

Concrete in the Jungle – the urgent need to manage new construction waste in India's cities

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Urbanization context – India and Delhi

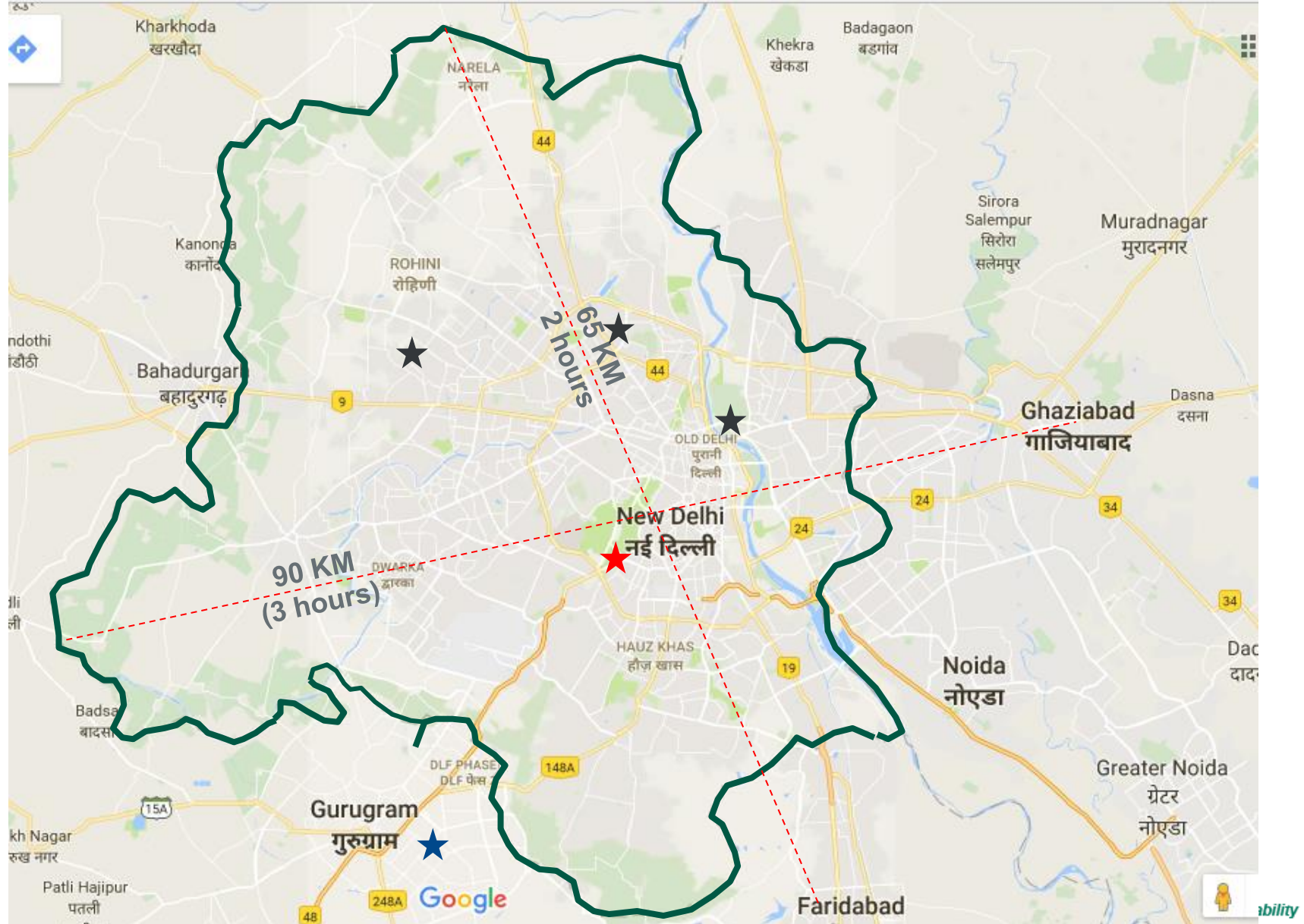
India

- Last 15 years - 127 million new urban residents
- Next 15 years - 177 million new urban residents projected to be added

Delhi NCT

- Last 15 years – 11.2 million added (80% growth)
- Next 15 years – 11 million projected to be added (44% growth)

National Capital Territory and main suburbs



Urbanization context - Delhi

- 547 building approvals in first 3 months of 2017 in Delhi - South Corporation
- The Construction and Demolition Waste Management Rules, 2016 notified by the Environment Ministry stipulates that permission for construction will be granted after a complete waste management plan is presented to local authorities (notified in March 2016)
- Cities with a population of more than 1 million will commission processing and disposal facility within 18 months from the date of final notification of these rules

ERM site study – Large real estate developer

- Under construction residential development
- Gurgaon, Haryana (NCR)
- Approximately 30 acres land area
- Approximately 300,000 sq. mts. built up area
- ERM engaged to propose construction waste management guidelines

Project performance standards - Voluntary

- Environmental Management System (ISO)
- Sustainability Initiatives
- IGBC Green Homes Rating Criteria
 - Cement bags
 - Scrap steel
- Corporate Social Responsibility
- Procurement Allocation for waste

Managed waste type

- Site maintains records for cement bags and steel scrap.
 - Between September 2011 and April 2015, 578.72 tonnes of steel scrap was disposed off from the Site to 8 different vendors. Scrap steel was sold for INR 26.875/ kg in September 2014.
 - During the same time 893,869 empty cement bags were sold to 6 different vendors.
- All other waste is removed as debris in tractor trolleys with no recording of the weight in the trolley.
 - In the first 4 months of 2015, a total of 750 tractor trolley trips were made at an average of 6 trips per day to clear debris.
 - Principal Contractors are responsible for waste disposal – minimum of 2 km from Site

Current waste handling practices



Estimated value of Waste on Site on 19th May

Approx. commercial value of the waste material on Site: INR 50,000 based on rough visual estimates done on Site.

Items	Unit	Estimated quantity	Recycle/ Reuse value	Recycle rates In INR
Cement	bags (1 bag = 60 kg)	30	Yes	25
Soil	bags	50	Yes	25
Sand	bags	50	Yes	25
Wood (Low quality, mostly packaging)	kg	2000	Yes	1.5
PVC Pipes (Various lengths/diameter)	kg	600	Yes	6
Fabrics (polypropylene filters)	kg	500	Yes	0
Mesh	kg	500	Yes	0
Geotextiles	kg	500	Yes	0
Gunny sacks/rags	kg	200	Yes	0.5
scaffolding (wood)	kg	2500	Yes	1.5
Packaging Plastics	kg	300	Yes	6
Plastics	kg	500	Yes	6
Iron Scrap	kg	700	Yes	15
Aluminium Scrap	kg	250	Yes	60
Steel Scrap	kg	200	Yes	15
Tin (Shed)	kg	300	Yes	10
Marble (broken pieces)	N.A.	N.A.	No	N.A.
Brickbats	N.A.	N.A.	No	N.A.
Gypsum	N.A.	N.A.	No	N.A.
Concrete	N.A.	N.A.	No	N.A.
Plaster of Paris	N.A.	N.A.	No	N.A.

Approximate total quantity of waste (tonnes)

- Approximate total waste generated at site since start of construction:
 - Steel (5%) – 578 tonnes
 - Soil, sand and gravel (36%) – 4000 tonnes
 - Bricks and masonry (31%) – 3500 tonnes
 - Concrete (23%) – 2500 tonnes
 - Wood (2%) – 200 tonnes
 - Bitumen (2%) – 200 tonnes
 - Other (1%) – 100 tonnes
- Using this methodology the total quantity of waste generated on site to date in Phase 1 can be estimated to be approximately 11,000 tonnes.

Path to engaging informal waste sector

- NGO will be the counterparty on the project.
- NGO proposes to deploy a 'Field Officer' who will be responsible for managing the day-to-day operation of the system and dealing with labor.
- NGO will be responsible for supply and training of manpower to sift through the waste to recover and segregate materials for reuse and recycle. All workers will carry an ID issued by NGO and will be in uniform. Typically, about 10-12 people per ton of waste handled are required.
- NGO will make arrangements with recyclers to off-take the wastes for recycling and processing.
- The money received by selling salvaged waste items to recyclers will contribute towards the NGO labour salaries. NGO will manage the sale of recyclables and payroll for recycling staff.

C&D waste treatment by-products

- Waste to product conversion ratio is 95%
- Recycled Aggregate (RA)
- Recycled Concrete Aggregate (RCA)
- GSB
- Brick pozzolana
- Recycled concrete / stone / tile aggregate of different sizes
- Recycled manufactured sand – mix of coarse, medium and fine
- Ready mix concrete (RMC)
- Kerb stones
- Paving blocks and tiles
- Bricks (solid, hollow)
 - GHG emission of 2.4 tCO₂e compared to 136 CO₂e for conventional bricks (per 1000 tonnes)

Issues to be considered

- Is this simply an enforcement problem or does the market have a role to play?
- Should we just look away? Give it more time and wait for the growth frenzy to ebb?
- What is the national level GHG impact? INDC?
- Is it cheaper to recycle or to landfill?
- What is the financial impact of waste?
- At what price point does recycling make sense?
- Is there a solution in prefabrication?
- Is the solution central or distributed?
- How can technology help?

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