Notes

All drainage shall comply with the typical drainage construction details and the requirements of BS EN 752.

Access covers and frames shall comply with the loadings specified and to BS EN 124 and kitemarked or if recessed covers are specified then in accordance with FACTA association equivalent.

The proposed building outlines shown on this drawing are for information only. Refer to Architects plans for precise location setting out information and details.

All drainage pipework shown shall be 100mm diameter unless noted otherwise.

All underslab drainage shall be laid at gradients of 1:40 min. for foul pipework and 1:80 min. for surface water unless noted otherwise.

All underslab drainage shall be clear of foundations unless shown otherwise with long radius bends kept to a minimum and used where unavoidable.

At least one soil pipe at the head of each foul run shall be vented to the atmosphere.

All drainage at manholes to be installed invert-to-invert.

All drop points to be accessible above ground for rodding purposes.

All drainage below level 00 slab to be encased in concrete (as per detail Class Y) with reinforcement tied to the slab.

All toilet drainage not connected directly to a manhole/inspection chamber to have rodding access above slab level.

All gutters shall be fitted with a leaf filter at each outlet to reduce the risk of blockage.

All rainwater downpipes shall be accessible above ground for rodding purposes.

Any part of the existing drainage system to be retained as part of the new scheme shall be cleaned and inspected by CCTV survey. Any structural defects shall be repaired or replaced as may be required using appropriate and approved methods.

Where existing access locations are to be retained the cover and frames shall be checked to ensure they are of a suitable duty for reuse and levels adjusted to suit proposed finished ground levels.

All internal access covers shall be recessed, double sealed and lockable.

Cover levels shown on this drawing are approximate and shall be adjusted to suit finished pavement levels on site by Contractor. Covers shall be orientated to suit pavement finishes where appropriate.

All private drainage pipework for foul and surface water systems have been designed on the basis of UPVC to BS EN 1401-1, unless noted otherwise.

All adoptable drainage pipework for foul and surface water systems have been designed on the basis of clayware, concrete or plastic to comply with Sewers for Adoption 6th Edition.

Concrete encasement of the pipework shall be required where the vertical clearance between two pipes crossing is less than 300mm

All existing drainage shall be assumed to be 'live' and shall be maintained at all times during the works. Existing drainage shall be reconnected to the new drainage system unless proven to be redundant for abandonment. All existing drainage to be abandoned shall be sealed by appropriate means.

All drainage connecting to the public sewer network shall not commence until receipt of the approval from the drainage authority and shall comply with requirements using vitrified clay pipework to BS EN 295 with plain sleeved or socketed flexible joints subject to their approval.

Where drainage works are carried out in the public highway the relevant necessary approvals and road opening notices shall be obtained from the highway authority and utility companies.

Upon completion all new drainage installation together with any existing drainage retained shall be jetted and CCTV surveyed upon completion. Contractor to ensure that the drainage system is fully operational, free of excess debris/silt and all identified faults rectified.

HEALTH & SAFETY: Future works shall be carried out by specialist competent and experienced contractors. All operatives shall have received full and appropriate training with appropriate qualifications for the operations they are required to undertake. All work shall be carried out in accordance with the relevant Health & Safety Regulations.

Proposed manhole schedule

Ref	Cover level	Invert level	Chamber size	MH Material / Type	Cover Class	Cover Size	Notes
SWMH 1	68525	67680	1200 x 675	Reinforced Concrete	D400	1200 x 675	Manhole for above ground attenuation tank to drain into
SWMH 2	68525	66840	1200 dia.	Precast Concrete Ring	D400		
SWMH 3	68525	67917	1500 dia.	Precast Concrete Ring	D400	600 x 600	
SWMH 4	68525	67740	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 5	68525	68000	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 6	68525	67515	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 7	68525	67315	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 8	68525	67975	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 9	68525	67630	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 10	68525	67545	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 11	68525	67085	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 12	68525	66840	1200 dia.	Precast Concrete Ring	D400	600 x 600	
SWMH 13	68525	66800	1200 dia.	Precast Concrete Ring	D400	600 x 600	300mm sumps to collect debris within tank during jetting out.
SWMH 14	68525	66750	1200 dia.	Precast Concrete Ring	D400	600 x 600	
SWMH 15	68525	65350	1200 dia.	Precast Concrete Ring	D400	600 x 600	Chamber with a flow control device - Hydrobrake by Hydro-International restricted to 8 l/s.
SWMH 16	68525	67330	1200 x 675	Reinforced Concrete	D400	1200 x 675	
SWMH 17	68525	67252	1200 x 675	Reinforced Concrete	D400	1200 x 675	Class 1 by-pass petrol interceptor.
SWMH 20	77050	76400	750 x 675	Brick	D400	750 x 675	
SWMH 21	77050	76250	750 x 675	Brick	D400	750 x 675	
SWMH 22	76150	74600	1200 x 675	Brick	A15	600 x 600	
SWMH 23	75460	73400	1200 x 675	Brick	A15	600 x 600	
SWMH 24	75190	72400	1200 x 675	Brick	A15	600 x 600	
SWMH 25	72900	71800	1200 x 675	Brick	A15	600 x 600	
FWMH 1	68525	67875	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 2	68525	67775	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 3	68525	67875	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 4	68525	67400	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 5	68525	66900	1200 x 675	Reinforced Concrete	D400	600 x 600	
FWMH 6	68525	66750	1200 x 675	Reinforced Concrete	D400	600 x 600	
FWMH 7	68525	66300	1200 x 675	Reinforced Concrete	D400	600 x 600	
FWMH 8	68525	66180	1200 dia.	Precast Concrete Ring	D400	600 x 600	
FWMH 9	68525	67645	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 10	68525	67465	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 11	68525	67185	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 12	68525	67350	1200 x 675	Reinforced Concrete	D400	1200 x 675	
FWMH 13	68525	65335	1200 dia.	Precast Concrete Ring	D400	600 x 600	
CWMH 2	68525	65335	1200 dia.	Precast Concrete Ring	D400	600 x 600	
CWMH 3	68525	63200	1200 dia.	Precast Concrete Ring	D400	600 x 600	

100mm @ A1 (50mm @ A3)

1 This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

3 Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm

3 Abbreviations:-

CL - Cover Level
IL - Invert Level
MH - Manhole
OD - Outer Diameter
RWP - Rainwater Pipe
SVP - Soil Vent Pipe

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Revised as clouded
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

HEYNE TILLETT STEEL
STRUCTURAL ENGINEERS
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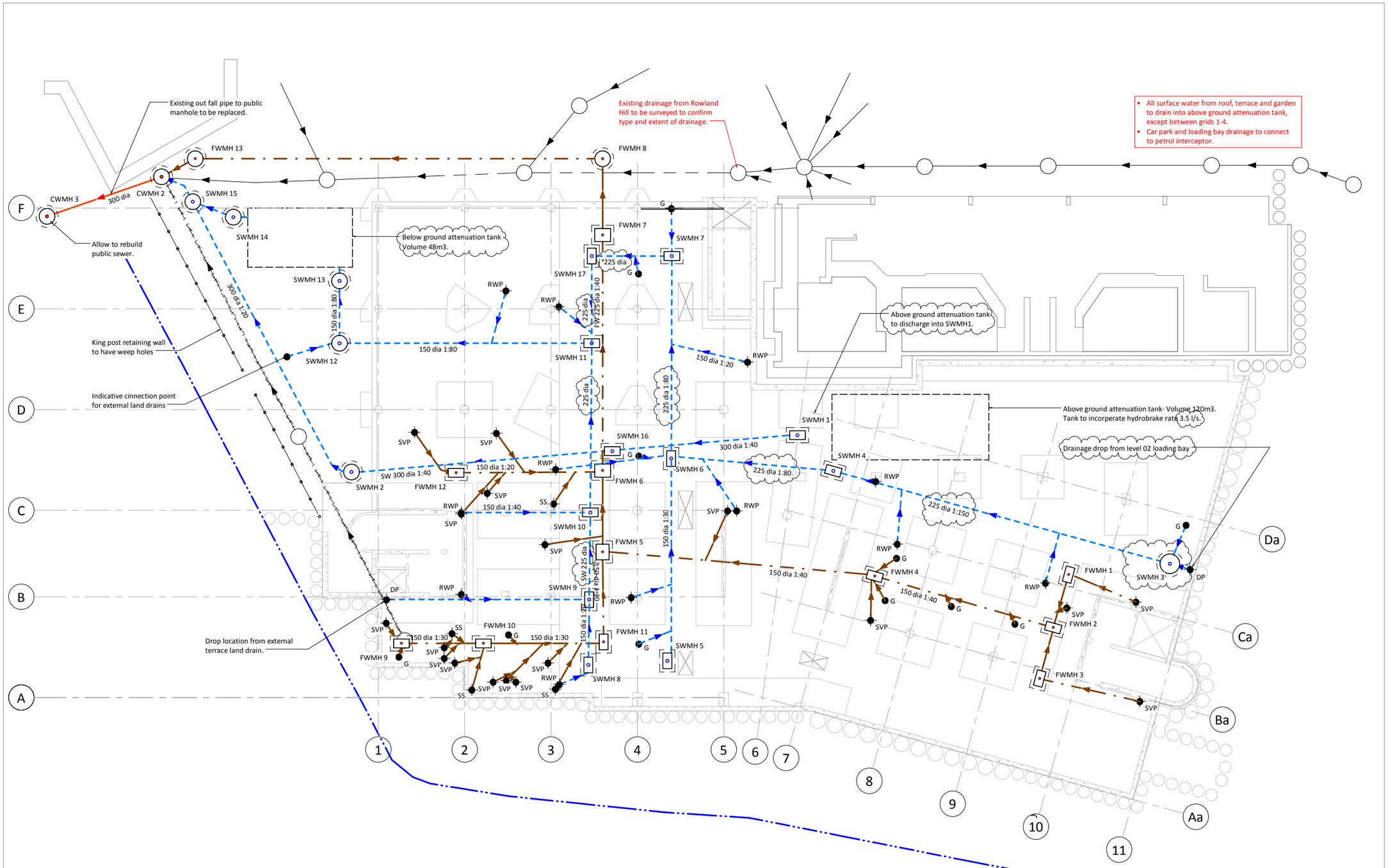
Job Name
Pears Building, Royal Free Hospital, London

Drawing Title
Proposed Drainage Notes

Purpose of Issue **Preliminary** Scale at A1

Drawing No **1415 / DR000** Rev **P2**



100mm @ A1 (50mm @ A3)

1 This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

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3 Abbreviations:-

CL	- Cover Level
IL	- Invert Level
MH	- Manhole
OD	- Outer Diameter
RWP	- Rainwater Pipe
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Drainage Key

- Proposed SW drain run
- Proposed Land drain run (drainage by others)
- Proposed FW drain run
- Proposed CW drain run
- Proposed Pumped Rising Main
- Existing SW drain run
- Existing FW drain run
- Existing CW drain run
- Existing Pumped Rising Main
- Public sewer
- Unspecified drain run
- Proposed Channel Drain
- Redundant drain run
- RWP Proposed / Existing Rain Water Pipe
- SVP Proposed / Existing Soil Vent Pipe
- RE Proposed / Existing Rodding Eye
- DP Proposed / Existing Drainage Point
- SS Proposed / Existing Stub Stack
- G Proposed / Existing Gully
- Proposed SW Manhole
- Proposed FW Manhole
- Proposed CW Manhole
- Proposed Public Sewer Manhole
- Existing Manhole

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Revised as clouded
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

HEYNE TILLETT STEEL
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Job Name
Pears Building, Royal Free Hospital, London

Drawing Title
Proposed Level 00 Drainage Plan

Purpose of Issue **Preliminary** Scale at A1 **1 : 150**

Drawing No **1415 / DR010** Rev **P2**

100mm @ A1 (50mm @ A3)

1 This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

3 Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm

3 Abbreviations:-

CL	- Cover Level
IL	- Invert Level
MH	- Manhole
OD	- Outer Diameter
RWP	- Rainwater Pipe
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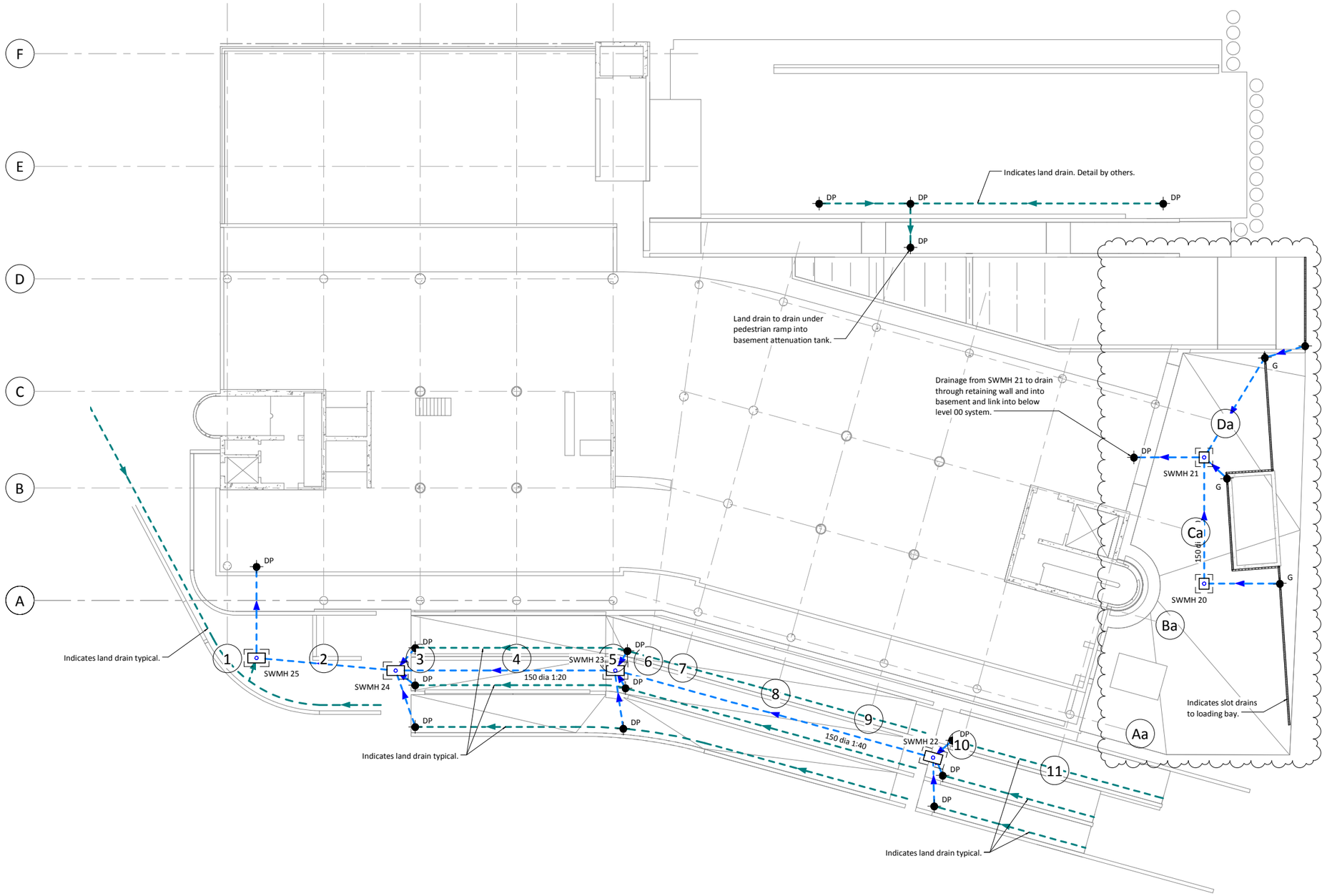

Drainage Key

- Proposed SW drain run
- Proposed Land drain run (drainage by others)
- Proposed FW drain run
- Proposed CW drain run
- Proposed Pumped Rising Main
- Existing SW drain run
- Existing FW drain run
- Existing CW drain run
- Existing Pumped Rising Main
- Public sewer
- Unspecified drain run
- Proposed Channel Drain
- Redundant drain run
- RWP — Proposed / Existing Rain Water Pipe
- SVP — Proposed / Existing Soil Vent Pipe
- RE — Proposed / Existing Rodding Eye
- DP — Proposed / Existing Drainage Point
- SS — Proposed / Existing Stub Stack
- G — Proposed / Existing Gully
- Proposed SW Manhole
- Proposed FW Manhole
- Proposed CW Manhole
- Proposed Public Sewer Manhole
- Existing Manhole

Rev	Date	By	Eng	Amendments
P2	NYI	TJ	NS	Revised as clouded
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

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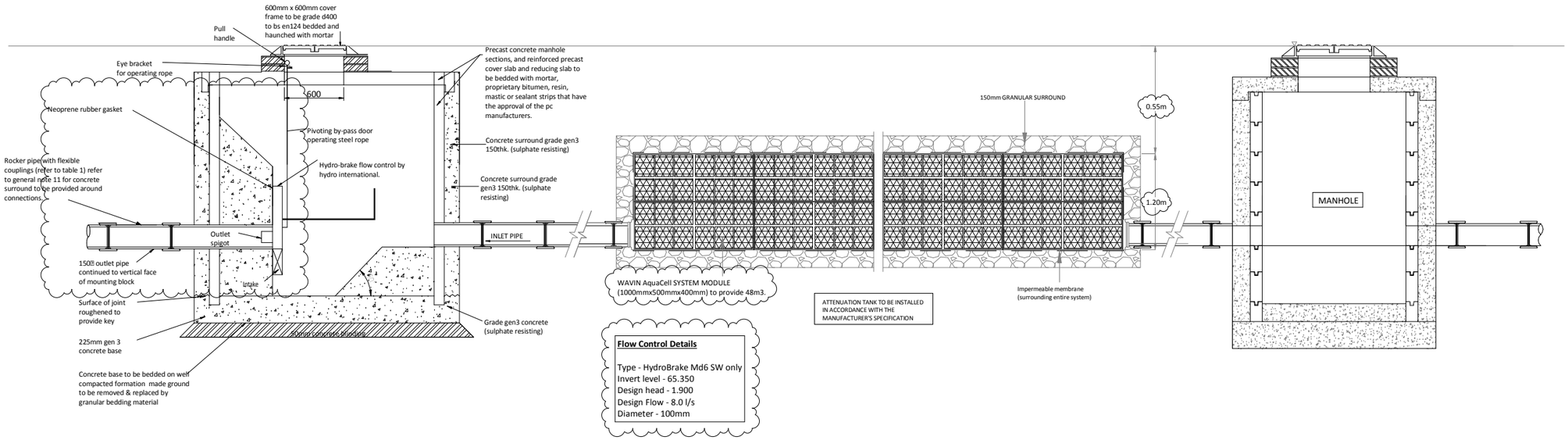
Job Name
Pears Building, Royal Free Hospital, London

Drawing Title
Proposed Level 02 Drainage Plan

Purpose of Issue **Preliminary** Scale at A1 **1 : 150**

Drawing No **1415 / DR020** Rev **P2**



Typical section through Attenutation tank

1 : 20

CONTROL MANHOLE NOTES

1. All dimension are in millimeters

2. Precaste concrete units to be bs5911 part 200 and to be constructed with a minimum class 3 sulphate risisting cement.

3. All insitu concrete to be class standard mix st4 (grade c20) in accordance with section 4 of bs5328 part 2.

4. Materials for jointing manhole rings to be a rubber bitumen compound of approved manufacturer 'tokstrip' or similar.

5. All brickwork to be class b engineering -2 courses min:4 courses max; 225mm thick - bs5628 part 3.

6. 20mm thick granolithic concrete benching to be brought up to a dense smooth face neatly shaped and finished to all branch connections. Where benching is less than 450mm wide, slope to be 1:10; more than 450mm, 1:30

7. Pipes entering manholes to have a flexible joint as close as feasible to outside face of any structure into which the pipe is built in order to facilitate movement of the joint.
The lenght of the next pipe (rocker pipelines, bedding, laying and jointing of pipes and backfilling of trenches shall be in accordance with the w.S.A.Spec 'sewers for adoption' - 6th edition together with any local authority requirements.

100mm @ A1 (50mm @ A3)

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3 Abbreviations:-

CL	- Cover Level
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MH	- Manhole
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Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Revised as clouded
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

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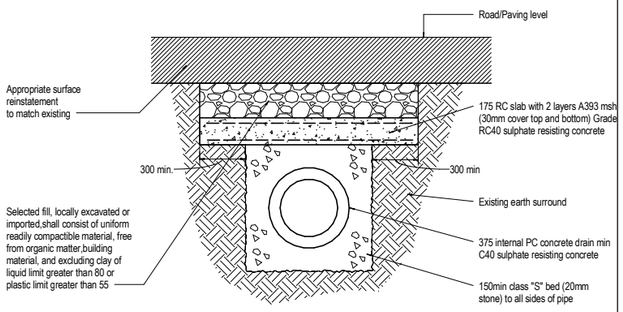
Job Name
Pears Building, Royal Free Hospital, London

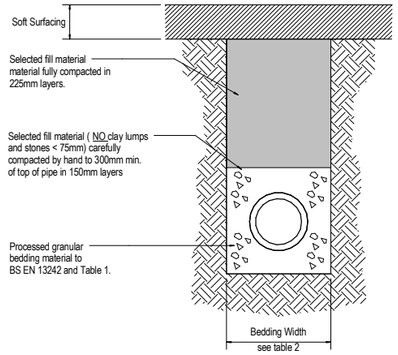
Drawing Title
Proposed Drainage Details Sheet 1

Purpose of Issue **Preliminary** Scale at A1 **1 : 20**

Drawing No **1415 / DR050** Rev **P2**

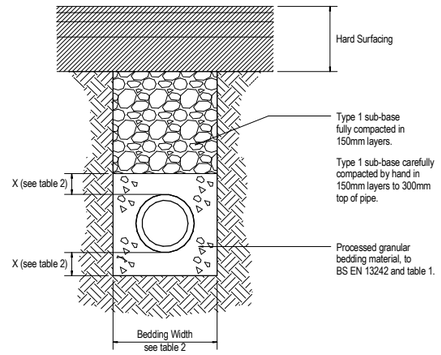


BEDDING TO PROPOSED DRAIN RUNS



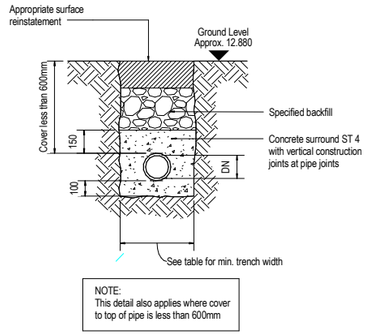
CLASS S BEDDING

(Granular Surround)

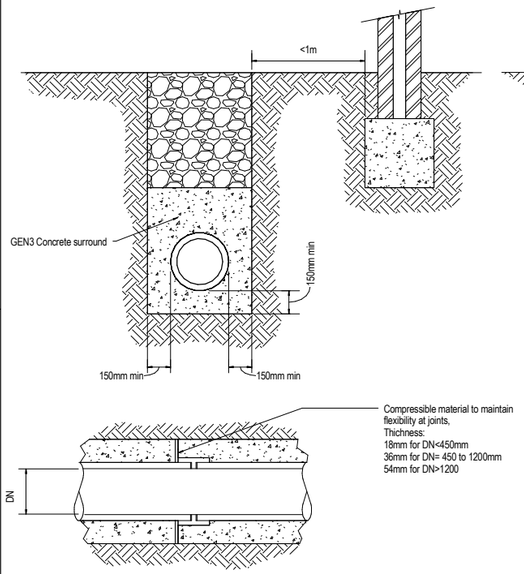


CLASS S BEDDING HARD SURFACING

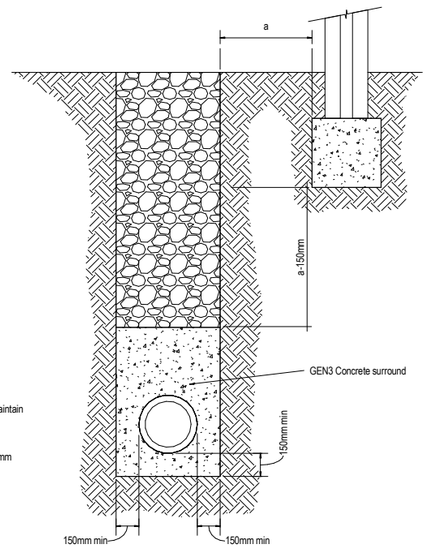
(Granular Surround)



CLASS Z BEDDING BEDDING FACTOR 2.6



TRENCH <1m FROM FOUNDATION



TRENCH >1m FROM FOUNDATION

TABLE 1

DN	Minimum trench width (OD + x)		
	Supported trench	Unsupported trench	
		# > 60°	# < 60°
less 225mm	OD + 0.40m	OD + 0.40m	OD + 0.40m
225 to 350mm	OD + 0.50m	OD + 0.50m	OD + 0.40m
350 to 700mm	OD + 0.70m	OD + 0.70m	OD + 0.40m
700 to 1200mm	OD + 0.85m	OD + 0.85m	OD + 0.40m
greater 1200mm	OD + 1.00m	OD + 1.00m	OD + 0.40m

In the values OD + x, x/2 equals the minimum working space between the pipe and the pipe and the trench wall or support, where:
OD is external diameter, in metres.
is angle of unsupported trench side measured to the horizontal.

MINIMUM TRENCH WIDTH IN RELATION TO NORMAL SIZE DN

TABLE 2

Trench depth	Minimum trench width
less 1.0M	No min. width required
1.0 to 1.75m	0.80m
1.75 to 4.00m	0.90m
greater 4.00m	1.00m

The minimum trench width shall be the greater of the values taken from tables 1 & 2.

MINIMUM TRENCH WIDTH IN RELATION TO TRENCH DEPTH

TABLE 1

Pipe DN	Aggregate size to BS EN 13242	
	Graded	Single Sized
DN<140	-	4/10
140<DN<400	2/14 or 4/20	4/10, 6/14 or 10/20

(all figures are mm unless indicated)

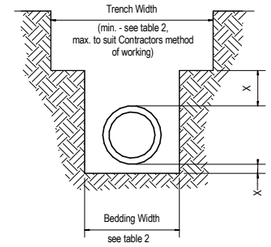
TABLE 2

Pipe DN	Min Trench Width (BS EN 1610)	Bedding Width - up to 300mm above crown of pipe		Min depth of bedding X
		Min	Max	
100	600	450	600	100
150	700	500	700	100

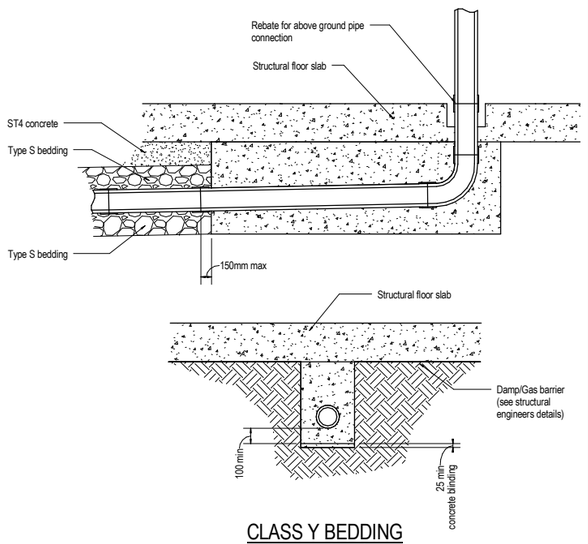
(all figures are mm unless indicated)

Notes:

1. For trenches >1m deep, minimum trench width to be increased as follows:
   1.01 - 1.75m deep = 800
   1.76 - 4.00m deep = 900
   >4.0m deep = 1000



TRENCH DETAILS



CLASS Y BEDDING

(Pipework Under Building Slab)

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Details removed
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

HEYNE TILLETT STEEL
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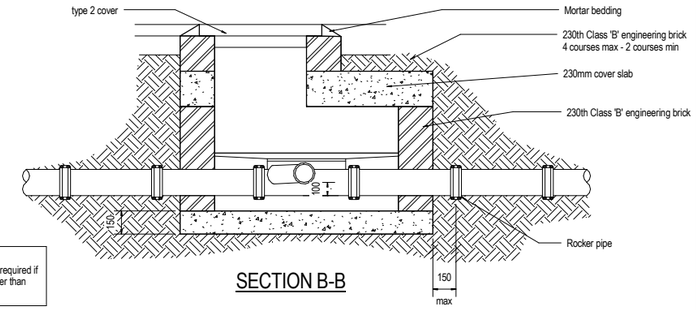
Job Name
Pears Building, Royal Free Hospital, London
Drawing Title
DRAINAGE DETAILS PIPEWORK

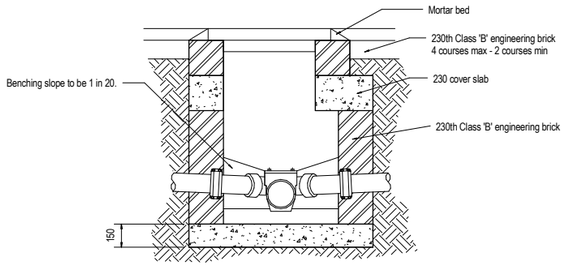
Purpose of Issue **Preliminary** Scale at A1 **1 : 20**

Drawing No **1415 / DR051** Rev **P2**

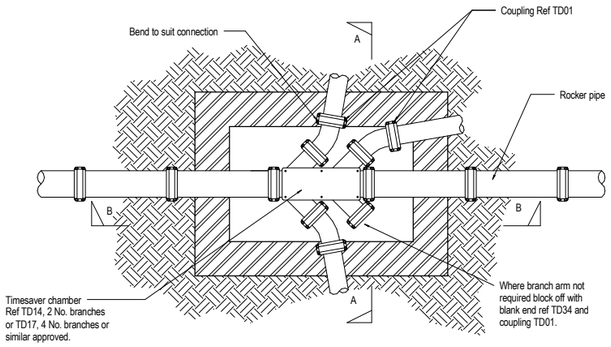


NB
Step rungs required if depth greater than 675mm

SECTION B-B

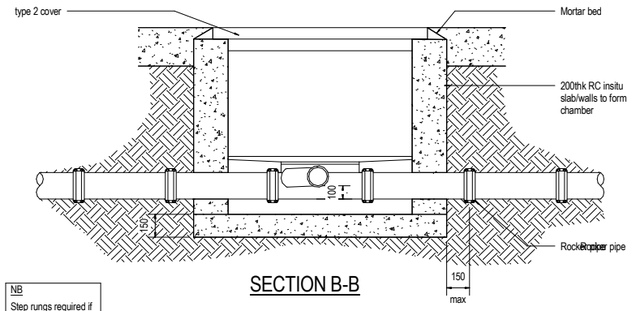


SECTION A-A



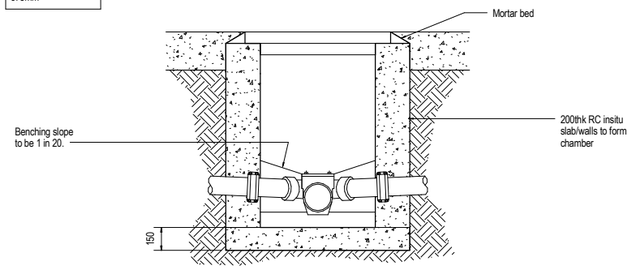
PLAN

TYPICAL INSPECTION MANHOLE / CHAMBER DETAIL

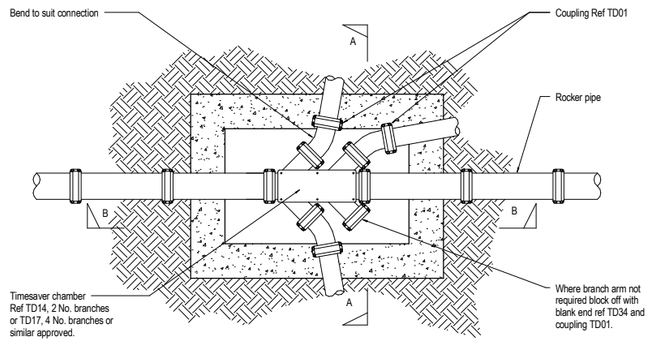


NB
Step rungs required if depth greater than 675mm

SECTION B-B

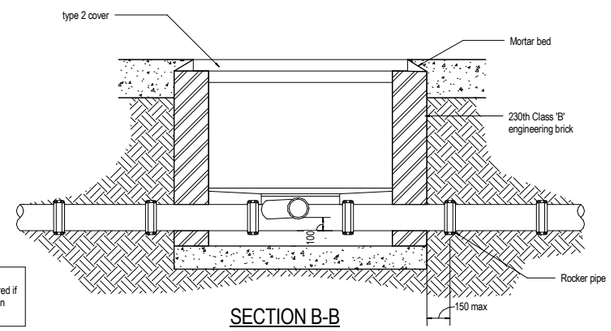


SECTION A-A



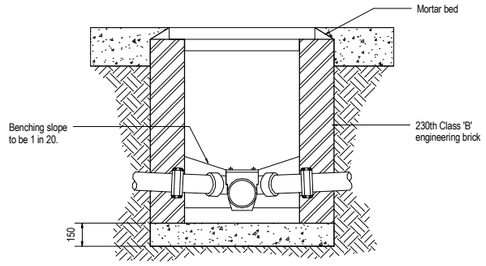
PLAN

TYPICAL RC INSPECTION CHAMBER / MANHOLE DETAIL

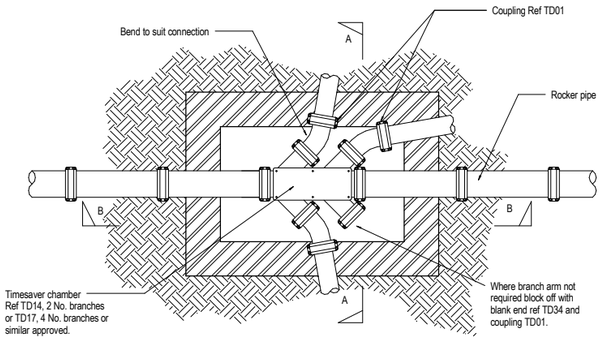


NB
Step rungs required if depth greater than 675mm

SECTION B-B

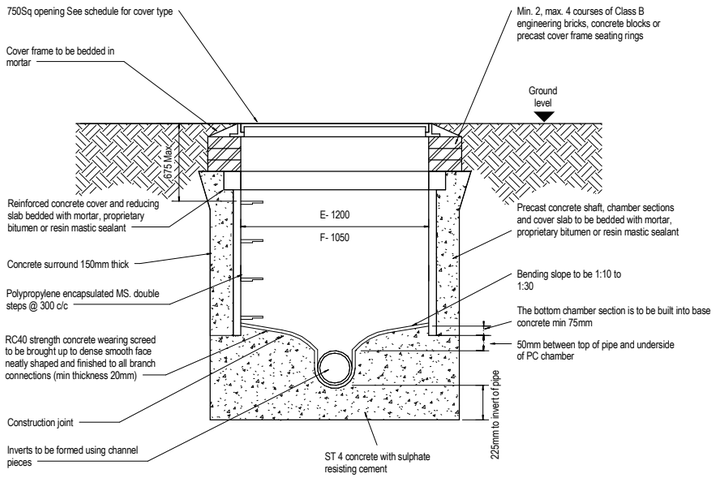


SECTION A-A



PLAN

TYPICAL BRICKWORK INSPECTION CHAMBER/MANHOLE DETAIL



TYPE E/F MANHOLE DETAIL

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Details removed
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

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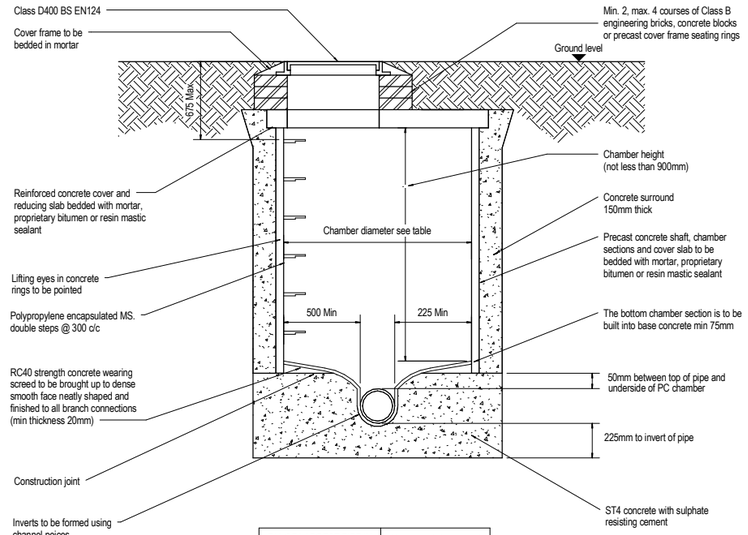
Job Name
Pears Building,
Royal Free Hospital,
London

Drawing Title
DRAINAGE DETAILS
MANHOLES SHEET 1

Purpose of Issue **Preliminary** Scale at A1 **1 : 20**

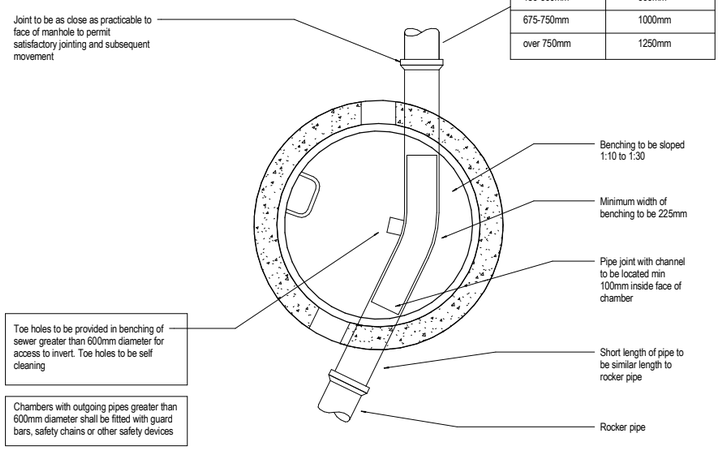
Drawing No **1415 / DR052** Rev **P2**



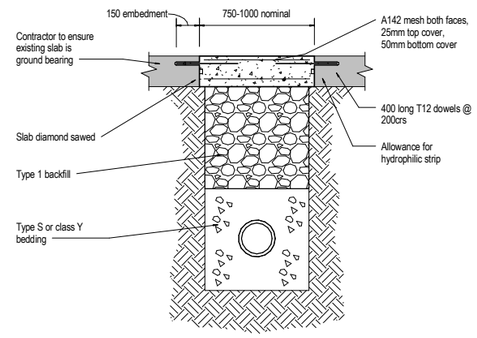
DIA OF LARGEST PIPE IN MANHOLE	CHAMBER DIAMETER
Less than 375mm	1200mm *

* 1050 where depth to soffit is 1.35M - 1.5M

PIPE DIAMETER	ROCKER PIPE LENGTH
150-600mm	600mm
675-750mm	1000mm
over 750mm	1250mm



TYPE B
MANHOLE MAXIMUM DEPTH TO SOFFIT 1.00 to 3.0m
(R12/722)



TYPICAL SLAB REINFORCMENT DETAIL

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Details removed
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

HEYNE TILLETT STEEL
STRUCTURAL ENGINEERS
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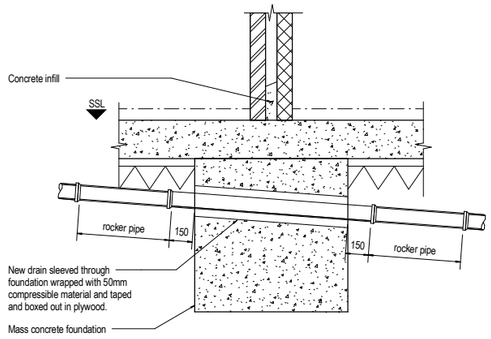
Job Name
Pears Building, Royal Free Hospital, London
Drawing Title
DRAINAGE DETAILS MANHOLES SHEET 2

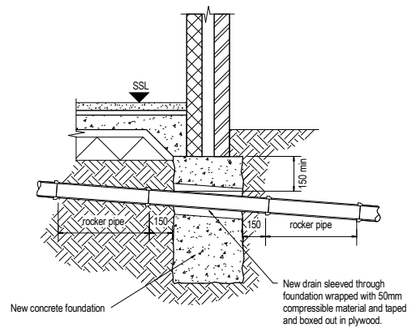
Purpose of Issue **Preliminary** Scale at A1 **1 : 20**

Drawing No **1415 / DR053** Rev **P2**

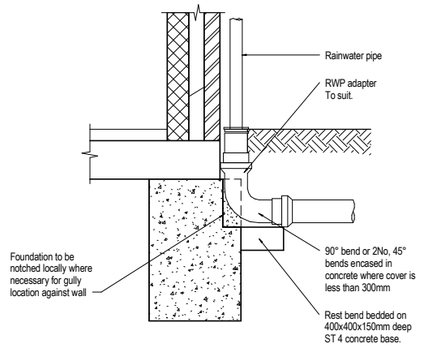
100mm @ A1 (50mm @ A3)



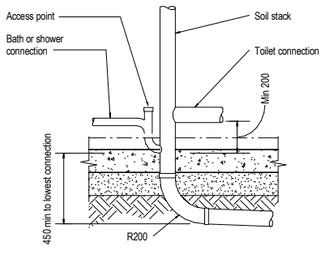
DRAIN CAST INTO FOUNDATION



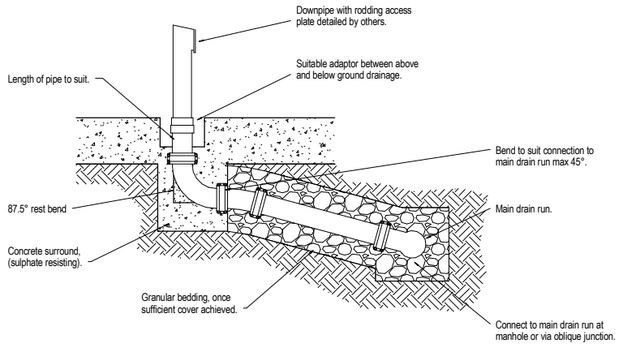
DRAIN CAST INTO FOUNDATION



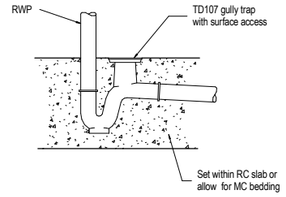
RAINWATER DOWN PIPE TO DRAIN (SURFACE WATER SYSTEM)



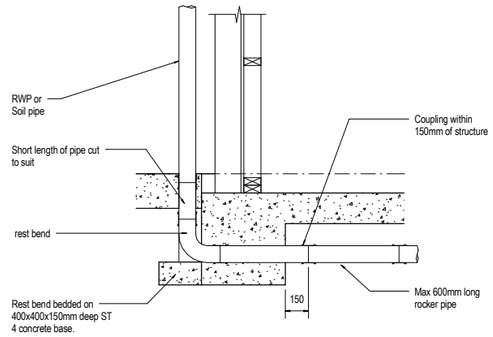
TYPICAL SOIL STACK DETAIL



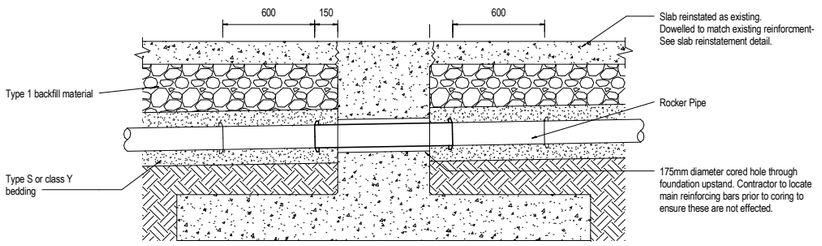
TYPICAL DETAILS AT DRAINAGE POINT



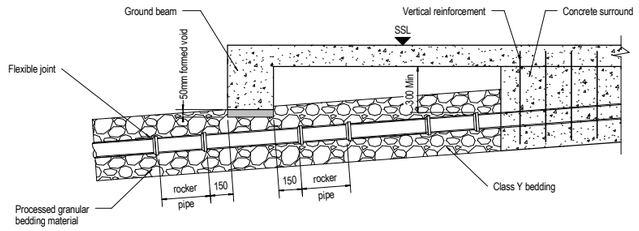
TRAPPED RWP



TYPICAL SOIL & VENT PIPE/STUB STACK/WC DETAIL



TYPICAL DETAIL AT CLASH WITH FOUNDATION



PIPE UNDER SLAB DETAIL

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Details removed
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

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Job Name

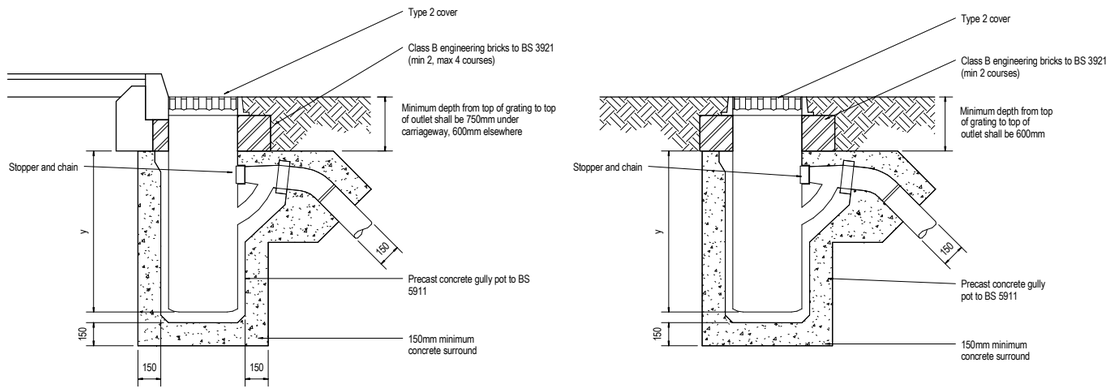
Pears Building, Royal Free Hospital, London

Drawing Title

DRAINAGE DETAILS SLAB/FOUNDATION PENETRATIONS

Purpose of Issue **Preliminary** Scale at A1 **1 : 20**

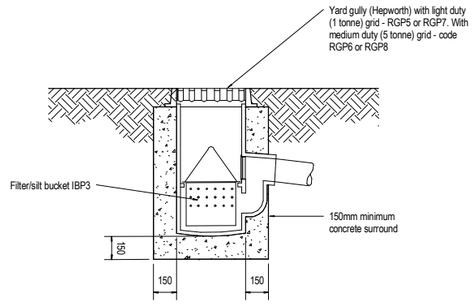
Drawing No **1415 / DR054** Rev **P2**



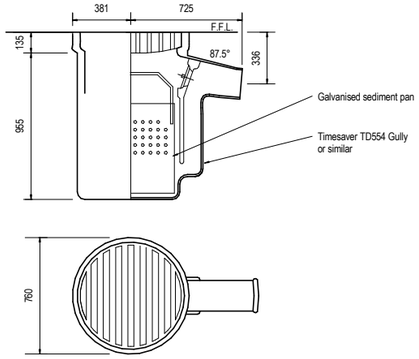
TYPE A

TYPE B

TYPICAL ROAD GULLIES



YARD GULLY

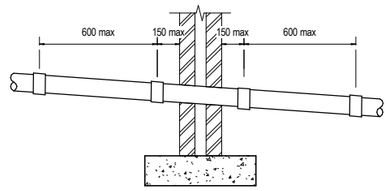


TYPICAL FLOOR GULLY

COVER TYPE	APPLICATION	USE	SPECIFICATION	SUITABLE FOR ADOPTION	BS EN 124 LOADING CLASS
2	Car parks, kerbsides, light industrial areas.	Gratings capable of withstanding a 25 Tonnes test load. For use in areas where not extending more than 500mm from kerb face into the carriageway. All units to be either non-rock or silent in operation.	Class C250 to BS EN 124 with 900cm minimum area of waterway, and a minimum frame depth of 100mm. The gratings shall not have longitudinal slots capable of arresting a cycle wheel. Slots to comply with clause 7.9, BS EN 124.	Check Highway Authority Spec.	C250

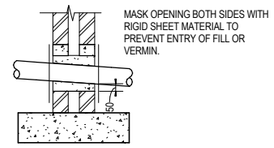
ROAD GULLY GRATING AND FRAME SCHEDULE

(A) SHORT LENGTH OF PIPE BEDDED IN WALL, JOINTS FORMED WITHIN 150 OF EITHER WALL FACE. ADJACENT ROCKER PIPES OF MAX. LENGTH 600 WITH FLEXIBLE JOINTS.



OR

(B) ARCH OR LINTELED OPENING TO GIVE 50 SPACE ALL ROUND THE PIPE.



PIPES THROUGH WALLS

(BUILDING REGS PART H1 - DIAGRAM 7)

Rev	Date	By	Eng	Amendments
P2	04.05.16	TJ	NS	Details removed
P1	29.01.16	AC	NS	CONTRACT PROPOSAL

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Job Name

Pears Building, Royal Free Hospital, London

Drawing Title

DRAINAGE DETAILS

Purpose of Issue **Preliminary** Scale at A1 **1 : 20**

Drawing No **1415 / DR055** Rev **P2**