

10.06 Damp Proofing

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asphalt and coal tar

Many damp proofing measures up to the mid nineteenth century were based upon asphalt or coal tar, but then various new chemicals began to be introduced. Coal tar was itself a recent development, but asphalt had been used in the Middle East from neolithic times. Up until the early nineteenth century most of the asphalt in commercial use was gathered on the shores of the Dead Sea, and it was sometimes referred to as Jewish asphalt.¹ New deposits of asphalt were discovered in Trinidad by Sir Walter Raleigh in 1595, and then in the eighteenth century rock asphalt was found in Switzerland, Germany and France,² notably at Val de Travers in the Swiss canton of Neuchâtel, where it was identified by one d'Eryns, of Berne, in 1716.³ Although the term 'bitumen' embraces both materials, coal tar and asphalt, so little coal tar pitch was used in Britain that the word bitumen alone came to signify asphalt. In 1681, however, two Englishmen had discovered how to make pitch and tar from pit coal, and in 1690 deposits of coal tar were discovered in Norway. But it was only when the gas industry was established, with coal tar as a by-product, that the material became significant, and it was the development of road-making that first created a substantial demand for both products.⁴

The rise of asphalt was a sudden phenomenon in Europe. Natural deposits were opened up in France, and asphalt footpaths were introduced in Paris by the 1830s. According to Ure, asphalt was found in its natural state in France at Obsann (Bas-Rhin), the Parc (l'Ain) and the Puy-de-la-Poix (Puy-de-Dôme), but it could also be made artificially.⁵ According to Loudon the French had generally neglected it until the revolution of 1830, but since that time it had come into wide use for pavements, flat roofs, and the lining of cisterns, and in England some use had been made of it for similar purposes.⁶ In 1834 'Cassell's patent asphalte or bitumen' was patented in Britain.⁷ Richard Tappin Claridge obtained a further patent in 1837, and laid one of

1 Andrew Ure, *A Dictionary of Arts, Manufactures and Mines* (London 1839), p 122.

2 James McCawley, *Roofing* (New York 1938), pp 12-14.

3 Wyatt Papworth [ed], the *Dictionary of Architecture* (London, 1853-1892), sv Bituminous Cements.

4 James McCawley, *Roofing* (New York 1938), pp 14-15.

5 Ure, *Dictionary*, p 122.

6 J C Loudon, *Encyclopaedia of Cottage, Farm and Villa Architecture* (1846 [1833]), §2446, p 1249.

7 E E Cassell and Co of the Patent Asphalte and Bitumen Works, London, also advertised a 'Patent Impervious Wood and Compressed Cork Flooring ... requiring no rafters, impervious to wet or damp, not liable to rot, and for durability and cleanliness well adapted to kitchens, cottages, warehouses, barns ...': *Builder*, III, 126 (5 July 1845), p 324.

the first asphalt pavements in Whitehall, and by the end of 1838 at least two other companies, Robinson's and the Bastenne company, were in production.⁸ During 1838 there was said to be an asphalt mania on the London stock market, with some companies claiming exclusive rights to the only genuine asphalt 'mines' in France, others that German asphalt was just as pure, and yet others asserting that perfectly good asphalt could be found in England.⁹

It was reported in 1838 that thirty-two French patents had been granted for different types of asphalt and bitumen, and as many applied for in Britain but refused, because they so much resembled each other.¹⁰ Claridge's was the type most used in the 1840s and 50s, and was made of the natural calcareous bitumen obtained at Pymont, Seyssel, in the French Department of Ain. This contained nine parts of limestone to one of bitumen, and under Claridge's patent it was improved by the addition of pitch or tar. Another readily available type was the Val de Travers asphalt from Neufchatel, Normandy, which contained one fifth bitumen, and there was also a 'colonial asphalte' made from coal tar, which could be laid at 30% the price of the imported types, but was unsuited to Victoria's climate because it melted at 46°C as opposed to 77°C for natural asphalt.¹¹ Trinidad asphalt had proved unprofitable to the lessees of the asphalt lake, who included the Earl of Dundonald, but the industry was transformed when the various leases were acquired and united by the Americans A L Barber and E B Warren, who proceeded to market the material worldwide.¹²

asphalt paving

For paving floors Loudon recommended an artificial mix using three parts of mineral pitch and three of resin, boiled for time in a pot, to which were added ten parts of sand, five of small gravel, and one of slaked lime. This was to be shovelled onto a foundation which had been levelled up with small stones, and then spread about 50 mm thick.¹³ By the middle of the century asphalt was widely used in flooring barns and outbuildings, as well as for pavements and roofs, and regarded by C B Allen as suitable for cottage floors. A layer of gravel or small stones was placed first, and onto this was spread about 50 mm of boiling asphalt, much as advocated by Loudon. This was carefully pressed down and smoothed, and very small stones were sifted over and pressed into it.¹⁴

The use of asphalt in building was a novelty in Melbourne in 1856, when the *Australian Builder* made a point of reporting that Cairns & Co of the Carron Yards had laid an asphalt floor in a store which Walter Powell had recently bought, in Flinders Lane East,¹⁵

8 *Mechanic's Magazine*, XXIX, 789 (22 September 1838), p 448.

9 *Mechanic's Magazine*, XXIX, 767 (27 April 1838), p 48.

10 *Mechanic's Magazine*, XXIX, 777 (30 June 1838), p 224.

11 Mayes, *Australian Builders' Price-Book* (1862), p 74.

12 McCawley, *Roofing*, p 14.

13 Loudon, *Cottage, Farm and Villa Architecture*, §2446, p 1249.

14 C B Allen, *Rudimentary Treatise on Cottage Building* (2nd ed, London 1854 [1853]), pp 40-41.

15 *Australian Builder*, 16 (19 June 1856), p 129.

the workmen were engaged in laying down first, broken metal, to form a foundation, and afterwards running on this the liquid asphalte. A portable furnace was used for keeping the pitch or tar in a state of ebullition, and into this was poured dry sand, both being well stirred together. It was not laid in slabs, but the whole mass was evenly spread and compressed by a trowel, and well rubbed and reduced to a uniform close surface. Lastly, a fine sand was sprinkled over the asphalte, and worked in with a trowel.

By July Cairns was publicly advertising that he would take contracts for asphalt work.¹⁶ In 1859 Milne & Co of Collins Street west were also advertising, offering to lay Seyssel, German or other asphalt,¹⁷ and in 1861 William Moss of Bignell's Lane was manufacturing asphalt locally.¹⁸ A Melbourne house advertised in 1861 had a stable with an asphalt floor, presumably dating from the time of construction in 1859.¹⁹

In Sydney a rock asphalt floor was laid in a store and dwelling near Market Wharf in about 1857, but a quantity of the material was reshipped from Sydney to Mauritius because nobody was interested in risking their capital on it. Twenty years later, however, the floor was reported to be in its original condition.²⁰ Asphalt was also one of the materials used for damp proof courses, and in 1873 Farmer's 'Victoria House' store at Sydney was given an 18 mm layer of asphalt through all the walls at ground level.²¹

Despite the fact that asphalt had been introduced mainly for paving purposes and laid by Claridge in 1837, it is said that the first sizeable application in Britain was as late as 1869 in Threadneedle Street, London.²² If so, then Australia was not far behind, for James Shepherd is said to have invented and patented the type of asphalt paving used in Melbourne,²³ and in 1871 the Patent Composition Paving Company of Melbourne laid a trial section of pavement for the Geelong Council at the intersection of Myers and Yarra Streets.²⁴ In 1886 asphalt blocks were laid on a trial basis at a number of Sydney street intersections by the Patent Asphaltum Company of New South Wales,²⁵ and in the following year it was reported that they had performed admirably. This company now began to expand its operations in every direction.

In 1887 the Patent Asphaltum Co of Sydney supplied the floor for a stable and coach house at Summer Hill,²⁶ and asphalt floors were laid in the basement and on the terraces of the Adelaide Jubilee Exhibition Building.²⁷ In 1889 an asphalt floor was laid at the St James's Park Skating Rink, in the Melbourne suburb of Hawthorn, under

16 *Australian Builder*, 18 (3 July 1856), p 148.

17 C B Mayes, *The Victorian Contractor's and Builder's Price-Book* (Melbourne 1859), p ii.

18 Intercolonial Exhibition of Australasia, 1866-7, *Official Record* (Melbourne 1867), p 200.

19 *Argus*, 28 September 1861, p 2.

20 *Town and Country Journal*, 3 March 1877, p 348.

21 H M Franklyn, *A Glance at Australia* (Melbourne 1881), p 348.

22 McCawley, *Roofing*, p 85.

23 Isaac Selby, *The Old Pioneers Memorial History of Melbourne* (Melbourne 1924), p 150.

24 W R Brownhill, *The History of Geelong and Corio Bay* (Melbourne 1955), p 90.

25 *Australasian Builder & Contractor's News*, 25 September 1887, p 285.

26 *Australasian Builder & Contractor's News*, 25 June 1887, p 125.

27 *Australasian Builder & Contractor's News*, 16 July 1887, p 158.

the supervision of Augustus Wolskel, Victorian representative of the Patent Asphaltum Company. The material consisted of Trinidad asphalt mixed with an exceptionally hard limestone from the Myall Lakes, New South Wales, and it was laid on felt over the original timber floor.²⁸ When the company held its half-yearly meeting in Sydney it was reported that the Melbourne branch was prospering so well that a branch in Brisbane was under consideration.²⁹ In Sydney itself Wertheim's Building, at the corner of Bridge Street and Queens Place, had a basement floor of another product, MacIntosh's Asphaltine, which was also continued vertically up the basement walls.³⁰

solid barrier damp-proof courses

There were a number of materials in use for damp proof courses, and an anonymous British text of 1878 stated that slate, coal tar and sheet lead were the common types.³¹ However, even in England damp proof courses were the exception rather than the rule as late as the 1880s.³² In about 1870 R S Burn recommended that walls be protected from rising damp by laying a course of slate or lead either in hydraulic cement or in tar and sand. As an alternative he suggested 'Taylor's foundation bricks', the terra cotta product described below.³³ Tar and slate was used in South Australia as early as the 1850s.³⁴

By the 1870s, according to Paul Stark, glass, basalt, slate and even timber were used in South Australia, an instance of the latter being a jarrah dampcourse at 136 Wright Street, Adelaide.³⁵ 'Lakeside' at Robe, a house probably of the 1880s, has what appears to be an original damp course of some sort of bituminous character, especially in the stables (seen by the writer), while a house in North Adelaide of the 1890s has a mixture of sand and tar, or perhaps asphalt.³⁶ Charles Mayes, in an ostensibly Australia-wide text, but writing from Melbourne, described the usual type in 1883 as consisting of one or two courses of slate embedded in Portland cement. He doubted that they would last twenty years without decaying, but in fact they are the commonest found in surviving buildings, and have generally remained effective wherever they have survived intact and unbridged. In 1887 it was reported that slate in cement was unsuitable for Sydney, mainly because the cement used locally was too porous.³⁷ Percy Oakden, in 1885, referred to slate and cement, asphalt, and patent

28 *Australasian Builder & Contractor's News*, 10 August 1889, p 138.

29 *Australasian Builder & Contractor's News*, 17 August 1889, p 148.

30 *Australasian Builder & Contractor's News*, 14 December 1889, p 579.

31 *Cottages: how to Arrange and Build Them, by a Sanitary Reformer* (2nd ed, London 1878), p 71.

32 S D Adshead, *Modern Methods of Building* [published version of a lecture to the RIBA, 1936] (London 1937), p 1.

33 R S Burn, *Modern Building and Architecture* (London, no date [c 1870]), p 26.

34 Verco diary c 1856, South Australian Archives, cited in Bruce Harry, 'Historic Building Method and its Relevance in Conservation Today', in Peter Freeman et al [eds], *Building Conservation in Australia* (Red Hill [ACT] 1985), p 50.

35 Information from Paul Stark, 1991.

36 Information from Paul Stark, 1991.

37 *Australasian Builder & Contractor's News*, 21 May 1887, p 35.

bituminous felt, but he now specially recommended the glazed terra cotta dampcourse which has been described above.^{38\}

A local patent was granted to the Melbourne architects A L Smith and Thomas Watts for the use of slabs of glazed or vitrified stoneware as a damp-proof course for walls.³⁹ This appears to be identical with the patent damp-proof course shown by John Taylor of London at the International Exhibition of 1862, which consisted of extruded slabs with holes running through them, claimed to combine the effects of a damp-proof course, air bricks, and bond reinforcement.⁴⁰ It seems to have been manufactured by Luke Nolan of the Gillbrook Pottery, Brunswick, by 1870, when Nolan described it as:⁴¹

Stoneware patent damp proof course, for preventing damp rising up the wall and for ventilating under the floor. 9-inch course, 6 d. each; 14-inch course, 9 d. each. This is a stoneware tile or flag, 2 1/2 inches [65 mm] thick perforated along its length, for laying along the top of the foundations of a building, prior to the bricks being commenced; the perforation prevents the damp rising and secures ventilation; the two sizes are for walls 9 inches and 14 inches thick.

It does not appear to have found much acceptance, and Charles Mayes stated in 1883 that 'glazed hollow tiles' for damp proof courses had been offered for sale in Melbourne and Sydney for many years, but very rarely used.⁴² Percy Oakden, in 1885, advocated it as the most effective form of damp proof course,⁴³ but no examples have been reported except for a debased version, possibly of fairly modern date.

asphalt and composition damp courses

The other options were tar mixed with ashes, or Callender & Sons' pure bitumen damp course. This latter, which was supplied in rolls, had been widely used in Britain and America, and, as reported in 1883, recently introduced in Sydney,⁴⁴ where it was sold through the agents Findlay & Baynes.⁴⁵ By 1887 it already promised to supersede all other damp proof courses, being cheaper than most or all of them.⁴⁶ In 1888 the *Australasian Builder & Contractor's News* gave the product a blatant

38 Terry & Oakden, *What to Build and How to Build It* (Melbourne 1885), p 12.

39 No 946 to Alfred Louis Smith & Thomas Watts, 22 August 1866.

40 International Exhibition, 1862, *Illustrated Catalogue of the Industrial Department* (2 vols, London 1862), p 56; Burn, *Modern Building and Architecture*, p 184. See also *Notes on Building Construction; Part III; Materials* (London 1879), p 135, for damp-proof courses of stoneware and fireclay by Doulton and Jennings.

41 *The Industrial Progress of New South Wales* (Sydney 1871), p 82. Nolan also showed his patent damp-proof course 'for floor ventilation' at the Philadelphia Exhibition of 1876: Victoria, *Official Catalogue &c* [Philadelphia Centennial Exhibition, 1876] (Melbourne 1876), p 97.

42 Charles Mayes, *The Australian Builders' Price-Book* (4th ed, Melbourne 1883), p 144.

43 Terry and Oakden, *What to Build and How to Build It* (Melbourne 1885), p 12.

44 Charles Mayes, *The Australian Builders' Price-Book* (4th ed, Melbourne 1883), p 144.

45 Charles Mayes, *The Australian Builders' Price-Book* (5th ed, Melbourne 1886), advertisements, no page.

46 *Australasian Builder & Contractor's News*, 21 May 1887, p 357.

editorial plug, reporting that gas tar, felt, pitch and slate had all been found wanting as damp-proof courses. The solution was Callender's Pure Bitumen Damp-Course, for which R B Baynes & Co (as the firm had become) were agents. It was elastic and very strong, and was already used 'in all Government offices' in Victoria and in a number of prominent buildings which were enumerated, in both Melbourne and Sydney.⁴⁷ In 1888-9 Callender's bitumen, damp-resisting solution, and other products were shown at the Centennial Exhibition.⁴⁸

In Australia the only references to asphalt damp courses are in urban situations. In 1890 the Commercial Bank of Australia headquarters in Melbourne was specified to have a damp course of half inch [13 mm] 'Patent Trinidad Asphaltum'.⁴⁹ By 1908 the Patent Asphaltum Co of New South Wales was advertising 'Trinidad Asphaltum Atco Refined', and it was soon manufacturing damp courses and other products which will be mentioned below. The company also had a depot on the Yarra Bank in South Melbourne, though it is not clear whether it manufactured at that address.⁵⁰ Not far away, however, Jas Forbes & Co, at Munro and Brady Streets, were asphalters and tar distillers, producing their own asphalt, bitumen paint, varnish, creosote and other products. They also imported the main brands of asphalt: Trinidad, Seyssel, Val de Travers and Limmer.⁵¹

In 1908 John Sanderson & Co advertised the 'Congo Never Leak Roofing & Damp Course', alleged to be more elastic, plastic and durable than any similar product.⁵² The Patent Asphaltum Co of Sydney advertised no less than five different damp proof courses: the canvas covered, consisting of bitumen and powdered limestone about 3.5 mm thick, covered in canvas on both sides; the 'Trinidad', of two layers of saturated felt with a fine layer of bitumen between; the 'Perfectus', a thicker material consisting of canvas coated with bitumen on both sides; the 'Acme' of sheet lead coated on either side in bitumen-saturated felt; and the 'Rubber', of very thick felt saturated with pure bitumen.⁵³

In 1914 Mayes listed slates and cement, glazed earthenware, Leadite, Ruberoid, Maltha, Malthoid and Vulcanite dampcourses.⁵⁴ Maltha and Leadite were made by William Fimmel & Co of Sydney.⁵⁵ The Patent Asphaltum Co of Sydney still supplied the Acme, Rubber and Perfectus damp courses.⁵⁶ The Acme damp course must be the same as the 'A.C.A. Bitu Lead Damp Course', which the Asphaltum Company claimed, in 1927, to have manufactured for over thirty years.⁵⁷ The situation was somewhat different in Britain where H A Welch claimed in 1936 that

47 *Australasian Builder & Contractor's News*, 15 December 1888, p 553.

48 Centennial International Exhibition 1888-1889, *Official Record* (Melbourne 1890), p 449.

49 G W Blackburn, 'The Commercial Bank of Australia Limited, New Premises, &c' [bill of quantities] (Melbourne 1890), p 61.

50 *Cazaly's Contract Reporter*, XXIV, 25 (23 June 1908), p 97.

51 *Cazaly's Contract Reporter*, XXIV, 25 (23 June 1908), p 98.

52 *Cazaly's Contract Reporter*, XXIV, 25 (23 June 1908), p 97.

53 C E Mayes, *The Australian Builders and Contractors' Price-Book* (7th ed, Sydney 1908), advertisements p 5.

54 C E Mayes, *The Australian Builders & Contractors' Price Book* (8th ed, Sydney 1914), p 32.

55 Mayes, *Australian Builders Price-Book* [1914], advertisements p 15.

56 Mayes, *Australian Builders Price-Book* [1914], advertisements p 5.

57 *Australian Homes* (Melbourne 1927), p 126.

bitumen felt was rarely used, and that slate in cement was the commonest damp proof course.⁵⁸

In 1938 tarred sand was still an option in Australia, as were earthenware, and slate set in cement, but the range of roll and sheet material now included Adamax, Anderson's Rok Bitumen, Crane Brand, Danks pure lead, Maltha, Ormco, Ormonoid Sentinel, P & B Asbestos, Rexilite (2 and 3-ply) and Trinidad Asphaltum. For damp-proofing floors and other large areas Malthoid and Ruberoid were used. By the 1940s two pound bituminous-coated lead (perhaps the same as Acme or Leadite) was the material accepted by most authorities in Australia, and Malthoid and other bitumenised products were in wide use.⁵⁹

58 H A Welch, *The Construction of the Modern House* [published version of a lecture to the RIBA, 1936] (London 1937), p 18.

59 *You Can Build Your Own Home!* (2nd ed, Sydney 1948 [1946]), p 45.