NESANS

TECHNICAL GUIDES

Mobile Crushing Plant Setup Guide: From Site Selection to First Crush

Complete guide to mobile crushing plant setup: site selection, permits, foundation, commissioning. Minimize setup time and maximize productivity.

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Your mobile crushing equipment arrives at the quarry site—₹3-5 crore worth of machinery ready for deployment. But within the first week, you're facing constant track sinking in soft ground, equipment spacing that causes material spillage, power generators overloading, and dust complaints from the village 500 meters away. The crushing performance you expected—150-200 TPH of quality aggregate—drops to 80 TPH with frequent stoppages. The problem isn't the equipment; it's the setup. Proper mobile crushing plant setup, from site selection to commissioning, determines whether your investment delivers projected returns or becomes a costly lesson in planning failures.

Mobile crushing plants offer significant advantages over stationary installations: rapid deployment, flexibility to follow material sources, lower initial infrastructure costs, and the ability to relocate when quarry faces change or contracts end. However, these advantages only materialize when site selection, layout planning, and setup procedures follow systematic engineering approaches rather than improvised decisions made under time pressure.

This comprehensive guide covers every aspect of mobile crushing plant setup, from initial site evaluation through first production. We provide specific technical parameters, layout dimensions, infrastructure requirements, and commissioning procedures based on hundreds of successful installations across India. Whether deploying a single mobile jaw crusher or a complete multi-stage mobile plant, this guide ensures your setup maximizes equipment performance while minimizing operational problems.

Chapter 1: Site Selection Fundamentals

1.1 Ground Conditions and Load-Bearing Requirements

Mobile crushing equipment exerts substantial ground pressure that many unprepared sites cannot sustain. Understanding load-bearing requirements prevents track sinking, equipment tilting, and structural damage that can sideline operations for weeks.

Equipment Weight and Ground Pressure Data:

EQUIPMENT TYPE	OPERATING WEIGHT (TONS)	TRACK LENGTH (M)	TRACK WIDTH (M)	GROUND PRESSURE (KG/CM²)
Mobile Jaw Crusher (40x24)	45-55	4.2	0.6	0.55-0.65
Mobile Jaw Crusher (48x36)	65-80	4.8	0.7	0.60-0.70
Mobile Cone Crusher (300)	55-70	4.5	0.6	0.58-0.68
Mobile Cone Crusher (400)	75-95	5.2	0.7	0.62-0.72
Mobile VSI Crusher	50-65	4.3	0.6	0.55-0.65
Mobile Screen (6x20 3-deck)	40-50	4.0	0.6	0.50-0.60
Wheel-Mounted Jaw	35-45	N/A	N/A	Point loads at outriggers

Soil Bearing Capacity Requirements:

SOIL TYPE	TYPICAL BEARING CAPACITY (KG/CM²)	SUITABILITY	GROUND PREPARATION REQUIRED
Hard rock surface	10-25+	Excellent	Level only, no preparation needed
Compacted gravel/ crushed stone	2.5-4.0	Excellent	Ensure 300mm minimum depth
Dense sand/gravel mix	1.5-2.5	Good	Compact to 95% Modified Proctor
Stiff clay	1.0-2.0	Acceptable	Add 200mm crushed stone layer
Firm clay	0.5-1.0	Marginal	Requires 400mm aggregate base
Soft clay	0.25-0.5	Poor	Geotextile + 500mm aggregate
Loose sand	0.5-1.0	Poor	Compact + 300mm aggregate cap
Organic soil/fill	<0.5	Unsuitable	Excavate and replace completely

Ground Investigation Procedure:

1. **Visual Assessment:** Look for standing water, soft spots, previous excavations, vegetation indicating high water table
2. **Hand Auger Test:** Bore to 1.5m depth at equipment locations to check soil consistency and water table
3. **Plate Load Test:** For critical installations, conduct plate bearing test per IS 1888 to verify bearing capacity
4. **Dynamic Cone Penetrometer:** Quick field test correlating to CBR value and bearing capacity
5. **Seasonal Consideration:** Assess conditions during monsoon if operations will continue year-round

Ground Preparation Specifications:

For sites requiring ground improvement before mobile crusher deployment:

EXISTING CONDITION	PREPARATION METHOD	MATERIAL SPECIFICATION	COMPACTION REQUIREMENT	ESTIMATED COST (₹/M²)
Soft clay (CBR <3)	Geotextile + aggregate	40mm crushed aggregate, 500mm depth	95% Modified Proctor	800-1,200
Firm clay (CBR 3-7)	Aggregate pad	40mm aggregate, 300mm depth	95% Modified Proctor	500-700
Loose sand	Compact + cap	Vibratory compaction + 200mm aggregate	98% relative density	350-500
Mixed fill	Proof roll + repair	Identify soft spots, replace with aggregate	No deflection under loaded truck	200-400

⚠ **Critical Warning:** Never position mobile crushing equipment on unprepared soft ground "temporarily" with plans to improve later. Track systems can sink 300-500mm overnight under static weight alone, requiring heavy recovery equipment and causing track mechanism damage costing ₹5-15 lakhs to repair.

1.2 Access Road Requirements

Mobile crushing equipment transport requires careful route planning. Low-bed trailers carrying tracked crushers create exceptional loads that many rural roads cannot support.

Transport Vehicle Specifications:

EQUIPMENT	TRANSPORT CONFIGURATION	GROSS VEHICLE WEIGHT (TONS)	OVERALL LENGTH (M)	OVERALL WIDTH (M)	HEIGHT (M)
Mobile Jaw Crusher	14-axle hydraulic trailer	80-110	22-28	3.5-4.0	4.2-4.5
Mobile Cone Crusher	14-axle hydraulic trailer	90-120	24-30	3.5-4.0	4.0-4.5
Mobile Screen	10-axle low-bed	60-80	20-24	3.2-3.5	4.0-4.2
Wheel-Mounted Unit	Self-propelled or 6-axle	45-60	16-20	3.0-3.2	4.0-4.2

Road and Bridge Requirements:

- **Road Width:** Minimum 6m for straight sections, 8m for curves

- **Curve Radius:** Minimum 25m for 14-axle trailers, 15m for smaller units
- **Gradient:** Maximum 8% for loaded climb, 10% for descent with braking
- **Bridge Capacity:** Verify IRC Class AA or 70R rating for heavy equipment
- **Overhead Clearance:** Minimum 5m for standard equipment, check actual heights
- **Culvert Capacity:** Most rural culverts rated for 20-ton axle loads—hydraulic trailers exceed this

Route Survey Checklist:

1. Drive entire route in daylight, noting potential obstacles
2. Measure overhead restrictions (power lines, bridges, tree canopy)
3. Identify narrow sections requiring traffic control or widening
4. Check bridge and culvert capacities with local PWD records
5. Note soft shoulders that prevent passing oncoming traffic
6. Identify turnaround points if route becomes impassable
7. Confirm night transport permissions if required for traffic management
8. Coordinate with electricity board for power line lifting if needed

1.3 Environmental and Regulatory Considerations

Distance Requirements from Sensitive Receptors:

RECEPTOR TYPE	MINIMUM DISTANCE (M)	REGULATORY BASIS	MITIGATION IF CLOSER
Residential area (>25 houses)	500	TNPCB/KSPCB guidelines	Enhanced dust control, barriers
Individual houses	200	State PCB norms	Dust screens, limited hours
Schools, hospitals	500	Environmental clearance	Not typically permitted closer
Water bodies (rivers, tanks)	100	CRZ/water body protection	Sediment control, no washing
Reserved forest	Site-specific	Forest clearance	As per FC conditions
National highways	75	NHAI building line	Setback compliance

RECEPTOR TYPE	MINIMUM DISTANCE (M)	REGULATORY BASIS	MITIGATION IF CLOSER
State highways	30-50	State PWD norms	As per state rules
Agricultural land boundary	50	Good practice	Dust barriers, drainage control

Permits and Clearances Required:

PERMIT/CLEARANCE	ISSUING AUTHORITY	TYPICAL TIMELINE	VALIDITY
Mining lease/quarry permit	Dept. of Mines & Geology	6-18 months	5-20 years
Environmental clearance	SEIAA or MoEF&CC	3-12 months	Project life (typically 30 years)
Consent to Establish	State PCB (TNPCB/ KSPCB)	1-3 months	Until commissioning
Consent to Operate	State PCB	1-2 months	1-5 years renewable
Factory license	Dept. of Factories	1-2 months	Annual renewal
Explosive license (if blasting)	PESO (Dept. of Explosives)	2-4 months	1-3 years
Water extraction permission	CGWB/State GW Authority	1-3 months	1-5 years
Transport permit (over-dimension)	RTO	1-2 weeks per trip	Single journey

⚠ **Important:** Mobile crushing plants operating on mining leases typically fall under the existing environmental clearance of the quarry/mine. However, standalone mobile operations (contract crushing, C&D waste recycling) may require separate environmental clearance depending on capacity and location. Verify requirements with State PCB before equipment mobilization.

1.4 Raw Material Access and Quality

Site selection must ensure consistent raw material supply meeting crusher feed requirements.

Feed Material Accessibility Factors:

- **Haul Distance:** Optimal <500m from face to crusher; up to 1,500m acceptable with adequate loader fleet
- **Vertical Lift:** Minimize elevation difference; each 10m lift adds 15-20% to haul cycle time
- **Face Accessibility:** Ensure excavator/loader can work safely at quarry face
- **Bench Height:** Match to excavator capability—typically 6-10m benches
- **Multiple Feed Points:** For large operations, position crusher to receive from multiple faces

Material Quality Considerations:

MATERIAL PROPERTY	ACCEPTABLE RANGE	IMPACT IF OUTSIDE RANGE	TESTING METHOD
Abrasion Index (Ai)	0.1-0.5	High wear costs if >0.5	ASTM C535
Crushing Work Index (CWi)	8-15 kWh/ton	Capacity reduction if >15	Bond Crushing Work Index
Moisture Content	<5%	Handling problems, screen blinding if >8%	IS 2386 Part 3
Clay Content	<3%	Product contamination, screen blinding	Sand equivalent test
Maximum Feed Size	80% of crusher opening	Bridging, reduced capacity	Visual assessment
Compressive Strength	50-250 MPa	Equipment selection varies	IS 9143

Chapter 2: Equipment Selection for Mobile Plants

2.1 Primary Mobile Jaw Crushers

The mobile jaw crusher forms the foundation of most mobile crushing operations, handling run-of-mine material and producing feed for secondary stages.

Mobile Jaw Crusher Selection Guide:

PARAMETER	NMJ-4024 SERIES	NMJ-4836 SERIES	APPLICATION
Feed Opening	1000 x 600mm	1200 x 900mm	Larger opening for poorly fragmented rock
Maximum Feed Size	800mm	1000mm	Match to blasting fragmentation
Capacity Range	100-180 TPH	180-350 TPH	Match to target production
CSS Range	75-200mm	100-250mm	Smaller CSS = finer product, lower capacity
Engine Power	250-300 HP	400-500 HP	Higher power for harder rock
Operating Weight	45-55 tons	65-80 tons	Affects transport and ground requirements
Transport Width	2.9-3.2m	3.2-3.5m	Route accessibility considerations
Fuel Consumption	25-35 L/hr	40-55 L/hr	Operating cost factor

Key Selection Factors:

1. **Required Capacity:** Select jaw crusher delivering 20-30% above target capacity to accommodate feed variations
2. **Feed Size Distribution:** Match feed opening to expected maximum boulder size with 80% passing 80% of opening
3. **Product Requirements:** Determine if jaw crusher product is final or feeds secondary—affects CSS setting
4. **Material Hardness:** Harder rock (>200 MPa) requires heavier-duty frames and higher power
5. **Site Constraints:** Transport route limitations may dictate maximum equipment size

Integrated Feeder Systems:

Mobile jaw crushers incorporate feeder systems that significantly affect performance:

- **Vibrating Grizzly Feeder:** Standard on most mobile jaws; grizzly bars scalp undersize (typically -40mm) to bypass crusher, increasing effective capacity 20-40%

- **Grizzly Bar Spacing:** Adjustable 40-100mm; set to bypass material smaller than CSS
- **Feeder Width:** Must exceed excavator bucket width for efficient loading
- **Hopper Capacity:** 6-12 m³ provides buffer for excavator cycling; larger hoppers for loader feeding

2.2 Secondary Mobile Crushers

Secondary crushing—whether cone, impact, or VSI—determines final product quality and gradation.

Mobile Cone Crusher Specifications:

PARAMETER	NMC-300 SERIES	NMC-400 SERIES	SELECTION CRITERIA
Head Diameter	900mm	1200mm	Larger head = higher capacity
Feed Opening	180mm	220mm	Determines maximum feed from primary
Capacity (CSS 20mm)	100-180 TPH	180-300 TPH	Match to primary output
CSS Range	10-40mm	13-50mm	Finer CSS for smaller products
Power Requirement	200-250 kW	300-400 kW	Affects fuel consumption
Crushing Force	150-200 tons	250-350 tons	Higher force for harder rock
Operating Weight	55-70 tons	75-95 tons	Transport considerations

Mobile Impact Crusher Specifications:

PARAMETER	NMI-1210 SERIES	NMI-1315 SERIES	SELECTION CRITERIA
Rotor Diameter	1000mm	1300mm	Larger rotor = higher capacity
Rotor Width	1000mm	1500mm	Wider rotor = better distribution
Feed Opening	1000 x 800mm	1300 x 1000mm	Can accept larger feed than cone
Capacity	150-250 TPH	250-400 TPH	Higher than equivalent cone
Power Requirement	200-300 kW	350-500 kW	Higher power consumption than cone

PARAMETER	NMI-1210 SERIES	NMI-1315 SERIES	SELECTION CRITERIA
Blow Bar Weight	80-120 kg each	150-220 kg each	Wear cost consideration
Operating Weight	50-65 tons	70-90 tons	Generally lighter than equivalent cone

Cone vs Impact Crusher Selection:

FACTOR	CONE CRUSHER PREFERRED	IMPACT CRUSHER PREFERRED
Material Abrasiveness	High abrasion (Ai >0.3)	Low-medium abrasion (Ai <0.3)
Product Shape	Good cubical shape	Excellent cubical shape
Wear Cost	Lower per ton for abrasive rock	Higher for abrasive materials
Reduction Ratio	4:1 to 6:1 typical	10:1 to 15:1 possible
Fines Generation	Less fines (-4mm)	More fines generation
Capital Cost	Higher initial cost	Lower initial cost
Maintenance Complexity	More complex (hydraulics, liners)	Simpler (blow bar changes)
Ideal Application	Hard granite, basalt aggregates	Limestone, recycled concrete

2.3 Mobile Screening Plants

Mobile Screen Selection by Application:

APPLICATION	SCREEN SIZE	DECK CONFIGURATION	CAPACITY (TPH)	CUT SIZES
Primary scalping	5' x 16'	Single or double deck grizzly	300-500	75-150mm
Secondary classification	6' x 20'	2-3 inclined decks	200-400	20, 10, 5mm
Final product screening	6' x 20'	3-4 horizontal decks	150-300	20, 10, 6, 3mm
Sand washing/ dewatering	6' x 16'	Single deck high-frequency	100-200	Dewatering only
Recycling	5' x 14'	Double deck with fingers	150-250	75, 38mm

Screen Deck Configuration for IS 383:2016 Aggregates:

For producing graded aggregates meeting IS 383:2016 specifications:

DECK POSITION	SCREEN APERTURE	PRODUCT GENERATED	IS 383 NOMINAL SIZE
Top deck	40mm	Oversize to recirculation or reject	Above graded limits
Second deck	20mm	20-40mm coarse aggregate	40mm nominal
Third deck	10mm	10-20mm medium aggregate	20mm nominal
Bottom deck	4.75mm	4.75-10mm fine aggregate	10mm nominal
Underflow	N/A	0-4.75mm crusher dust/sand	Fine aggregate

2.4 Capacity Matching Principles

Proper capacity matching between crushing stages prevents bottlenecks and maximizes system efficiency.

Capacity Matching Rules:

STAGE RELATIONSHIP	CAPACITY RATIO	REASONING
Primary to Secondary	Primary 1.2-1.5x Secondary	Primary produces surge; secondary must keep up at peak
Secondary to Screen	Screen 1.3-1.5x Secondary	Screen handles return plus fresh feed
Screen to Tertiary	Tertiary sized for screen oversize	Typically 30-50% of screen feed
Feeding to Primary	Excavator 1.5-2.0x Primary	Excavator availability <100%; need overcapacity

Example 200 TPH Aggregate Plant Sizing:

EQUIPMENT	SIZED CAPACITY	EXPECTED OPERATING RATE	UTILIZATION
Excavator (20T)	350-400 TPH	250-300 TPH	60-75%
Mobile Jaw Crusher	250-300 TPH	200-220 TPH	70-85%
Mobile Cone Crusher	180-220 TPH	150-180 TPH	75-85%

EQUIPMENT	SIZED CAPACITY	EXPECTED OPERATING RATE	UTILIZATION
Mobile Screen (3-deck)	300-350 TPH	220-280 TPH	65-80%
Return Conveyor	80-100 TPH	40-60 TPH	50-60%

Chapter 3: Layout Planning and Optimization

3.1 Material Flow Principles

Optimal layout minimizes double-handling, reduces conveyor lengths, and provides safe access for operations and maintenance.

Layout Planning Priorities:

1. **Gravity Flow:** Wherever possible, use gravity to move material—reduces power consumption and equipment
2. **Linear Progression:** Arrange equipment in logical sequence following material transformation
3. **Minimize Transfers:** Each transfer point adds cost, causes degradation, and creates dust
4. **Access Requirements:** Ensure maintenance access to all equipment without moving other units
5. **Stockpile Space:** Adequate room for product stockpiles without interfering with traffic

Minimum Spacing Requirements:

BETWEEN EQUIPMENT	MINIMUM DISTANCE (M)	RECOMMENDED DISTANCE (M)	PURPOSE
Jaw crusher to cone crusher	8	12-15	Surge pile buffer, access
Crusher to screen	6	8-12	Conveyor angle, access
Screen to stockpiles	10	15-20	Radial stacker swing
Equipment to haul road	6	10-15	Safety, dust control

BETWEEN EQUIPMENT	MINIMUM DISTANCE (M)	RECOMMENDED DISTANCE (M)	PURPOSE
Between parallel equipment	5	8-10	Maintenance access
Equipment to site boundary	15	25-30	Buffer, future expansion

Typical Mobile Plant Layout Options:

Option 1: Linear Layout

- Equipment arranged in straight line
- Simplest conveyor arrangement
- Best for narrow sites
- Requires approximately 80-100m length for 3-stage plant
- Feed from one end, stockpiles at other

Option 2: L-Layout

- Primary stage on one axis, secondary/tertiary on perpendicular axis
- Reduces overall site length to 50-60m
- Better suited for square/rectangular sites
- Allows feed from multiple directions

Option 3: Stacked/Compact Layout

- Equipment positioned close together with elevated discharge
- Minimizes footprint (40x40m possible for 2-stage)
- Higher conveyor lifts required
- More challenging maintenance access

3.2 Conveyor Arrangements

Conveyor Design Parameters:

PARAMETER	PRIMARY DISCHARGE	SECONDARY FEED	PRODUCT STACKOUT
Belt Width	800-1000mm	650-800mm	500-650mm

PARAMETER	PRIMARY DISCHARGE	SECONDARY FEED	PRODUCT STACKOUT
Belt Speed	1.5-2.0 m/s	1.5-2.0 m/s	2.0-2.5 m/s
Maximum Incline	18°	18°	20° (radial stacker)
Typical Length	10-15m	8-15m	15-25m
Drive Power	15-30 kW	11-22 kW	7.5-15 kW
Trough Angle	35°	35°	35°

Transfer Point Design:

Transfer points between conveyors are critical for minimizing spillage, dust, and material degradation:

- **Drop Height:** Minimize free-fall to <1.5m where possible; use rock boxes for higher drops
- **Chute Angle:** Minimum 60° from horizontal for reliable flow
- **Impact Zone:** Install impact idlers and wear liners in loading zones
- **Dust Enclosure:** Full enclosure at transfers with dust extraction or suppression
- **Belt Cleaners:** Primary and secondary cleaners at all head pulleys
- **Skirt Boards:** Extended skirting (3-4m) at loading points to contain splash

3.3 Traffic Management

Site Traffic Layout Requirements:

TRAFFIC TYPE	ROAD WIDTH	GRADIENT	SURFACE
Dump truck haul road	10-12m (two-way)	<10%	Compacted aggregate
Loader operating area	20-25m turning radius	<5%	Compacted aggregate
Light vehicle access	4-5m	<15%	Gravel or aggregate
Emergency access	4m minimum	<12%	All-weather surface
Stockpile loading	15m loader operating	<5%	Heavy-duty surface

Traffic Flow Principles:

1. **One-Way Circuits:** Where possible, create one-way loops to minimize reversing
2. **Separation:** Keep dump trucks and light vehicles on separate routes
3. **Visibility:** Clear sightlines at intersections; remove stockpile or equipment obstructions
4. **Speed Control:** Limit haul truck speeds to 20 km/hr; light vehicles to 15 km/hr
5. **Pedestrian Exclusion:** Define no-walk zones around operating equipment

Chapter 4: Infrastructure Requirements

4.1 Power Supply Options

Mobile crushing plants typically operate on diesel power, but understanding all options enables optimal selection.

Power Source Comparison:

POWER SOURCE	TYPICAL CAPACITY	COST PER UNIT	ADVANTAGES	DISADVANTAGES
On-board diesel engines	250-500 HP per unit	₹18-22/ kWh	Self-contained, mobile	High fuel cost, emissions
Diesel generator sets	250-1000 kVA	₹14-18/ kWh	Centralized power, electric drives	Requires cables, less mobile
Grid connection (HT)	500 kVA+	₹6-8/kWh	Lowest running cost	Infrastructure cost, not mobile
Hybrid (diesel + solar)	Site-specific	₹10-14/ kWh	Reduced fuel consumption	Higher capital, space needed

Power Requirement Estimation:

EQUIPMENT	CONNECTED LOAD (KW)	TYPICAL DEMAND (KW)	POWER FACTOR
Mobile Jaw Crusher	160-220	120-180	0.85
Mobile Cone Crusher	220-350	180-280	0.85

EQUIPMENT	CONNECTED LOAD (KW)	TYPICAL DEMAND (KW)	POWER FACTOR
Mobile VSI Crusher	180-280	140-220	0.85
Mobile Screen (3-deck)	30-45	22-35	0.80
Conveyors (each)	11-30	8-22	0.80
Water pumps, misc	15-30	10-25	0.85

Generator Sizing for Electric-Drive Mobile Plants:

When using generator sets for electric-drive mobile equipment:

- **Total Connected Load:** Sum all motor nameplates
- **Demand Factor:** Apply 0.7-0.8 factor for simultaneous operation
- **Starting Current Allowance:** Add 25-30% for motor starting surges
- **Generator Sizing:** Select next standard size above calculated requirement
- **Redundancy:** Consider standby generator for critical operations

Example: 200 TPH Plant Generator Sizing

EQUIPMENT	CONNECTED LOAD (KW)	DEMAND FACTOR	RUNNING LOAD (KW)
Jaw Crusher Motor	160	0.75	120
Cone Crusher Motor	250	0.80	200
Screen Motors (2x22)	44	0.70	31
Conveyors (5x15)	75	0.65	49
Auxiliaries	25	0.80	20
Total	**554**	-	**420**
Starting Allowance (+30%)	-	-	546
Generator Required	-	-	**625 kVA minimum**

4.2 Water Supply Systems

Water Requirements by Application:

APPLICATION	CONSUMPTION RATE	QUALITY REQUIREMENT	STORAGE RECOMMENDATION
Dust suppression (conveyors)	2-5 L/ton processed	Any non-corrosive	1 day's consumption
Dust suppression (crushers)	3-8 L/ton processed	Low solids preferred	1 day's consumption
Sand washing	1.5-2.5 m³/ton product	Low clay content	4-hour buffer minimum
Wet screening	0.8-1.5 m³/ton screened	Moderate quality	2-hour buffer
Equipment cooling	Variable by equipment	Clean, filtered	500L minimum reserve
Domestic use (workers)	50 L/person/day	Potable	3 days' supply

Water Source Options:

1. **Quarry Sump:** Most quarries accumulate water that can be pumped for operations
2. **Borewell:** Requires CGWB permission; 100-200mm bore typical for crushing operations
3. **Surface Water:** River/canal abstraction requires state water resources permission
4. **Tanker Supply:** Expensive (₹300-600/kL) but quick to establish
5. **Rainwater Harvesting:** Supplement supply; requires significant storage

Water System Design:

- **Storage Tank:** Minimum 50,000L for dust suppression; 200,000L+ for washing
- **Distribution Pump:** 5-10 HP for dust suppression; 15-30 HP for washing
- **Pressure Requirement:** 3-4 bar for spray nozzles; 2-3 bar for washing
- **Piping:** HDPE or GI pipe; 50-75mm main headers, 25-40mm laterals
- **Nozzle Types:** Full cone for dust suppression, flat fan for washing

4.3 Fuel Storage and Handling

Fuel Consumption Estimation:

EQUIPMENT	FUEL CONSUMPTION (L/HR)	DAILY (10 HR)	MONTHLY (250 HR)
Mobile Jaw Crusher (300 HP)	30-40	300-400L	7,500-10,000L
Mobile Cone Crusher (400 HP)	45-60	450-600L	11,250-15,000L
Excavator (20T)	18-25	180-250L	4,500-6,250L
Wheel Loader (3m³)	15-22	150-220L	3,750-5,500L
Generator (500 kVA)	80-120	800-1,200L	20,000-30,000L

Fuel Storage Requirements:

- **Storage Capacity:** Minimum 7-10 days' consumption for supply security
- **Tank Type:** Double-wall steel tanks preferred; single-wall with containment acceptable
- **Containment:** Bund wall containing 110% of largest tank volume
- **Dispensing:** Electric pump with flow meter for tracking consumption
- **Fire Safety:** 10m separation from ignition sources; fire extinguishers
- **Spill Kit:** Absorbent materials, disposal containers on site

Licensing Requirements:

STORAGE CAPACITY	LICENSE REQUIRED	ISSUING AUTHORITY
Up to 2,500L	None (own use)	N/A
2,500L - 45,000L	Petroleum Storage License	Chief Controller of Explosives
Above 45,000L	Petroleum Storage License + additional safety	PESO

Chapter 5: Step-by-Step Setup Process

5.1 Pre-Mobilization Checklist

Complete these tasks before equipment leaves its current location:

Administrative Preparation:

1. ☐ Transport permits obtained for all over-dimension loads

2. ☐ Route clearance confirmed (no new obstacles since survey)
3. ☐ Site access permission documented
4. ☐ Consent to Operate valid and displayed
5. ☐ Insurance coverage confirmed for transport and operation
6. ☐ Operator licenses verified and photocopied
7. ☐ Emergency contact list prepared

Site Preparation:

1. ☐ Ground bearing capacity verified at all equipment positions
2. ☐ Ground leveling completed (±50mm tolerance)
3. ☐ Drainage directed away from equipment areas
4. ☐ Access road to site completed and load-tested
5. ☐ Turning areas confirmed adequate for low-bed trailers
6. ☐ Power supply ready (generator positioned or cables laid)
7. ☐ Water supply operational
8. ☐ Fuel storage installed and filled
9. ☐ Temporary facilities ready (office, toilet, first aid)

Equipment Preparation (at origin):

1. ☐ Final mechanical inspection before transport
2. ☐ Fluid levels checked (oil, hydraulic, coolant)
3. ☐ Loose items secured or removed
4. ☐ Conveyor belts tensioned appropriately for transport
5. ☐ Transport locks engaged where applicable
6. ☐ Lighting and warning devices functional
7. ☐ Cleaning completed to avoid debris during transport

5.2 Equipment Positioning Sequence

Positioning Order (Critical):

Equipment must be positioned in correct sequence to avoid trapped units:

1. **Final Screen:** Position at product stockpile end first

2. **Secondary/Tertiary Crushers:** Position with discharge toward screen
3. **Primary Crusher:** Position last, nearest to quarry feed point
4. **Conveyors:** Connect in sequence from primary to stockpiles
5. **Ancillary Equipment:** Generators, water pumps, etc.

Positioning Tolerances:

PARAMETER	TOLERANCE	CONSEQUENCE OF EXCEEDING
Level (side-to-side)	±15mm per meter	Uneven wear, bearing damage
Level (front-to-back)	±20mm per meter	Feed distribution problems
Position accuracy	±100mm	Conveyor alignment issues
Conveyor alignment	±25mm	Belt tracking problems
Discharge height	As designed ±50mm	Material spillage

Track Deployment Procedure:

1. **Unload Position:** Select firm, level area for trailer unloading
2. **Track Condition:** Inspect tracks for transport damage before off-loading
3. **Off-Loading:** Use ramps rated for equipment weight; 15° maximum angle
4. **Travel to Position:** Limit speed to 1-2 km/hr; avoid sharp turns
5. **Final Positioning:** Use surveyed marks; fine adjustment with tracks
6. **Leveling:** Deploy outriggers or use blocking under tracks
7. **Secure Position:** Engage travel locks; block tracks if on slope

5.3 Mechanical Connections

Conveyor Installation:

1. **Frame Assembly:** Install supports at calculated heights for correct discharge angles
2. **Belt Threading:** Thread belt over all idlers; splice if not continuous
3. **Tension Adjustment:** Set initial tension per manufacturer specification (typically 2-3% elongation)
4. **Tracking Check:** Verify belt runs central on all idlers

5. **Cleaner Installation:** Install primary and secondary cleaners at head pulley
6. **Skirt Installation:** Fit skirting at loading zones with correct clearance
7. **Safety Guards:** Install guards at all pinch points, pulleys, and drives

Chute Connections:

- **Alignment:** Chutes must center material on receiving conveyor or equipment
- **Angle:** Minimum 60° from horizontal for reliable flow
- **Wear Protection:** Install wear liners in impact zones
- **Sealing:** Flexible seals at connections to minimize dust escape
- **Access:** Include inspection doors for blockage clearing

5.4 Electrical Connections

Cable Installation Requirements:

MOTOR SIZE	CABLE SIZE (ARMORED)	MAXIMUM RUN (415V)	VOLTAGE DROP LIMIT
Up to 30 kW	3C x 25 mm²	100m	5%
30-75 kW	3C x 50 mm²	80m	5%
75-150 kW	3C x 95 mm²	60m	5%
150-250 kW	3C x 150 mm²	50m	5%
250-400 kW	3C x 240 mm²	40m	5%

Electrical Installation Checklist:

1. ☐ Cable route planned avoiding traffic and water accumulation
2. ☐ Cables protected by covers or buried where crossing roads
3. ☐ All terminations completed by qualified electrician
4. ☐ Phase rotation verified before motor start
5. ☐ Earth continuity tested on all equipment
6. ☐ Insulation resistance tested (minimum 2MΩ)
7. ☐ Overcurrent protection settings verified
8. ☐ Emergency stops tested at all locations
9. ☐ Control circuits tested for correct interlock operation

10. ☐ Motor running direction verified (brief jog test)

Chapter 6: Commissioning Procedures

6.1 Pre-Start Inspection

Complete Before First Material:

Mechanical Systems:

- ☐ All guards in place and secure
- ☐ Bolted connections torqued to specification
- ☐ V-belt tensions correct (deflection check)
- ☐ Lubrication points serviced
- ☐ Hydraulic systems filled and bled
- ☐ Crusher chamber empty and clear
- ☐ Screen cloths correctly tensioned
- ☐ Conveyor belts tracking central
- ☐ No loose tools or debris in equipment

Fluid Levels:

- ☐ Engine oil at correct level
- ☐ Hydraulic oil at correct level
- ☐ Crusher lubricant at correct level
- ☐ Coolant level and concentration correct
- ☐ Fuel tank full
- ☐ No visible leaks anywhere

Electrical Systems:

- ☐ All covers closed
- ☐ No exposed wiring
- ☐ Control panel settings at normal
- ☐ Emergency stops reset

- ☐ Warning lights functional
- ☐ Horn/alarm functional

6.2 No-Load Testing

Run all equipment without material to verify proper operation:

No-Load Test Sequence:

1. **Conveyors:** Start from discharge end, working back to feed
   - Run for 15 minutes minimum
   - Verify belt tracking remains central
   - Check bearing temperatures (hand touch—not hot)
   - Listen for unusual noises
2. **Screen:** Start and observe for 10 minutes
   - Verify vibration is smooth and even
   - Check for loose components
   - Confirm screen media not moving/lifting
3. **Secondary Crusher:** Start and run for 20 minutes
   - Monitor oil pressure and temperature
   - Listen for abnormal sounds
   - Verify all displays reading normal
4. **Primary Crusher:** Start and run for 20 minutes
   - Verify flywheel running true
   - Check bearing area temperatures
   - Confirm CSS setting correct
5. **Feeder:** Brief run to verify operation

No-Load Performance Targets:

EQUIPMENT	NORMAL SOUND LEVEL	MAX BEARING TEMP	VIBRATION
Jaw Crusher	85-90 dBA @ 1m	60°C	Smooth, slight frame movement

EQUIPMENT	NORMAL SOUND LEVEL	MAX BEARING TEMP	VIBRATION
Cone Crusher	80-85 dBA @ 1m	55°C (bearing), 70°C (oil)	Very smooth, minimal vibration
Screen	90-95 dBA @ 1m	55°C	Consistent elliptical motion
Conveyor	75-80 dBA @ 1m	50°C	Minimal, no belt wander

6.3 Load Testing

Initial Material Feed Procedure:

1. **Start Sequence:**
   - Confirm all downstream equipment running
   - Start feeder at 25-30% of normal rate
   - Observe material flow through system
   - Check for spillage or blockage points
2. **Gradual Increase:**
   - Increase feed rate in 10-15% increments
   - Wait 5 minutes between increases
   - Monitor crusher power draw and temperatures
   - Verify product quality at each increment
3. **Full Load Operation:**
   - Achieve design feed rate over 30-45 minutes
   - Run at full load for minimum 2 hours
   - Take product samples for gradation analysis
   - Document operating parameters

Commissioning Performance Verification:

PARAMETER	TARGET	ACTION IF OUTSIDE
Production rate	±10% of design	Investigate feed rate, settings
Product gradation	Within specification	Adjust CSS, screen apertures

PARAMETER	TARGET	ACTION IF OUTSIDE
Power consumption	Within rated capacity	Check for mechanical drag
Fuel consumption	Within expected range	Engine tune, load matching
Bearing temperatures	Below limits	Check lubrication, alignment
Material spillage	Minimal	Adjust chutes, skirts

Chapter 7: Safety Considerations

7.1 Site Safety Requirements

Mandatory Safety Installations:

ITEM	SPECIFICATION	LOCATION	REGULATORY BASIS
First aid kit	Factory Act compliant	Site office, each equipment	Factory Act
Fire extinguishers	ABC type, 5kg minimum	Each equipment, fuel storage	Factory Act
Safety signage	Danger, warning, mandatory	Entry, equipment, hazards	IS 9457
Barricading	1.2m height minimum	Equipment perimeter	Good practice
Emergency contact board	Visible, updated	Entry gate, office	Factory Act
Toilet facilities	1 per 25 workers	Within 100m of work area	Factory Act
Drinking water	Potable, cool	Multiple locations	Factory Act

Personal Protective Equipment (PPE):

PPE ITEM	SPECIFICATION	WHO MUST WEAR	WHEN REQUIRED
Safety helmet	IS 2925	All personnel	Always on site
Safety shoes	IS 15298 Part 4	All personnel	Always on site

PPE ITEM	SPECIFICATION	WHO MUST WEAR	WHEN REQUIRED
High-visibility vest	Class 2 minimum	All personnel	Always on site
Safety glasses	IS 5983	Near operating equipment	Within 25m of crushers
Hearing protection	NRR 25+ dB	Near operating equipment	Within 15m of crushers
Dust mask	N95 minimum	Dusty areas	When visible dust
Gloves	Task-appropriate	Material handling	As needed

7.2 Equipment Safety Devices

Required Safety Devices—Verify Operation:

Crushers:

- Emergency stop buttons (minimum 2 locations)
- High oil temperature shutdown
- Low oil pressure shutdown
- Metal detector/tramp iron protection
- Level sensor in feed hopper
- Guard interlocks

Conveyors:

- Emergency stop pull cords (full length)
- Belt slip detection
- Belt alignment switches
- Head and tail pulley guards
- Idler guards where accessible

Screens:

- Emergency stop
- Vibration monitoring
- Guard interlocks on access doors

7.3 Emergency Procedures

Emergency Response Plan Elements:

1. **Emergency Contact Numbers:** Ambulance, fire, police, nearest hospital, company contacts
2. **Assembly Point:** Designated safe area away from equipment and traffic
3. **Evacuation Routes:** Clearly marked paths to assembly point
4. **First Aid Responders:** Trained personnel identified
5. **Fire Response:** Extinguisher locations known, personnel trained
6. **Equipment Shutdown:** Emergency stop procedures posted and practiced

Common Emergency Scenarios:

EMERGENCY	IMMEDIATE ACTION	EQUIPMENT ACTION	REPORTING
Personal injury	First aid, call ambulance	Stop affected equipment	Factory inspector within 24 hrs if serious
Fire	Alert, evacuate, fight if safe	Stop all equipment, power off	Fire department, insurance
Crusher blockage	Stop feeder immediately	Planned shutdown sequence	Supervisor for clearing
Hydraulic burst	Evacuate area	Emergency stop	Maintenance team
Electrical fault	Do not approach	Isolate at source	Qualified electrician only

Chapter 8: Cost Analysis and Economics

8.1 Setup Cost Components

Typical Setup Costs (200 TPH Mobile Plant):

COST COMPONENT	LOW END (₹ LAKHS)	HIGH END (₹ LAKHS)	NOTES
Ground preparation	5	25	Depends on existing conditions

COST COMPONENT	LOW END (₹ LAKHS)	HIGH END (₹ LAKHS)	NOTES
Equipment transport	8	20	Distance and route dependent
Conveyor connections	3	8	Complexity dependent
Electrical installation	2	6	Cable length dependent
Water system	2	8	Source and distance dependent
Fuel storage	1	4	Capacity dependent
Safety and signage	0.5	1.5	Standard requirements
Temporary facilities	1	3	Office, toilet, shelter
Commissioning	1	3	Duration dependent
Total Setup	**23.5**	**78.5**	-

8.2 Operating Cost Estimation

Operating Cost Components (₹/ton):

COST COMPONENT	MOBILE PLANT (₹/ TON)	STATIONARY PLANT (₹/ TON)	DIFFERENCE
Fuel/Power	80-120	40-60	Mobile uses more fuel
Wear parts	40-60	35-55	Similar
Labor	25-40	30-50	Mobile requires fewer
Maintenance	30-50	25-40	Mobile slightly higher
Overheads	15-25	20-35	Mobile lower infrastructure
Total Operating	**190-295**	**150-240**	Mobile 15-25% higher

Break-Even Analysis Factors:

Mobile crushing makes economic sense when:

- **Contract Duration:** Less than 3-5 years at single location
- **Multiple Sites:** Need to relocate as material depletes or contracts change
- **Quick Start:** Production required within weeks rather than months
- **Lower Capital Risk:** Asset retains value and can be sold if project ends
- **Remote Locations:** Grid power unavailable or expensive to connect

8.3 ROI Calculation Example

Scenario: Contract crushing operation, 200 TPH aggregate production

INVESTMENT COMPONENT	AMOUNT (₹ LAKHS)
Mobile Jaw Crusher (owned)	325
Mobile Cone Crusher (owned)	400
Mobile Screen (owned)	175
Conveyors and accessories	50
Setup costs	50
Total Investment	**1,000**

OPERATING PARAMETERS	VALUE
Production rate	200 TPH
Operating hours/month	250
Monthly production	50,000 tons
Crushing contract rate	₹180/ton
Monthly revenue	₹90 lakhs
Operating cost @ ₹240/ton	₹120 lakhs
Monthly EBITDA	₹(30) lakhs (loss at this rate)

Corrected Scenario with Owned Material:

PARAMETER	VALUE
Selling price (mixed aggregates)	₹800/ton average
Monthly revenue	₹400 lakhs
Operating cost @ ₹240/ton	₹120 lakhs
Royalty @ ₹60/ton	₹30 lakhs
Monthly EBITDA	₹250 lakhs
Annual EBITDA	₹3,000 lakhs
Simple payback	4 months
5-year ROI	1,400%

Chapter 9: Common Mistakes and How to Avoid Them

9.1 Site Selection Mistakes

MISTAKE	CONSEQUENCE	PREVENTION
Inadequate ground assessment	Equipment sinking, structural damage	Always test bearing capacity before positioning
Ignoring drainage	Flooding, equipment damage, operational delays	Grade site away from equipment; install drainage
Insufficient space for stockpiles	Material congestion, rehandling required	Plan for 2-3 days' production per grade
Poor feed material access	Excessive haul costs, low production	Position to minimize haul distance
Regulatory non-compliance	Closure orders, penalties	Verify all permits before mobilization

9.2 Equipment Setup Mistakes

MISTAKE	CONSEQUENCE	PREVENTION
Incorrect equipment sequence	Trapped equipment, repositioning needed	Position downstream equipment first
Poor leveling	Accelerated wear, vibration problems	Use precise leveling instruments
Conveyor misalignment	Belt damage, spillage	Check alignment before starting
Inadequate guarding	Safety violations, injuries	Install all guards before operation
Skipping no-load testing	Undetected problems cause failures	Always run no-load tests fully

9.3 Operational Mistakes

MISTAKE	CONSEQUENCE	PREVENTION
Starting crusher with full chamber	Mechanical damage, high starting current	Always start empty
Ignoring warm-up procedures	Accelerated wear, potential seizure	Follow manufacturer warm-up times
Overfeeding crushers	Blockages, poor product quality	Control feed rate to maintain power
Neglecting lubrication	Bearing failures, major repairs	Follow lubrication schedule strictly
Running with damaged wear parts	Frame damage, poor production	Replace wear parts before metal-to-metal

Chapter 10: Conclusion and Best Practices Summary

10.1 Key Success Factors

Successful mobile crushing plant setup depends on systematic attention to:

1. **Thorough Site Assessment:** Ground conditions, access, permits, and material supply before mobilization

2. **Proper Equipment Selection:** Matching capacity and capabilities to actual requirements
3. **Professional Layout Planning:** Material flow, access, and safety considerations integrated
4. **Complete Infrastructure:** Power, water, fuel, and facilities ready before equipment arrives
5. **Systematic Commissioning:** Following procedures rather than rushing to production
6. **Safety First:** No shortcuts on safety requirements at any stage

10.2 Quick Reference Checklist

Before Equipment Mobilization:

- ☐ Ground bearing capacity verified >0.7 kg/cm²
- ☐ Access route surveyed and cleared
- ☐ All permits valid and displayed
- ☐ Site leveled and drained
- ☐ Infrastructure (power, water, fuel) ready
- ☐ Safety installations complete

During Setup:

- ☐ Position downstream equipment first
- ☐ Level all equipment to specification
- ☐ Align all conveyors properly
- ☐ Install all safety guards
- ☐ Complete electrical testing
- ☐ Verify all fluid levels

Before First Production:

- ☐ Complete no-load testing of all equipment
- ☐ Verify safety device operation
- ☐ Train all operators on procedures
- ☐ Start feed rate at 25% and increase gradually

- ☐ Document all operating parameters
- ☐ Take product samples for quality verification

10.3 Support Resources

For assistance with mobile crushing plant setup, equipment selection, or operational optimization, Nesans provides:

- **Technical Consultation:** Site assessment and equipment recommendation
- **Installation Support:** Commissioning engineers for proper setup
- **Operator Training:** Comprehensive training programs
- **Spare Parts:** Genuine parts with fast delivery
- **Service Support:** Preventive maintenance programs and emergency service

Contact our technical team at service@nesansindia.in or call our support line for site-specific guidance on mobile crushing plant setup and optimization.

Topics: #Crushing #Mobile Crushing #Plant Setup

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