

Multi Ply Bituminous Waterproofing

BUR Waterproofing
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Multi Ply Bituminous Waterproofing

- Historically prominent – many jobs in place
- Still significant portion of today's projects, mostly Coal Tar Pitch systems
- Redundancy is desired attribute
- Unlike BUR where felts are “shingled”, Waterproofing felts are often “phased” or ply-on-ply.



Bitumens

- **Asphalts**

- Usually Type I – near flux
- Blown asphalts are subject to deterioration from water contaminant chemicals

- **CTP**

- Superior water resistance
- Both bitumens, especially CTP, cold flow so back-nailing may be required on vertical surfaces

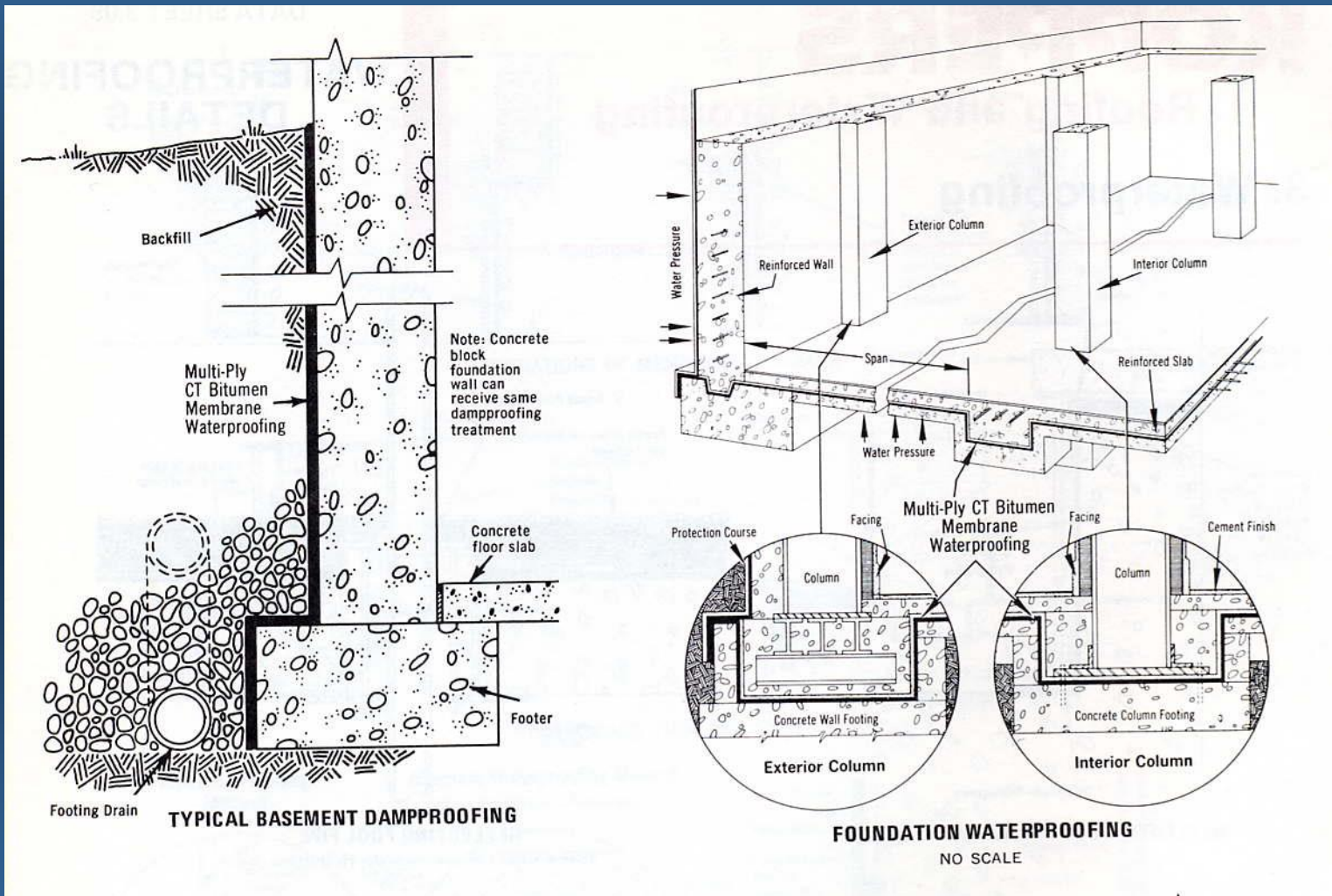


Reinforcement Felts

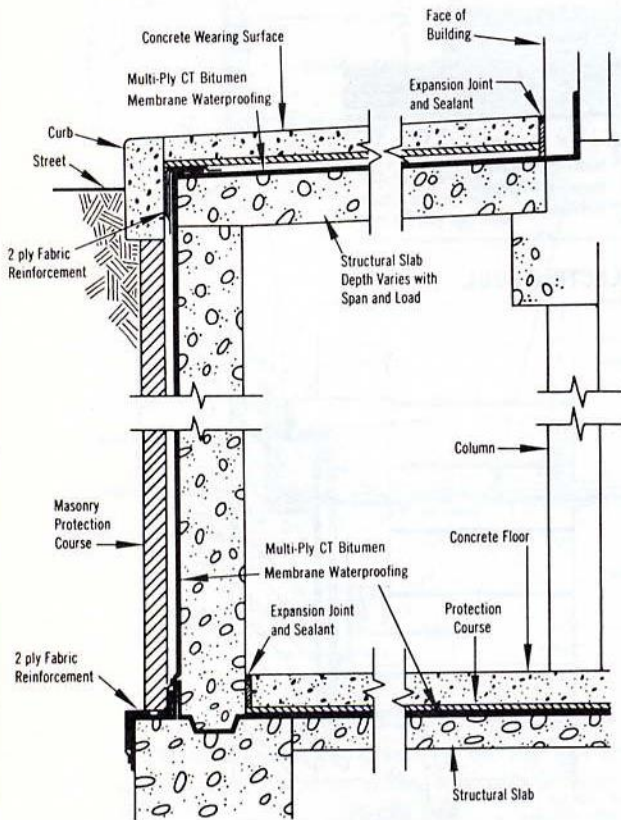
- Historically - cotton and jute saturated with asphalt or CTP
- Glass felts are used almost exclusively in asphalt systems
- CTP saturated organic felts, D227, should be used with CTP to avoid migration within membrane assembly
- For asphalt membranes, use polyester or glass felts, D2178



Waterproofing Details (BUR)

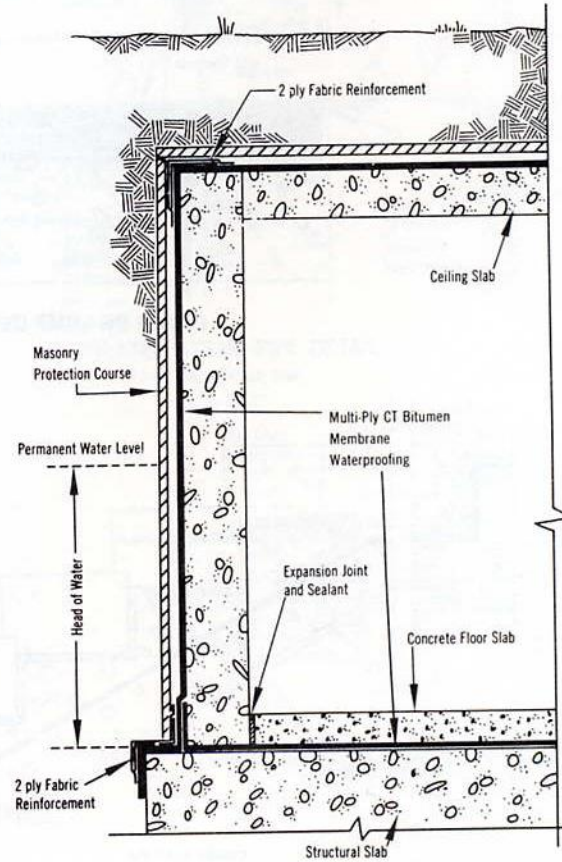


Waterproofing Details (BUR)



SIDEWALK VAULT

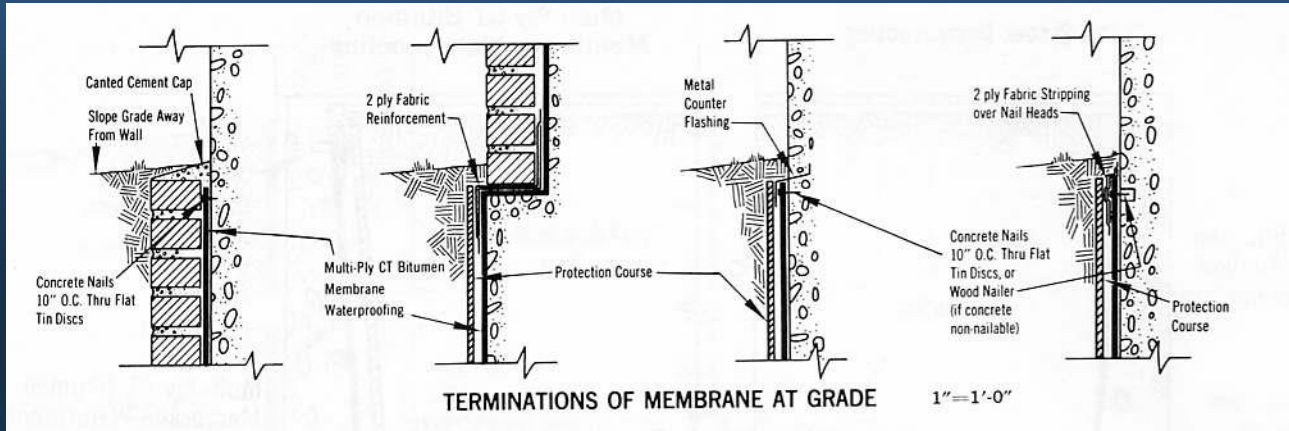
1/2" = 1'-0"



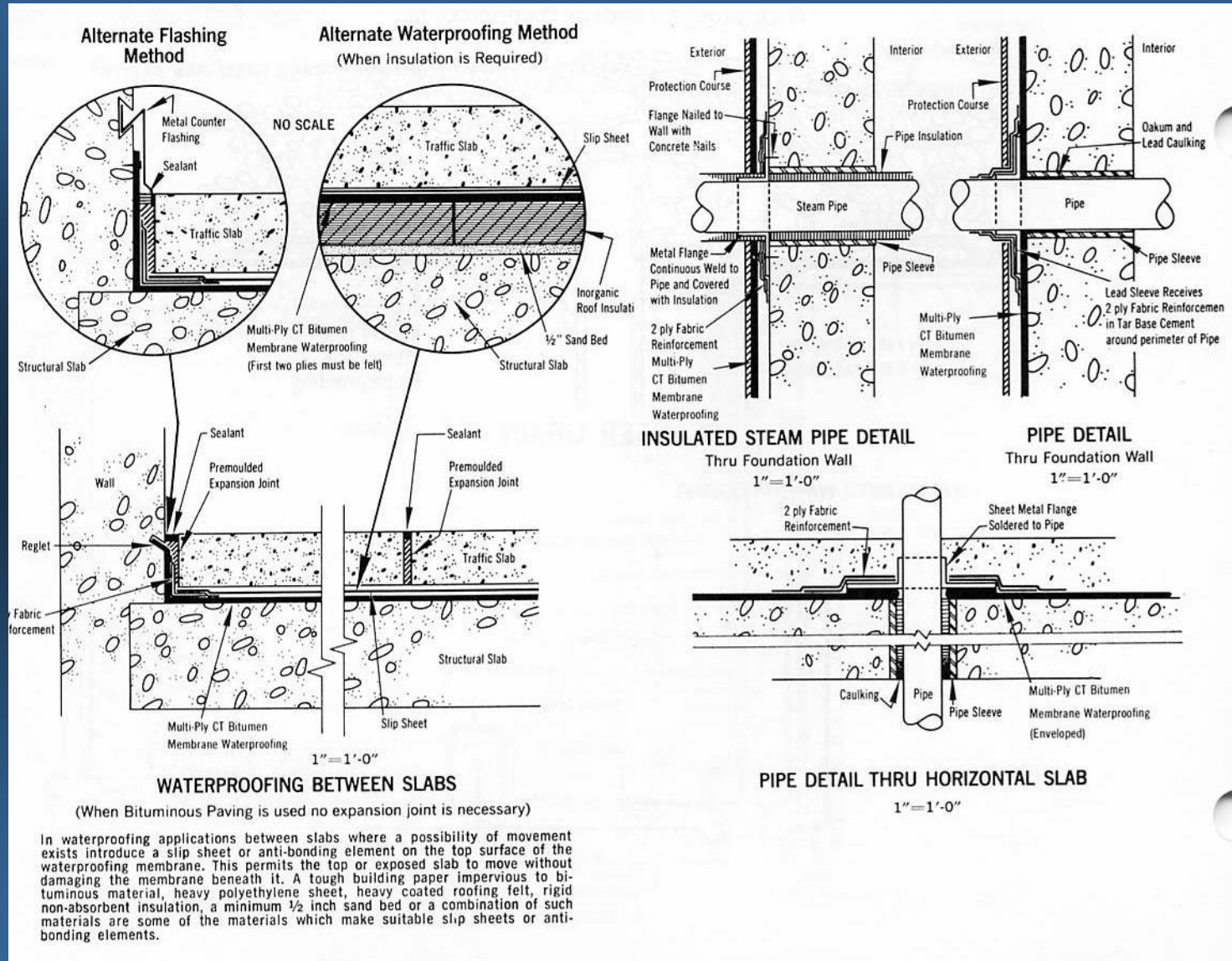
TUNNEL

1/2" = 1'-0"

Waterproofing Details (BUR)



Waterproofing Details (BUR)



Reinforcement Fabrics

I. GENERAL

Waterproofing bitumens by themselves are highly water resistant; however for long lasting results, it is essential that a supporting reinforcing structure or membrane is included in the waterproofing system. This reinforcing structure lends flexibility to the waterproofing agent and provides the means for the specified quantities of bitumens to be "built-up" in place.

II. DESCRIPTION

A. Three basic types of reinforcement membranes

1. Tar and asphalt saturated cotton fabric. Cotton fabric is available in both standard and specification grade. The primary difference between the two grades is the weight.

The federal government, the American Society for Testing Materials (A.S.T.M.), the American Railroad and Engineering Association (A.R.E.A.) and the American Association of State Highway Officials (AASHO) have specifications covering the use of cotton fabric.

<u>Product</u>	<u>Applicable Specifications</u>	<u>Nominal Sq. Yd. Dr. Weight</u>	<u>Sq. Yd. Saturated Wt.</u>
Specification Cotton Fabric	Fed. Spec. SS-C-450a A.S.T.M. D-173-68 A.R.E.A. and AASHO for various states	3.5 oz.	10 oz. minimum
Standard Cotton Fabric	None	2.0 oz.	6.5 oz. Typical Analysis

<u>Product</u>	<u>Breaking Strength of Saturated Fabric</u>	<u>Nominal Thread Count</u>	<u>Coating</u>	<u>Color</u>
Specification Cotton Fabric	50 Warp 50 Fill Minimum	26 to 32 Warp 24 to 32 Fill	Asphalt or Tar	Black
Standard Cotton Fabric	40 Warp 20 Fill Typical Analysis	27 Warp 15 Fill Typical Analysis	Asphalt or Tar	Black

Reinforcement Fabrics

2. Glass fabric – Koppers coated woven glass fiber fabric is marketed under two registered trade names. Both have proven performance records in the construction industry . . . Glasfab® and Glascoat®.

<u>Product</u>	<u>Applicable Specifications</u>	<u>Nominal Sq. Yd. Dr. Weight</u>	<u>Sq. Yd. Saturated Wt.</u>
Glasfab®	Fed. Spec. HH-C-466b A.S.T.M. D-1668-71	1.2 oz. to 2.0 oz. 1.4 oz. min.	1.5 oz. to 2.6 oz. 2 oz. to 3 oz.

3. Tarred felt – Approved tarred felt is a product of the “felting” of organic fibers. The dry felt is then saturated with coal tar saturant and manufactured to meet the following specs:
(1) ASTM D 227, (2) Fed. Spec. HHR-595B Type 15C Style A

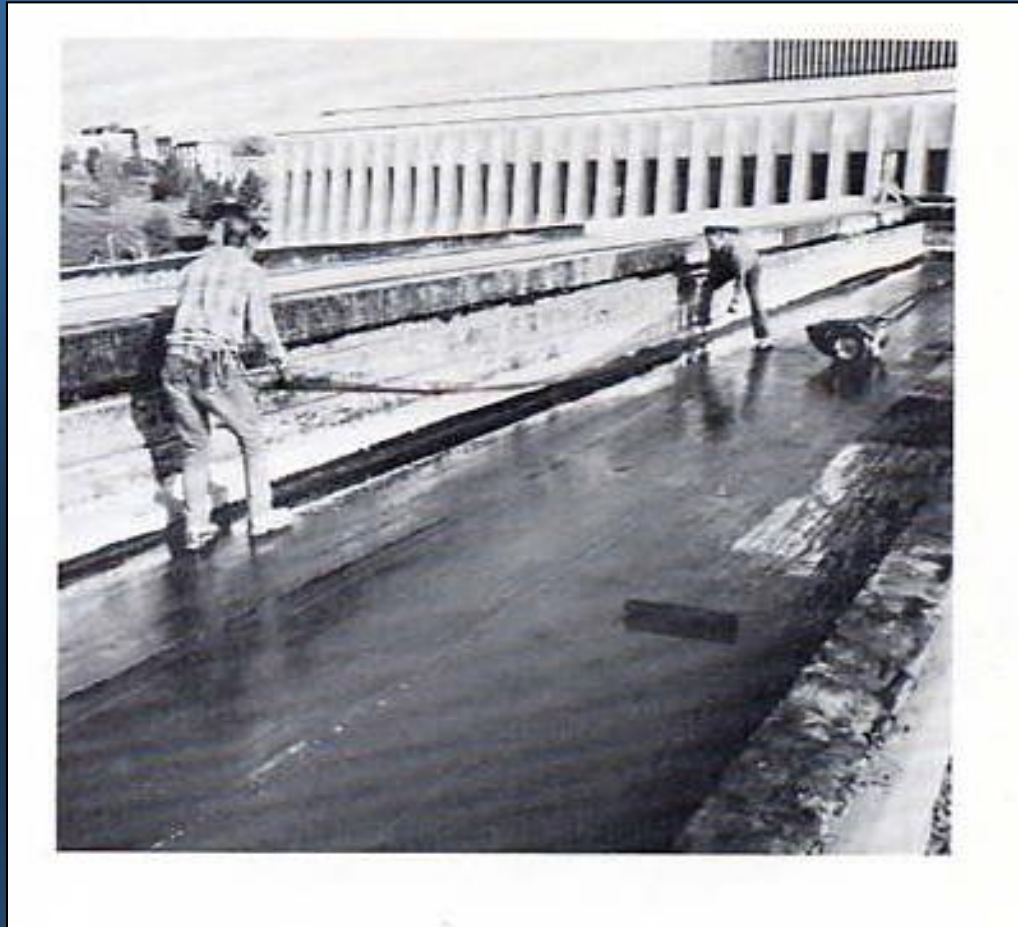
B. Other – Other types of membrane reinforcing used in waterproofing.

1. Jute – Asphalt saturated jute, commonly referred to as treated burlap, is quite often specified for roofing and waterproofing applications. The fabric is more coarse and tends to hold more of the bituminous coating material which results in a heavier build-up of the coating with fewer applications. Jute is used also for protection of newly seeded areas, ditch liners to hold planted material in place until growth starts, and embankment erosion control.

<u>Product</u>	<u>Applicable Specifications</u>	<u>Nominal Sq. Yd. Dr. Weight</u>	<u>Sq. Yd. Saturated Wt.</u>
Jute	Fed. Spec. HH-B-00800 A.S.T.M. D-1327-59	7.5 oz.	9.75 oz. minimum Typical Analysis

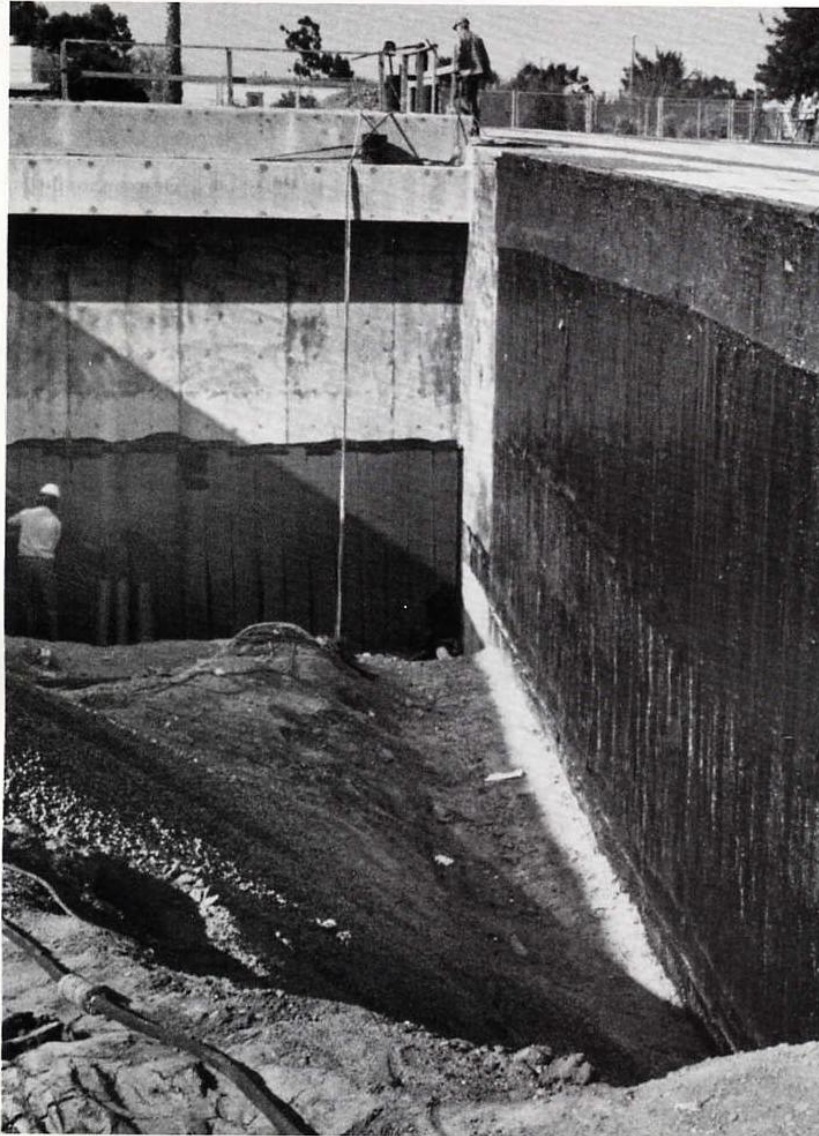
<u>Product</u>	<u>Breaking Strength of Saturated Fabric</u>	<u>Nominal Thread Count</u>	<u>Coating</u>	<u>Color</u>
Jute	50 Warp 50 Fill Typical Analysis	9 Warp 9 Fill Typical Analysis	Asphalt	Black





Woven glass fabric embedded is hot applied coal tar bitumen.

Coal Tar Waterproofing



Below grade wall waterproofing application:

1. Mop wall completely with _____ Coal Tar.
2. Starting at the most practical place, install the desired number of plies lapping them as follows: (a) Four-ply—lap 27½ inches (699mm). (b) Three-ply—lap 24⅔ inches (626mm). (c) Two-ply—lap 19 inches (483mm). (d) When more than four plies are used in a membrane, it is recommended that they be installed in at least two operations, i.e., two plies over three, three plies over three, etc. maintaining the shingle fashion method in each operation.
3. If wood nailers are installed, nail membrane to nailer with 1½ inch (38mm) roofing nails through flat tin discs 8 inches (203mm) on center. If wood nailers are not available, it is recommended the felts be fastened with an anchor bar, wall plugs & fastener devices.
4. Mop the entire surface with _____ Coal Tar. At no place shall felt touch felt and the reinforcement shall not be exposed.
5. As soon as any portion of the waterproofing has been completed, cover it with a protection course and backfill.
6. Backfilling should be done on a daily basis if at all possible. Too long a delay can result in felt slippage.

Plies of Membrane Recommended for Different Water Pressures Based on application to solid wall or floor

head of water feet & meters (m)	Felt, Fabric, or Combined Felt & Fabric	
	plies	pitch moppings
1-3 (0.3 to 0.9)	2	3
4-10 (1.2 to 3.0)	3	4
11-25 (3.4 to 7.6)	4	5
26-50 (7.9 to 15.2)	5	6

Plies of Membrane Recommended for Different Water Pressures

Based on application to solid wall or floor

head of water in feet	Felt, Fabric, Glasfab or Combined Felt & Fabric	
	plies	pitch moppings
1-3	2	3
4-10	3	4
11-25	4	5
26-50	5	6
51-100	6	7

Pressure in Pounds per Square Inch for Different Heads of Water in Feet

Head, ft.	0	1	2	3	4	5	6	7	8	9
0	0.433	0.866	1.299	1.732	2.165	2.598	3.031	3.464	3.897
10	4.330	4.763	5.196	5.629	6.062	6.495	6.928	7.361	7.794	8.227
20	8.660	9.093	9.526	9.959	10.392	10.825	11.258	11.691	12.124	12.557
30	12.990	13.423	13.856	14.289	14.722	15.155	15.588	16.021	16.454	16.887
40	17.320	17.753	18.186	18.619	19.052	19.485	19.918	20.351	20.784	21.217
50	21.650	22.083	22.516	22.949	23.382	23.815	24.248	24.681	25.114	25.547
60	25.980	26.413	26.846	27.279	27.712	28.145	28.578	29.011	29.444	29.877
70	30.310	30.743	31.176	31.609	32.042	32.475	32.908	33.341	33.774	34.207
80	34.640	35.073	35.506	35.939	36.372	36.805	37.238	37.671	38.104	38.537
90	38.970	39.403	39.836	40.269	40.702	41.135	41.568	42.001	42.436	42.867

Ref. Kidder-Parker Architects and Builders Handbook



Cold Process Waterproofing

Hydrostatic Head	Polyester or Glass Fabric	Waterproofing Mastic ASTM D4586
0-5 ft.	1 Ply	8 gallons/100 sq.ft.
5-15 ft.	2 Ply	13 gallons/100 sq.ft.
15-30 ft.	3 Ply	18 gallons/100 sq.ft.



Rubberized Asphalt Waterproofing

- Really a single ply
- Predominant form is a self adhering, 56-mil sheet laminated to 4-mil HDPE film
- Rolled material utilizes silicone release paper to prevent sticking
- Must be pressure rolled
- Concrete substrate must be primed



Rubberized Asphalt Waterproofing

- Not all self adhering modified sheets are suitable for waterproofing
 - Per ASTM, water absorption should be 3.2% by weight or less
 - Range of water absorption: 1% to 10%
 - Internal reinforcement can be detrimental



Application

- Prime substrate, peel off release film, position with lap joint
- Pressure roll membrane and seams
- Use liquid component at corners and at penetrations



Rubberized Bitumen Sheet Alerts

- Make sure the sheet is suitable for waterproofing – absorption of moisture and wicking
- Assure tight bond, full adhesion
- Seal top edges at end of day's work
- Must seal edges of sheet at angles and penetrations using liquid waterproofing
- Top edge of membrane must be secured and sealed on vertical surfaces





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