▶ Vehicle tires and carriages should be thoroughly washed before it leaves the construction site from the construction site. The sprinkling of water along the vehicular movement route also prevents dust from resuspension. This requires a washing system at the site's exit to properly manage the mud removed during washing and to ensure the water can be recycled.



2.2.6. Site Commissioning and Cleaning

After construction, debris and waste from new construction, remodeling, renovation, or residential projects must be taken care of, so that further interior work can be carried out smoothly. Activities such as interior cleaning, section cleaning, and refinishing also carry dust particles into the surrounding air.

- ▶ During post-construction cleaning, control excessive dust by spraying water during the cleaning process.



- ▶ Use mechanized assistance and appropriate protective gear during post-construction cleaning in extremely dusty conditions.



2.2.7. Construction and Demolition (C&D) Waste Management

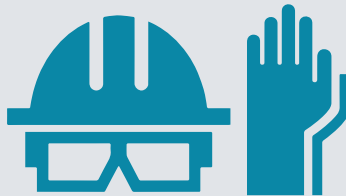
The C&D waste generated during construction activities should be disposed of at C&D waste collection centres managed by the Surat Municipal Corporation (SMC). Proper precautions need to be taken to minimize dust resuspension during the unloading of the waste at the site. A light water spray that maintains moisture in the waste will reduce dust resuspension significantly.

QUICK REFERENCE VISUAL GUIDE

Steps to reduce air pollution and personal exposure during construction activities

DEMOLITION

Sprinkle water regularly during demolition activities.



Use proper PPE such as facemask, eye protection, gloves and helmet.

To prevent dust from escaping, cover the open areas of the buildings during internal demolition.



EXCAVATION OR BACKFILLING

Sprinkle water before and during excavation to increase moisture content.



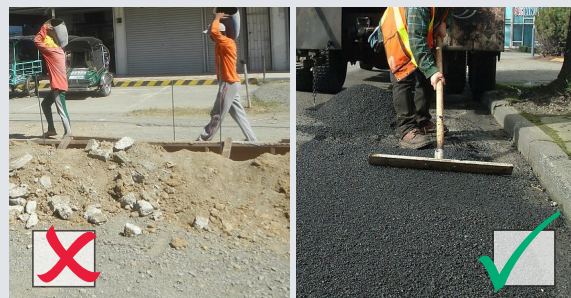
Cover excavated material piles and exposed areas to prevent soil disruption during windy conditions.



Prevent dust from accumulating during roadside excavation by properly isolating the site.



After completing roadside work, accumulated dust should be properly managed and the road patch should be repaired.



CONCRETING

Using ready-mix concrete (RMC) eliminates the need for on-site material storage and mixing, reducing air pollution on the site.



FINISHING

Isolate areas meant for stone cutting and grinding activities.



MOVEMENT OF BUILDING MATERIAL

Wash the vehicle's tires and carriage section at a designated area before it leaves the site.



Cover the transported material properly.



SITE COMMISSIONING AND CLEANING

In case of excessive dust, use water during post-construction clean-up.



CONSTRUCTION AND DEMOLITION(C&D)

Dispose C&D waste at waste collection centres managed by the Surat Municipal Corporation.







Monitoring the Implementation of Clean Construction Practices

This manual suggests a self-assessment submission for implementing clean construction practices.

Annexure-1

Reference for suggested Performa to be submitted to SMC. The self-assessment submission should be a monthly activity (to be submitted before the 7th day of every month). Though all construction projects should submit it voluntarily, it should be made mandatory for all projects that are midsize and larger (10,000+ sq. ft.).

Annexure-2

This is a checklist for construction projects and must be maintained at the project site. Maintaining and referring to the checklist will ensure effective and timely implementation of Clean Construction practices and help in identifying gaps (if any) in capacity building, training resources, dust mitigation schedule, etc. Site supervisors, or other staff appointed by them, will be responsible for maintaining this checklist and a record of Clean Construction practices in the Daily Progress Report (DPR).

ANNEXURE-1

Self-declaration dust mitigation activities at the construction site, to be submitted to Surat Municipal Corporation (SMC)

Date:	Project Name:	
Project In charge:	Project Size (sq. ft.):	
Project stage		
Use of green net/ tarpaulin around the site	Yes	No
Material/ debris transport		
Vehicle cleaning	Yes	No
Wheel-washing	Yes	No
Vehicle covering	Yes	No
Construction material storage		
On-site covered	On-site uncovered	
On the road	Other	
Off-site		
Demolition waste storage/collection		
On-site covered	On-site uncovered	
On the road	Other	
Off-site		
Area for cutting/grinding activities		
Open in front of the building	Open inside the building	
The specific area inside the site		
Grinding and stone-cutting activities		
wet activity	No wet activity	
NA		
Internal road at construction site		
Unpaved	Wet process, if unpaved	
Paved	Type of road, if paved	
Roads leading to the site		
Unpaved	Wet process, if unpaved	
Paved	Type of road, if paved	
Construction and demolition (C&D) waste		
On-site recycling		
Transport to C&D waste management facility	Yes	No
Facility name, If yes		
Emission reduction measures display on site	Yes	No
Emission reduction schedule	Yes	No
Company policy on emission control of the builder/ developer/contractor	Yes	No
Compulsory implementation scope of Clean Construction practices in tender document	Yes	No
Prepared By:		Checked By:

ANNEXURE-2

Checklist for dust mitigation measures to be maintained at the construction site

Date:	Construction site:		
Site In charge:	Location:		
Emission mitigation schedule	Yes	No	NA
Capacity-building training on emission mitigation	Yes	No	Frequency, if yes
Assigning responsibilities for Clean Construction among team	Yes	No	Team leader name, if yes
On-site dust control measures display	Yes	No	
Good practices rewards for workers	Yes	No	
Review of implemented mitigation measures	Daily	Weekly	Monthly
Clean Construction talks during workers safety drills	Yes	No	
Clean Construction practices mention in the Daily Progress Report (DPR)	Yes	No	
Prepared By:		Checked By:	

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