



इंडियन डेवेलपमेंट सेंटर
INDIAN DEVELOPMENT CENTER

TECHNICAL OPTIONS FOR HANDWASHING FACILITIES

COVID 19



31 March 2020

Cover page image credits: The Guardian

TECHNICAL OPTIONS FOR HANDWASHING FACILITIES

- COVID 19 -

31 March 2020



इंडियन डेवेलपमेंट सेंटर
INDIAN DEVELOPMENT CENTER

DC 18A, Del Court, Jaypee Greens,
Greater NOIDA-201310, Uttar
Pradesh, India

connect@indevcen.org

**Uttar Pradesh State
Resource Center for Waste
Management (SRC)**

4th Floor, Room No. 404 & 403
Local Bodies Directorate, Plot No.
18, Sector 7, Gomti Nagar Extension,
Lucknow- 226010, Uttar Pradesh,
India

Contents

Acknowledgement	ii
Foreward	iii
Introduction	iv
Option 1: Cycle Rickshaw Mobile Handwashing Stations	1
Option 2: Kitchen Bucket/Drum with Stand and Soap Water Dispenser Arrangements.....	3
Option 3: Tippy Tap.....	5
Option 4: Portable Plastic Sink Basin	9
Option 5: Do-It-Yourself (DIY) Foot Pump Powered Portable Handwashing Stations.....	12
Option 6: Handwashing Kiosk/ATM	23
6.1 Type 1: Regular Handwashing ATM	23
6.2 Type 2: Smart Handwashing ATM.....	25
6.3 Low Cost Hand Washing ATM	26
Option 7: ‘Tap Up’ Hand Sink	28
Option 8: Semi-Permanent Fixed Group Hand Washing Facilities for Schools.....	30
8.1 Type 1.....	30
8.2 Type 2.....	33
8.3 Type 3.....	35
8.4 Type 4.....	38
Option 9: Semi-Permanent Mobile Group Hand Washing Facilities for Schools.....	41
9.1 Type 1.....	41
9.2 Type 2.....	44
Option 10: Happy Tap	48
Option 11: Tripod Handwashing Kit	51
Option 12: Water-Efficient Tap and Low-Cost Foaming Soap: The Povu Poa “Cool Foam”	53

Acknowledgement

At the outset, Indian Development Center (IDC) will like to place on record that this document is a compilation of some of the hand washing facilities tried out by different organizations, projects and individuals. IDC team has tried their best to place on record the source of information for the compilation. Inadvertently, if some acknowledgements or reference to the sources are left out, IDC will update the document in the next revision or at the earliest.

We gratefully acknowledge the input of the many individuals who reviewed this document, most importantly Shri Deepak Mehra and Shri Naga Sreenivas. We would like to extend our gratitude to Shri Akhilesh Gautam, Executive Director, Indian Development Center for his constant guidance during the preparation of this document. The collaborative effort of the Indian Development Center (IDC) team to improve hand washing practice by use of various context specific Technical Options of Hand Washing Facilities are presented in this document.



Akhilesh Gautam

Executive Director
Indian Development Center (IDC)

Foreward

Handwashing is a golden practice to maintain personal hygiene amidst pandemic of COVID 19. There are large number of scientific published studies and reports that provide evidence of reduction in disease load by practicing handwashing especially on critical occasions such as after defecation, before handling food and at the start of ingesting food with hands. Our age old practice of allocating left and right hand for different purpose in itself presents as a useful behavior for disruption of germs transmission. However, in background of COVID 19, we need to do more. The handwashing practice is emerging as best disruption of the corona virus spreading further and in that sense is seen in role of a vaccine to protect ourselves and loved ones, just not in our immediate community but for the larger humanity across nations.

I am pleased to see this publication as an excellent compilation of some of the handwashing facilities that have worked elsewhere across communities, projects and organizations. In this time of environmental sanitation and health emergency that has taken a shape of a pandemic we need to build on the knowledge that is already available from elsewhere and establish them in the local context. No matter how optimistic we remain with the hope of this virus going away, we still need to remain protected with handwashing practices in our home, work place, offices and public spaces.

The handwashing practices in public places can-not happen without practical and doable facilities. This publication provides for various technical options that can offer some solutions to establish handwashing facilities in different situation with some local modifications depending on resource, cultural, economic and social contexts.

I would like to place most sincere gratitude to Ms. Priti Gautam, Chief Operating Officer of the Indian Development Center (IDC) for having inspired the idea to urgently place in public domain the cumulative knowledge around technical options for establishing handwashing facilities. A great deal of effort went in to making of this publication by the IDC team for preparing a long list of such handwashing facilities across the world including India and undertake an analysis of each of the facility with regards to its building blocks.

I hope organizations at all levels of their strength including Governments, Departments, Local Authorities including Municipal Bodies and Village level institutions make good use of this publication in propagating science behind establishing handwashing facilities and provide their active contribution to disruption of novel corona virus and save lives and health now, and later when we go back to normal routine. No work is perfect and therefore professional team at IDC will be happy to receive comments and suggestions to improve this publication or in roll out of this publication through implementation.

Introduction

Germs are everywhere! They can get onto our hands and items we touch throughout the day. Washing hands at key times with soap and water is one of the most important steps we can take to get rid of germs and avoid spreading germs to those around us. Good and frequent hand washing is the first line of defense against the spread of many diseases from the common cold to more serious infections, such as meningitis, bronchiolitis, flu, hepatitis A, and most types of infectious diarrhea. Keeping hands clean is one of the most important steps we should take to avoid getting sick and spreading germs to others. Hand hygiene is considered as an important intervention measure for pandemic public health threats, such as severe acute respiratory syndrome and avian influenza hand-hygiene interventions are efficacious for preventing gastrointestinal illnesses, in both developed and lesser-developed countries. Many studies have reported a relationship between improvements in hand hygiene and reductions in rates of infectious illnesses in the community. Hand washing aims to decontaminate the hands and prevent cross transmission (Kaltenthaler 1991; Larson 1995; Rotter 1999).

The challenge is to find effective ways of getting people to wash their hands appropriately. Hand washing may require infrastructural, cultural, and behavioral changes, which take time to develop, as well as substantial resources. This document aims to provide various Technical Options for Hand Washing Facilities. This document shall help the reader to find a context specific solution to ensure handwashing for all.

Option 1: Cycle Rickshaw Mobile Handwashing Stations



Tricycle rickshaw handwashing unit at Nagar Panchayat Piparaich & Mundera Bazaar (District: Gorakhpur)

Cycle Rickshaw Mobile Handwashing Stations are a low cost portable option for hand washing facility. It contains sink and water tank, mounted on a tricycle and water outlet can be connected to nearby drain or greenery. It is attached to a water source preferably to a tank filled with water. Such units enable people to wash their hands anytime, anywhere, as they do not require access to mains water or drainage.

Design (design component, assembly related details):

It is very easy to assemble in a very less time (very simple process), since it does not involve any complex process. It can be used by 4 users at a time, and can be modified for 6 as per requirements.

Application:

- Construction worksites
- Offsite work locations
- Events and festivals
- Gatherings and occasions
- Movie and television shoots
- Weddings and other parties etc.

Raw material/vendors:

Locally available raw material can be used. Tricycle, syntax tank, sink and sink cocks can be procured locally.

Energy Consumption:

Cycle Rickshaw Mobile Handwashing Stations does not involve any energy to operate. They are energy independent.

Operation & Maintenance (O&M):

Cycle Rickshaw Mobile Handwashing Stations involve very low O&M, at the end of the day sink needs to be cleaned.

Tentative cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1	500L Syntax tank	1	3,529	3,529
2	Tricycle	1	12,999	12,999
3	Double bowl Sink	2	2,800	5,600
4	Sink cock	4	237	948
5	Manpower (Plumber)	2	325	650
			Sub total	23,726
7	Miscellaneous (including pipe fittings, sink outlets and other plumbing items)	1		2,373
				26,099/-

Pricing Source: Gem portal, UPPWD SOR

Tentative cost of 1 unit (4 users) = INR 26,099

NOTE: The above assembly can be modified as per user’s requirement, it can be modified to collect waste water (which can be emptied at the end of the day) and can be attached with a soap dispenser.

References:

- Office of the Executive Officer, Nagar Panchayat Piparaich & Mundera Bazaar (District: Gorakhpur)

Option 2: Kitchen Bucket/Drum with Stand and Soap Water Dispenser Arrangements



Simple kitchen bucket handwashing unit

This modal Consist of a plastic bucket with a lid a - plastic turn handle spout, a plastic stool for the bucket to stand on, a plastic receptacle for used water a soapy water bottle is included. Ease of use the physical act of operating the handwashing station facilitates habit formation, and this proved an important technology-associated factor in our case. For women who maintain the home and care for children, adequate capacity was a major determinant in acceptability.

Design (design component, assembly related detail):

Kitchen bucket/drum with stand and soap water dispenser are Easy to Assemble in a very small time and the assembly process is easy.

It contains a Bucket/Drum which is mounted on the top of the stool there is a tap in the Bucket/Drum for water outlet, it can be used by one person at a time.



- Package Contents -50 Litre Bucket With Lid- DIMENISONS-48(D)*60 CM(H)
- Made in India-Food Grade Plastic-100% Virgin (HDPE) Plastic
- Space Saver design & Easy to Clean
- Available in 2 Sizes (32, 40, 50 Litre)& Attractive Colours Blue, Red, Green, Yellow.

Application:

- Used In hiking & tour.
- Small event like birthday party.
- In primary school in villages.
- Used in offices, banks, etc

Raw Material/Vendor:

Locally available raw material can be used. GeM portal, Amazon & other online platform can also be used to procure.

Energy Consumption:

They are energy independent.

Operation & Maintenance Cost (O&M):

Very Low O&M Cost only the sink tub need to be clean regularly when it fill-up

Tentative Cost:

S. No.	Item	No. of Units	Unit Cost	Total Cost
1	Plastic bucket (50 Lit)	1	600	600
2	Plastic sink tub	1	100	100
3	Plastic stool	1	250	250
4	Soap Bottle	1	100	100
5	Tap	1	60	60
Total Cost				1060/-

Pricing Source: IndiaMart.com, Amazon.in, GeM Portal

Tentative cost of 1 unit (1 user) = INR 1060

References:

- <https://images.app.goo.gl/zgsaEtWuVDkB4Bda6>
- Hulland et al.: Designing a handwashing station for infrastructure-restricted communities in Bangladesh using the integrated behavioral model for water, sanitation and hygiene interventions (IBM-WASH). BMC Public Health 2013 13:877.

Option 3: Tippy Tap

Tippy tap is a user friendly way to encourage effective hand washing at a very low cost. It is a hand free device made of locally available materials can used even in the areas where no running water is available. It is operated by a foot lever so as to reduce the transmission of pathogens (especially for the case of Covid19).

Design (design component, assembly related details):

It is very easy to assemble in a very less time (very simple process), since it does not involve any complex process. It can be used by 1 user at a time, and can be modified for as per requirements.

STEP 1: Cut the woods in to required shapes -Cut two branches of wood of approximately 2-meter length, which have a Y-shape at the end. Cut two thinner branches, each of approximately 1-meter length. Attach a piece of string of approximately 1-meter length to one of the sticks.



A typical Tippy-Tap

STEP 2: Mark the hole-Mark the location for the hole on the container, around 12 cm below the cap

STEP 3: Heating the nail-Hold the nail with a pair of pliers, and heat the nail with a lighter.

STEP 4: Making the holes-With the hot nail, make the hole in the container, and a second hole in the cap inserting the rope Put the rope, which is attached to the stick, through the hole in the cap.

STEP 5: Knotting the rope-Make a knot in the rope which cannot pass through the hole.

STEP 6: Putting it together-Screw the cap back on the container. The stick is now connected to the container with the rope.

STEP 7: Making the hole through the soap-Using a screwdriver, make a hole through the soap by slowly rotating and pushing the screwdriver through the soap

STEP 8: Inserting the rope-Put the second piece of rope through the hole in the soap, and tie a piece of wood to it.

STEP 9: Filling the container-Fill the container with water, up to the level of the hole.

STEP 10: Putting the poles in the ground-Using a shovel, put the poles in the ground to a depth of 50cm. The distance should be about 70 cm.

STEP 11: Hanging up the container-Put the stick through the handle of the container, and put the stick between the poles. Adjust the length of the rope such that the end of the stick is about 15cm above the ground

STEP 12: Adding the soap-Tie the rope with the soap to the stick.

STEP 13: Gravel soak away-Between the two poles, below the container, dig a hole of 40 x 40 cm, and 10 cm deep. Fill the hole with gravel. The water soaks away in the hole, and prevents a mud hole from forming. The gravel also keeps mosquitos from breeding.

STEP 14: Using the Tippy Tap-Push the stick down with your foot. This tips the container, which makes water run out of the hole.



Application:

- Construction worksites
- Offsite work locations
- Individual homes
- Events and festivals
- Gatherings and occasions
- Movie and television shoots
- Weddings and other parties etc.

Raw material/vendors:

1. Two wooden branches of 2-meter length, with Y-shaped end.
2. Two thinner sticks of approximate length of 1 meter.
3. A saw to cut the wood.
4. A nail
5. A pair of pliers
6. A lighter
7. A shovel
8. Two lengths of rope (0.5 m and 1 m)
9. A 5-liter container
10. A piece of soap
11. A screwdriver
12. A bag of gravel.

Energy Consumption:

Tippy tap does not involve any energy to operate. They are energy independent.

Operation & Maintenance (O&M):

Tippy tap involves very low O&M; drains should be provided for used water.

Operation and maintenance issues

- Refilling of water
- Height cannot be adjusted once constructed
- Not aesthetic
- Need to provide facility to drain used water
- Container may sway away

Tentative cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1	Rope	1.5 m	10 Rs/m	15
2	Container	5 L	30 Rs	30
3	Soap	1	25 Rs	25
4	Gravel	2 Head span	15 Rs	30
				100/-

Pricing source: Local vendors (Delhi -NCR)

Tentative cost of 1 unit (1 user) = INR 100, excluding labour charge

Reference:

<https://sswm.info/humanitarian-crisis/rural-settings/hygiene-promotion-community-mobilisation/important/simple-handwashing-devices>

Option 4: Portable Plastic Sink Basin

Set up a portable hand washing station without plumbing! Encourage hand washing habits and help keep everyone healthy while meeting licensing requirements. The water pump has a flow



Typical portable handwashing sink

rate of up to half a gallon per minute. The tank for the non-potable clean water holds five gallons while the waste water tank holds six gallons. There is a catch tray under the tanks. Mistake-proof connectors means the clean and wastewater tanks cannot be inadvertently switched. Plastic and Stainless Steel sinks are approximately 5" deep. Power switch inside the cabinet and openings for cord management.

Design (design component, assembly related details):

It is very complex and require technical knowledge to assemble this kind of washing station. It can only be used by single person at a time. Water holding capacity is less so it requires frequent emptying & refilling of water container It is suitable for small households and can't be used at community level.

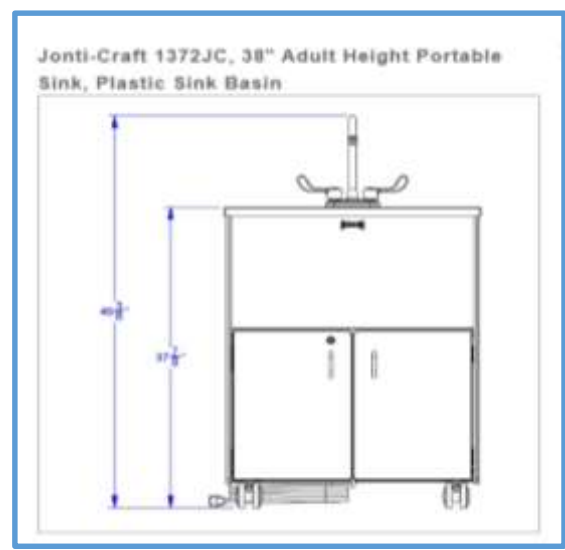
Plastic Basin Measurements: Length (Front to Back): 9-3/8", Width (Left to Right): 13-1/4", Depth 4- 5/8"

Application:

- Individuals.
- Small household level.
- Portable hand washing sink can be used for indoors as well as for outdoors handwashing purposes. It easy to move from one place to another.

Raw material/vendors:

Height:	38"
Width:	28.5"
Depth:	23.5"
Material:	Birch Plywood w/ UV Acrylic
Finish:	Birch
Basin	Plastic
Clean Water Capacity:	5 gallons
Waste Water Capacity:	6 gallons
Limited Warranty:	1 Year
Frame Construction:	Laminate
Maintenance	High



Energy Consumption:

Portable hand washing sink is energy dependent for watering. Only be installed with availability of electricity.

Operation & Maintenance (O&M):

Portable handwashing sink requires high operation and maintenance cost. As technical assistance is required for its installation and maintenance.

Tentative cost:

These portable sinks and wash basins are mostly used in foreign countries. In India no company manufactures these kind of sinks.

Tentative cost of 1 unit (multiple users, depending on the choice of design) = INR 1,14,090

References:

- <https://www.portablehandwashing.com/Jonti-Craft-1372JC-38-Adult-Height-Portable-Sink- p/1372jc.html>

Option 5: Do-It-Yourself (DIY) Foot Pump Powered Portable Handwashing Stations



*Various types of foot pump powered hand washing stations collated from various sources.
Source: Scroll.in (top left) Toppla Group (top right),Instructables.com(bottom three)*

A simple activity such as a hand wash using soap and washes diminishes the risk of bacteriological and viral infections of various types; but it is proportional to ease of availability and affordability of a handwashing facility. It can be easily inferred from the data on cases of diarrheal disease and respiratory infections that handwashing in infrastructure-restricted communities are actually very low. Portable handwashing stations are dedicated and appropriately located stations where handwashing can be performed. These shall result in improved handwashing practices. (Hulland et al., 2013)

Design (design component, assembly related details):

The design of any type of portable handwashing unit shall be such that it is light weight and consist of a smaller number of parts so that is easy to transport and assemble. There must be handle or grooves to allow one person to lift, place and assemble it. The uses of roller wheels must be avoided as it may lead to slippage during use.

DIY Construction steps (As stated on Instructables.com):

Step 1: Fresh Water Bucket

Make a 3/8" dia hole about 1" from the bottom of the bucket that will be kept at the base to store fresh water.



1. Now place the male portion of the 3/8" 90 degree brass fitting though the hole created the previous step from the inside.

(Place an O-ring on the inside of the bucket at the base of the 90 degree fitting before pushing it though the bucket wall (Photo 2). When the fittings are tightened the O-ring will seal the hole in the bucket.)

2. The female end of the 3/8" barbed hose fitting shall be placed from outside of the bucket.

3. Now screw the second male barbed hose fitting inside the fresh water bucket. It shall look like a 90 degree. (Photo 3)

4. Rotate the open end of the second male hose fitting so that it touches the base of the bucket. (photo 3) This will help to utilize all the water in the bucket and reduce refilling frequency.

Alternate Construction: It is not necessary to make a hole in the bucket for this hand wash station. Instead of making holes in the bucket, cuttings could be made in the lid. Just make sure to do the cutting carefully

so that grey water bucket easily sits on top on this. By doing so, we can save a lot on the brass fittings as well. But the disadvantage is that the pipe may not always stay in the bucket and may pop out.

Step 2: Basin



The basin is that part of this unit that facilitates the user in various ways while assuring no visibility of what's going on inside the bucket assembly. It is not vital to the system but its advantages are many.

Firstly, it is a cover for the Grey Water Bucket. It ensures that the user doesn't have to see the soapy and dirty grey water left over there by the previous user while hand washing. One very important function that a basin does is that it does not allow the existing grey water to splash back at the user.

It also prevents spilling and splashing of water from hands to pants while handwashing due to its high walls.

Because the Basin sits almost entirely above the grey water bucket it does not compromise the storage capacity of the grey water bucket. This allows the grey water bucket to be emptied only when the fresh water bucket is empty.

The basin also helps in increasing the height of the entire system so that the user doesn't have to bend much.

Step 3: Basin Construction - the Bottom

The Basin is constructed by using the upper part of the 3rd bucket and its bucket lid.

Cropping the Outer Rim of a lid creates a trimmed base for the basin.

1. First step is the removal of the rubber seal from lid.

2. Trim along the bottom of the trench where the seal was fitted earlier. (see dotted path in Photo 2) . Trim along the circumference of the lid so that the outer rim could be separated. (Photo 2 & 3 shows where to cut)

3. Once you are done with the outer rim cutting exercise, smoothing of the outer diameter outer diameter of the lid by trimming any excess material is required. This is done to ensure that outer diameter of the lid is flush with the Upstanding Rib Wall.

When complete the overall lid diameter should not extend beyond the Upstanding Rib Wall.



Step 4: Basin Construction - Join the Side Wall & Bottom

In a nutshell, the basin is nothing but a cut portion of a bucket with a hole at the centre to allow drainage into grey water bucket.

The cut off lid part from the previous step, added as a bottom to the cut off top portion of another bucket, creates a shortened bucket Basin.

1. Cut-off the top rim portion of the third bucket. The size of the cut should be about three quarters of an inch further of the last flange on the bucket. The cut out upper portion of a bucket acts as the side wall for our basin.

2. Fit the cut out Lid from previous step into the side wall of the basin.

3. From the underside of the side wall of the basin, make sure the Upstanding Rib Wall on the trimmed lid is flush with the bottom of the Basin Side Wall. (photo 2)

4. Drill four 1/8" diameter holes through the Upstanding Rib Wall on the Trimmed lid and the Basin Side Wall. Drill one hole in all 4 directions/quadrants.

5. Use pop-rivets made of aluminium or any available metal (with washer) to secure these two components through the four drilled holes.

Note that it is not necessary for the interface between the trimmed lid and the side wall of the to be a full waterproof seal. Because anyways the grey water will pour into the designated bucket below.

Step 5: Foot Pump

The pump is made from a marine (outboard motor) fuel line primer squeeze bulb. The hose and bulb (with integral check valve) could be purchased as a total assembly from a sporting good / hardware store that sells marine supplies for outboard motors.

The pedal assembly was made using some scrap wood, a door hinge, wood dowels, and a foam rubber toy ball (smiley ball/foam stress ball).



The dowels are stuck into holes of the wooden base by glue. These allow the bulb to move up and down freely when pumped. The top of the dowels shall be left open installation during use and storage after use is easy.

The function of the foam rubber ball is to prevent and reduce wear and tear of the rubber squeeze bulb.

The ball was cut in half and epoxied into a recess on the underside of the pedal. The recess was cut with a hole saw drill bit and then the material inside the hole saw cut was chiselled out.

Step 6: Support Table

The wider deck of the table provides stability for the two buckets. A nearly filled Grey Water Bucket stacked on top of a nearly empty Clean Water Bucket can be a bit of a top heavy tip hazard on uneven ground.



If required, based on the height of the table the clean water bucket could be kept a few inches above the ground. This reduces the impact to ground cover when compared to a bucket sitting directly on the ground for an extended period of camping.

A soap solution bottle/soap could be kept on the deck flange of the table. Items like wrist watches, mobiles or any other item held in hand can be placed here while washing hands.

The table is not necessary if it is adding a lot to the budget.

Step 7: Spout Riser



One main purpose of the support table is to stabilise the attachment of spout riser. In absence of the table a vertical rod/bamboo could be used for this purpose. The Spout Riser is a combination of 1" dia. and

1/2" dia. galvanized pipe sections threaded together and attached to the support table. If these items are not available, or are costly, then simple PVC pipes could be used with joints assembly to give it a shape of a tap.

The galvanized pipes that make up the Spout Riser threads into a plumbing mounting flange attached to the table.

Step 8: Spout

The Spout is formed from an automotive steel fuel/brake line. (purchased as a generic 4' section at the local auto supply store)

1. Bend it into a 180-degree cane shape.

The diameter of the bend should be 1/2 diameter of the bucket. This will position the Spout nozzle over the hole in the bottom of the Basin.

Note: The flared end of the brake line adds a finished look to the open "Nozzle" end of the Spout.

2. Slide a 2" section of clear hardware tubing onto the other end of the Spout.

3. Slide a 1/2" to 3/8" galvanized reducer fitting on the Spout.

4. Then slide about a 24" length of tubing onto the Spout.

The reducer fitting will be trapped in location on the Spout by the two sections of tubing; yet free to spin and thread onto the Spout Riser.

Note: The contact area of several inches of tubing "sleeved" over the bottom end of the Spout, and the low pressures involved, means a clamp is not required to retain the tubing or to prevent leaks at this joint.

5. Feed the Spout, and Tubing Assembly down through the Spout Riser pipes and thread the reducer fitting onto the top of the 1/2" Spout Riser Pipe.



Step 9: Connect the Pump



After the spout and pipe feeder are placed in spout riser pipes, the clear tube is to be attached to the squeeze bulb pump.

The reason there are two sections of tubing is so that the unit can be disassembled for storage. The upper clear tubing remains attached to the Spout as a friction fit. There is no room for a clamp inside the smaller diameter upper Spout Riser pipe so the serviceable connection is made under the support table.

Step 10: Storage after use



Note: Each of the components - Pump, Pedal, two sections of Spout Riser pipes and the Spout and Tubing Assembly are sized to fit within the height of the bucket for storage.

- Everything is stored inside the Grey Water Bucket.

- This bucket fits inside the Fresh Water Bucket

(The brass fittings in the Fresh Water Bucket are mounted low enough that they do not prevent the buckets from nesting fully together.)

- The Basin fits inside the top of the Grey Water Bucket

(the 1/2" pipe portion of the Spout Riser fits through the drain hole in the Basin)

The Fresh Water Lid fits on top of the Basin to close everything up.

Application:

It finds wide application at sites where space per unit is less, and multiple units are required at multiple places.

For e.g.:

1. Bus stands
2. At pedestrian crossing and roadside public transport boarding area like Auto stand
3. Entry points of offices
4. Outside homes
5. Guard huts/checkpoints of apartment complexes and societies
6. Entry and exit points of public area such as parks
7. Parking areas
8. Camping sites
9. Home backyards

Kigali, Rwanda



Rwandan capital city of Kigali has made it mandatory for all public transport commuters to wash their hands before boarding. Above is the setup at a bus station in Kigali wherein it can be seen that many foot pump powered hand wash stations have been placed all around the bus station.

Raw material/vendors:

The central components of this project are 25 liter buckets with lids and a marine (outboard motor) fuel primer squeeze bulb and hose assy.

The Squeeze Bulb is the pump that moves the water from the Fresh Water Bucket up to the Spout and out, collected and funneled by the Basin into the Gray Water Bucket the rest is just plumbing and support. Major Components are as follows:

- 25 litre utility buckets
- 25 litre bucket lids
- Marine fuel primer bulb and hose assembly
- 3/8" brass fittings
- Rubber O-ring
- 3/8" tubing
- various 1" and 1/2" plumbing pipe sections and fittings
- Automotive steel fuel/brake line

- Door hinge
- Scrap wood

Energy Consumption:

One main feature of this is that it is 'Human powered'. The foot pump works on the principles of fluid mechanics. Pressure generated at the foot pump unit pushes water from clear water tank to the wash basin/sink. It does not require any electrical energy to function.

Operation & Maintenance (O&M):

Owing to simple parts, its O&M is easy. Even replacing parts is cheaper.

Tentative cost:

Design Option 1: High cost model

S. No	Item	No. of Units	Unit Cost (Rs)	Net Cost
1.	25 liter utility buckets with bucket lids	3	250	750
2.	Marine fuel primer bulb and hose assembly	1	1,000	1,000
3.	3/8" brass fittings	1	250	250
4.	Rubber O-ring	1	27	27
5.	3/8" tubing	3 meters	100	100
6.	various 1" and 1/2" plumbing pipe sections and fittings	1 set	500	500
7.	Automotive steel fuel/brake line	1	2,000	2,000
8.	Door hinge	1	25	25
9.	Scrap wood	As per requirement	50	50
10.	Old small table [not necessarily required]	1	200	200
Total				4,902

Pricing Source: Amazon.in, Indiamart.com, Flipkart.com

Tentative cost of 1 unit (1 user) = INR 4,902

Design Option 2: Low cost model

S.No	Item	No of Units	Unit cost (Rs)	Net Cost
1.	25-liter utility buckets with bucket lids	3	250	750
2.	Marine fuel primer bulb and hose assembly	1	1,000	1,000
3.	Rubber O-ring	1	27	27
4.	3/8" tubing	10 meters	300	300

5.	various 1" and 1/2" plumbing pipe sections and fittings	1 set	500	500
6.	Door hinge	1	25	25
7.	Scrap wood	As per requirement	50	50
Total				2,652/-

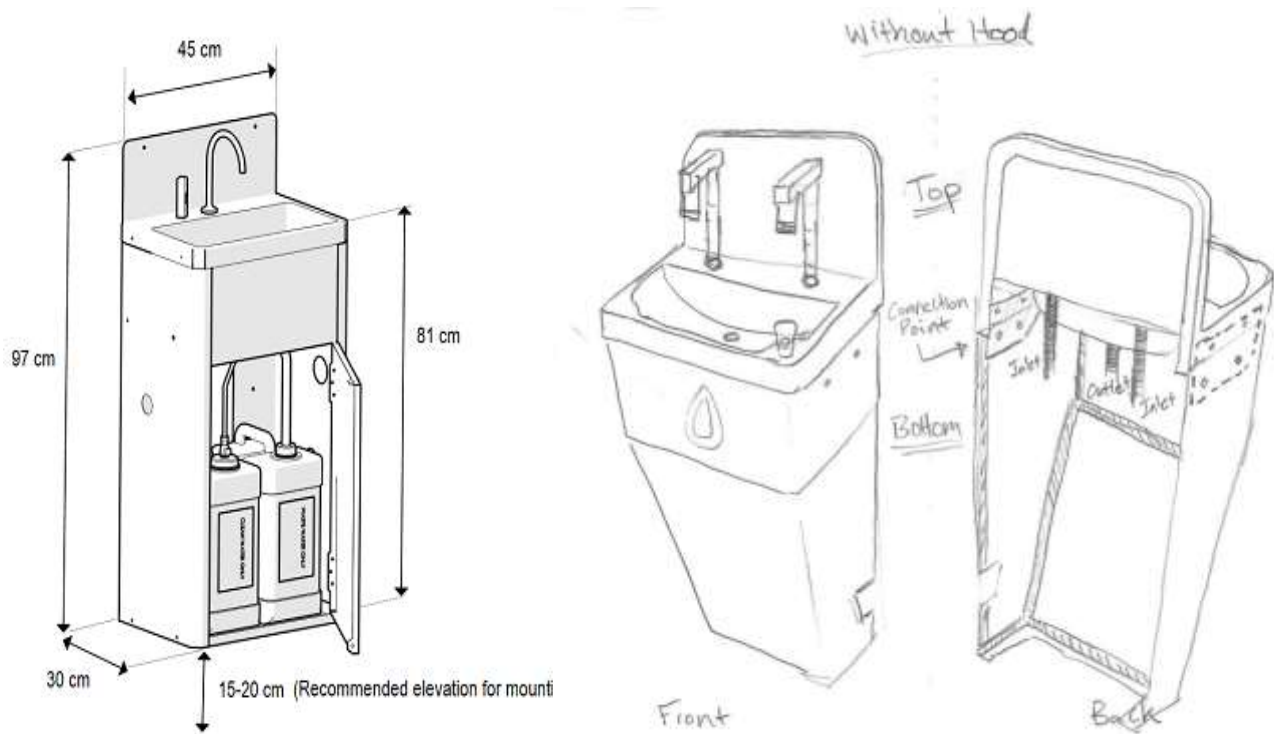
Pricing Source: Amazon.in, Indiamart.com, Flipkart.com

Tentative cost of 1 unit = INR.2652

References:

- Hullah *et al.*: **Designing a handwashing station for infrastructure-restricted communities in Bangladesh using the integrated behavioral model for water, sanitation and hygiene interventions (IBM-WASH)**. *BMC Public Health* 2013 **13**:877.
- Instructables.com; **Field Sink : 13 Steps (with Pictures)**, (accessed 30 March 2020) [<https://www.instructables.com/id/Field-Sink/>]

Option 6: Handwashing Kiosk/ATM



A typical and washing kiosk/ATM

Washing your hands regularly is one of the first things that will be on the priority for public health and hygiene around the world. In outlining “basic” measures in protecting oneself against the new virus, the WHO’s first tip is to “wash your hands frequently”. Soon it will be on priority projects to accomplish the health hygiene like sanitation.

6.1 Type 1: Regular Handwashing ATM

The handwashing kiosk or ATM is a concept of introducing a behaviour change about washing your hand frequently despite of wherever you are. This handwashing kiosk or ATM act like a community toilet and public toilet which will be convince to everyone from everywhere.

Design (design component, assembly related details):

The Sink is entirely self-contained (no plumbing required). It draws its water supply from a 10L, refillable freshwater tank located inside the unit and dispels the waste water into a completely separate 10L waste water tank also located within the unit.

It is constructed entirely from food grade stainless steel and features an inbuilt splashback, large 11 Litre bowl capacity and options for mains water connections. The unit delivers a timed, 10 second, hot water rinse (40-45°C) and is capable of delivering 50 hand washes per filling. It also has a push button for a cold-water rinse.

Application:

The kiosk is utilized across all types of permanent and semi-permanent spaces like Commercial Food Service Operations including Café's, Restaurant's, Kiosk's, Pop-up's and Home Food Businesses, on road sites like public toilets, parks, markets.

Raw material/vendors:



Fabrinox sinks is committed to achieving handwashing hygienically and also help in water conservation. A brand of Fabrinox Potnis India Pvt.Ltd. who's manufacturing plant is located in Pawane MIDC, Navi Mumbai, India. Fabrinox manufactures International standard knee operated and foot operated hand wash sinks and hand wash stations.

Energy Consumption:

The hand washing kiosk or ATM is essentially energy or solar power dependent because of the water filters provided at bottom chambers.

Operation & Maintenance (O&M):

The hand washing ATM needs moderate maintenance as it requires to change water filters and sometime changing or replacing of electric wires attached to it.

Tentative cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1	Hand washing ATM (full-including all item)	1	38,500	38,500/-

Pricing Source: Fabrinox Potnis India

Tentative cost of 1 unit (1 user) = INR 38,500

6.2 Type 2: Smart Handwashing ATM

The handwashing kiosk or ATM is a concept of introducing a behaviour change about washing your hand frequently despite of where ever you are. This smart handwashing kiosk or ATM act like an automotive hand washing machine which can be used at special designed places.

Design (design component, assembly related details):

The design is of casing SUS 304/ painted metal plate with size 580x580x1760 mm. It is an automatic hand washing machine with air velocity of 25m/s and air flow duration of 25seconds. The average noise of the machine is 65DB. The whole machine is English control panel with customized setting and size.

Application:

The automatic kiosk or ATM is specially designed for utilizing across all types of permanent spaces like Commercial Food Service Operations including Café's, Restaurant's, Kiosk's, Pop-up's and Home Food Businesses, markets, malls etc.



Raw material/vendors:

Waway equipment is the brand who manufacture this smart hand washing machine. It is internationally exported having a base station in Shenzhen, China.

Energy Consumption:

This hand washing kiosk or ATM is highly dependent on electric energy having an electric consumption of 220 V 50 HZ / 2KW.

Operation & Maintenance (O&M):

This smart hand washing ATM needs high maintenance as it fully automatized and complexed controlling panels.

Tentative cost:

S.No.	Item	No. of Units	Unit Cost	Net Cost
1	Fully automated hand washing ATM (full-including all item)	1	1,50,000-2,00,000 /-	1,50,000-2,00,000 /-

Pricing Source: Waway Equipment

Tentative cost of 1 unit (1 user) = INR 1,50,000 – 2,00,000

6.3 Low Cost Hand Washing ATM



The handwashing kiosk or ATM is a concept of introducing a behaviour change about washing your hand frequently despite of where ever you are. This low cost handwashing kiosk or ATM is specially designed for easy to use easy to access in an emergency basis.

Design (design component, assembly related details):

The design of the ATM comes in two types one with self-contained (no plumbing required) and which requires water inlet plumbing connection. In self-contained type it draws its water supply from a 10L, refillable fresh water tank located inside the unit and dispels the waste water into a completely separate 10L waste water tank also located within the unit.

It is constructed entirely from plastic and features an inbuilt splashback, large 11 Litre bowl capacity and options for mains water connections. The unit is capable of delivering 50 hand washes per filling.

Application:

The low cost kiosk or ATM is specially designed for semi-permanent spaces like Sabzi mandi, markets, road side like public toilets, parks.

Raw material/vendors:

Life Buoy is a brand who manufacture this low cost hand washing kiosk. Lifebuoy is based in India.

Energy Consumption:

This hand washing kiosk or ATM is independent from electric energy.

Operation & Maintenance (O&M):

This hand washing ATM needs very low maintenance and it is easy to use and access.

Tentative cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1	Sink	1	750	750
2	Faucet	1	100	100
3	10 Lit bottle	2	100	200
4	Plastic sheet	1	4,000	4,000
TOTAL				5,050

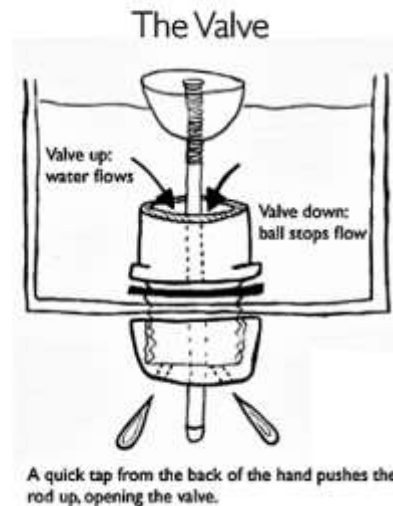
Pricing Source: Lifebuoy

Tentative cost of 1 unit (1 user) = INR 5,050

References:

- <https://www.transplumb.com/products-1/food-services-portable-sinks/permanent-1/commercial-sink>
- <https://cleanroom-solution.com/hand-wash-basin/>
- <http://fabrinopotnisindia.com/sinks/>

Option 7: 'Tap Up' Hand Sink



Original Andy Handy sink, Self-constructed 'Tap up' sink and valve. Source: SUSANA (2009) and DANIELSSON and LIPPINCOTT (2012)

A bucket with a valve at the bottom can also serve as a hand sink. The 'tap up' hand sink was developed by Mathew Lippincott for outdoor festivals in the Pacific Northwest of the US in 2011. It is based on a Finnish design called the Andy Handy. The Andy Handy costs about \$ 40 USD/ INR 3000 and can be ordered from Finland. However, the 'Tap Up' sink can easily be constructed on one's own.

This hand sink is a simple option for food prep, eating, and first aid areas, as well as around restrooms. This bucket system is easy to fill and empty and can be made with any two similarly sized buckets. We recommend coupling this sink with a foaming soap dispenser. Foam does not require water to lather up, generating significant water savings.

Design (design component, assembly related details):

There is no specific design to tap up hand wash as this needs only 2 buckets and a location where it can be setup. 25 litres of water provides a minimum of 32 uses. Hand washing with the Tap Up requires about a half cup of water. Four or more holes for the water spray allow for more effective hand washing. Can be built and repaired with locally available materials and amateur building experience.

Application:

The hand sink is useful for promoting hygiene in situations without running water.

Raw material/vendors:

Since two buckets and some tools to make a hole is needed so we don't require any vendor for it and it can be made by self.

Energy Consumption:

It is not dependent on any kind of Energy source.

Operation & Maintenance (O&M):

The container needs frequent refilling. Leaks can be repaired by means of tape or other sealing material.

Tentative cost:

S. No	Item	No. of Units	Unit Cost	Net Cost
1	Bucket	2	250	500
2	Jute rope	2 Meter	10/m	20
3	Valve	1	200	200
4	Leak proofing agent	1	20	20

Pricing Source: Local Vendors (Delhi-NCR)

Tentative cost of 1 unit (1 user) = INR 740

Reference:

- <https://sswm.info/humanitarian-crises/rural-settings/hygiene-promotion-community-mobilisation/important/simple-handwashing-devices>

Option 8: Semi-Permanent Fixed Group Hand Washing Facilities for Schools



8.1 Type 1

This is a semi-permanent fixed type of hand washing facility designed for few to large number of group of persons. Such type of facilities can be installed in a moderate to large outdoor spaces. Life of hand washing station is around 3-5 years.

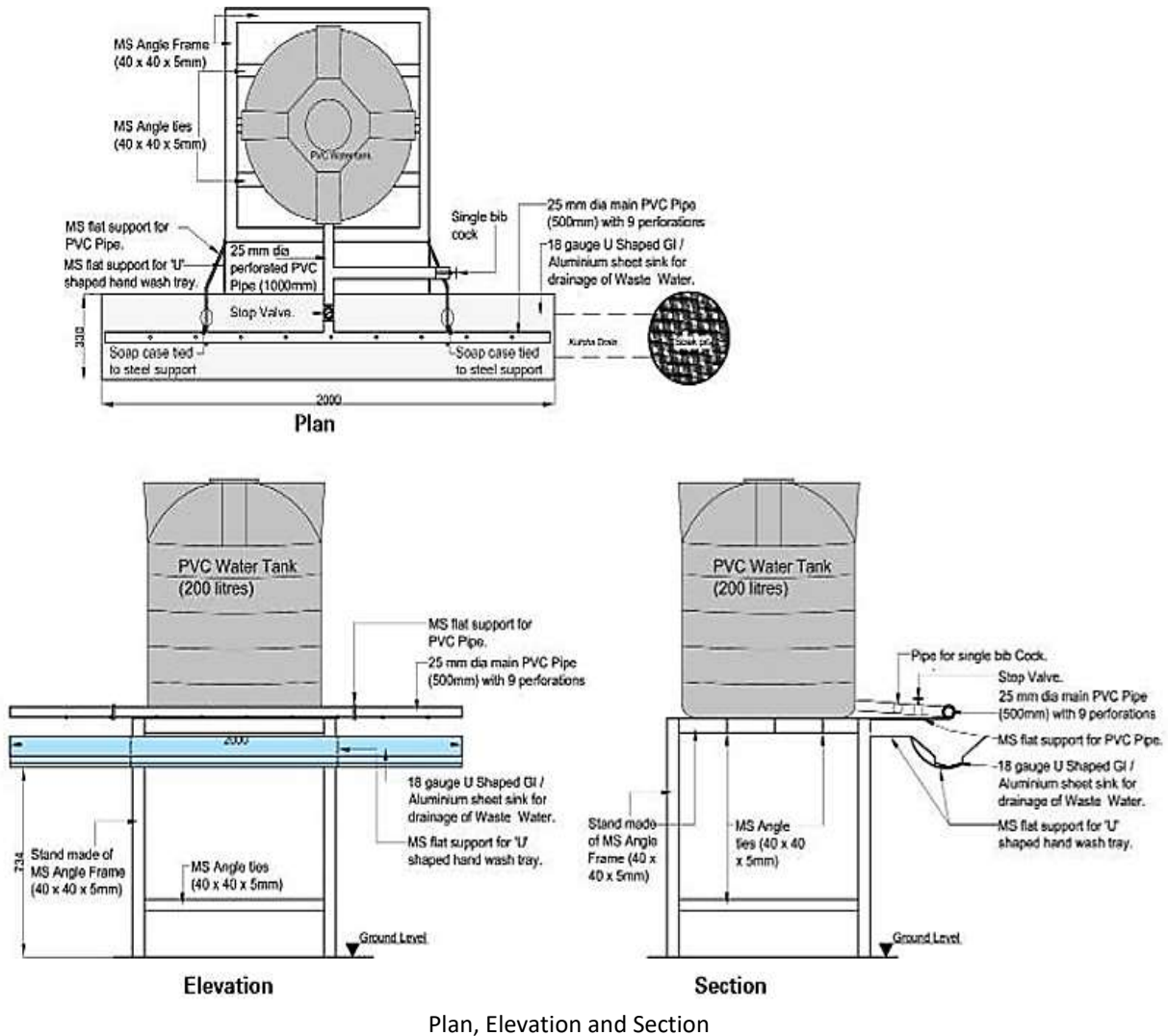
Design (Design Component, Assembly Related Details):

Design structure of this facility includes, perforated PVC pipe attached with PVC tank of 200 L capacity. Folded galvanized sheet is used as a drain tray over metal support. Water in the installed tank can be taken from the tube well manually without requiring any electric power. Water outlet is connected to the soak pit, next to the hand wash unit, which is surrounded by bamboo security fencing. Chances of vandalism of such facilities in outdoor spaces are low to moderate.

Lower Primary School, Huzuripara Village, Assam, India

This type of hand washing facility is installed in the lower primary school in Huzuripura villages, to maintain good hygiene. 9 hand washing points have been provided to cater 52 students of the school. It has been installed in the year 2013, using the locally available material.





Plan, Elevation and Section

Application:

1. Schools
2. Bus stands,
3. Railway stations,
4. Market areas,
5. Outside of religious places
6. Any other Public places such as parks, playgrounds etc.

Raw Material/Vendors:

Raw materials used for the installation of this facility can be easily available in the local market. The unit can be dismantled and assembled again, under adult supervision. Technical supervision required in fabricating the design.

Energy Consumption:

As the height of the tank is not much, one can easily pour the water into the tank without requiring any electro-mechanical energy. So, it is independent of any energy consumption.

Operation & Maintenance (O&M):

Requires reasonable operation and maintenance.

Tentative Cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1.	25 mm dia. PVC pipe with 9 perforations (500 mm)	1	100	100
2.	25 mm dia. Perforated PVC pipe (1000 mm)	1	200	200
3.	18 gauge U shaped GI/Aluminum sheet sink for drainage of waste water (350 mm x 2000 mm)	1	300	300
4.	Single BIB cock	1	170	170
5.	Stand MS Angle frame (40x40x5 mm)	1	360	360
6.	Stand MS Angle T (40x40x5 mm)	1	180	180
7.	PVC water tank (200 L)	1	1,225	1,225
8.	Soak Pit	1	5,185	5,185
9.	Manpower	1 skilled 1 unskilled	408 350	758
10.	Miscellaneous	-	1,000	1,000
Total				13,108/-

Pricing Source: India Mart Portal

Tentative cost of 1 unit (multiple users based on length & design): INR 13,108 to 14,000

8.2 Type 2



This is a semi-permanent fixed type of hand washing facility designed for few to large number of group of persons. Such type of facilities can be installed in a very small to moderate outdoor spaces. Life of hand washing station is around 3 years.

Design (Design Component, Assembly Related Details):

Design structure of this facility includes, perforated PVC pipe connected to PVC tank, of capacity 30 L, with stone and concrete tray below. This stone and concrete tray acts as a drain channel. Water in the installed tank can be taken from the tube well/hand pump manually, as and when required, and can be filled into the tank without requiring any electro-mechanical power. Waste water, as per the need, from the outlet can be disposed off into open ground, flower bed, trench, drains or soak pit. Chances of vandalism of such water tank unit in outdoor spaces are high.

Government Primary School, Tanpur, Madhya Pradesh, India

This type of hand washing facility is installed in the Government primary school in Tanpur villages of MP, to maintain good hygiene. 12 hand washing points along with two soap cases have been provided and it is catering to 134 children. It has been installed in the year 2013, using the locally available material.



Application:

1. Schools
2. Outside of religious places
3. Any other Public places such as parks, playgrounds etc.

Raw Material/Vendors:

Raw materials used for the installation of this facility can be easily available in the local market. The unit can be dismantled and assembled again, by children. It is simple in design and construction. It promotes face to face peer learning.

Energy Consumption:

As the height of the tank is not much, one can easily pour the water into the tank without requiring any electro-mechanical energy. So, it is independent of any energy consumption.

Operation & Maintenance (O&M):

Requires low operation and maintenance. Operation and maintenance is required for the joints leak due to frequent assembly and disassembly.

Tentative Cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1.	75 mm thick, 300 mm wide brick support for tray	1	974	974
2.	Closed end PVC pipe of 40 mm Dia. (4000 mm)	1	500	500
3.	Brick peer to keep elevated PVC tank (600 mm width x 600 mm x 800 mm)	1	1,000	1,000
4.	Control valves	12	189	2,268
5.	PVC water tank (30 L)	1	300	300
6.	Manpower (1 skilled and 1 unskilled)	1 skilled 1 unskilled	408 350	758
7.	Miscellaneous	-	1,000	1,000
Total				6,800/-

Pricing Source: India Mart Portal

Tentative cost of 1 unit (multiple users based on length & design): INR 6,800 to 7,800

8.3 Type 3



This is a fixed type of hand washing facility designed for group of large number of persons. Such type of facilities can be installed in a sufficient outdoor space. Life of hand washing station is around 5 years.

Govt. Schools from Uttar Pradesh and Maharashtra, India

This type of hand washing facility is installed in the Government schools from Uttar Pradesh and Maharashtra, to use it before the mid-day meal in the school. It is ensuring good hygienic conditions. 8 to 12 hand washing points along with three to four soap cases have been provided and it is catering to 160 children. It has been installed in the year 2014, using the locally available material.



Design (Design Component, Assembly Related Details):

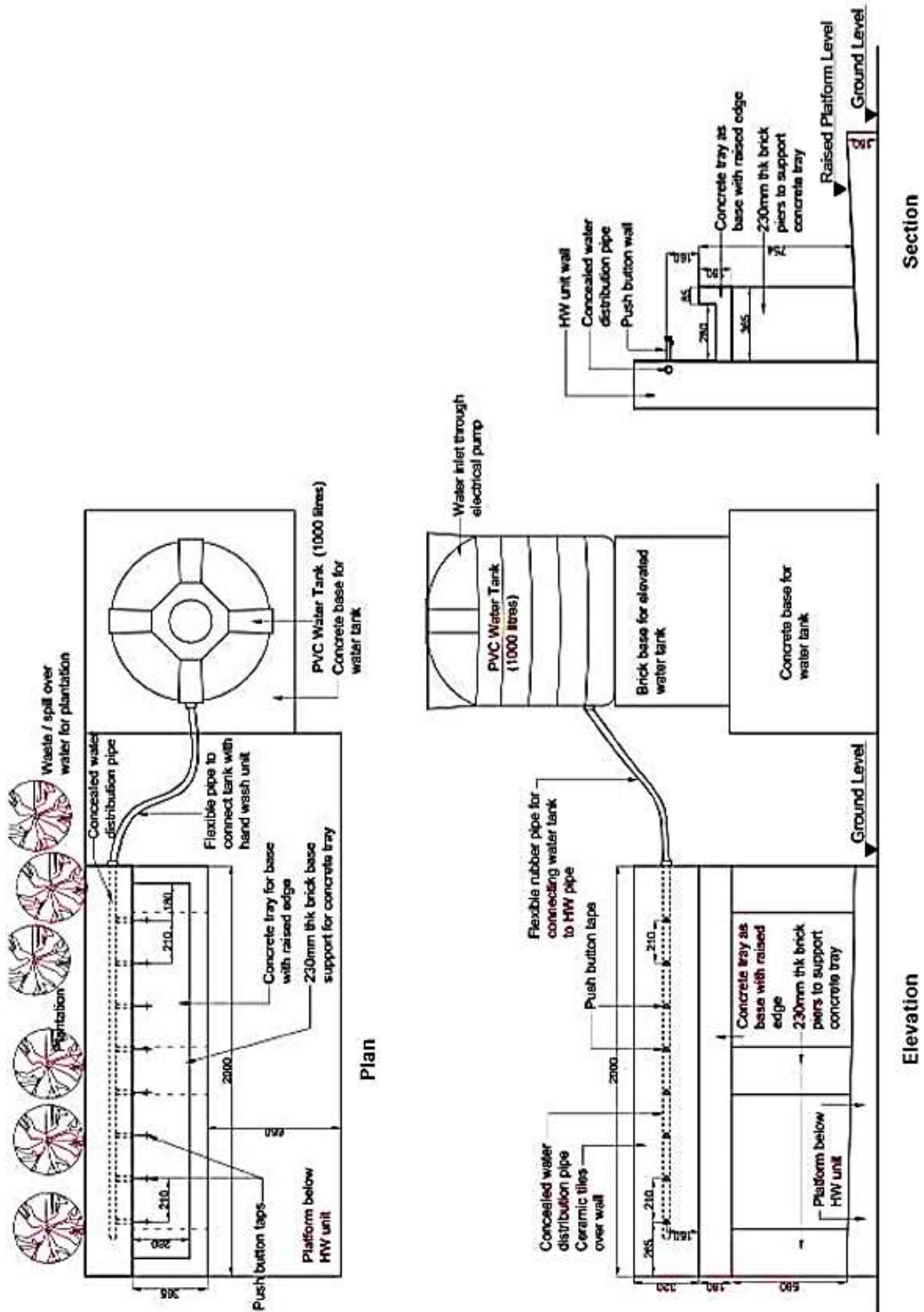
Design structure of this facility includes, taps on wall, connected with PVC tank of capacity 1,000 L, with concrete drain tray. Hand washing can be operated and used from single side. This stone and concrete tray acts as a drain channel. Water in the installed tank can be taken from the hand pump/bore well, using electric motor having power 2-3 Hp., and can be filled into the tank. Wastewater, as per the need, from the outlet can be disposed off into open ground, flower bed, trench, drains or soak pit. Chances of vandalism of such water tank unit in outdoor spaces are low.

Application:

1. Schools
2. Bus stands,
3. Railway stations,
4. Market areas,
5. Outside of religious places
6. Any other Public places such as parks, playgrounds etc.

Raw Material/Vendors:

Raw materials used for the installation of this facility can be easily available in the local market. The unit can be dismantled and assembled again, under adult supervision. Technical supervision is required during construction of the design.



Energy Consumption:

As it is installed on some height, one can require electro-mechanical energy. Motor with power of having 2-3 Hp is sufficient to pour water in to the water tank. So, it is dependent of energy consumption.

Operation & Maintenance (O&M):

Requires moderate operation and maintenance. Operation and maintenance is for the maintenance and replacement of pipes, if corroded, and for the leakages from the joints; due to frequent assembly and disassembly.

Tentative Cost:

S. No.	Item	No. of Units	Unit costs	Net Cost
1.	Raised platform 150 mm height	1	330	330
2.	230 mm thick brick peer to support concrete tray (500 mm height)	1	900	900
3.	Brick base for elevated water tank (600 mm width x 600 mm x 800 mm)	1	1,000	1,000
4.	Control valves	16	189	3,024
5.	PVC water tank (1000 L)	1	7,000	7,000
6.	Manpower	1 skilled 1 unskilled	408 350	758
7.	Miscellaneous	-	2,000	2,000
Total				15,012 /-

Pricing Source: India Mart Portal

Tentative cost of 1 unit (multiple users based on length & design): INR 15,012 to 18,225

8.4 Type 4



This is a fixed type of hand washing facility designed for four number of persons. Such type of facilities can be installed in a low to moderate outdoor spaces. This can be mounted anywhere and does not need any big spaces. Life of hand washing station is up to 5 years.

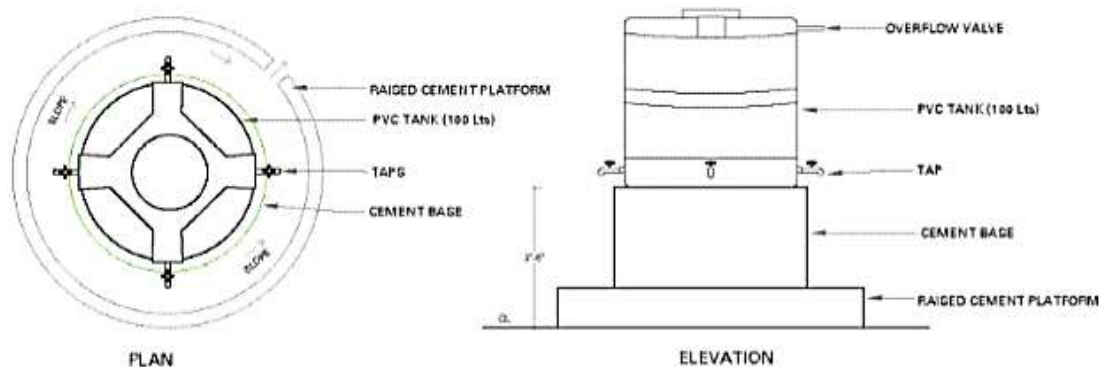
Primary School Jamalpur Village, Uttar Pradesh, India

This type of hand washing facility is installed at primary school in Jamalpur village of U.P. It is being used before the mid-day meal in the school for ensuring good hygienic conditions. Four hand washing points along with two soap cases have been provided and it is catering to 83 children. It has been installed in the year 2014, using the locally available material.



Design (Design Component, Assembly Related Details):

Design structure of this facility includes, the water tank of capacity 100 L which is situated on a raised platform with a cement base. There are four outlets/ taps in the tank. The number of taps can also be marginally increased depending upon the requirement. This raised platform of cement concrete acts as a drain channel. Water in the installed tank can be taken from the tube well/hand pump manually, as and when required, and can be filled into the tank without requiring any electro-mechanical power. Waste water, as per the need, from the outlet can be disposed off into open ground, flower bed, trench, drains or soak pit. Chances of vandalism of such water tank unit in outdoor spaces are low.



Application:

1. Schools
2. Bus stands,
3. Railway stations,
4. Market areas,
5. Outside of religious places
6. Any other Public places such as parks, playgrounds etc.

Raw Material/Vendors:

Raw materials used for the installation of this facility can be easily available in the local market. The unit can be dismantled and assembled again, under adult supervision. Technical supervision is required during construction of the design.

Energy Consumption:

The water tank can be easily filled up especially if a smaller sized tank is used and does not require any electro-mechanical energy.

Operation & Maintenance (O&M):

Requires moderate operation and maintenance. Operation and maintenance is for the maintenance and replacement of pipes, if corroded, and for the leakages from the joints.

Tentative Cost:

S. No.	Item	No. of Units	Unit Costs	Net Cost
1.	Raised platform 150 mm height	1	330	330
2.	Cement concrete base for elevated water tank (800 mm height)	1	1,000	1,000
3.	Control valves	4	189	756

4.	PVC water tank (100 L)	1	700	700
5.	Manpower	1 skilled 1 unskilled	408 350	758
6.	Miscellaneous	-	1,000	1,000
Total				4,544 /-

Pricing Source: India Mart Portal

Tentative cost of 1 unit (multiple users based on length & design): 4,544 to 6,000

References:

- Benzian, N. S. (2016, 10 10). *FIT RESOURCES*. Retrieved from Fit for School International: http://www.fitforschool.international/wp-content/ezdocs/giz_unicef_Catalogue_WashingFacilities_FINAL_WEB_new.pdf
- unicef. (2015, June). *Group handwashing facilities in schools*. Retrieved from Rotary India Wash In School: https://www.rotaryindiawashinschools.com/Downloads/Documents/GroupHWfacilitiesinschoolDesignManual_10212016112035AM.pdf

Option 9: Semi-Permanent Mobile Group Hand Washing Facilities for Schools

9.1 Type 1



This is a movable type of hand washing facility designed for four to six number of persons. Such type of facilities can be installed in a low to moderate outdoor spaces. This is best suitable for pre-schools (Anganwadi). Life of hand washing station is upto 5 years.

Design (Design Component, Assembly Related Details):

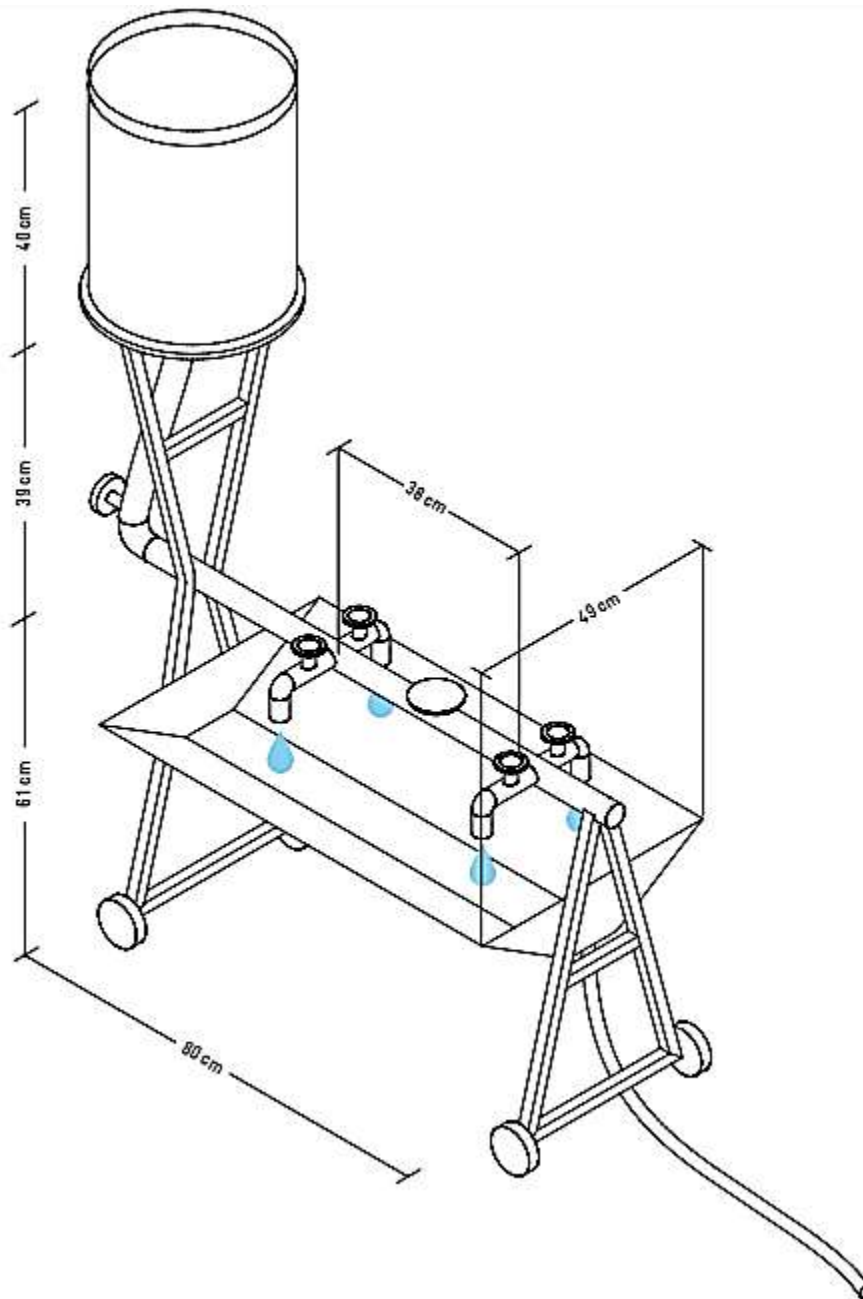
Design structure of this facility includes, the water tank/bucket of capacity 40 L which is situated on a movable platform having wheels. Water tank is kept at convenient height to easily pour water into the tank/bucket. There are four outlets/ taps connected to the tank/bucket with flexible pipe. It can be used from both the sides and usable for differently-abled children. The number of taps can also be marginally increased depending upon the requirement. Water in the installed tank can be taken from the tube well/hand pump manually, as and when required, and

Anganwadi, Hasipur, Uttar Pradesh, India

This type of hand washing facility is installed at Anganwadi in Hasipur village of U.P., used before the mid-day meal in the school and ensures good hygienic conditions. Four hand washing points along with one soap case have been provided and it is catering to 25 children. It has been installed in the year 2014, using the locally available material.



can be filled into the tank without requiring any electro-mechanical power. Waste water, as per the need, from the outlet can be disposed off into open ground, flower bed, trench, drains or soak pit. Chances of vandalism of such water tank unit in outdoor spaces are high.



Application:

1. Schools

Raw Material/Vendors:

Construction and installation of this facility can be done with the help of skilled labour, at any local welding store. Three days' time is required for construction of parts and installation of

facility. GI pipe and soft PVC pipes are required. Basin with side slope is made. The unit is dismountable and portable.

Energy Consumption:

The water tank can be easily filled up especially if a smaller sized tank is used and does not require any electro-mechanical energy.

Operation & Maintenance (O&M):

Requires moderate operation and maintenance (Occasional repairs).

Tentative Cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1.	Flexible rubber pipe (500 mm)	1	265	132
2.	GI pipe, 1 inch (1,000 mm)	1	975	975
3.	Faucets (Nos.)	4	115	460
4.	PVC couplings	1	415	415
5.	Tube bar (3,500 mm)	1	265	930
6.	GI grid (500,000)	1	375	187
7.	Bucket, 40 liters	1	400	400
8.	Wheels (Nos.)	4	375	1,500
9.	Paint	1	375	375
10.	Manpower	1 skilled 1 unskilled	408 350	758
11.	Miscellaneous	-	1,000	1,000
Total				7,132 /-

Pricing Source: India Mart Portal

Tentative cost of 1 unit: INR 7,132 INR to 8,000

9.2 Type 2



This is a movable type of hand washing facility designed for eight to twelve number of persons. Such type of facilities can be installed in indoor as well as in a small outdoor spaces. Life of hand washing station is up to 5 years.

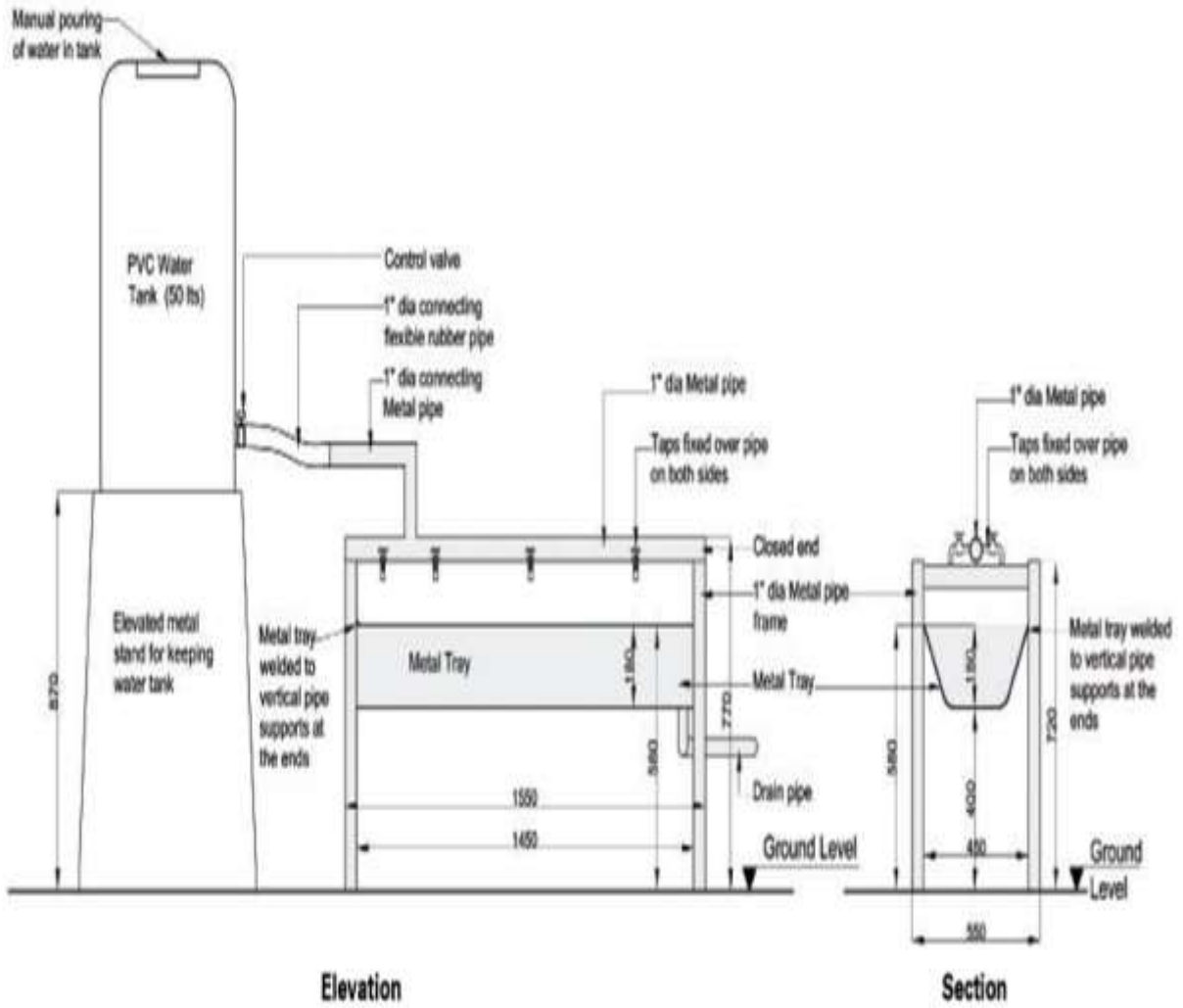
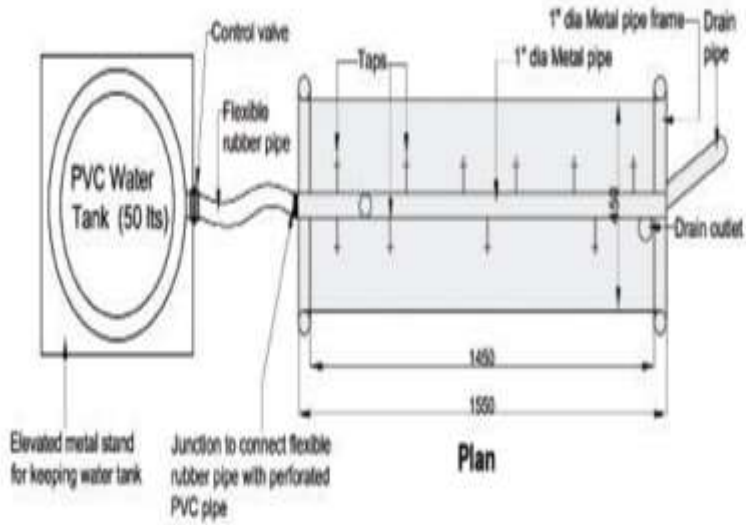
Design (Design Component, Assembly Related Details):

Design structure of this facility includes, portable multiple tap hand wash stand, PVC water tank of capacity 50 L which is situated on an elevated metal stand. Water tank is kept at convenient height to easily pour water into the tank/bucket. Metal tray is welded to vertical pipe, and taps are fixed over pipe on both the sides. The number of taps can also be marginally increased depending upon the requirement. Water in the installed tank can be taken from the tube well/hand pump manually, as and when required, and can be filled into the tank without requiring any electro-mechanical power. Waste water, as per the need, from the outlet can be disposed off into open ground, flower bed, trench, drains or soak pit. Chances of vandalism of such water tank unit in outdoor spaces are high.

Government Middle School, Banedia, Madhya Pradesh, India

This type of hand washing facility is installed at Government middle school in Banedia of U.P. It is being used before the mid-day meal in the school to ensure good hygienic conditions. 10 hand washing points along with two soap cases have been provided. It has been installed in the year 2014, using the locally available material.





Application:

1. Schools
2. Bus stands,
3. Railway stations,
4. Market areas,
5. Outside of religious places
6. Any other Public places such as parks, playgrounds etc.

Raw Material/Vendors:

Raw materials can be available in the local market, but the technical supervision required in fabricating the design. The facility can be dismantled and assembled again, under adult supervision

Energy Consumption:

The water tank can be easily filled up especially if a smaller sized tank is used. It does not require any electro-mechanical energy to pour water into the water tank.

Operation & Maintenance (O&M):

Requires moderate operation and maintenance.

Tentative Cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1.	Closed end PVC pipe of 40 mm Dia. (1500 mm)	1	350	350
2.	18 gauge U shaped GI/Aluminum sheet sink for drainage of waste water (350 mm x 2000 mm)	1	300	500
3.	1" Dia. Connecting Flexible rubber pipe (100 mm)	1	200	200
4.	1" Dia. Connecting metal pipe (50 mm)	1	250	250
5.	Elevated metal stand for keeping water tank (550 mm x 870 mm)	1	2,000	2,000
6.	PVC water tank (50 L)	1	500	500
7.	Valves	12	189	2,268
8.	Manpower	1 skilled 1 unskilled	408 350	758
9.	Miscellaneous	-	1,174	1,174
Total				8,000 /-

Pricing Source: India Mart Portal

Tentative cost of 1 unit (multiple users based on length & design): 8,000 INR to 9,000

References:

- Benzian, N. S. (2016, 10 10). *FIT RESOURCES*. Retrieved from Fit for School International: http://www.fitforschool.international/wp-content/ezdocs/giz_unicef_Catalogue_WashingFacilities_FINAL_WEB_new.pdf
- unicef. (2015, June). *Group handwashing facilities in schools*. Retrieved from Rotary India WashInSchool: https://www.rotaryindiawashinschools.com/Downloads/Documents/GroupHWfacilitiesinschoolDesignManual_10212016112035AM.pdf

Option 10: Happy Tap



A typical 'Happy Tap' model

The LaBobo also dubbed Happy Tap is the world's first purpose-built, mass-produced handwashing station. It was developed through a rigorous design and iterative testing phase and reflects the right mix of aesthetic appeal, functionality, durability, and affordability. Handwashing stations - a dedicated, convenient location where both soap and water are available for handwashing, are associated with improved hygiene. Products like Happy Tap are locally feasible and acceptable that enable frequent handwashing. A happy Tap is a technical option for hand washing specially designed for kids to get a habit of hand washing from childhood and with observations of the product it is noted that kids are using it happily like playing it with a toy.

Design (Design Component, Assembly Related Details):

Happy Tap is a lightweight portable sink with a detachable 15 liters water tank, a water conserving rain spout, and a soap dish to store bar soap. The only tap designed by moms to make handwashing fun for kids, happy tap is bright, engaging and easy to use for kids. The body is made up of PET plastic which is recyclable. For homes with no source of running water happy tap is a blessing for them. It allows families to invest in their children's health.

Application:

- Schools (especially primary and pre-primary)
- Construction worksites
- Offsite work locations
- Parks and Gardens
- Events and festivals
- Gatherings and occasions
- Commercial markets
- Sabzi Mandi
- Bus stations

Raw material/vendors:

The raw material which is used in Happy Tap is PET plastic, a pipe for collecting waste water into a bucket and additionally tooth brush, towel holder and hand sanitizer stand if required.

Energy Consumption:

Happy Tap handwashing stations does not involve any energy to operate. They are energy independent.

Operation & Maintenance (O&M):

Happy Tap handwashing stations are very low in O&M, at the end of the day the water bucket can be easily cleaned for refilled with water.

Tentative cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1	Pet plastic raw material	1	1000	1000
2	Water pipe	1	25	25
3	Plastic towel holder	1	100	100
4	Tooth paste stand	1	50	50
5	Sanitizer stand with sanitizer	1	250	250
6	Soap	1	25	25
7	Bucket	1	250	250
8	Miscellaneous	1	250	250
				1,950 /-

Pricing source: Flipkart.com

Tentative cost of 1 unit (1 user) = INR 1,950

NOTE: The above assembly can be modified as per user's requirement, it can be modified to collect waste water (which can be emptied at the end of the day) and can be attached with a soap dispenser.

References:

- [_https://happytap.net/en/solution/](https://happytap.net/en/solution/)

Option 11: Tripod Handwashing Kit



Handwashing Kit in use after ten months In Nduta Camp, Tanzania. Photo: Oxfam

This new hand washing kit is a robust Water-conserving unit as it has push up taps for handwashing only. Every element of the design is low cost and durable. It is very lightweight, stackable which make it easy to transport. It is Easy to use, height-adjustable, and accessible for all. It is Bright in colour and have mirrors to attract people to come and use. It is mainly used in the area where there is water scarcity but to conserve water it can be used anywhere subject to its availability.

Design (Design Component, Assembly Related Details):

It is a 24-litre water tank with attached lid having 4.5 litre internal liquid soap dispenser with space for bar soap as an alternative option. It consists of water collection basin to restrict splashing of water out of the basin. It has a drainage pipe connected to basin so that water that is being used can be safely disposed. 3 wooden legs in this hand washing kit balances the kit perfectly and it also makes it easy to transport it from one place to another. It has 2 mirror, 4 taps (2 for water and 2 for liquid soap) so that more than one people can use it at a time.

Application:

The hand sink is useful for promoting hygiene in situations without running water.

Energy Consumption:

It is not dependent on any kind of Energy source.

Operation & Maintenance (O&M):

The container needs frequent refilling. Leaks can be repaired by means of tape or other sealing material and regular cleaning is recommended for its durability and prevent the spread of any disease.

Tentative cost:

S. No.	Item	No. of Units	Unit Cost	Net Cost
1	Basin	1	2,000	2,000
2	Drainage pipe	1	50	50
3	Wooden Leg	3	150	450
4	Mirror	2 (1'*1')	100	200
5	24 litre water tank	1	400	400
6	Tap	4	18	72
				3,172

Pricing Source: India Mart and local Vendor (Delhi-NCR)

Tentative cost of 1 unit (1 user) = INR 3,172

References:

- <https://views-voices.oxfam.org.uk/2019/02/user-centred-handwashing-kit/>

Option 12: Water-Efficient Tap and Low-Cost Foaming Soap: The Povu Poa “Cool Foam”



Povu Poa handwashing stations, as bucket (left) and pipe (right) models. Image credit: Noel Wilson

In settings without piped water, refilling water containers and securing soap for handwashing requires constant user effort and expense, creating barriers to handwashing with soap.

Povu-Poa is an innovative and adaptable system which integrates a cost-effective foaming soap dispenser with a hygienic, water-frugal water tap in a secure and affordable design. It makes handwashing convenient and economical in areas without reliable piped water. The Povu Poa is also adaptable to institutional settings; for example, the pipe model can be connected to large tanks for higher water storage capacity.

Design (Design Component, Assembly Related Details):

The product comes in a pipe model, which can be hung from a tree or nail in a wall and is very portable. There is also a bucket model, which captures the runoff and has a larger capacity but is more cumbersome to move around.

- The Povu Poa **bucket model** is composed of two 20-liter buckets stacked vertically, which can be set on any level surface and easily disassembled for transport and security (Figure A).
- The Povu Poa **pipe model** is a light, highly portable 5-liter pipe that can be hung from a wall, fencepost, tree, or other standing structure and that can be plumbed to larger water tanks and drainage systems (Figure B).



Water- and Soap-Dispensing Elements of the Povu Poa Handwashing

Both Povu Poa models integrate the water-frugal swing tap to dispense water (Figure 2A) and the accordion soap foamer that mixes soapy water with air to create a foam (Figure 2B). System (A) Users can operate the Povu Poa Swing Tap hygienically with the back of their hand. The swing tap dispenses water from up to 3 holes; users can control the amount and flow of water coming from these holes based on how far forward or backward they pull/push the tap. (B) The Povu Poa Soap Foamer creates foam by mixing soapy water and air. Runoff water from handwashing collects in the lower bucket for the bucket model or a separate basin for the pipe model.

Application:

It is very useful in any setting without piped water supply such as:

- Agricultural fields
- Construction worksites
- Offsite work locations

Energy Consumption:

It is not dependent on any kind of Energy source.

Operation & Maintenance (O&M):

Popu poa-model involves refilling with soap. The dispenser transforms 5 grams of powdered soap and 250 milliliters of water into 100 hand washes.

In the bucket model, lower bucket need to be emptied when it is filled with runoff water.

Tentative cost:

As of now there are no vendors in India. For 5L piped model cost in Kenya is 12\$ = ~ INR 720

References:

- <https://medium.com/usaid-global-waters/sophisticated-handwashing-without-piped-water-designing-the-povu-poa-647a1b764658>
- <https://www.ghspjournal.org/content/4/2/336#sec-1>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4982256/>
- <https://demandasme.org/cool-foam/>

IDC staff
who made
this
document
possible



Harpreet Singh



Shubham Mishra



Navneet Tiwari



Gaurav Verma



Vishal Pratap Singh



Akshay Bajpai



Vivek Tiwari



Puneet Agnihotri



Sudhish KS



Manish Kulkarni



Atit Jaiswal



Emil TC





इंडियन डेवेलपमेंट सेंटर
INDIAN DEVELOPMENT CENTER

DC 18A, Del Court, Jaypee Greens,
Greater NOIDA-201310, Uttar
Pradesh, India

connect@indevcen.org

**Uttar Pradesh State
Resource Center for Waste
Management (SRC)**

4th Floor, Room No. 404 & 403
Local Bodies Directorate, Plot No.
18, Sector 7, Gomti Nagar Extension,
Lucknow- 226010, Uttar Pradesh,
India