

संख्या : एस0एम0एस0-1 / 2015-16-आर0डी0डी0-368-469
हिमाचल प्रदेश सरकार
ग्रामीण विकास विभाग

प्रेषक

सचिव (ग्रा0 वि0)
हिमाचल प्रदेश सरकार

प्रेषित

1. समस्त उपायुक्त एवं जिला कार्यक्रम समन्वयक (मनरेगा)
हिमाचल प्रदेश।
2. समस्त उप निदेशक एवं परियोजना अधिकारी
जिला ग्रामीण विकास अभिकरण,
हिमाचल प्रदेश।
3. समस्त खण्ड विकास अधिकारी एवं
खण्ड कार्यक्रम अधिकारी(मनरेगा),
हिमाचल प्रदेश।

दिनांक : शिमला 24th फरवरी, 2016

विषय:-

महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम के अन्तर्गत किसानों की निजी भूमि पर कच्चे पानी के टैंकों को पोली लाईन्ड टैंकों/पक्के टैंकों में बदलने/निर्मित करने हेतु योजना।

महोदय/महोदया,

वर्ष 2015-16 के लिए वार्षिक बजट प्रस्तुत करते हुए माननीय मुख्य मंत्री महोदय ने यह घोषणा की थी कि महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम के अन्तर्गत किसानों की निजी भूमि पर पानी के टैंकों के निर्माण को प्रोत्साहित करने हेतु राज्य सरकार 20 करोड़ रुपये की अतिरिक्त धनराशि का प्रावधान करती है, जिस का उपयोग किसानों की निजी भूमि पर निर्मित कच्चे पानी के टैंकों को पोली लाईन्ड/पक्के टैंकों में परिवर्तित करने के निर्माण पर किया जाएगा। क्योंकि महात्मा गांधी नरेगा के अन्तर्गत सामग्री व्यय पर अधिकतम 40 प्रतिशत की सीमा निर्धारित की गई है, अतः यह धनराशि सामग्री घटक पर 40 प्रतिशत से अधिक व्यय होने वाली धनराशि पर व्यय की जाएगी।

महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम की अनुसूची 1 के पैरा 4, उप पैरा II (1) के अनुसार दुर्बल वर्गों की निजी भूमि की उत्पादकता में सुधार लाने के लिए जल संचय ढांचों से सिंचाई के लिए उपयुक्त अधोसंरचना उपलब्ध करवाना एक स्वीकार्य कार्य है, अतः उपरोक्त प्रावधान के अनुसार लक्षित समूह को सिंचाई सुविधा प्रदान करने हेतु उनकी निजी भूमि पर कच्चे पानी के टैंकों को पोली लाईन्ड टैंकों/पक्के टैंकों में

बदलने/निर्मित करने के लिए एक विस्तृत योजना तैयार की गई है, जिसके अन्तर्गत किसानों की निजी भूमि पर कच्चे पानी के टैंकों को पोली लाईन्ड टैंकों/पक्के टैंकों में बदलने/निर्मित किया जाएगा(योजना और ड्राइंग तथा अनुमान पत्र अनुबन्ध-क पर संलग्न है)।

यह सुनिश्चित करने के लिए कि योजना के अन्तर्गत अधिक से अधिक लक्षित समूहों के लाभार्थियों को लाभ पहुँचाया जा सके। यह आवश्यक है कि योजना का अधिक से अधिक प्रचार-प्रसार किया जाये तथा लक्षित समूहों को इस बारे में अधिक से अधिक जानकारी प्रदान की जाये। संलग्न योजना को सभी ग्राम पंचायतों को प्रेषित किया जाये तथा योजना के अन्तर्गत लाभार्थियों से आवेदन पत्र पर, जिनको सहायता प्रदान करनी है, उसका विवरण मंगवा कर मनरेगा की कार्य-योजना में सम्मिलित कर कार्य का निष्पादन सुनिश्चित किया जाये।

क्योंकि यह एक बजट आश्वासन है तथा इस योजना के अन्तर्गत सहायता/धनराशि प्रदेश सरकार द्वारा अपने संसाधनों से उपलब्ध करवाई जाएगी जिसकी समीक्षा माननीय मुख्य मंत्री महोदय द्वारा स्वयं समय-समय पर की जायेगी। अतः यह आवश्यक है कि योजना का निष्पादन/कार्यान्वयन प्रभावी ढंग से किया जाये तथा इसमें पारदर्शिता एवं गुणवत्ता भी सुनिश्चित की जाये।

योजना के कार्यान्वयन हेतु धनराशि अलग से निर्मुक्त की जा रही है जिसे अलग खाते में रखा जाये तथा योजना के अन्तर्गत प्रगति का ब्यौरा भी विभाग को प्रेषित करें।

भवदीय



(डा० अजय शर्मा)

विशेष सचिव(ग्रा०वि०)

हिमाचल प्रदेश सरकार।

संलग्नक-उपरोक्त।

महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम के अन्तर्गत किसानों की निजी भूमि पर कच्चे पानी के टैंकों को पोली लाईन्ड टैंकों/पक्के टैंकों में बदलने/निर्मित करने हेतु योजना

महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम की अनुसूची 1 के पैरा 4, उप पैरा II (1) के अनुसार दुर्बल वर्गों की निजी भूमि की उत्पादकता में सुधार लाने के लिए जल संचय ढांचों से सिंचाई के लिए उपयुक्त अधोसंरचना उपलब्ध करवाना एक स्वीकार्य कार्य है, अतः उपरोक्त प्रावधान के अनुसार लक्षित समूह को सिंचाई सुविधा प्रदान करने हेतु उनकी निजी भूमि पर कच्चे पानी के टैंकों को पोली लाईन्ड टैंकों/पक्के टैंकों में बदलने/निर्मित करने के लिए निम्न योजना प्रस्तावित है—

1. परिचय

वर्ष 2015-16 के लिए वार्षिक बजट प्रस्तुत करते हुए माननीय मुख्य मंत्री महोदय ने यह घोषणा की थी कि महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम के अन्तर्गत किसानों की निजी भूमि पर पानी के टैंकों के निर्माण को प्रोत्साहित करने हेतु राज्य सरकार 20 करोड़ रुपये की अतिरिक्त धनराशि का प्रावधान करती है, जिस का उपयोग किसानों की निजी भूमि पर निर्मित कच्चे पानी के टैंकों को पोली लाईन्ड/पक्के टैंकों में परिवर्तित करने/पोली लाईन्ड/पक्के टैंकों के निर्माण पर किया जाएगा। क्योंकि महात्मा गांधी नरेगा के अन्तर्गत सामग्री व्यय पर अधिकतम 40 प्रतिशत की सीमा निर्धारित की गई है, अतः यह धनराशि सामग्री घटक पर 40 प्रतिशत से अधिक व्यय होने वाली धनराशि पर व्यय की जाएगी।

2. योजना का नाम

इस योजना को "महात्मा गांधी नरेगा के अन्तर्गत ग्रामीण क्षेत्रों में किसानों की निजी भूमि पर कच्चे पानी के टैंकों को पोली लाईन्ड/पक्के टैंकों में परिवर्तित करने/निर्मित करने" की योजना के नाम से क्रियान्वित किया जाएगा।

योजना के अन्तर्गत निम्न लाभार्थी पात्र होंगे—

- (क) अनुसूचित जाति
- (ख) अनुसूचित जनजाति
- (ग) घुमन्तु जनजाति
- (घ) अधिसूचना में से निकाली गई जनजातियां
- (ङ) गरीबी रेखा से नीचे अन्य कुटुंब
- (च) महिला प्रधान वाले कुटुंब
- (छ) शारीरिक रूप से विकलांग प्रधान वाले कुटुंब
- (ज) भूमि सुधारों के लाभार्थी
- (झ) इंदिरा आवास योजना के अधीन लाभार्थी
- (ञ) अनुसूचित जनजाति तथा अन्य पारंपरिक वनवासी (वन अधिकार मान्यता) अधिनियम, 2006 (2007 का 2) के अधीन लाभार्थी

उपरोक्त वर्णित लाभार्थियों को सहायता प्रदान करने के उपरांत लघु या सीमांत किसानों की भूमि पर निर्मित कच्चे टैंकों को पोली लाईड/पक्के टैंकों में परिवर्तित करने या नये पोली लाईड टैंकों/पक्के टैंकों का निर्माण किया जा सकता है।

4. लाभार्थियों का चयन तथा पात्रता के मापदण्ड

लाभार्थियों का चयन ग्राम सभा द्वारा किया जाएगा। जिन लाभार्थियों को इस योजना के अन्तर्गत सहायता प्राप्त की जानी है, वह आवश्यक रूप से मनरेगा के अन्तर्गत जॉब कार्ड धारक होने चाहिए और टैंकों के निर्माण में स्वयं भी कार्य करेंगे।

सहायता प्राप्त करने के लिए लाभार्थी को संलग्नक-1 में दर्शाई गई प्रपत्र में या सादे पेपर पर आवेदन करना होगा। लाभार्थी अपना आवेदन ग्राम पंचायत, खण्ड कार्यक्रम अधिकारी (बी0डी0ओ0) को दे सकते हैं। खण्ड कार्यक्रम अधिकारी द्वारा प्राप्त आवेदन पत्र परीक्षण उपरांत ग्राम पंचायत को अग्रिम कार्रवाई हेतु प्रेषित किये जायेंगे।

ग्राम पंचायत द्वारा लाभार्थियों से प्राप्त आवेदनों का विवरण ग्राम सभा में अनुमोदन हेतु प्रस्तुत किया जाएगा।

5. योजना के अन्तर्गत टैंक निर्माण हेतु ड्राईंग तथा अनुमान पत्र

योजना के अन्तर्गत कच्चे टैंक को पक्के टैंक में परिवर्तित करने तथा कच्चे टैंक को पोली लाईन्ड टैंक में परिवर्तित करने हेतु ड्राईंग तथा अनुमान पत्र विभाग की अभियान्त्रिकी शाखा द्वारा तैयार किये गये हैं, जिसके अनुसार:-

1. 10,000 लीटर की क्षमता के टैंक को पक्के टैंक में परिवर्तित करने हेतु ड्राईंग अनुसार टैंक का निर्माण ईंटों या पत्थरों से किया जा सकता है (ड्राईंग तथा अनुमान पत्र संलग्न)।
2. टैंक की क्षमता भूमि की उपलब्धता के अनुसार कम या अधिक हो सकती है परन्तु कम से कम 5,000 लीटर की क्षमता के टैंक का निर्माण आवश्यक रूप से किया जाना चाहिए।

कार्य के निष्पादन में कोई ठेकेदार या मशीनरी प्रयुक्त नहीं होगी और न ही किसी मशीनरी का उपयोग किया जाएगा।

6. योजना के अन्तर्गत स्वीकार्य सहायता

मनरेगा के अन्तर्गत सामग्री घटक पर (material componant) अधिकतम लागत 40 प्रतिशत होगी। यदि लक्षित समूह की निजी भूमि पर पूर्व में महात्मा गांधी नरेगा के अन्तर्गत निर्मित कच्चे टैंक को पोली लाईन्ड टैंक या पक्के टैंक में परिवर्तित करना हो तो इस हेतु सहायता राशि निर्मित कच्चे टैंक के आकार तथा क्षमता के अनुपात अनुसार देय होगी। जिसकी अधिकतम सीमा 10,000 रुपये प्रति टैंक होगी। इस हेतु तकनीकी प्राकलन तैयार किया जाएगा। सहायता राशि का भुगतान लाभार्थियों द्वारा सामग्री क्रय के बिल / वाउचर प्रस्तुत करने तथा सम्बन्धित कनिष्ठ अभियन्ता / तकनीकी सहायक द्वारा कार्य के मुल्यांकन के उपरान्त ही किया जाएगा।

7. तकनीकी सहायता एवं निरीक्षण

योजना के अन्तर्गत निर्मित होने वाले टैंकों के निर्माण हेतु लाभार्थी को तकनीकी जानकारी सम्बन्धित कनिष्ठ अभियन्ता / तकनीकी सहायक द्वारा प्रदान की जाएगी ताकि टैंकों के निर्माण के समय इनका समय-समय पर निरीक्षण भी किया

जाएगा ताकि पक्के और टिकाऊ टैंकों को निर्माण सुनिश्चित किया जा सके। इस हेतु यह भी आवश्यक है कि सामग्री की मात्रा/खपत संलग्न अनुमान पत्र में दर्शाई गई मदों अनुसार किया जाए। सुरक्षा की दृष्टि से यह भी सुनिश्चित करें कि टैंक निर्माण के पश्चात् इसके चारों ओर जाली लगाई जाए।

मनरेगा के अर्न्तगत ग्रामीण क्षेत्रों में किसानों की निजी भूमि पर कच्चे पानी के टैंकों को पक्के टैंकों में परिवर्तित करने तथा कच्चे टैंक को पोली लाईन्ड टैंक में परिवर्तित करने हेतु आवेदन प्रपत्र

सेवा में,

प्रधान/खण्ड कार्यक्रम अधिकारी,

ग्राम पंचायत.....

विकास खण्ड.....

जिला.....

विषय:-

मनरेगा के अर्न्तगत ग्रामीण क्षेत्रों में किसानों की निजी भूमि पर कच्चे पानी के टैंकों को पक्के टैंकों में परिवर्तित करने / कच्चे टैंक को पोली लाईन्ड टैंक में परिवर्तित करने हेतु आवेदन ।

महोदय,

मैं निम्नलिखित विवरणानुसार मनरेगा के अर्न्तगत अपने निजी भूमि पर कच्चे पानी के टैंकों को पक्के टैंकों में परिवर्तित करने / कच्चे टैंक को पोली लाईन्ड टैंक में परिवर्तित करने हेतु सहायता प्राप्त करना चाहता हूँ:-

1. लाभार्थी का नाम:-.....
2. पिता का/पति का नाम :-.....
3. ग्राम पंचायत:-.....
4. क्या लाभार्थी निम्न श्रेणी से सम्बन्धित है:-

- (I) अनुसूचित जाति.....हां/नहीं
- (II) अनुसूचित जन-जाति..... हां/नहीं
- (III) गरीबी रेखा से नीचे रहने वाले परिवार.....हां/नहीं
- (IV) इन्दिरा आवास योजना का लाभार्थी..... हां/नहीं
- (V) लघु किसान.....हां/नहीं
- (VI) सीमान्त किसान.....हां/नहीं

टैंक निर्माण हेतु सहायता

5. टैंक निर्माण हेतु प्रस्तावित भूमि का खसरा नम्बर..... स्थान.....
6. अपेक्षित टैंक की क्षमता.....लीटर

भवदीय,

नाम.....
गाव.....
डाकघर.....
ग्राम पंचायत.....
विकास खण्ड.....
जिला.....

ANNEXURE-A

Name of Work:- Standard estimate for converting Kacha water Tanks to Pucca Water Tanks / Poly lined Tanks.
10000 liter Capacity

1.	Providing and laying Cement Concrete 1:4:8 (1Cement: 4 Sand: 8 Stone Aggregate 40 mm nominal size) and curing complete in foundation and plinth.						
	1 x 4.05 x 3.60 x 0.10 = 1.46	Cum					
	Total	1.46	Cum	427.95	625	2293.1	3348
2.	Providing and laying cement concrete 1:1.5:3 ((1Cement: 1.5 Sand: 3 Graded Stone Aggregate 20 mm nominal size) and curing complete excluding cost of form work and reinforcement form RCC work. (In foundation)						
	Slab. 1 x 3.15 x 2.70 x 0.10 = 0.85	Cum	533.80	454	3681.25	3129	
3.	Random rubble masonry coursed with hard stone of approved quality in foundation and plinth including raking out joints in cement mortar 1 : 4 (1 Cement : 4 sand)	Cum					
	Long walls	Cum					
	1 st Step = 2 x 3.75 x 0.75 x 1.0 = 5.63						
	2 nd Step = 2 x 3.45 x 0.60 x 1.0 = 4.14						
	3 rd Step = 2 x 3.15 x 0.45 x 0.80 = 2.27	Cum					
	Short walls						
	1 st Step = 2 x 1.80 x 0.75 x 1.0 = 2.70						
	2 nd Step = 2 x 1.80 x 0.60 x 1.0 = 2.16						
	3 rd Step = 2 x 1.80 x 0.45 x 0.80 = 1.30						
	Total = 18.20	Cum	801.96	14596	2169.63	39487	
4.	Providing tor steel reinforcement for RCC work including bending, binding and placing in position complete up to floor two levels. = 0.85 cum@ 75 kg/rmt. = 63.75 kg.		4.95	316	59.40	3787	
5.	Providing form work with steel plates 3.15mm thick so as to give a fair finish including centering, shuttering, strutting and propping etc. with wooden batten and ballies height of propping not exceeding 4 meters and removal of the same for insitu reinforced concrete and plain concrete work in vertical surfaces such as walls (any thickness)						
	Tank. 1x 2.25 x 1.80 = 4.05	sqm.					
	Total	4.05	67.40	273	143.56	581	
6.	20 mm thick cement plaster in two coat in C.M 1:3(1 cement:3 sand)						
	Tank. 2 x (2.25 + 1.80) x 2.80 = 22.68						
	Total.	22.68	74.80	1696	156.20	3543	

Mury

-7-

7.	Providing and fixing on wall face PVC (D-plast) rain water pipes of working pressure not less than 4.5 kg/sqm including filling the joints with approved adhesive complete. 100 mm dia pipe. PVC pipe from roof/slab to tank = 1 x 5 = 5	Rmt				
	Total = 5	Rmt	18.20	91	255.40	1277
8.	Providing and fixing manhole cover complete. 1 x 1 = 1 No.		50.00	50	1132.00	1132
9.	Cement concrete flooring 1:2:4 (1 cement: 2 sand: 4 graded stone aggregate 20 mm nominal size) laid in one layer finished with a floating coat of neat cement. 40 mm thick. 1 x 2.25 x 1.80 = 4.05 sqm.		55.70	226	182.70	740

Total Rs

18324-00 54024-00

Less 15% Contractor profit and overhead charges

2749-00 8104-00

Total Rs 15575-00

45920-00

Add 62% labour enhancement for MGUREGA labour Rs 9657-00

9657-00

Total Rs 25232-00

55577-00

Add for extra carriage of materials by manual labour (As per site condition)

0-00

Add for extra cost and extra carriage of material by mechanical transport (As per site condition)

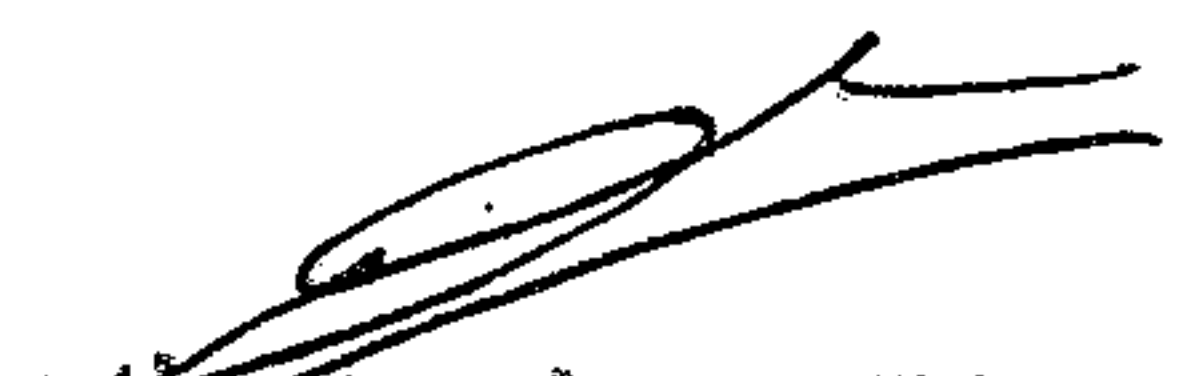
0-00

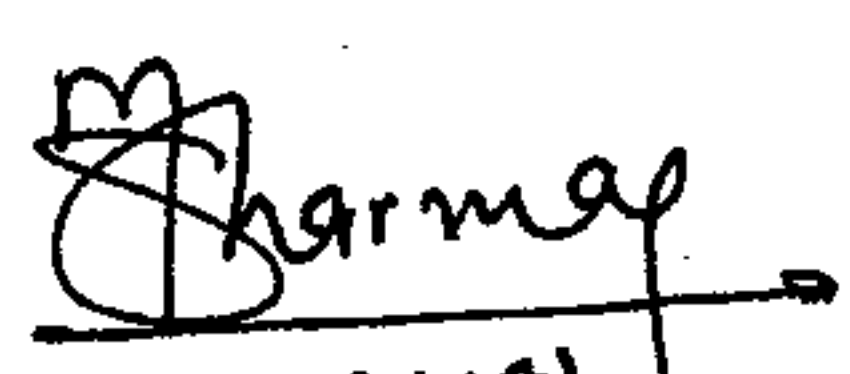
Grand Total Rs 55,600-00

Cost per liter = 5.56/liter

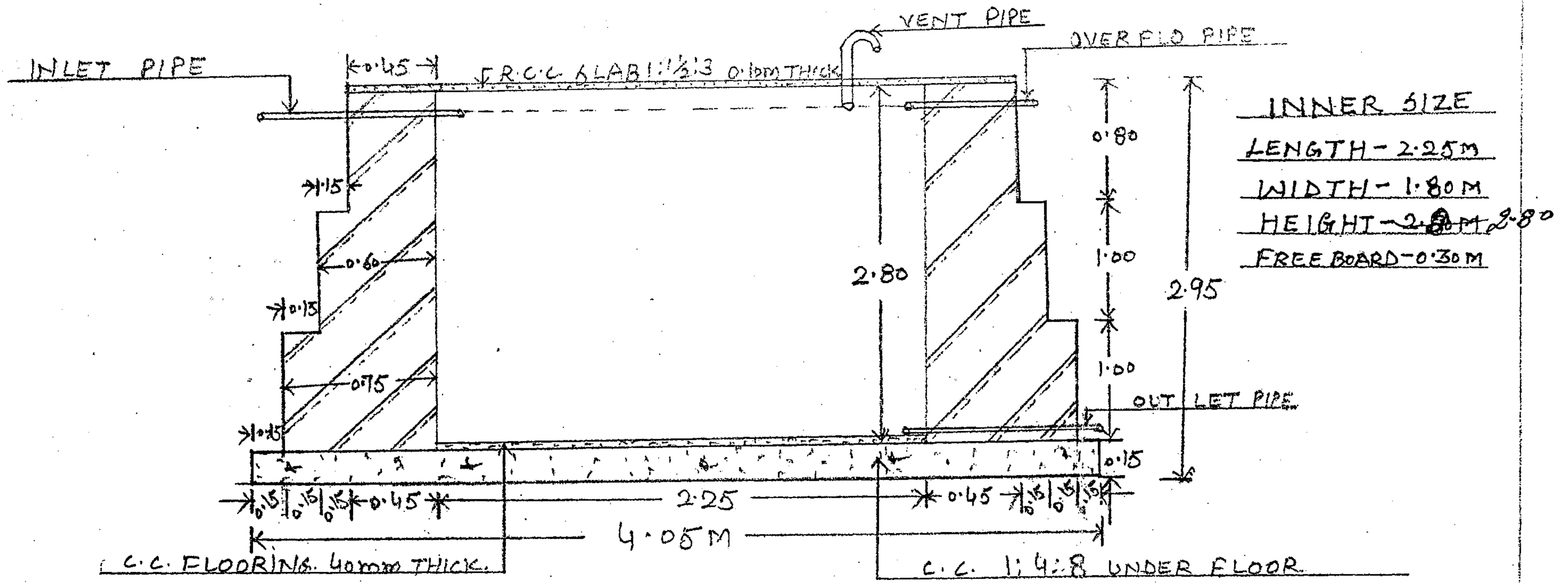
Labour Component Rs 25232-00 45%

Material Component Rs 30,368-00 55%


Executive Engineer (RD),
Rural Development Deptt.
HP Shimla - 9


JE (CH)

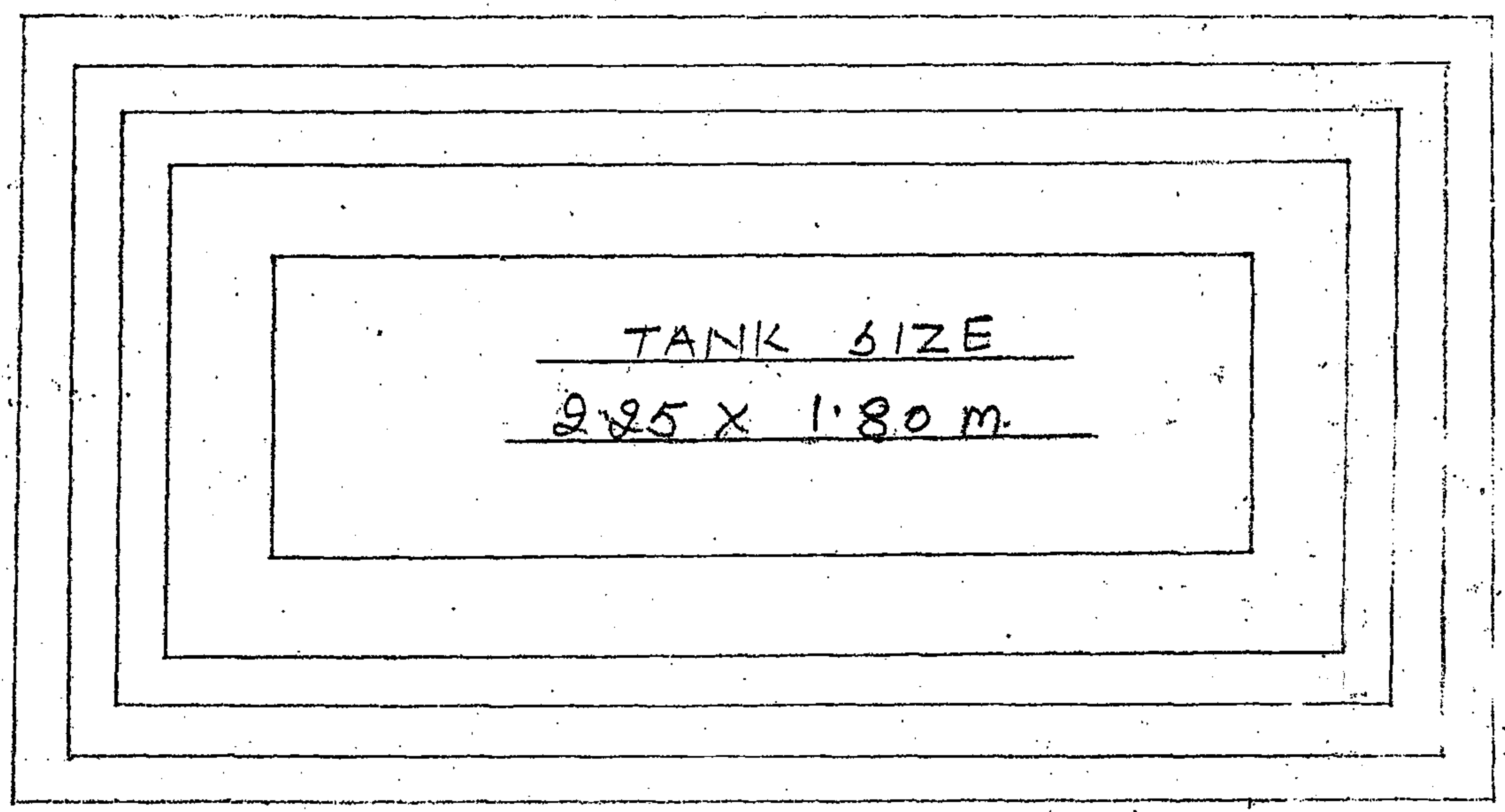
C/O STONE MASONRY STORAGE TANK CAPACITY 10,000 LITRE



CROSS SECTION AT A-A

M. J. J.

C/O STONE MASONRY STORAGE TANK CAPACITY 10000 LITRE



TANK SIZE
2.25 X 1.80 m.

PLAN

Ying

4

Abstract of Cost

Name of work:- Converting Katcha water tank to Poly lined Tank 10000 liter Capacity

SR. No.	Description of Item	Qty	Unit	Labour Rate		Through Rate	
				Rate	Amount	Rate	Amount
1	Providing and fixing Poly lined sheet 2 to 4 mm thick on the inner face of katcha water tank. Rate confirmed from local market) Size (2.25 X 1.80 X 2.80) Mtr	11.34	Sqm	5.00	57.00	75.00	851.00
	Total				57.00		851.00
	Less 15% (10% Contractor Profit + 5% Overhead Charges)				9.00		128.00
	Toal Rs.				48.00		723.00
	Add 62% labour enhancement for MGHNREGA Lbour				30.00		30.00
	Toal Rs.				78.00		753.00
	Add for extra carriage by Manual Labour			As per site condition			0.00
	Add for extra cost and extra carriage of materials by Mech Transport			As per site condition			0.00
	Grand Total					Grand Total Rs	753.00
				Cost per litre			Rs 0.07/-

specifications for thickness and execution are annexed as 'c'

BE

[Signature]
Executive Engineer (RD)
Rural Development Deptt.
HP Shimla - 9

Labour component Rs. 78/- 10%
Material Component Rs. 675/- 90%

[Signature]
JE (M&C)

Specification for thickness

FARM POND AND RESERVOIR LINING

Introduction

In India agriculture contributes 40% to our country's GNP and gives subsistence to 70% of our population. And yet 1/3 of our total geographical area is drought-prone because we are dependent upon the monsoons which can be erratic. Drought-prone areas have to be provided water not only for human and cattle consumption but also for irrigation. Whereas even after good monsoons water is not available only because of lack of proper management and storage.

Water Management is the cheapest and purest source of water is rain water. Harvesting of the water in pond, lakes, wells, tanks and reservoirs helps to preserve this water so that it can be put to varied uses later on. One of the most effective ways of water management is through Pond / Canal Lining.

Vast amounts of water are lost through seepage, especially where the soil is gravelly and porous. It is estimated that 70% of water is lost between the storage and usage point. Many states have been experiencing drought resulting in shortage of water, particularly during the summer months. Lining of canals reduces seepage losses. The conventional methods for Farm pond and canal lining are: use of cast-in-situ concrete, bricks, stone-slabs, precast tiles, precast concrete slabs etc. Introduction of plastics sheets in the form of LDPE film below the hard cover lining is effective in improving water tightness of lining.

Pond lining

Pond sealing or lining is the process of installing a fixed lining of impervious material, or mechanically treating the soil in a pond to impede or prevent water loss. Ponds can serve as storm water management detention facilities, add visual aesthetics, create an environment for wildlife, and serve as golf course hazards.

These reservoirs and ponds are located in a variety of soil types which exhibit a wide range of seepage characteristics. Because of seepage, the water level of the reservoirs and tanks depletes rapidly seepage losses not only mean loss of useful water but also lead to other problems such as breach in the embankment, water logging and

increased salinity in adjacent areas. With appropriate lining of reservoirs, ponds, canals the seepage loss can be minimized.

Pond liners or dam liners are generally required where:

- The natural ground is rock
- Fine clay is difficult to obtain
- Water is in short supply
- Underground faults exist
- Water or ground is toxic
- A small pond is to be installed

What are the benefits of a pondliner?

Covering bottom sediments with black plastic, landscape fabric or other light prevention materials can be useful in small scale situations for controlling submersed weeds. Several bottom-covering materials are commercially available. They are all called benthic barriers. The best benthic barrier is gas permeable and opaque and cannot be penetrated by plant roots or vegetation. Various types of pondliners are also used to keep water in the pond if a clay barrier is not available.

The Lining film

Lining film is a revolutionary concept in water management which dramatically reduces seepage loss at a reasonable cost. Lining film is tough, multilayer, wide width, black, low density polyethylene (LDPE) film by the latest Co-extrusion blown film technique it is available in various widths (4 to 10 metres) and thicknesses (100 to 250 microns).

Procedure to construct a Lined Pond

First of all the pond dimensions (L*B*D, Side Slope) are to be identified and than mark the top level as well as the bottom level length and breadth on the ground clearly. Put pegs at the corners of the pond and tie a rope to demarcate pond dimensions.

Next start digging the pond from the inside rectangle (l*b) and dig till desired depth is achieved. Excavated soil can be kept near the pond around the demarcated periphery and can be used later after screening as a soil cover. Screening is very important as it will remove big boulders and sharp edged gravel which could damage the plastic film.

Precautions

Digging along the slope is a tedious task but it must be done meticulously as the durability of the structure depends on it. If desired, a bamboo frame can be used to achieve uniform digging as per the desired slope.

Water losses in ponds and reservoirs

The need of water during the rainy season is minimal, and therefore, the water available from precipitation or from rivers/streams is stored in ponds and reservoirs for various domestic, agricultural and industrial purposes over a period of time. In the areas of acute shortage of water, ponds and reservoirs sometimes form the only source of water. However, a good portion of water stored in these reservoirs or pond is lost by evaporation, seepage and temperature. The seepage and temperature losses are shown in Table below. Evaporation being surface phenomenon is directly related to the surface area of a storage and temperature. The present estimate of evaporation losses are 6 M ha m. Taking into consideration the large and small storages of the country, the total water loss due to evaporation would be enough to meet the drinking water requirements of India in 2000 AD. Water loss in a storage is sum total of seepage losses through dam/bund and bed of reservoirs/ tank and evaporation from open surface.

Seepage and percolation losses in soil

Sl. No.	Type of soil	Water loss through seepage (Cumecs/million m ² of wetted area)	Drop in depth per day (cm)
1.	Heavy clay loam	1.21	10.36
2.	Medium clay loam	1.96	16.84

3.	Salty clay loam	2.86	24.61
4.	Sandy loam	5.12	44.03
5.	Loose sandy soil	6.03	51.80
6.	Porous gravelly soil	10.54	90.65

In permeable soils, losses due to seepage are about 3% of storage capacity seepage, beside loss in storage, may result in water-logging in certain areas.

A tank having water about four metres in depth and located in a heavy clay loam soil area would totally get exhausted within 40 days whereas in case it is located in porous gravelly soil, the tank would get empty in five days. However, over a period of time, the silt deposit helps in partially clogging the pores in the sides and bed of tanks, which helps in reducing the seepage losses.

To conserve water stored in ponds and reservoirs, means must be found to minimum seepage and evaporations losses. Even in the areas receiving very low rainfall, about 200 to 300 cu. M. of water is reported to be possible for collection from each Ha of land which otherwise goes waste by run off. Harvesting and storing of this water if done in dug-out farm ponds will not only help in reducing the run off but will also help in providing protective irrigation to a portion of the catchment area. If protected against seepage, it would have a potential to support a short duration crop. The seepage and other losses in normal unlined ponds in sandy loamy soils are reported to be to an extent of 5 to 15 cm. per day. If this can be minimized by way of lining the walls and floor of the ponds with LDPE films or any other such material, the water could be well utilized.

Conventional lining method like brick and tile lining are either too expensive or not sufficiently effective. Since the water in the reservoir/pond is stagnant, LDPE film lining with 30-60 cms soil cover is adequate for bed-lining. Depending on the circumstances and soil conditions, single tile lining with the LDPE film or double tile lining or LDPE film lining with soil cover can be used on the sides. Polyethylene film lining alone or in combination with conventional lining has proved to be a seepage proof barrier between the soil and the water.

Benefits of Pond and Reservoir lining with plastics film

- ❖ Reduction in seepage losses to the maximum extent (95%).
- ❖ Harvesting and storing of rain water from early monsoons.
- ❖ Utilisation of harvested rain-water for short during crops as well as during off season.
- ❖ Lining of ponds and reservoirs improve water availability over a longer period of time.
- ❖ It is highly useful in porous soils where water retention in ponds and water harvesting tanks is minimal.
- ❖ Economical and effective method of storing water.
- ❖ Eliminates water logging and prevents upward intrusion of salts into stored water.
- ❖ Useful for the purpose of storage of drinking water, for pisciculture and for providing supplementary irrigation. A large number of ponds have been lined with plastics for providing drinking water in the coastal and hilly areas of Gujarat, West Bengal, Karnataka and Himachal Pradesh, and uttaranchal.
- ❖ Prevents soil erosion.
- ❖ Technique is also suitable for effluent ponds and channels to reduce soil and ground water contamination.

This technique can also be used in the lining of salt-pans for improving productivity as well as quality of salt.

Materials

Film

The properties of LDPE film shall conform to Indian Standards

The LDPE film, shall conform to the following average mechanical properties when tested as per Indian Standards.

Table 1 Typical Mechanical Properties of LDPE

Property	Test Method	Unit	Expected Value
1.	2.	3.	4.
Melt flow	IS: 2530	gm/10 min	0.20
Density	IS: 2508	gm /cm ³ at 23°c	0.930
Carbon black content	IS: 2530	%	2.5-3.0
Carbon black dispersion	-do-	-	Satisfactory
Nominal thickness	IS: 2508	microns	100,125,150 175,200,250
Tolerance on thickness	-do-	%	±20
Tensile Strength at Break*	-do-	Kg/cm ²	M/D 140 T/D 110
Elongation at break*	-do-	%	M/D 200 T/D 400
Dart impact strength:			
For 100 microns	IS: 2508	F 50 gms	120
125 microns	IS: 2508	F 50 gms	155
150 microns	IS: 2508	F 50 gms	190
175 microns	IS: 2508	F 50 gms	215
200 microns	IS: 2508	F 50 gms	250
250 microns	IS: 2508	F 50 gms	320
Kinetic coefficient of friction	IS: 2508		Not less than 0.40

* Measured on 100 micron Thick LDPE Film

Note: The dispersion of Carbon black in film matrix shall be uniform.

The shall have nominal thickness of not less than 100 microns (0.10 mm). The thickness shall suit physical properties of subgrade soil and designed water depth in the canal.

Table 2 Thickness of LDPE Film Rigid Cover/with Earth Cover corresponding to Water Depth

Sl. No.	Water Depth (Metres)	Film Thickness (microns)		
		With Rigid Cover	With Earth Cover	
		Film as Primary Barrier	Film as Secondary Barrier	
1.	up to 1m	150	100	200
2.	1 m to 3 m	200	100	250
3.	Exceeding 3 m	250	100	300

LDPE film shall be obtained in rolls having a continuous unspliced length, and in various widths without joints as per requirements. The length of rolls may be of about 40 metres for convenience in handling. Film rolls can be obtained in specific lengths and widths as per requirements of the designed section of a canal to avoid wastage and minimise the joints. The film supplied must conform to the Indian Standard specifications. However the film sample may be got tested before use at the nearest PDC or testing laboratory where facilities may be available.

Top cover: The top cover over the film may consist of any of the following:

- (a) Insitu cement concrete M10 of IS: 456
- (b) Precast cement concrete tiles confirming to IS: 3860
- (c) Stone slabs
- (d) Brick
- (e) Compacted soil
- (f) Burnt clay tiles conforms to IS: 3367

Sand : Sand required for cushion layer below the film shall be of fine quality, passing through 53 m IS Sieve.

Film Laying Technique

- The film shall be laid/ spread/ unrolled over subgrade prepared below the designed bed level to the extent of cover thickness, in strips. Depending on the width of bed/ perimeter of the section, the film can be laid parallel or perpendicular to the flow of the water. Longitudinal joints should be avoided.
- Where longitudinal joints can not be avoided, the loose ends of the film strip shall be anchored with an allowance of 50 cm for anchoring in the trenches, where ever necessary. Necessary space shall be kept vacant at the trenches for anchoring the film.
- The film shall be spread loosely over the subgrade so that it shall attain the contours of subgrade and compensate for thermal variations during the day. An extra length of one percent in both the directions on this account shall be provided.
- The adjacent layers of film shall be laid in such a manner that over- lap shall point towards down stream of canals.
- The film shall be jointed using any suitable method explained in para 12.0.
- Film shall be spread in the above manner and held in position at the two extremities of bed by placing excavated earth or sand bags on it, while the two ends of film are being loosely held over the embankment.

Jointing of Film

There are various methods of jointing adjacent length of the film to avoid leakage along the joints. The method depends on its suitability to a particular set of prevailing site conditions.

Simple Over Lapping

Figure 3 gives the method of over lapping of the film. The simple over lap shall not be less than 30 cm for earth cover and 15 cm for hard cover. It is the least preferred of all the methods sealing as overlap joint is prone to leakage.

Folded Over Lap

Figure 4 shows the details of a folded over-lap. The fold shall not be less than 7.5 cm.

Jointing by Hot Bitumen

The film can also be jointed by a coat of bitumen which is easily available from standard suppliers such as Indian Oil corporation. Bitumen grade 85/25 and 80/ 100 in the ration of 2:1 should be heated at a temperature around 100⁰C. Heated bitumen can be crudely tested on a small piece of film so that overheated bitumen may not damage the film. After ascertaining the appropriateness of the temperature, apply a thick coat of tested bitumen on 10 cm area along the width of both the sheets and fold them as shown in Fig. 5 and cover the same wide brick masonry profiles (Dhamalies) at a suitable interval depending upon the width of the film which should come directly over this joint at a regular interval in order to ensure a better joint of the film. Using damaged film is not recommended. However, this method has been found very convenient for repairing punctures in the film at site itself. In case of big holes, pieces of sheet should be pasted from both sides.

Sealing by Adhesive Tapes

Adjacent lengths of the film can also be jointed with suitable adhesive tapes as shown in Fig. 6. The hydrostatic pressure and the over- layer is sufficient to make the over- lap practically water-tight. However with passage time under submerged conditions, the joints may open up. Soil particles creeping into the joint while laying, may also lead to leakage.

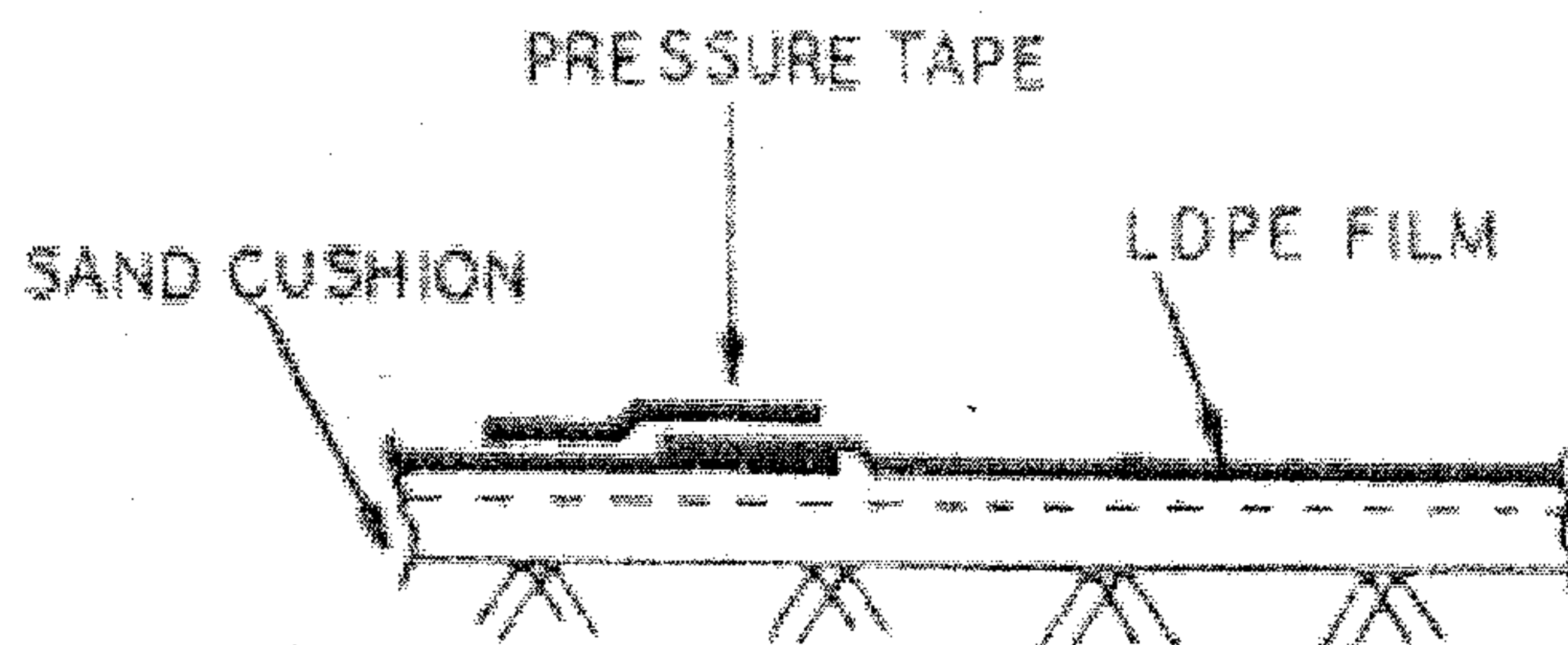


Fig 1 : Over- lap Joint with Pressure Tape

Heat sealing

As shown in Fig. 7 the over-lap joints shall be heat sealed with hot iron. The temperature of the iron shall be adjusted and maintained at 150°C and pressed on the film joint over-lap for 3 seconds, for 100 micron film. For every 50 micron increase in the film thickness the time be increased by one second. To avoid the risk of the film sticking to the iron a poly-tetra-flur -ethylene (PTFE) impregnated glass cloth or Teflon sheet or cellophane sheet should be placed between the film and the iron.

Heat sealing is the most effective of all the methods.

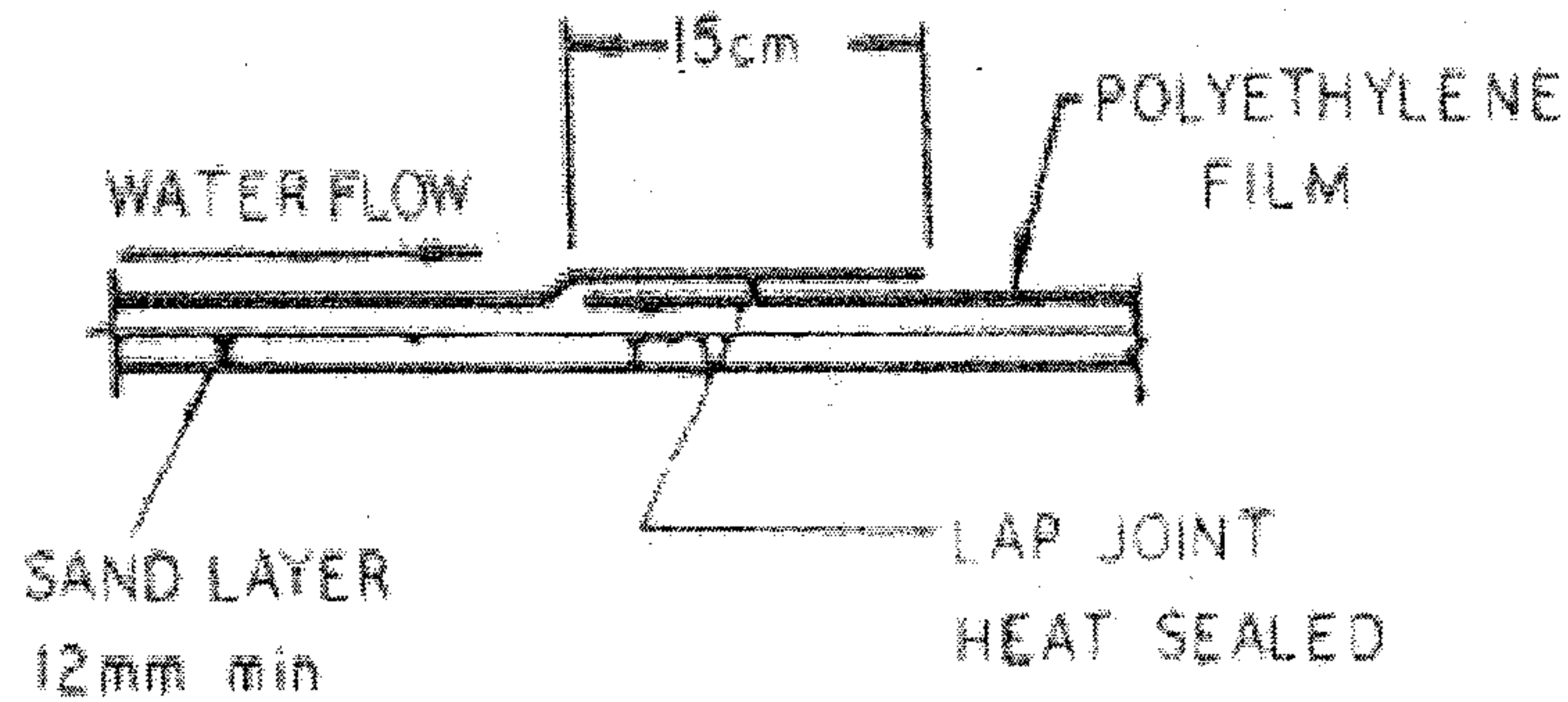


Fig. 2 : Heat Sealing of Joints

Earth Cover over Film

- ✓ The earth from excavation of adjacent section be used for covering the film in earlier section. Thus, by the time, earth cover is provided in one section, the adjacent section is ready to receive film lining.
- ✓ All the stones, roots etc., should be removed from the earth used for filling.
- ✓ The film on the bed should be covered first. To avoid any damage to the film a 7.5 cm layer of earth free from gravel or granular material should be laid and compacted over the film.
- ✓ Rest of the earth cover should be spread over it in 15 cm layers, watered, and compacted by using light roller or manual templates.
- ✓ Extra length of the film shall be placed in trench at embankment top and covered with earth. The embankment may be then raised to designed level.

Do's and Don'ts for Use of Film on Canal

- See at the time of purchase that the film rolls are packed properly. Keep the film rolls in original packing prior to actual use or laying the film.
- Don't leave unpacked film rolls exposed to sun over prolonged periods. Store them preferably indoors.
- See that uniform pressure is applied while heat sealing the film.
- Don't rough handle or drag the film rolls as the film may get damaged in the process.
- Don't let workers walk on the film while the lining operation is in progress to avoid any damage to the film. If unavoidable they should walk barefoot.
- Don't slide the cover material like bricks, tiles etc., on the film to avoid any damage and displacement.
- Don't use hooks for lifting the rolls.
- Don't use reprocessed LDPE film, as the quality of reprocessed LDPE film can not be guaranteed and may lead to premature failure of the film.