

## **APPENDIX A - HEALTH, SAFETY AND SECURITY CONSIDERATIONS**

This project must be managed in a way that protects the health and safety of both workers on the project and community. Protection of workers involved in the Pesarean remediation project is a critical consideration for the project design and execution, as is protection of the community during the work. The following measures will be incorporated into the project to address these concerns:

### **Worker Health Protection**

- Education will be provided to all workers and supervisors about the hazards of lead and other metal exposure and hygiene and personal protection methods to be taken to reduce their exposure and health risks. This includes methods to assure that workers understand the key education messages, such as by having workers demonstrate proper use of personal protection equipment (PPE) and by testing orally.
- Workers will be provided with clean uniforms (trousers and shirts) dedicated for the work. Workers must change into regular clothes at the end of their work shifts, and the uniforms must be washed after each day of work before further use by the workers. The project will provide for laundry and storage of uniforms. Typically, two uniforms are needed for each worker – one being worn and the other being laundered and dried in preparation for the next day.
- All workers with potentially significant exposure to lead or other metal dust must be provided with PPE including respiratory protection (N95 dust masks). New N95 masks will be provided for each day of work.
- All workers will be provided with sturdy gloves. If workers will be working at assignments where head or eye injury risks are heightened, they must be provided with helmets and/or goggles.
- Workers must wear sturdy shoes (as opposed to sandals or flip-flops) during all work. These will be provided if workers do not have them. Shoes will be washed to remove dust at the end of shifts.
- Workers will be required to wash their hands and faces before eating, and eat in areas where exposure to lead dust or waste is minimal. Wash stations and safe, clean eating areas will be established and identified by the project management. No food is allowed to be brought into the project work areas.
- Workers will be provided with ample drinking water during the work to prevent dehydration. Drinking water used in the project area must be in sealed bottles. Measures must be implemented to collect used water bottles to prevent littering and inappropriate waste disposal in Pesarean.
- Workers will be required to shower at the end of each work day, before changing into non-work clothes. Secure locations for showers, with adequate water and privacy, will be provided. Also, secure lockers will be

- provided to workers adjacent to the shower and changing areas for workers to keep their non-work clothes during the work day.
- Washing areas will be established for washing of uniforms, helmets and tools at the end of work each day. These items will then be stored in dedicated locations with appropriate security to assure that they remain clean and accounted for.
  - Blood lead levels will be tested before and after the work in at least a representative number of workers to confirm that the work has not resulted in increased health risks to workers.

### **Worker Safety Protection**

Workers will be at risk of injury or health impacts due to various physical hazards, including cuts and abrasions; injuries due to hitting against objects, trips, falls; muscle injuries due to lifting or heavy work; and heat stress. Precautions to be taken to prevent these are:

- Workers must use care at all times during the work. In particular, care should be taken when working with or around equipment and vehicles, when going up or down sloped areas, or in areas where soil may be slippery.
- To avoid muscle and joint injuries, workers should not attempt to lift heavy loads (generally anything over 25 kg) or to use extreme force to move objects or soil. Workers should use good lifting techniques and call for help by other workers or mechanical equipment for heavy lifting or high force work.
- Sturdy work gloves must be worn at all times when working to prevent cuts, abrasions and other hand injuries (the most common form of work injury on projects such as this.)
- Sturdy work boots must be worn at all times when working to prevent foot injuries and to assure good traction.
- To prevent heat stress and muscle injuries, workers must rest briefly after work requiring heavy exertion, and should drink water regularly. Workers should be educated specifically about the hazards and signs of heat stress, precautions to be taken, and the need to be alert to the signs of heat stress in fellow workers.
- Heavy equipment (excavator, front end loader, Bobcat, dump truck) must have working back-up alarms to warn people. No one should go under or onto heavy equipment, or behind equipment when in operation, without operator knowledge.
- Heavy equipment must be turned off when not in use and when re-fueling.
- Heavy equipment operators may require an observer (particularly for the excavator) when making movements when operator visibility is not adequate to assure the pathway is safe, and hand signals to be used should be agreed upon in advance.

- If high levels of noise (above 90 dBA) are experienced near heavy equipment, workers and operators must be provided with hearing protection.

### **Dust Control and Environmental Protection**

- All potentially lead or metal contaminated wastes or soils, once excavated, will be stored well covered with plastic tarps at the end of each day to prevent community exposure, dust generation, distribution by rain runoff or other risks.
- Work areas will be moistened as needed to control and reduce dust. This includes yards and alleys when being excavated, as well as the waste dump area where active work is occurring, and waste or contaminated soil in trucks. Hoses and portable sprayers will be provided to enable moistening. There should be a dedicated worker(s) for dust control.
- Temporary storage or transfer piles of excavated contaminated material must be minimized to the extent possible, and placed in locations where they can be effectively removed and cleaned up (in addition to covers and moistening.) Transfer piles at the transfer pad must be covered at night or at times when active work is not being done at the pile.
- At the transfer pad, pile surfaces and concrete areas will be moistened as needed to prevent dust, though not made so wet that mud will be created and tracked out of the pad area on vehicle wheels.
- Transport of all potentially contaminated waste will be done in a secure, dust free manner. For trucks, this means high quality covers on top of waste in the truck, and moistening the top layer of waste if needed. For wheelbarrows, carts and front-end loaders, this means covers to the extent possible, particularly if the material is being moved for some distance. Moistening to reduce dust should also be done.
- Trucks must follow prescribed routes through the village. Roads used for transport of waste or contaminated soil must be inspected at the end of each work day, and any spills cleaned up and brought to the transfer pad.
- Equipment such as shovels, hoes, rakes and wheelbarrows must be kept in the project areas, or washed with water when brought out of the project area, and at the end of the project.
- Parts of vehicles, such as tires and buckets, that come in contact with lead contamination must also be washed down with water inside the project area before leaving the project area.
- All trash and waste generated by the project must be collected and disposed of properly. If it potentially contaminated by lead or other metals, it should be sent to the transfer pad for collection and disposal. The contractor will make arrangements for proper disposal of contaminated waste (such as bags) that can not be sent to the paver manufacturer.

## **Community Protection**

- Household residents in the project will be requested (strongly) to vacate their houses during cleaning and during remediation activities in adjacent yards or alleys so as to avoid potential exposure to any lead or other metal contaminated dust that may be generated during the work.
- As discussed elsewhere, education will be provided to people living in the project area regarding the hazards of lead and other metal dusts, how the work will be done, and measures to be taken to protect themselves and their children. Key areas of focus are how to prevent contaminated dust migration, as well as major exposure pathways (ingestion, inhalation) and how the risks from exposure from these pathways can be reduced.
- To prevent exposure to the community, all unauthorized persons must be kept out active work areas – see the security section below. Workers must stay in the project area or approved areas for washing, changing clothes and eating until they have washed and changed into regular clothes. The use of distinctive uniforms helps everyone in the area know who is authorized to be in the project area and if a potentially contaminated worker is out of the project area.
- Methods will be provided for community residents to raise questions or concerns about health, safety or environmental concerns to the project management. Information about these community communication channels will be provided during the community education program.
- Signs, poster or banners will be posted at prominent locations to inform the community about the project, health and safety concerns, and what community members should do to protect themselves and their families.

## **Security and General Work Practices**

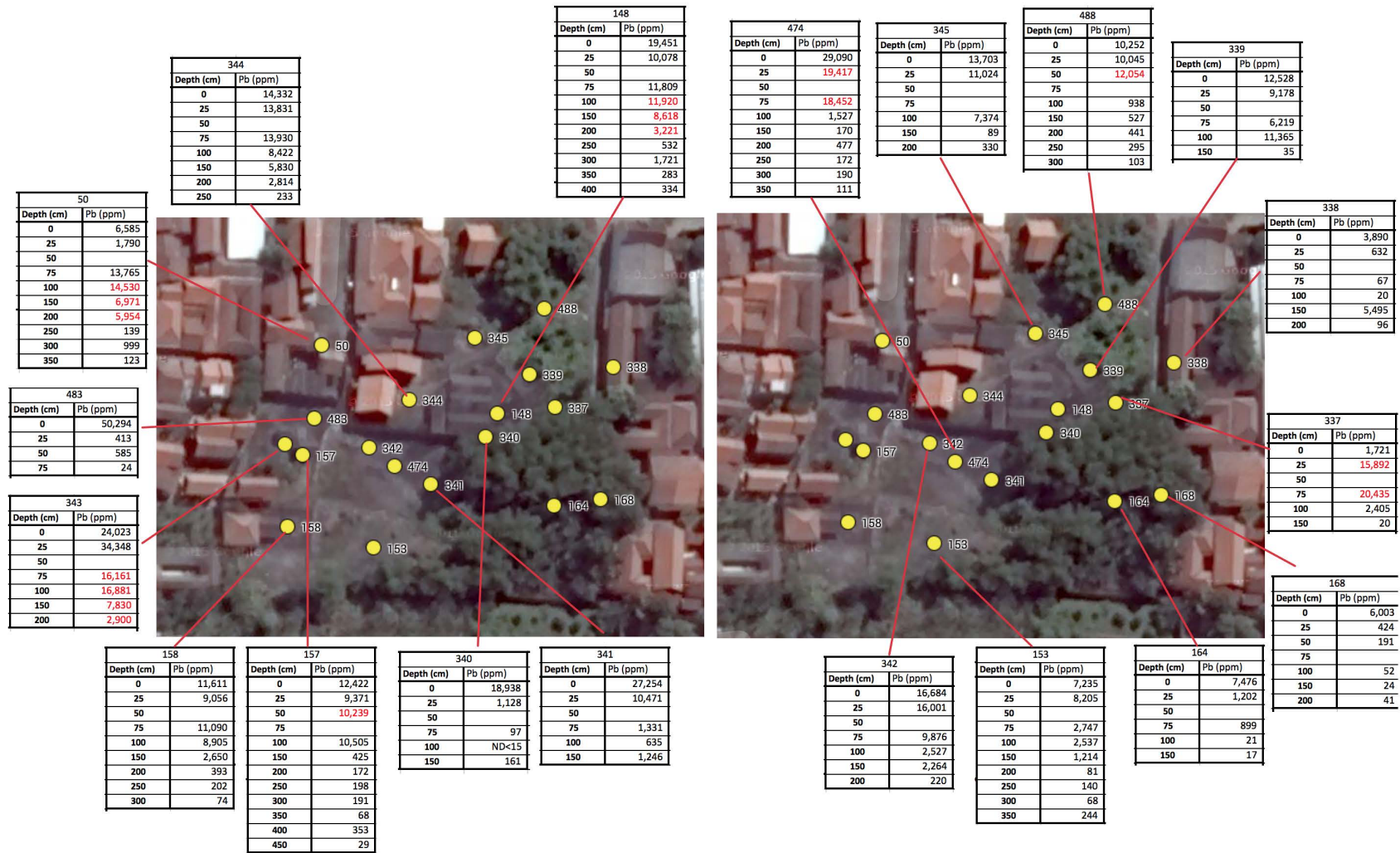
- The waste dump area and transfer pad areas must be fenced off to prevent unauthorized access during the project. Plastic construction fence at least 1 m high, or something equivalent, should be used. Openings will be provided to allow personnel, vehicle and equipment access.
- Guards must be hired to keep unauthorized persons out of the waste dump and transfer pad areas. The work and heavy equipment may make people, particularly children, curious to see what is happening, and children may also want to play in the waste dump area as they they are used to doing. Guards should be stationed to prevent entry and intercept any people trying to enter the these areas.
- A secure storage area must be provided for movable tools, equipment and supplies to prevent theft. An inventory of tools, equipment and supplies must be kept by a stockroom manager to assure that these are returned to the storage area at the end of each workday, as well as to determine when additional supplies are needed.

- No unusual security threats are expected during the work. However, the local police and authorities should be notified of the work plans and their cooperation requested to help maintain a secure and safe workplace.
- All workers and managers must behave with consideration for the local community and in compliance with all applicable laws and regulations.
- No eating, smoking will be allowed in the project area. Drinking of alcoholic beverages is prohibited for all workers during workdays. The project area and related washing, changing and storage areas must be kept neat and orderly.
- In general work should only be done during daylight hours.
- Workers or contractors should not talk to any member of the press about the project; press inquiries will be handled by the project manager

### **Health, Safety and Security Oversight, Incident Management**

- A health and safety officer will be employed during all days of the work to assure that the health and safety requirements are being followed. He/she will be given authority to stop work or order changed work practices if unacceptable practices are observed.
- The project manager must have authority to discipline or if necessary dismiss any worker who violates safety or security procedures.
- All workers and managers must be well trained about health, safety and security measures prior to being allowed to work on the project. Records of training must be kept, specifically including names, when they were trained, subjects covered in the training, who did the training and worker signatures. This is usually done by means of a training sign in sheet.
- The contractor must have an incident management procedure, and provide training about this. Incidents include any injuries that require first aid or medical care, any thefts, any fights or altercations between workers or with community members, any security breaches (unauthorized people in the work area), and any damage to buildings or property of the community. The procedure should indicate who to report incidents to, and dates, type of incident, who was involved, description of causes, what was done to address the incident and prevent future incidents, and cost or impact on the project. The project manager is responsible for follow up on all incidents to be sure they are properly recorded and actions are taken to resolve the incident and prevent future similar incidents.
- Emergency contact information should be established and posted, notably including the project manager, local medical support (doctors, ambulance, hospital), fire department, and police.

## Appendix B. Dump Site Waste Depth Profiles



## APPENDIX G - Material and Labor Estimates for Remediation Work

No.	Item	Units	No. of days
<b>Transport dump waste to transfer pad and disposal there</b>			
1	Front end loader w/ operator	number/day	50
1	Excavator w/ operator	number/day	50
2	Shovels, wheelbarrows, picks, etc.*	per set	1
10	Clearing of vegetation at dump site	workers/day	10
10	Labor	workers/day	60
2	Supervision	workers/day	60
24	Uniforms (cotton), gloves, boots	sets (two/worker)	1
12	Respirators (NIOSH N95)	number/day	50
4	Security fencing for dump area	100 m	1
* 1 set = 2 wheelbarrows, 3 shovels, 2 picks, 2 rakes, 2 hoes			
<b>Grading and finishing dump waste area after waste removal, paving pathways</b>			
1	Front end loader w/ operator	number/day	15
2600	Clean soil	m3 - delivered	1
2	Shovels, wheelbarrows, picks, etc.*	sets	1
10	Labor	workers/day	10
2	Supervision	workers/day	10
24	Uniforms (cotton), gloves, boots	sets (two/worker)	1
	Respirators (NIOSH N95)	not needed for this work	
400	Pavers for paths	m2	1
4	Labor - paver installation	workers/day	30
12000	Grass seed	m2	1
<b>Transfer Pad operation</b>			
4	Security fencing for area	100 m	1.4
1	Front end loader for storage pad	number/day	60
5	Labor for storage pad	workers/day	60
1	Storage pad supervisor	workers/day	60
6	Uniforms (cotton), gloves, boots	sets (two/worker)	60
6	Respirators (NIOSH N95)	number/day	60
<b>Excavation of waste piles and highly contaminated soil in yards and alleys</b>			
2	Bobcat w/operator	number/day	35
5	Dump trucks (5 m3)	number/day	25
4	Shovels, wheelbarrows, picks, etc.*	sets	1
2	Hand pushed roller compactor	number	1
10	Labor - pile & cont. soil excavation	workers/day	25
2	Supervisors - excavation crews	workers/day	25
2600	Clean soil	m3	1
10	Labor - placing, compacting clean soil	workers/day	25
2	Supervisors clean soil crews	workers/day	25
24	Uniforms (cotton), gloves, boots	sets (two/worker)	1
12	Respirators (NIOSH N95)	number/day	25

Paving of alleys & misc areas		
1200 Pavers	m2	1
100 Cement	sack	1
2 Shovels, wheelbarrows, picks, etc.*	sets	1
10 Labor - soil removal & prep.	workers/day	10
10 Labor - installing pavers	workers/day	30
2 Supervisors	workers/day	10
Uniforms (cotton), gloves, boots	use sets from yard work	
12 Respirators (NIOSH N95)	number	10
Excavation and covering high school yard with clean soil		
1 Bobcat w/operator (per day)	number/day	12
40 Gravel	m3	1
100 Clean soil	m3	1
660 Geotextile	m2	1
Dump trucks (5 m3)	number	
2 Shovels, wheelbarrows, picks, etc.*	sets	1
5 Labor	workers/day	10
1 Supervisors	workers/day	10
Uniforms (cotton), gloves, boots	use sets from yard work	
Respirators (NIOSH N95)	not needed for this work	
Covering of cemetery area with clean soil		
1 Bobcat w/operator (per day)	number/day	12
400 Pavers	m2	1
3600 Clean soil	m3	1
3810 Geotextile	m2	1
2 Shovels, wheelbarrows, picks, etc.*	sets	1
4 Labor - install pavers	workers/day	30
10 Labor - install soil	workers/day	30
2 Supervisors	workers/day	30
Uniforms (cotton), gloves, boots	use sets from yard work	
House Cleaning		
6 HEPA vacuums (per unit)	number	1
18 HEPA filters for vacuums	number	1
6 Buckets, sponges, etc. (per team)	set	1
18 Labor (per day per laborer)	workers/day	40
2 Supervision (per day per supervisor)	workers/day	40
48 Uniforms (cotton), gloves, boots	use sets from yard	1
Respirators (NIOSH N95)	not needed for this work	
Support Work		
40 Food for workers	per day	90
40 Bottled water for workers	per day	90
6 Laundry	workers/day	90
1 Wash room use	per week	20
2 or 3 Toilet and shower facilities	per day	90