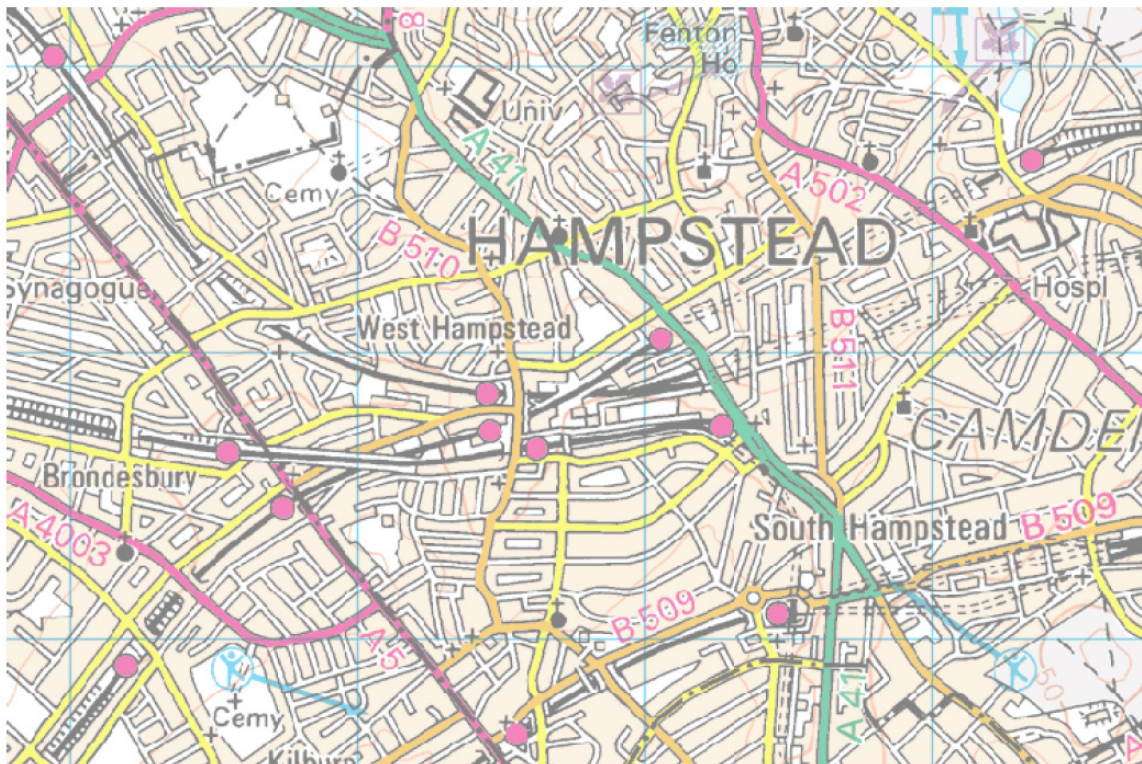


224 Finchley Road

London

NW3 6DH

Hydrological and Flooding Risk Report



Date Issued:	24.10.2011
Issued by:	J. Puddy
Checked by:	G. Egmore-Frost
Revision:	Rev A



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1. INTRODUCTION

London Basement have been commissioned by The Basement Design Studio to undertake a hydro geological assessment and flood risk report to assess the impact of the proposed basement extension at 224 Finchley Road, London NW3 on the local groundwater regime and the risk posed by flooding.

This is in response to changes in the LDF Policy DP23-Water and DP27 Basements and Lightwells, with specific reference to the following section

23.12 Development can have an impact on the water environment beyond the site where it takes place by altering the flow of water above and below ground and changing where water is absorbed or rises to the surface. For example, the construction of a basement could cause surface water flooding if its location forces water to the surface or could cause flooding elsewhere if the movement of water below ground is altered. Changing water movements can alter soil conditions in the wider area. Applications for developments in areas where historic underground streams are known to have been present will be required to include assessments of the potential for, and management of, groundwater flood risk (see our Camden Planning Guidance supplementary document for further information). Basements also affect the ability of the ground to absorb rain when soil is replaced by an impervious structure and can be particularly susceptible to flooding due to their underground location. In certain circumstances the use of basements may be restricted to non-habitable uses. For further detail on our approach to basements please see policy DP27-Basements and lightwells.

This report presents the findings of a desk based study of the available ground and groundwater conditions in the surrounding area taking into account published geological records from the British Geological Survey, groundwater conditions from the Environment Agency and the available site investigation information from Chelmer Site Investigations from work carried out in September 2011, the report of this activity can be found in appendix B of this document.

Using this information conclusions are drawn on the possible impact of the proposed basement structure on the local groundwater and drainage regime.

Information regarding the proposed water management systems is presented in appendix C of this report.

It should be noted that this report does not comprise a geotechnical appraisal of the proposed development.



2. SITE LOCATION

2.1 General

The site is located at No. 224 Finchley Road, London NW3 6DH
A site location is presented in Figure 1.

2.2 Proposed development

The proposals are to extend an existing lower ground storey below the footprint of the existing property, which is a substantial brick built semi detached house of approximately 100 years old.

The property is residential and the development is intended to be a self contained dwelling.

Low level upstands will be formed around the rear lightwell to reduce the risk of localised flooding. Practical measures are taken to reduce the impact of flooding. The development will be drained by a surface water pump and 'dual' pumps will be installed as standard. These are fitted with a high level alarm with battery backup to warn in the event of pump failure. A further battery back up system is available to ensure the pumps continue to operate in the event of mains failure.

Details of the water management systems are presented in appendix C.

Scheme designs for the existing and proposed basement structures are presented in Appendix A.

3. GEOLOGY AND GROUND CONDITIONS

3.1 Published geology

According to British Geological Survey the site lies on the Claygate Beds overlying the London Clay Formation.

3.1.1 Claygate Beds

17 – 24 m. Interbedded, fine-grained sand, silt and clay.

The lower boundary of the Claygate Beds is drawn at the base of lowest fine-grained sand bed, conformable on silty clay.

3.1.2 London Clay Formation

London Clay Up to 150 m Fine, sandy, silty clay. The London Clay Formation ¹ is an over consolidated firm to very stiff, becoming hard with depth, fissured, blue to grey silty clay of low to very high plasticity. The upper and lower parts may contain silty or fine grained sand partings. It also contains, within it, laminated structured, nodular claystone and rare sand partings. The London Clay is approximately 90m thick in the area. The London Clay is relatively impermeable and this is confirmed by the relatively low permeability typically 1×10^{-9} m/s and lower.

¹ <http://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=LASI>

3.2 Available ground investigation information

A site investigation was undertaken by Chelmer Site Investigations under the direction of London Basement. The factual reports is included as Appendix B.

4. GROUNDWATER

4.1 Aquifer classification

Bagshot Formation and Claygate Beds are classified as a Secondary Aquifer (Class A) by the Environment Agency (EA, 2010). These comprise permeable layers capable of supporting water at a local scale.

The Claygate Beds can let some water pass through and therefore springs may be found at the boundary of the Claygate Beds with the impermeable London Clay.

The London Clay is classified as an aquitard, although is slightly more permeable where weathered or where it has a higher proportion of sand.

4.2 Groundwater

The borehole log records no groundwater to a depth of 6.0 m below the ground level. The remarks the borehole log record no water seepage at 6m and that the borehole was dry and open upon completion.



5. CONCLUSIONS

5.1 Current hydrological regime

The ground and groundwater conditions indicate that precipitation falling on the site where not already collected by gulleys from roof and hard standing has and will continue to infiltrate through the made ground and firm clay passing downwards until it reaches the top of the relatively low permeability London Clay Formation where the direction of flow will become lateral. Contribution to local groundwater from vertical infiltration of rainwater is likely to be very limited at this site and the development will not alter this.

5.2 Impact of proposed basement construction

The site investigation data confirms the anticipated shallow depth geology as suggested by desk study information.

The site investigation information would suggest that the basement will not encounter groundwater or form an obstruction to regional flow. Furthermore, the available borehole information from the BGS in the area would confirm that no groundwater could be expected at 6 m or so below which is below the anticipated depth of the proposed construction.

Contribution to local groundwater from vertical infiltration of rainwater is likely to be very limited at this site and the development will not alter this.

Based on the ground and groundwater conditions at the site, the proposed basement will have no discernable impact on the local hydrology and will therefore not impact or influence neighbouring properties. It is outside of 20 metres from either a Canal or Watercourse. Therefore, the likelihood of flooding is minimal. The flood map from the area is shown in figure 2.

The level used for the 1:200 year flood is considered to be 5.32 AOD.

We have either carried out or received Planning approval for many basement works for example: in Goldhurst Terrace, Willoughby Road, Parliament Hill, Perceval Avenue and Glenilla Road all with AOD's ranging well above the 1:200 year floodplain.



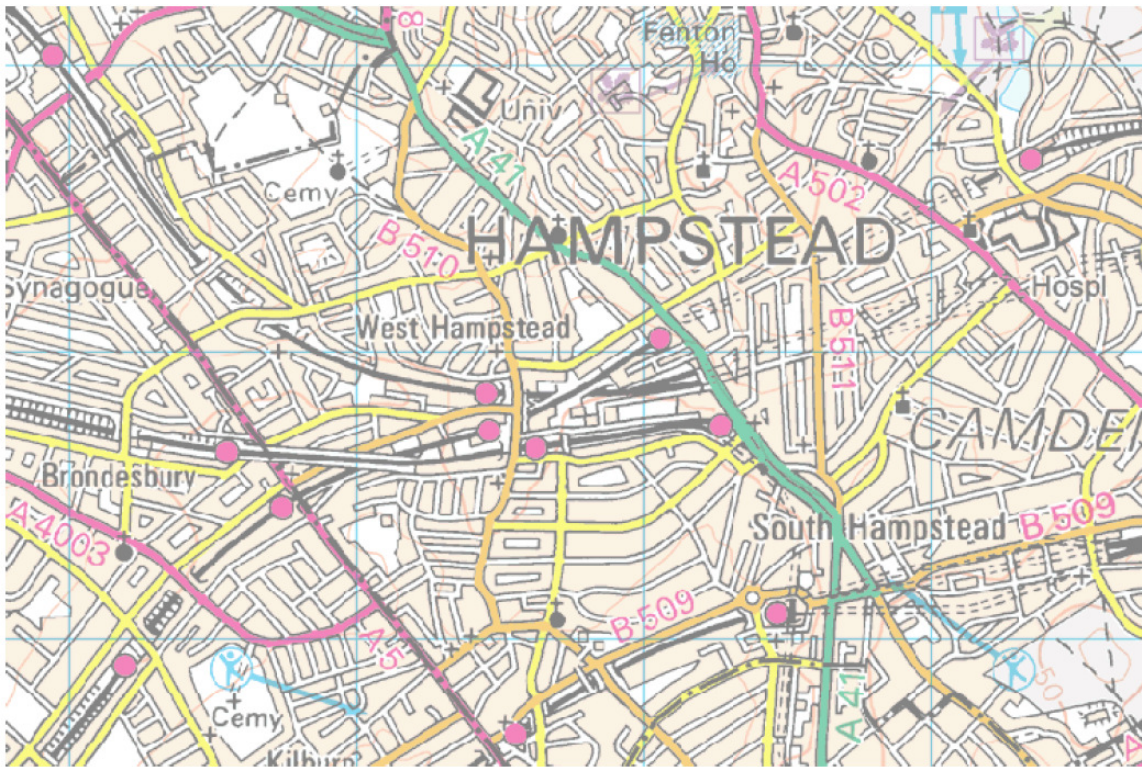
FIGURES

- 1 Site location plan**
- 2 EA flood risk map**

figure 1 - site location map

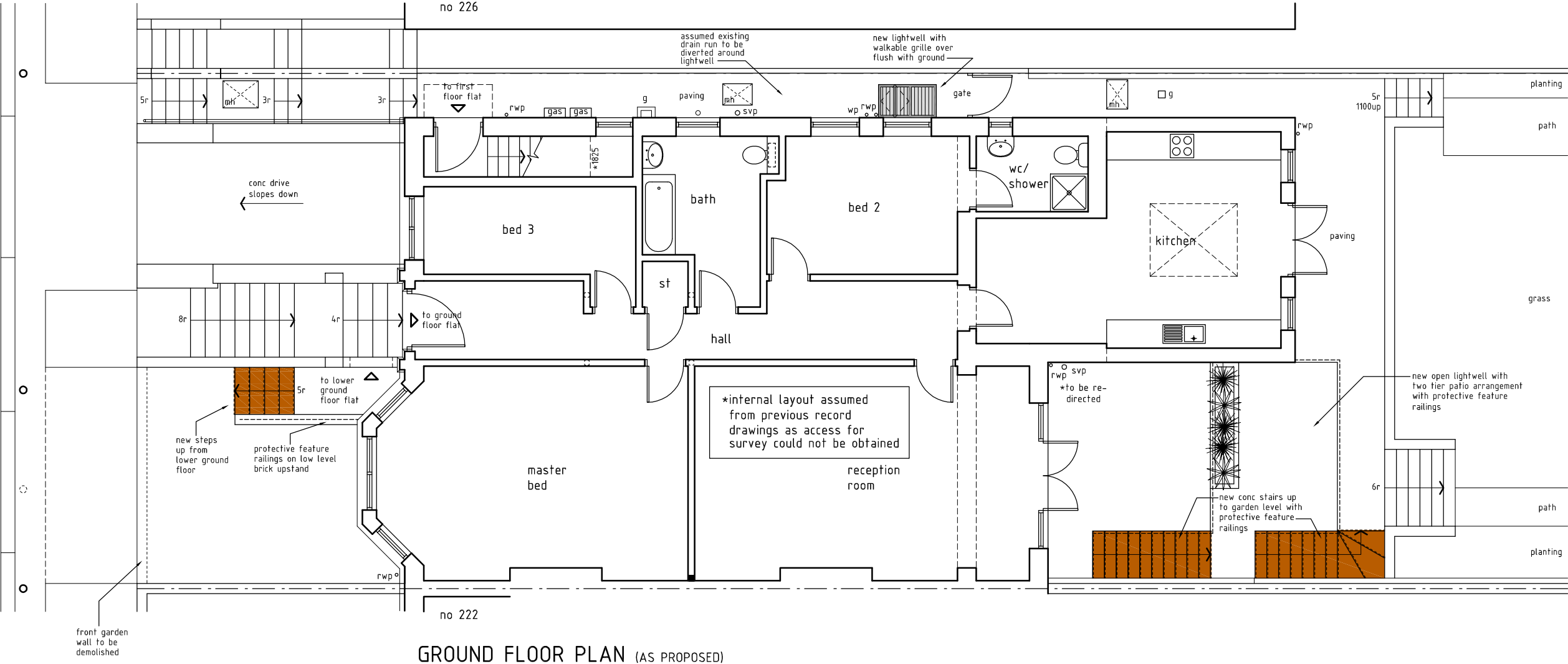
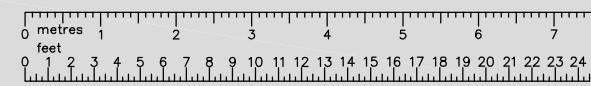


figure 2 - EA flood risk map



Appendices

- A Proposed basement plans**
- B Site investigation records**
- C Water management systems**



NOTES:

This drawing is intended as a scheme proposal and serves as a guide to clients to indicate possible room configurations.

Clients should be aware that these scheme proposals may indicate works that may not have been allowed for in the initial estimate such as additional excavation, enlarged or additional lightwells and/or the removal of chimneys.

This drawing has been based on a dimensional survey without the benefit of trial holes or other exploratory works.

As a consequence this drawing does not necessarily take account of perimeter wall thicknesses and/or foundation projections. Room sizes are therefore approximate and scaled dimensions should not be relied upon.

We cannot guarantee that all additional space indicated can be created in areas where access was not available.

Clients are advised that additional supports, piers, posts or buttresses may be required in the final structural design.

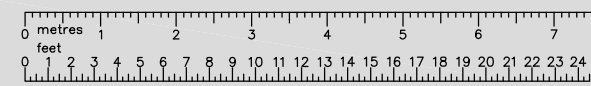
SCHEDULE OF AREAS:

(gross internal)

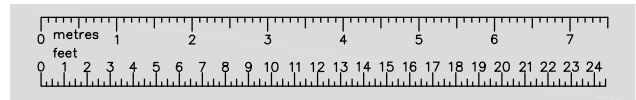
Existing Lower Ground (as drawn):
*32m2 (344 sq. ft.)

Proposed Basement (as drawn):
*148m2 (1593 sq. ft.)

Proposed Area (as used for preliminary costings):
*133m2 (1432 sq. ft.)



LOWER GROUND FLOOR PLAN (AS PROPOSED)



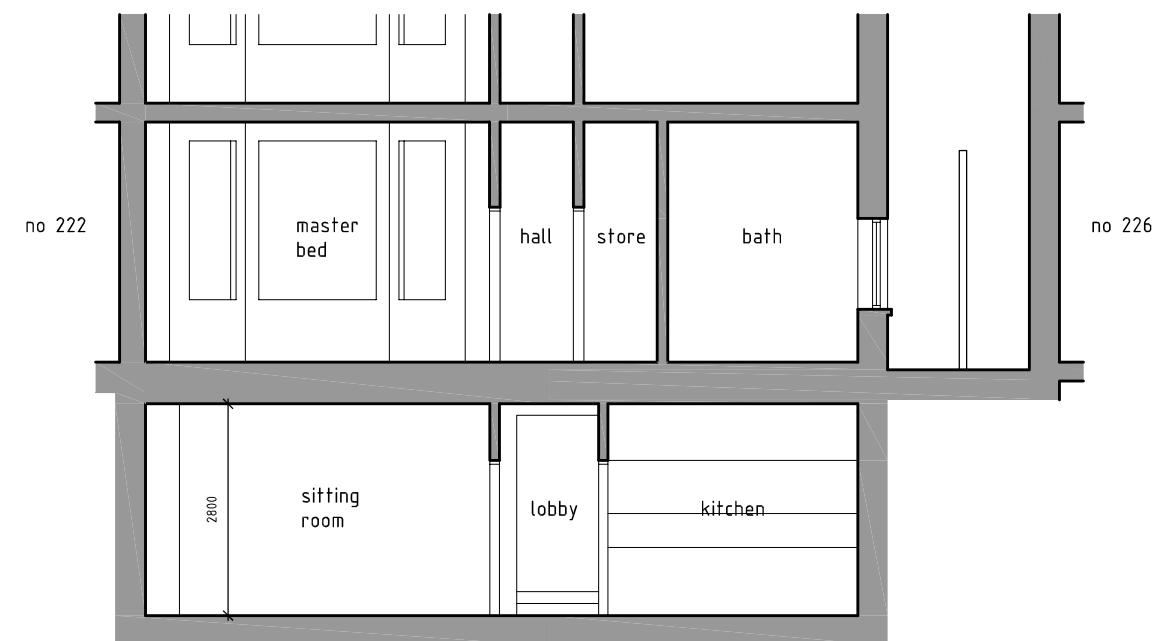
FRONT ELEVATION in true elevation
(AS PROPOSED)



FRONT ELEVATION (AS PROPOSED)



REAR ELEVATION (AS PROPOSED)



CROSS SECTION (AS PROPOSED)

REV. A CLIENT AMENDMENTS

30-09-11



Client london basement

Job ref. LBJ 1156

Project Mr K Ayoubi
224 Finchley Road
London
NW3 6DH

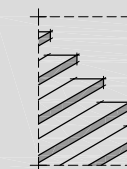
Scale 1:100 @ A3

Date Sept 11

Drawing Title SCHEME DESIGNS

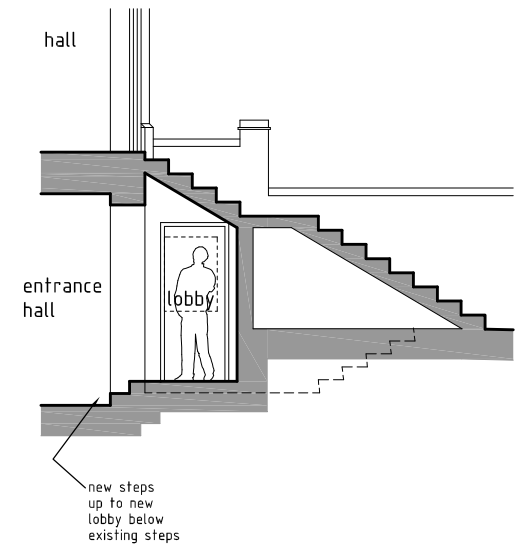
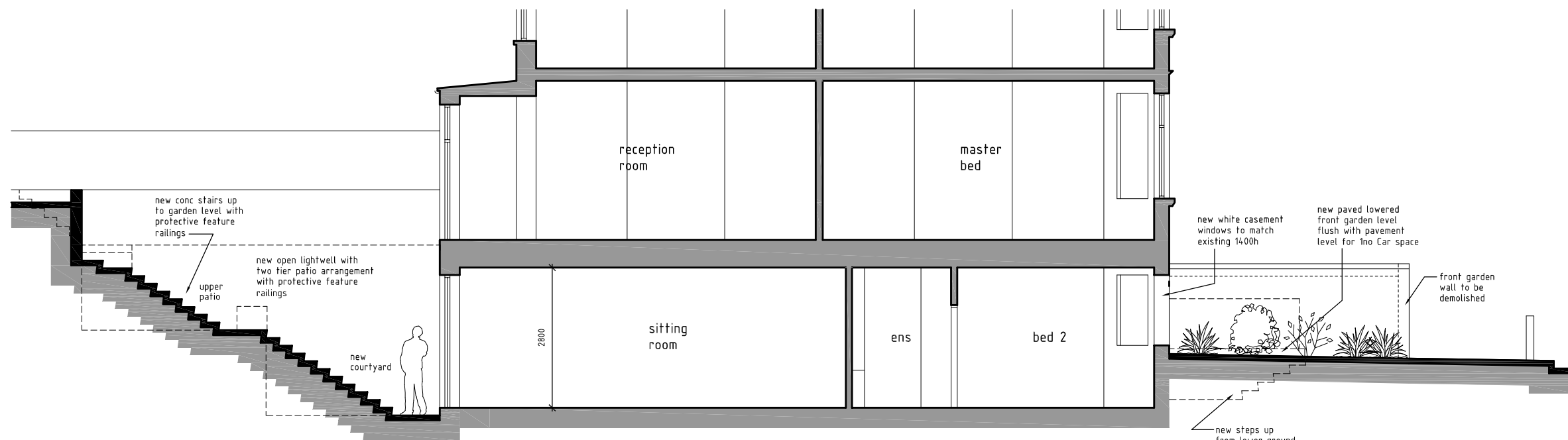
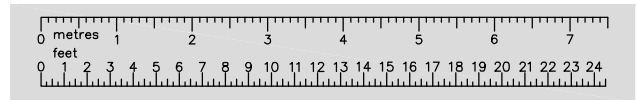
Drawing No. 11/038-02A

Sheet 3 of 4



the basement
design studio

Suite 17, Maple Court, Grove Park, White Waltham. SL6 3LW
tel. 01628-826066 www.basementdesignstudio.co.uk



LONGITUDINAL SECTION (AS PROPOSED)

FRONT STEPS SECTION
(AS PROPOSED)

REV. A CLIENT AMENDMENTS 30-09-11



Client london basement

Job ref. LBJ 1156

Project Mr K Ayoubi
224 Finchley Road
London
NW3 6DH

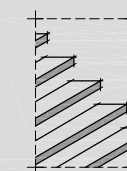
Scale 1:100 @ A3

Date Sept 11

Drawing Title SCHEME DESIGNS

Drawing No. 11/038-02A

Sheet 4 of 4



the basement
design studio

Suite 17, Maple Court, Grove Park, White Waltham, SL6 3LW
tel. 01628-826066 www.basementdesignstudio.co.uk

A Factual Report on the
Site Investigation undertaken
for
London Basement / Holbase Ltd

at

224 Finchley Road
London NW3

CSI Ref: 2782

Date: 2nd September 2011



Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk

The site plan shows the layout of the property at No. 224 X2. The property is bounded by Finchley Road to the south and a dashed line to the north. The plan includes a drive, a footpath, and a raised front border. A north arrow is located in the center of the plan, and a scale bar indicates a distance of 1m. A legend in the bottom right corner defines the symbols used in the plan.

Legend:

- DRIVE
- - - FOOTPATH
- FINCHLEY ROAD
- RAISED FRONT BORDER
- STEPS UP
- NO. 224 X2

Site Plan Details:

- The property is bounded by Finchley Road to the south and a dashed line to the north.
- The drive is located on the left side of the property.
- The footpath is located on the right side of the property.
- The raised front border is located between the drive and the footpath.
- The steps up are located on the right side of the drive.
- The north arrow is located in the center of the plan.
- The scale bar indicates a distance of 1m.
- The legend in the bottom right corner defines the symbols used in the plan.

Key:

						
Tree/Shrub	Borehole	Trial Pit	Gully	Tree Stump	Rain Water/ Soil Pipe	Manhole

Chelmer Site Investigations

Unit 15 East Hanningfield Industrial Estate
Old Church Road, East Hanningfield, Essex CM3 8AB

Telephone: 01245 400930 Fax: 01245 400933

Email: info@siteinvestigations.co.uk Website: www.siteinvestigations.co.uk



Client: London Basement/Holbase Ltd		Scale: N.T.S.		Sheet No: 1 of 1		Weather: Sunny		Date: 2.9.11	
Site: 224 Finchley Road, London NW3		Job No: 2782		Borehole No: 1		Boring method: Hand auger			
Depth Mtrs.	Description of Strata	Thick-ness	Legend	Sample	Test Type	Result	Root Information	Depth to Water	Depth Mtrs
G.L. 0.15	SHINGLE OVER TOPSOIL	0.15							
0.8	MADE GROUND: medium compact dark brown very silty clay with gravel and brick pieces and fragments.	0.65		D			Hair and fibrous roots to 1.3m. 		0.5
	Stiff mid brown/orange grey veined silty CLAY with partings of orange/brown silt and fine sand and crystals.	0.5		D	V	128 136			1.0
1.3	Very stiff fragmented as above.	1.9		D	V	140+ 140+	No roots observed below 1.3m. 		1.5
				D	V	140+ 140+			2.0
			D	V	140+ 140+			2.5	
			D	V	140+ 140+			3.0	
3.2	Very stiff mid brown grey veined silty CLAY with partings of brown and orange silt and fine sand and crystals.	2.8		D	V	140+ 140+			3.5
				D	V	140+ 140+			4.0
			D	V	140+ 140+			4.5	
			D	V	140+ 140+			5.0	
			D	V	140+ 140+			5.5	
			D	V	140+ 140+			6.0	
6.0	Borehole ends at 6.0m								
Drawn by: JG		Approved by: ME		Key: T.D.T.D. Too Dense to Drive D Small Disturbed Sample J Jar Sample B Bulk Disturbed Sample V Pilcon Van (kPa) U Undisturbed Sample (U100) M Mackintosh Probe W Water Sample N Standard Penetration Test Blow Count					
Remarks: Borehole dry and open on completion.									



REPORT NOTES

Equipment Used

Hand tools, Mechanical Concrete Breaker and Spade, Hand Augers, 100mm/150mm diameter Mechanical Flight Auger Rig, GEO205 Flight Auger Rig, Window Sampling Rig, and Large or Limited Access Shell & Auger Rig upon request and/or access permitting.

On Site Tests

By Pilcon Shear-Vane Tester (Kn/m^2) in clay soils, and/or Mackintosh Probe in granular soils or made ground and/or upon request Continuous Dynamic Probe Testing and Standard Penetration Testing.

Note:

Details reported in trial-pits and boreholes relate to positions investigated only as instructed by the client or engineer on the date shown.

We are therefore unable to accept any responsibility for changes in soil conditions not investigated i.e. variations due to climate, season, vegetation and varying ground water levels.

Full terms and conditions are available upon request.

DELTA MEMBRANE SYSTEMS LTD.



DELTA SYSTEM 500

'Providing Waterproofing Solutions'



The Sealed System

In Soil retaining situations such as basements and vaults etc. The **DELTA** sealed system is recommended. The membrane selection depends on the required finish and flow rate if applicable. All membrane junctions, fixing points, service entries and other protrusions are sealed with the **DELTA** Seal range of sealing products. Where active ground water is evident or expected drainage of one form or another should be incorporated into the specification. Our Technical staff are available to give advice in this respect.

The Ventilated System

In above ground situations or in areas where no free running water is expected, for example where external pavements have been built up the ventilated system can be used. The ventilated system with air gap at top and bottom does not require sealed joints or fixings, a 100mm overlap is sufficient in this situation. This

method is seen as a sympathetic solution in Heritage type properties as a general damp proofing system. The fabric of the building remains unchanged but the new internal surfaces are 'dry' and are salt and contamination free. Both dry lining or plaster direct finishes are available on the ventilated system.

Floors

As well as being a complete waterproofing and damp proofing system **DELTA** system is also used to upgrade damp and defective floors. With excellent crush resistance the system lends itself to a variety of different finishes which include conventional screeds, thin layer fast drying screeds and wood based floating floors. Insulation can also be used in conjunction with the system where required. The system can be linked to the D.P.C. constructed within a new wall or to an existing or chemical D.P.C.

Preparation

As the membrane systems are mechanically fixed there is no



reliance on the ability of the product to bond to the substrate. The **DELTA** system can be applied



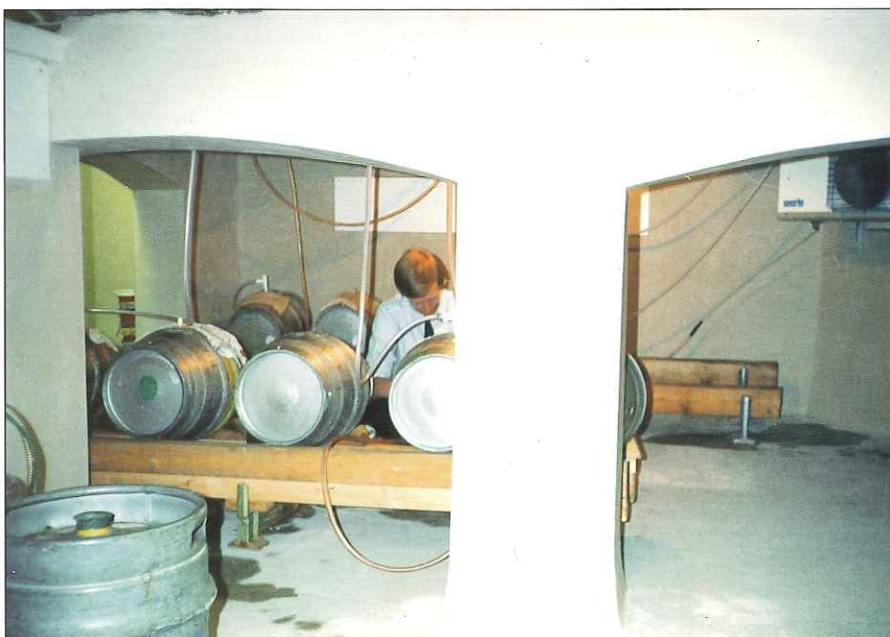
to a variety of different substrates for example over existing renders or broken down bitumen coatings, etc. This can be easily achieved without detriment to the integrity of the system.

Damp Pressure Equalisation

The studded structure of the membrane allows the dampness behind the membrane to move in all directions unhindered, therefore the whole of the wall or floor surface takes the damp loading. Break down created by weak points are eliminated. The product does not divert the problem to other areas.

Flexibility

In structures where movement or vibration can be a problem, examples being under street vaults, railway arches, and buildings constructed with movement joints,



the **DELTA** system can cope. The **DELTA** membrane has an elongation break of greater than 50%.

Speed

As there is little or no preparation required the system is by comparison quick to install. When dry finishes are used the system is a 'fast track' solution. Decoration does not need to be delayed as there is no drying process.

DELTA Membrane Systems are the U.K. arm of the world's largest producer of studded membrane systems. The market leading **DELTA** brand has a track record approaching three decades. The **DELTA** systems have been used successfully in many situations in the U.K. From small domestic basements up to major



waterproofing of London Underground stations there is rarely a dampness or water ingress problem that falls outside the scope of the capabilities of the **DELTA** system.

What are DELTA Systems

With the introduction of the latest British Standard 8102 (1990) 'for Protection of structures against water



from the ground', the use of cavity membranes has been generally accepted in the U.K. **DELTA** Systems are a complete range of products which are used together to solve many of today's problems in both new and old construction. **DELTA** Systems can easily deal with aggressive ground water conditions, where basements are liable to flooding, or indeed where simple dampness, contamination or salting problems are prevalent. Other more diverse applications include Turf covered roofs, barn conversions, tunnel linings or even as a barrier against radon gas.

The main components of the system are the membranes themselves. These are manufactured from virgin high density polyethylene which is thermally and alkaline stabilised. The stud heights vary from 3mm for **DELTA-FM**, 8mm for **DELTA MS 500 & DELTA PT** to 20mm for **DELTA MS 20**. The cavity created by the membrane contains between 2.1 and 10 Litres of space respectively. This is known as either the 'Air gap' or the 'Drained Cavity', in wet situations.

The Membranes

DELTA-MS 500 This is used for walls and floors, and is supplied in 2.4, & 2m x 20m rolls. This membrane can be used for light water ingress situations, and is available in brown, yellow (**DELTA-FM**), and clear. The 500 clear aids the selection of good fixing points in the more difficult application i.e. Random stone and friable brickwork. The sealed **DELTA** fixing is used to secure System 500, the centre shank of this fixing is also used for subsequent dry lining applications.

DELTA PT LATH This membrane has a mesh incorporated on the internal face which is attached by a thermic welding process at the time of manufacture. The sealed PT fixing plug is used to secure the





membrane at 250mm horizontal and vertical centres. The welded mesh and fixing plugs allow for direct render 1.1.6.

(cement/lime/sand), or plasters: Tilcon Whitewall, Carlite Bonding, or dab fixed plasterboard for internal applications. When this grade is used for external above ground protection DELTA renders can be used as a finish. These renders are polymer modified and also have reinforcing fibres incorporated for added strength and durability. This grade is available in clear 2.0m x 20m (40m²) or 1.5m x 10m (15m²).

DELTA MS 20 This is a heavy gauge version of System 500 with deep 20mm studs. This is used where extra drainage capacity is required, for example on deeper structures, or where a larger flow rate is required. MS 20 can also be used as a 'cavity former' for many types of new construction. The rolls are a full 2 metre width by 20 meters in length (40m²).

External Protection

DELTA GEO-DRAIN

Structures that are earth retaining can be damaged by moisture penetration from the outside or by water under hydrostatic pressure.

DELTA Membranes are available as geocomposites to deal with such problems. They act as a waterproof

drainage layer, and quickly remove the water to suitable drainage around the structure. They prevent the build-up of hydrostatic pressure on the structure and filter the water via an integral polypropylene filter layer. This prevents the fine ground particles from blocking the drainage facility and avoids destabilising the soil.

Guarantee

DELTA membrane systems come with a thirty year guarantee. The guarantee covers the membrane and all other system components. Based on experience, accelerated ageing tests and a quality manufacturing system to ISO 9001, the **DELTA** range can also be guaranteed with confidence.

Technical site and/or office visits

Staff are available to visit site to give advice on particularly difficult or in unusual situations, where appropriate specifications are prepared to assist in the correct use of the system. We believe our technical staff to be second to none and certainly the most experienced in the U.K. Market. This service is open to

Property owners, Architects, Surveyors and specialist companies.

Who Installs DELTA Systems

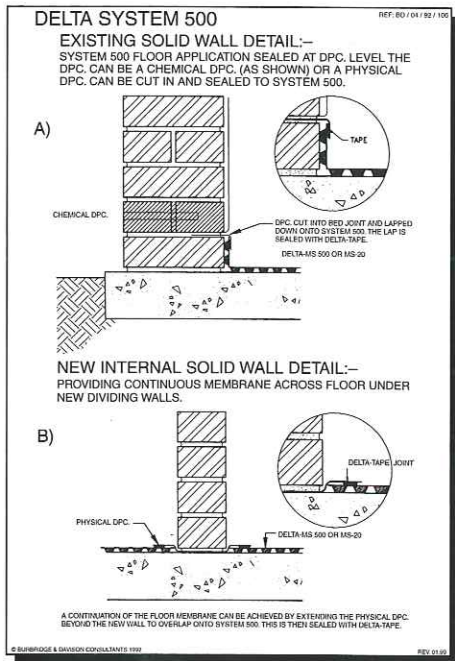
Although **DELTA** systems are by comparison, easy to install, it must be recognised that correct diagnosis of the problem is essential so that **DELTA** systems can be designed and tailored to the needs of the building, to give the best possible performance.



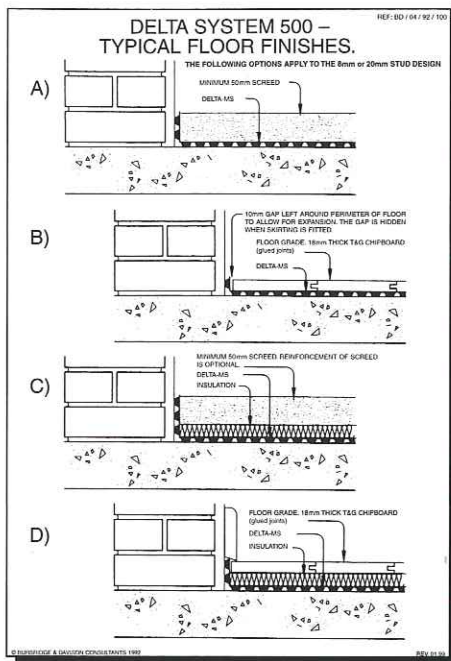
It is therefore recommended that only competent specialist contractors, who understand dampness, and the associated problems, be employed to survey the site, install the system and thereby ensure the best possible performance of the system. **DELTA** systems are installed by a nationwide network of specialist contractors who are holders of 'Registered Installers' Certificates.



DELTA® SYSTEM 500

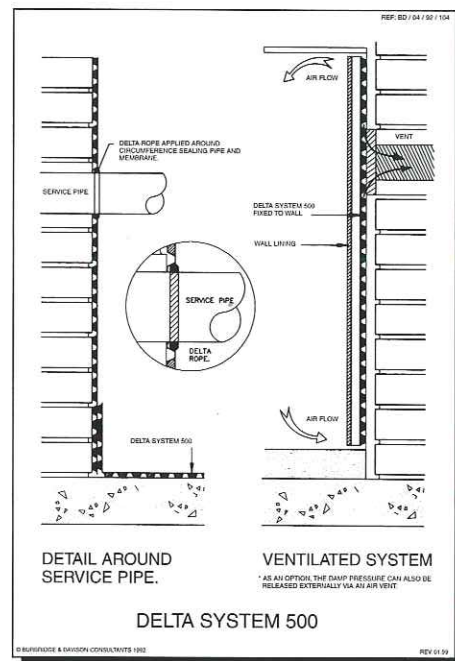


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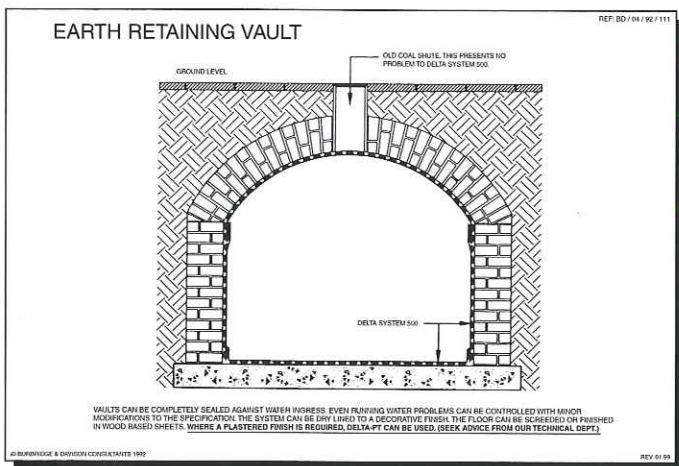


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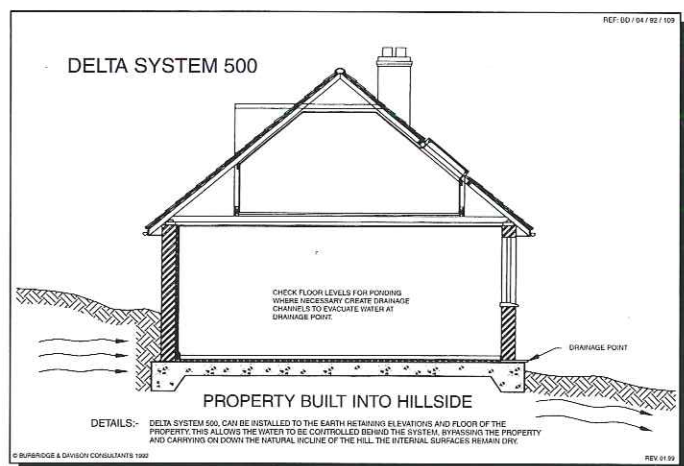
© BURBRIDGE DAVIDSON CONSULTANTS 1992-1999



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DELTA®-FM:

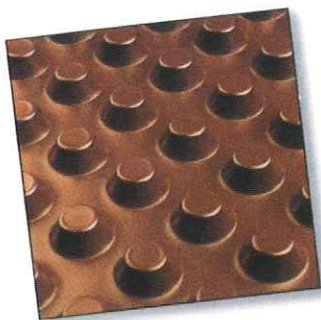


DELTA®-FM is specifically designed for floor applications, to combat dampness, and contamination. The special low stud profile (3mm) minimises changes in floor levels but still provides an air gap to achieve damp pressure equalisation.

The membrane is a fast-track application that allows various floor finishes to be achieved with zero 'down time'. The R.H. levels are isolated in the air gap, and controlled. Delta-FM can be used in new build, remedial or refurbishment projects for floors, and walls.

Material:	Virgin high-performance PE-VHD
Application:	Special low stud profile for floor. Can be used on walls
Sheet thickness:	approx. 0.6 mm
Dimple height:	approx. 3 mm
Compressive strength:	approx 140 kN/m ²
Roll dimensions:	20m x 2m (40m ²)
Volume between dimples:	approx 2.1 l/m ²
Service temperature range:	-30degC / +80degC

DELTA®-MS 500:



Cavity drainage membrane for use on walls and floors, as a waterproof system. A choice of finishes are available. Can also be used externally for waterproof protection of sub-ground structures.

Material:	high density polyethylene
Thickness:	approx. 0.6 mm
Stud height:	approx. 8 mm
Roll size:	available in brown & clear
(With flat edge of 7 cm on one side)	2.4 x 20 m
Compressive strength:	2.0 x 20 m
Drainage capacity:	> 250 kN/m ²
	approx. 2.25 l/s · m
	approx. 135 l/min · m
	approx. 8 100 l/h · m
Air volume between studs:	approx. 5.3 l/m ²
Temperature resistance:	- 30°C to + 80°C
Chemical properties:	resistant to chemicals, resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	B2 accord. to DIN 4102, in the case of special requirements possibly B1 accord. to DIN 4102 (test mark PA III 2.2087)

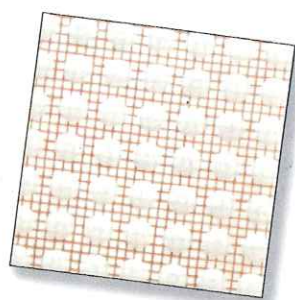
DELTA®-MS 20:



Dimpled sheeting with particularly high drainage capacity and compressive strength, suitable for high performance seepage layers in building and civil engineering construction.

Material:	high density polyethylene
Thickness:	approx. 1 mm
Stud height:	approx. 20 mm
Roll size:	2.0 x 20 m
	In the case of special requirements, also available in board format
Compressive strength:	approx. 150 kN/m ²
Drainage capacity:	approx. 10 l/s · m
	approx. 600 l/min · m
	approx. 36 100 l/h · m
Air volume between studs:	approx. 14 l/m ²
Temperature resistance:	- 30°C to + 80°C
Chemical properties:	resistant to chemicals, resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	B2 accord. to DIN 4102, in the case of special requirements possibly B1 accord. to DIN 4102

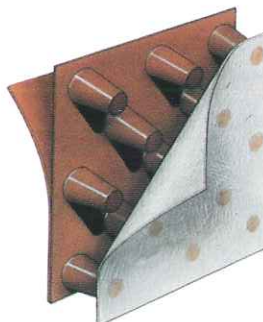
DELTA®-PT:



Dimpled sheeting with plastic mesh welded on, suitable as a damp-proof base for plaster or shotcrete, e.g., as a seepage layer in tunnel construction, or for repairing basements internally.

Material:	high density polyethylene
Thickness:	approx. 0.5 mm
Stud height:	approx. 8 mm
Roll size:	2.0 x 20 m
	1.5 x 10 m
Compressive strength:	approx. 70 kN/m ²
Drainage capacity:	approx. 5 l/s · m
	approx. 300 l/min · m
	approx. 18 100 l/h · m
Void between studs:	approx. 5.5 l/m ²
Temperature resistance:	- 30°C to + 80°C
Chemical properties:	resistant to chemicals, resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	B2 accord. to DIN 4102

DELTA®-GEO-DRAIN:



Dimpled sheeting with integral separating membrane and welded-on geotextile as a compact protection and drainage system for elastic thick layer waterproofing in building construction. Installation depth up to 10m.

Material:	high density polyethylene
Material of geotextile:	polypropylene
Material of separating membrane:	polyethylene
Stud height:	approx. 9 mm
Roll size:	2.0 x 12.5 m
Compressive strength:	approx. 400 kN/m ²
Drainage capacity:	approx. 3.5 l/s · m
	approx. 210 l/min · m
	approx. 12 600 l/h · m
Void between studs:	approx. 7.9 l/m ²
Temperature resistance:	- 30°C to + 80°C
Chemical properties:	resistant to root penetration, rotproof, neutral towards drinking water
Behaviour in fire:	B2 accord. to DIN 4102

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