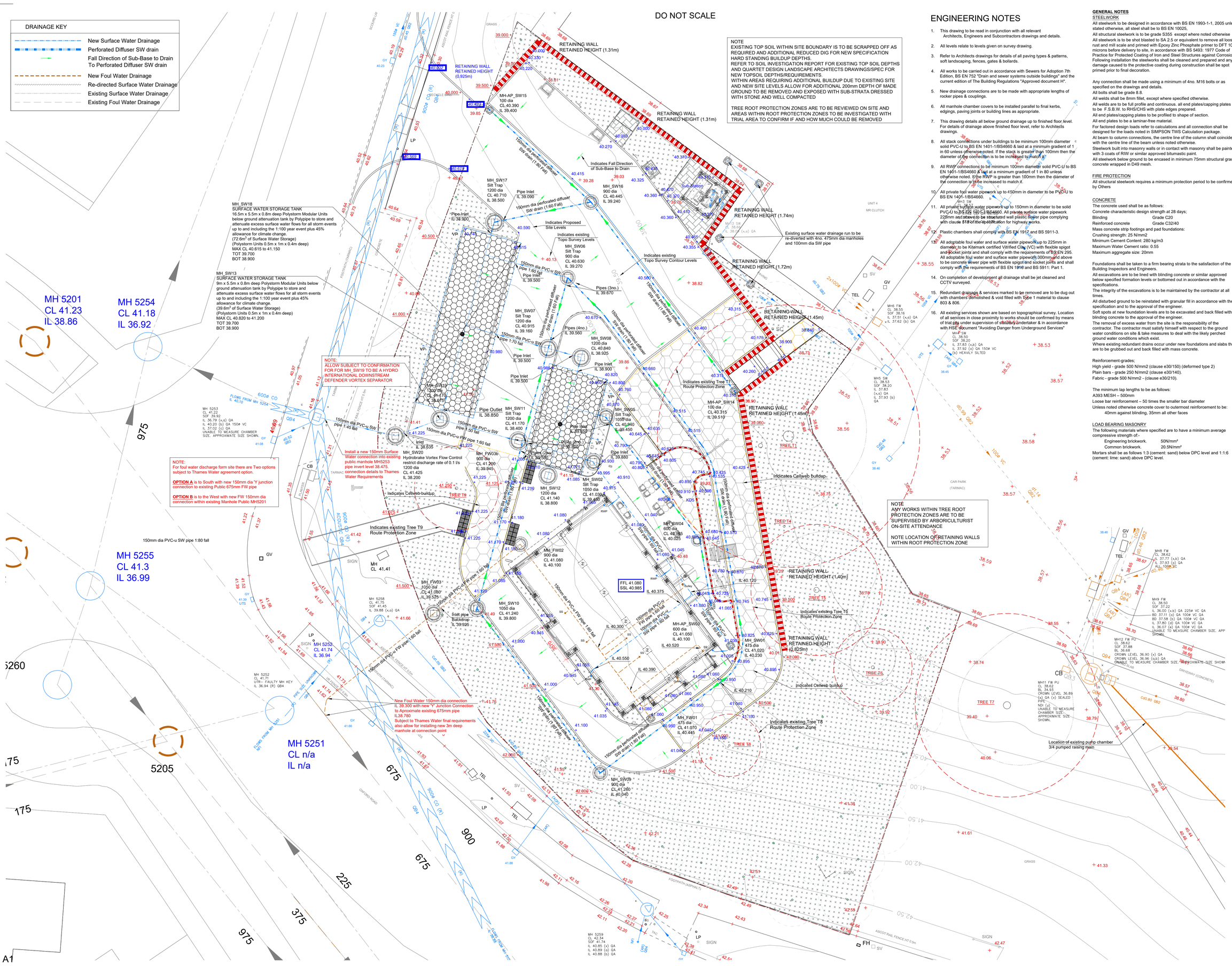
DO NOT SCALE




# ENGINEERING NOTES

1. This drawing to be read in conjunction with all relevant Architects, Engineers and Subcontractors drawings and details.
2. All levels relate to levels given on survey drawing.
3. Refer to Architects drawings for details of all paving types & patterns, soft landscaping, fences, gates & bollards.
4. All works to be carried out in accordance with Sewers for Adoption 7th Edition, BS EN 752 "Drain and sewer systems outside buildings" and the current edition of The Building Regulations "Approved document H".
5. New drainage connections are to be made with appropriate lengths of rocker pipes & couplings.
6. All manhole chamber covers to be installed parallel to final kerbs, edgings, paving joints or building lines as appropriate.
7. This drawing details all below ground drainage up to finished floor level. For details of drainage above finished floor level, refer to Architects drawings.
8. All stack connections under buildings to be minimum 100mm diameter solid PVC-U to BS EN 1401-1/BS4660 & laid at a minimum gradient of 1 in 60 unless otherwise noted. If the stack is greater than 100mm then the diameter of the connection is to be increased to match it.
9. All RWP connections to be minimum 100mm diameter solid PVC-U to BS EN 1401-1/BS4660 & laid at a minimum gradient of 1 in 80 unless otherwise noted. If the RWP is greater than 100mm then the diameter of the connection is to be increased to match it.
10. All private foul water pipework up to 450mm in diameter to be PVC-U to BS EN 1401-1/BS4660.
11. All private surface water pipework up to 150mm in diameter to be solid PVC-U to BS EN 1401-1/BS4660. All private surface water pipework 225mm and above to be structured wall plastic sewer pipe complying with clause 518 of the specification for highway works.
12. Plastic chambers shall comply with BS EN 1917 and BS 5911-3.
13. All adoptable foul water and surface water pipework up to 225mm in diameter to be Kitemark certified Vitrified Clay (VC) with flexible spigot and socket joints and shall comply with the requirements of BS EN 295. All adoptable foul water and surface water pipework 300mm and above to be concrete sewer pipe with flexible spigot and socket joints and shall comply with the requirements of BS EN 1916 and BS 5911: Part 1.
14. On completion of development all drainage shall be jet cleaned and CCTV surveyed.
15. Redundant drainage & services marked to be removed are to be dug out with chambers demolished & void filled with Type 1 material to clause 803 & 806.
16. All existing services shown are based on topographical survey. Location of all services in close proximity to works should be confirmed by means of trial pits under supervision of statutory undertaker & in accordance with HSE document "Avoiding Danger from Underground Services"

**GENERAL NOTES**

STEELWORK

All steelwork to be designed in accordance with BS EN 1993-1-1, 2005 unless stated otherwise, all steel shall be to BS EN 10025.
All structural steelwork is to be grade S355 except where noted otherwise
All steelwork is to be shot blasted to SA 2.5 or equivalent to remove all loose rust and mill scale and primed with Epoxy Zinc Phosphate primer to DFT 100 microns before delivery to site, in accordance with BS 5493: 1977 Code of Practice for Protected Coating of Iron and Steel Structures against Corrosion. Following installation the steelworks shall be cleaned and prepared and any damage caused to the protective coating during construction shall be spot primed prior to final decoration.

Any connection shall be made using a minimum of 4no. M16 bolts or as specified on the drawings and details.
All bolts shall be grade 8.8.
All welds shall be 8mm fillet, except where specified otherwise.
All welds are to be full profile and continuous. all end plates/capping plates are to be F.S.B.W. to RHS/CHS with plate edges prepared.
All end plates/capping plates to be profiled to shape of section.
All end plates to be a laminar-free material.
For factored design loads refer to calculations and all connection shall be designed for the loads noted in SIMPSON TWS Calculation package.
At beam to column connections, the centre line of the column shall coincide with the centre line of the beam unless noted otherwise.
Steelwork built into masonry walls or in contact with masonry shall be painted with 3 coats of RIW or similar approved bitumastic paint.
All steelwork below ground to be encased in minimum 75mm structural grade concrete wrapped in D49 mesh.

FIRE PROTECTION

All structural steelwork requires a minimum protection period to be confirmed by Others

CONCRETE

The concrete used shall be as follows:
Concrete characteristic design strength at 28 days;
Blinding — Grade C20
Reinforced concrete — Grade C32/40
Mass concrete strip footings and pad foundations:
Crushing strength: 25 N/mm2
Minimum Cement Content: 280 kg/m3
Maximum Water Cement ratio: 0.55
Maximum aggregate size: 20mm

Foundations shall be taken to a firm bearing strata to the satisfaction of the Building Inspectors and Engineers.
All excavations are to be lined with blinding concrete or similar approved below specified formation levels or bottomed out in accordance with the specifications.
The integrity of the excavations is to be maintained by the contractor at all times.
All disturbed ground to be reinstated with granular fill in accordance with the specification and to the approval of the engineer.
Soft spots at new foundation levels are to be excavated and back filled with blinding concrete to the approval of the engineer.
The removal of excess water from the site is the responsibility of the contractor. The contractor must satisfy himself with respect to the ground water conditions on site & take measures to deal with the likely perched ground water conditions which exist.
Where existing redundant drains occur under new foundations and slabs they are to be grubbed out and back filled with mass concrete.

Reinforcement-grades;
High yield - grade 500 N/mm2 (clause e30/150) (deformed type 2)
Plain bars - grade 250 N/mm2 (clause e30/140).
Fabric - grade 500 N/mm2 - (clause e30/210).

The minimum lap lengths to be as follows:
A393 MESH – 500mm
Loose bar reinforcement – 50 times the smaller bar diameter
Unless noted otherwise concrete cover to outermost reinforcement to be:
40mm against blinding, 35mm all other faces

LOAD BEARING MASONRY

The following materials where specified are to have a minimum average compressive strength of:-
Engineering brickwork. — 50N/mm²
Common brickwork. — 20.5N/mm²
Mortars shall be as follows 1:3 (cement: sand) below DPC level and 1:1:6 (cement: lime: sand) above DPC level.

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEER'S & SUB-CONTRACTORS DRAWINGS AND DETAILS AND THE PROJECT SPECIFICATION. WHERE ANY DISCREPANCY MAY EXIST BETWEEN THESE NOTES & THE SPECIFICATION, THE SPECIFICATION SHALL PREVAIL.
2. ALL SETTING-OUT TO BE CHECKED AGAINST ARCHITECTS LATEST SETTING OUT DRAWING.
3. NO DIMENSIONS ARE TO BE SCALED FROM THIS DRAWING.
4. NO DEVIATION MAY BE MADE FROM THE DETAILS SHOWN ON THIS DRAWING WITHOUT PRIOR AGREEMENT OF THE ENGINEERS.
5. ANY DISCREPANCY BETWEEN THIS DRAWING AND ANY OTHER DOCUMENT SHOULD BE REFERRED IMMEDIATELY TO THE ENGINEER.
6. ALL WORKMANSHIP, MATERIALS AND LOADINGS TO BE IN STRICT ACCORDANCE WITH THE LATEST EDITIONS OF:
   - EC0 - BASIC STRUCTURAL DESIGN
   - EC1 - ACTIONS ON STRUCTURES
   - EC2 - DESIGN OF CONCRETE STRUCTURES
   - EC3 - DESIGN OF STEEL STRUCTURES
   - EC7 - GEOTECHNICAL DESIGN
   - THE BUILDING REGULATIONS, MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

CONTRACTOR IS TO ALLOW FOR ALL TEMPORARY WORKS AS NECESSARY TO UNDERTAKE AND MAINTAIN THE STRUCTURAL INTEGRITY OF THE PROPOSED BUILDING AND SURROUNDING STRUCTURES AT ALL TIMES

CONTRACTOR TO PROVIDE FULL DESIGN AND FABRICATION DRAWINGS FOR RETAINING WALLS AND GEOSYNTHETICS CELLWEB TREE PROTECTION SYSTEM TO BE INSTALLED AS PER MANUFACTURS RECOMENDATIONS

NOTE:
Contractor is responsible for liasing between Retaining Wall Designer and Installer and GEOSYNTHETICS Cell web system and final design aspects for acceptance by Contract Administrator and Clients Design Team

NOTE:
Retaining Wall and GEOSYNTHETICS Cellweb details shown are for indication. All final design and working details are to be designed by Contractors specialist contractor to manufacturer details and provide detailed design and drawings for approval by Clients Design Team
GEOSYNTHETICS details
Jamie Leake tel 01455 241507
jamie.leake@geosyn.co.uk

NOTE:
For all dimensions and setting out refer to architects drawings

NOTE
Refer to M&E spec and drawings for additional excavation locations for incoming and redirected services on site

NOTE:
THE CONTRACTOR IS TO REFER TO ALL RELEVANT INFORMATION
PROJECT MANAGERS CONTRACT DOCUMENTATION, ARCHITECTS SPEC AND DRAWING
M&E SPEC AND DRAWINGS
QUARTET DESIGN ARBORICULTURAL CONSULTANTS SPEC AND DRAWINGS
SOIL INVESTIGATION REPORT,
TOPO SURVEY,
SUBSCAN SURVEY,
UTILITIES REPORT,

NOTE:
THE CONTRACTOR IS TO REFER TO STARBUCKS DEVELOPER DRIVE THOUGH SPECIFICATION AND ALL DRAWINGS

CONTRACTOR IS TO CHECK WITH DESIGN TEAM FOR THE LATEST REVISION SPECIFICATION AND ALL DRAWINGS

Contractors Design & Tender Requirements

The contractor's is to ensure full compliance with the Project Managers, Architects, M&E, Arboriculturist, Engineers and Tenants specifications / requirements.

Contractor is to allow for detailed design of all retaining walls, Geosynthetics Cellweb and detailed fabrication drawings including full dimensioned drawings for approval by Design Team

Contractor is to Allow for liasing with Thames Water and making applications for off site connections to existing public sewer system for seperate surface water and foul water connections and for all application fees

| | | | |
|---|---|---|---|
| P1 | ISSUED FOR PLANNING CONDITION 6 | GB | 11.06.26 |
| T2 | DRAWING TITLE CORRECTED<br>MH_SW19 NOTE FOR DOWNSTREAM DEFENDER VORTEX SEPARATOR ADDED | GB | 28.05.26 |
| T1 | ISSUED FOR TENDER | GB | 26.05.26 |
| MK | REVISION | BY | DATE |

DRAWING STATUS

ISSUE

DRAWING TITLE

PROPOSED SURFACE WATER AND FOUL WATER DRAINAGE LAYOUT

PROJECT

STARBUCKS POD,
SCOURS LANE,
TILEHURST,
READING, RG30 6AX


simpson | tws
Devonshire House
Fourth Floor
60 Goswell Road
London, EC1M 7AD
Tel: 020 7253 2626
E: mail@simpsoneng.com
W: www.simpsoneng.com
London, Henley-on Thames and Gloucester

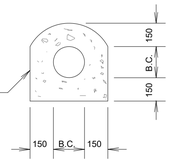

| Drawn | Ch'kd | Scales | Date |
|---|---|---|---|
| GB | - | 1:150 | 08/04/26 |

Purpose of Issue: ISSUE

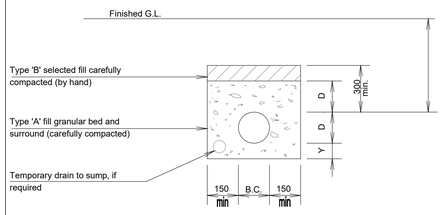
| Project Number | Drawing Number | Revision |
|---|---|---|
| P24-0805 | PH01 | P1 |

LEGEND

D = Internal diameter of pipe
B.C. = External diameter of pipe
Y = Depth of bedding (100mm min.)

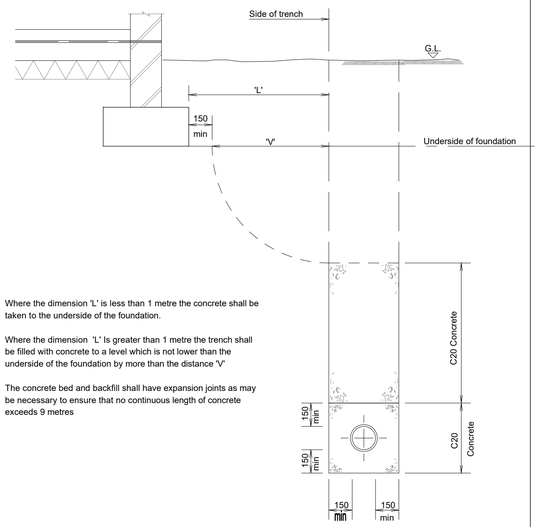



## BEDDING TYPE '1'




## BEDDING TYPE '2'

1. Type 'A' fill :- granular material for beds and surrounds, the material shall be coarse aggregate to B.S. 882 Table 1, 10mm nominal size.
2. Type 'B' fill :- shall be uniform, readily compactable material free from tree roots, vegetable matter, building rubbish and frozen soil and excluding clay lumps retained on a 75mm sieve and stones on a 28mm sieve.
3. For flexible pipe joints use 12mm flexible baffle between each section of concrete surround.
4. Type '1' to be flexibly jointed as per specification.
5. Bedding type '1' to be used :-
a. Where pipe is adjacent to underside of foundations
b. Where crown of pipe is less than 600mm below finished ground level.
c. Where crown of pipe is less than 900mm below a road



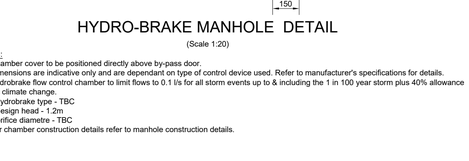

Where the dimension 'L' is less than 1 metre the concrete shall be taken to the underside of the foundation.

Where the dimension 'L' Is greater than 1 metre the trench shall be filled with concrete to a level which is not lower than the underside of the foundation by more than the distance 'V'

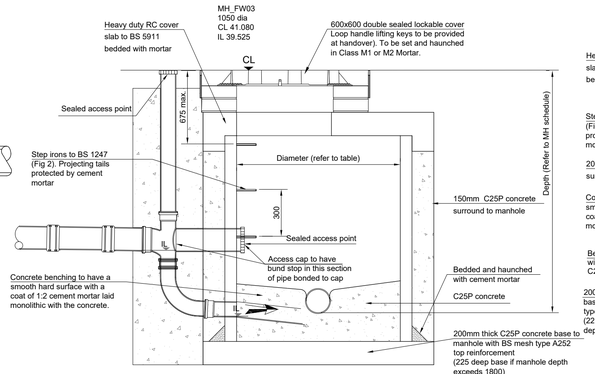
The concrete bed and backfill shall have expansion joints as may be necessary to ensure that no continuous length of concrete exceeds 9 metres

## CONCRETE BED AND BACKFILL IN TRENCHES ADJACENT TO FOUNDATIONS

| Nominal bore of pipe (mm) | Alternative aggregate (mm) single sized | Graded |
|---|---|---|
| 225 - 300 | 10 | -- |
| 375 - 525 | 10, 14 | 14 to 15 |
| 150 | 10, 14, 20 | 14 to 5, 20 to 5 |
| 100 | 14, 20 | 14 to 5, 20 to 5 |
| Exceeding | 14, 20, 40 | 14 to 5, 20 to 5, 40 to 5 |

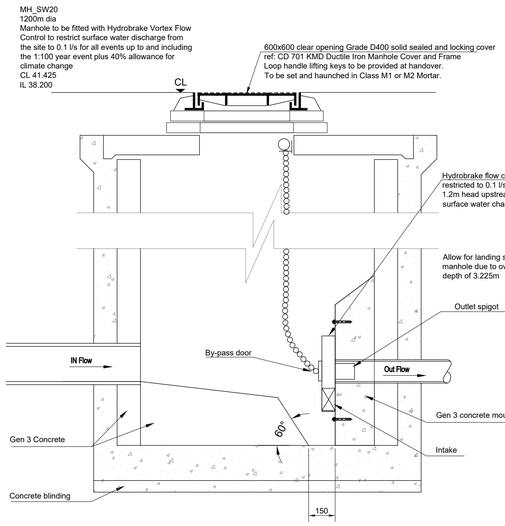



Hydrobrake Chamber (Plan)



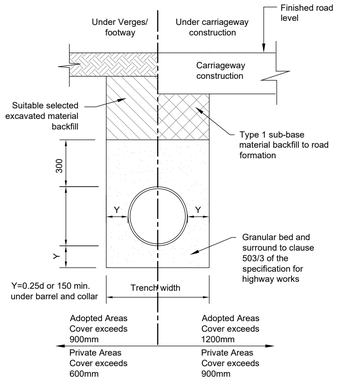

## MH_FW03 BACKDROP MANHOLE DETAIL

(SCALE 1:20)




## HYDRO-BRAKE MANHOLE DETAIL

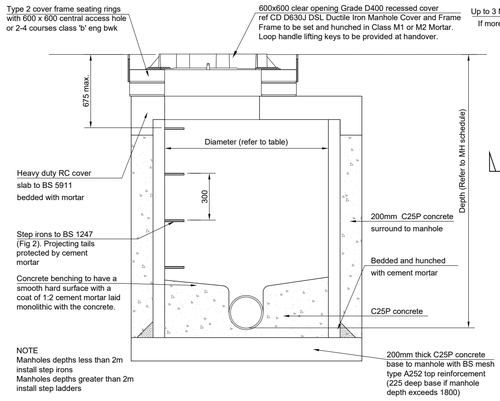
(Scale 1:20)




## Class S Granular Surround

NOTES:
1. Chamber cover to be positioned directly above by-pass door.
2. Dimensions are indicative only and are dependant on type of control device used. Refer to manufacturer's specifications for details.
3. Hydrobrake flow control chamber to limit flows to 0.1 l/s for all storm events up to & including the 1 in 100 year storm plus 40% allowance for climate change.
   hydrobrake type - TBC
   design head - 1.2m
   orifice diametre - TBC
4. For chamber construction details refer to manhole construction details.

DO NOT SCALE




## TYPICAL PRECAST MANHOLE DETAIL

| MIN. MANHOLE SIZES | |
|---|---|
| DEPTH | DIAM. |
| 900-1350 | 900 |
| 1351-1500 | 1050 |
| 1501-2500 | 1200 |

MH Dia also subject to pipe diameter refer to MH schedule

All precast concrete components to be in accordance with BS 5911 part 2 and to have tongue & grooved / ogee joints.

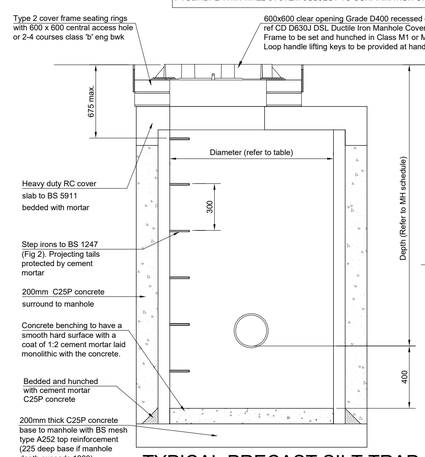
Joints to liberally coated with approved bitumous jointing material of trowelling grade before being fixed in position

Joints to be neatly struck off on internal surface.

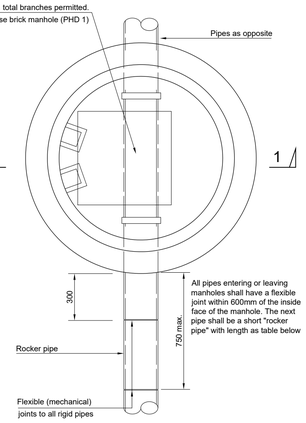
Lifting holes in P.C. units to be cleaned and filled with cement mortar.

All concrete in contact with the ground to be S.R.P.C.

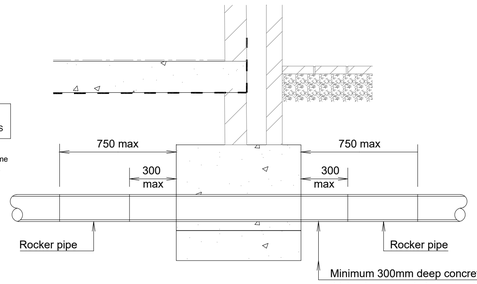
NOTE:
SURFACE WATER DRAINAGE PIPE RUNS TO BE CONCRETE PIPES OR PVCu/HDPE TWIN WALL SYSTEM SUBJECT TO CONFIRMATION OF DETAILS




## TYPICAL PRECAST SILT TRAP MANHOLE DETAIL

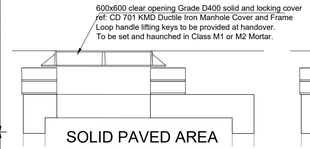



## PLAN ON TYPICAL PRECAST MANHOLE DETAIL



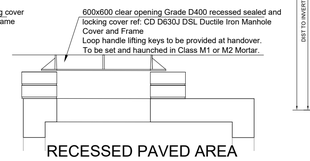

## ROCKER PIPE DETAIL THROUGH FOUNDATIONS

(Scale 1:20)



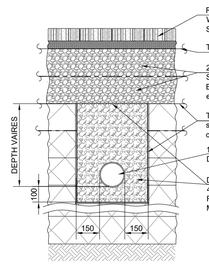

## SOLID PAVED AREA MANHOLE COVER DETAIL

(SCALE 1:20)



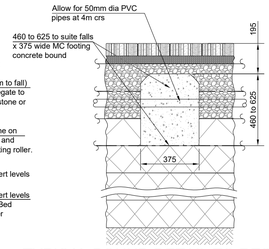

## RECESSED PAVED AREA MANHOLE COVER DETAIL

(SCALE 1:20)



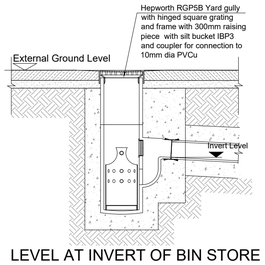

## 150MM DIA PERFORATED DIFFUSER SW DRAIN

(Scale 1:20)



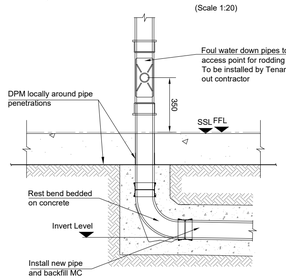

## TYPICAL BOUND DETAIL TO RESTRICT SURFACE WATER FLOW BETWEEN SEPARATED BAYS OF POUROUS PAVED AREAS (Allow for 75m o/a length in area across site TBC)

(Scale 1:20)




## LEVEL AT INVERT OF BIN STORE GULLY+ SHOWING DRAINAGE POINT INSTALLATION DETAILS

(Scale 1:20)




## LEVEL AT INVERT OF REST BEND + SHOWING DRAINAGE POINT INSTALLATION DETAILS

(Scale 1:20)

SURFACE WATER MANHOLE SCHEDULE

| MANHOLE | LEVELS cover | LEVELS invert | INTERNAL Depth | MIN. INTERNAL MH SIZE | CONDITION | COVER grade | COVER opening | COVER reference | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| MH-SW01 | 41.020 | 40.230 | 790 | 475 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-SW02 | 41.030 | 39.450 | 1580 | 1050 dia | Silt Trap | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | 400mm deep silt trap |
| MH-AP-SW03 | 41.050 | 40.100 | 950 | 100 dia | - | D400 | 600x600 | - | Rodding Access Point |
| MH-SW04 | 40.965 | 40.025 | 940 | 600 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-SW05 | 40.940 | 39.450 | 1490 | 1050 dia | Silt Trap | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | 400mm deep silt trap |
| MH-SW06 | 40.630 | 39.270 | 1360 | 900 dia | Silt Trap | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | 400mm deep silt trap |
| MH-SW07 | 40.915 | 39.160 | 1755 | 1200 dia | Silt Trap | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | 400mm deep silt trap |
| MH-SW08 | 40.840 | 38.925 | 1915 | 1200 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-SW09 | 41.260 | 40.040 | 1220 | 900 dia | - | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | - |
| MH-SW10 | 41.240 | 39.800 | 1440 | 1050 dia | - | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | - |
| MH-SW11 | 41.170 | 38.400 | 2770 | 1200 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-SW12 | 41.140 | 38.800 | 2340 | 1200 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-SW13 | 41.200 | 38.900 | 800 | See Note | SW Tank | - | - | Surface Water Storage Tank Polystorm Modular Units 9m x 5.5m x 0.8m dp (39.6m3 of Surface Water Storage - Polystorm Units 0.5m x 1m x 0.4m dp) Cl 40.820 to 41.200 - TOT 39.700 - BOT 38.900 | |
| MH-AP-SW14 | 40.315 | 39.510 | 805 | 475 dia | - | D400 | 600x600 | - | Rodding Access Point |
| MH-AP-SW15 | 40.390 | 39.400 | 990 | 475 dia | - | D400 | 600x600 | - | Rodding Access Point |
| MH-SW16 | 40.445 | 39.240 | 1205 | 900 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-SW17 | 40.710 | 38.500 | 2210 | 1200 dia | Silt Trap | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | 400mm deep silt trap |
| MH-SW18 | 40.615 | 38.900 | 800 | See Note | SW Tank | - | - | Surface Water Storage Tank Polystorm Modular Units 16.5m x 5.5m x 0.8m dp (72.6m3 of Surface Water Storage - Polystorm Units 0.5m x 1m x 0.4m dp) Cl 40.615 to 41.150 - TOT 39.700 - BOT 38.900 | |
| MH-SW19 | 41.170 | 38.675 | 2495 | 1200 dia | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | allow for hydro international down stream defender vortex separator |
| MH-SW20 | 41.425 | 38.200 | 3225 | 1200 dia | - | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | - |

NOTE:- Manhole covers by www.clark-Drain.com (tel 01733 765317)

EXISTING FOUL WATER MANHOLE SCHEDULE

| MANHOLE | LEVELS cover | LEVELS invert | INTERNAL Depth | MIN. INTERNAL MH SIZE | CONDITION | COVER grade | COVER opening | COVER reference | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| MH-FW01 | 41.070 | 40.445 | 625 | 475 | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-FW02 | 41.080 | 40.100 | 980 | 900 | - | D400 | 600x600 | CD D630J DSL Ductile Iron Recessed Cover and Frame | - |
| MH-FW03s | 41.080 | 39.525 | 1555 | 1050 | - | D400 | 600x600 | CD 701 KMD Ductile Iron Solid Cover and Frame | - |

NOTE:- Manhole covers by www.clark-Drain.com (tel 01733 765317)

## ENGINEERING NOTES

1. This drawing to be read in conjunction with all relevant Architects, Engineers and Subcontractors drawings and details.
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8. All stack connections under buildings to be minimum 100mm diameter solid PVC-U to BS EN 1401-1/BS4660 & laid at a minimum gradient of 1 in 60 unless otherwise noted. If the stack is greater than 100mm then the diameter of the connection is to be increased to match it
9. All RWP connections to be minimum 100mm diameter solid PVC-U to BS EN 1401-1/BS4660 & laid at a minimum gradient of 1 in 60 unless otherwise noted. If the RWP is greater than 100mm then the diameter of the connection is to be increased to match it.
10. All private foul water pipework up to 150mm in diameter to be PVC-U to BS EN 1401-1/BS4660.
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12. Plastic chambers shall comply with BS EN 1917 and BS 5911-3.
13. All adoptable foul water and surface water pipework up to 225mm in diameter to be Kitemark certified Vitrified Clay (VC) with flexible spigot and socket joints and shall comply with the requirements of BS EN 295. All adoptable foul water and surface water pipework 300mm and above to be concrete sewer pipe with flexible spigot and socket joints and shall comply with the requirements of BS EN 1916 and BS 5911: Part 1.
14. On completion of development all drainage shall be jet cleaned and CCTV surveyed.
15. Redundant drainage & services marked to be removed are to be dug out with chambers demolished & void filled with Type 1 material to clause 803 & 806.
16. All existing services shown are based on topographical survey. Location of all services in close proximity to works should be confirmed by means of trial pits under supervision of statutory undertaker & in accordance with HSE document "Avoiding Danger from Underground Services"

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| MK | REVISION | BY | DATE |
|---|---|---|---|
| P1 | ISSUED FOR PLANNING CONDITION 6 | GB | 11.06.26 |
| T2 | DRAWING TITLE CORRECTED MH_SW19 NOTE FOR DOWNSTREAM DEFENDER VORTEX SEPARATOR ADDED | GB | 28.05.26 |
| T1 | ISSUED FOR TENDER | GB | 26.05.26 |

DRAWING STATUS

ISSUE

DRAWING TITLE

PROPOSED SURFACE WATER AND FOUL WATER DRAINAGE DETAILS (SHEET 1 OF 2)

PROJECT

STARBUCKS POD,
SCOURS LANE,
TILEHURST,
READING, RG30 6AX


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Devonshire House
Fourth Floor
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London, Henley-on Thames and Gloucester

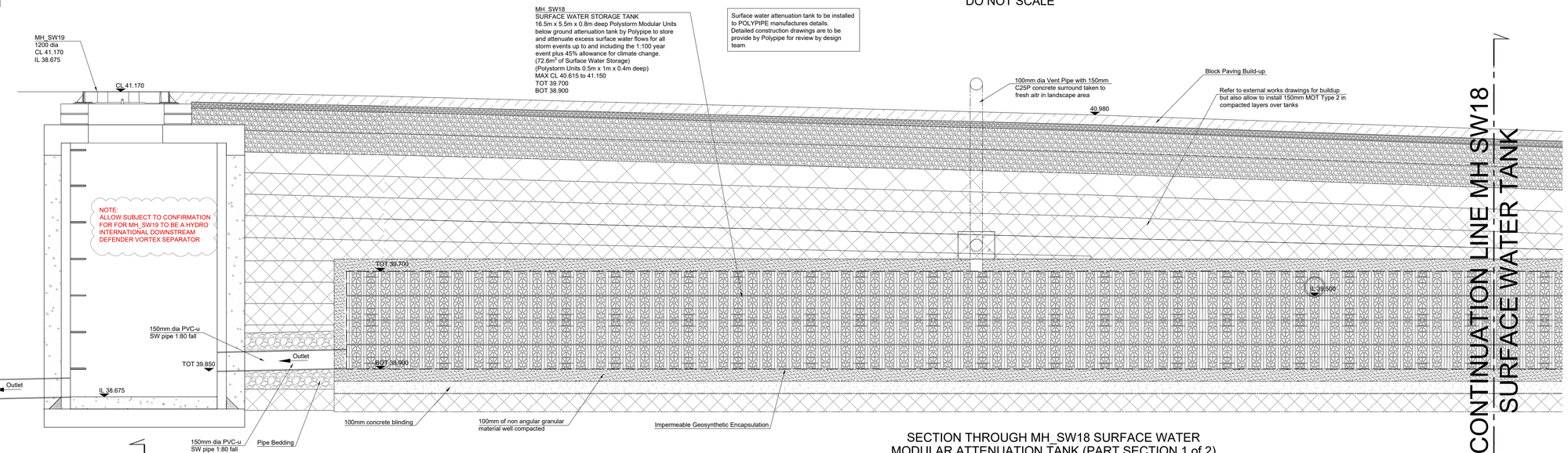

| Drawn | Ch'kd | Scales | Date |
|---|---|---|---|
| GB | - | 1:20 | 08/04/26 |

Purpose of Issue
ISSUE

| Project Number | Drawing Number | Revision |
|---|---|---|
| P24-0805 | PH02 | P1 |

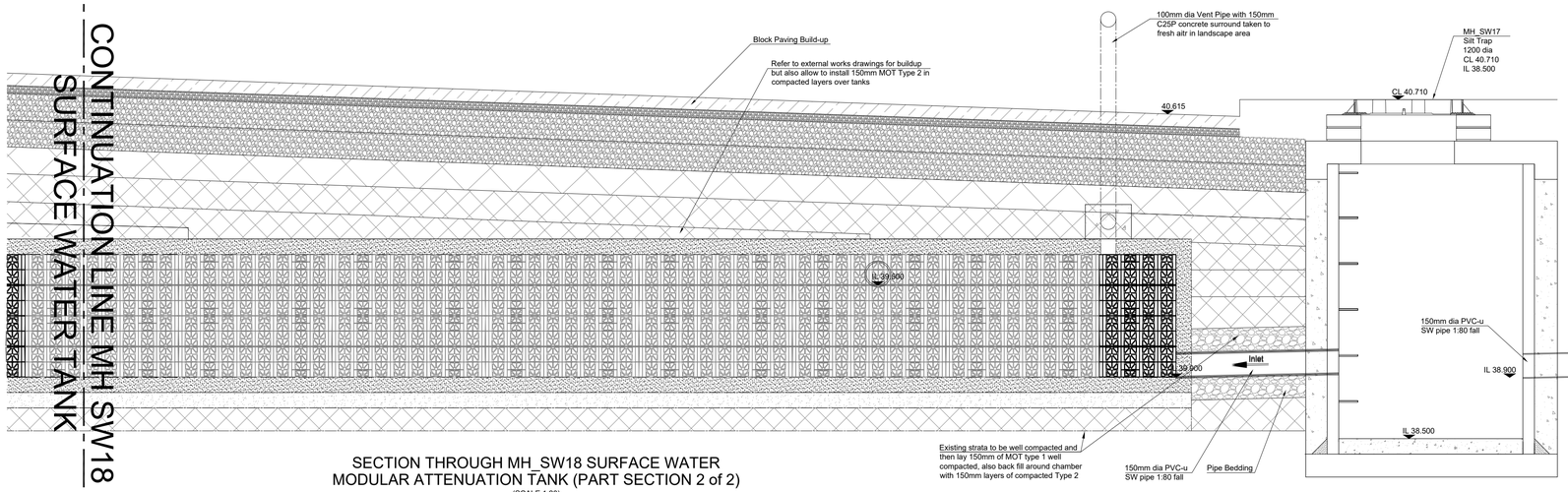
A1

DO NOT SCALE



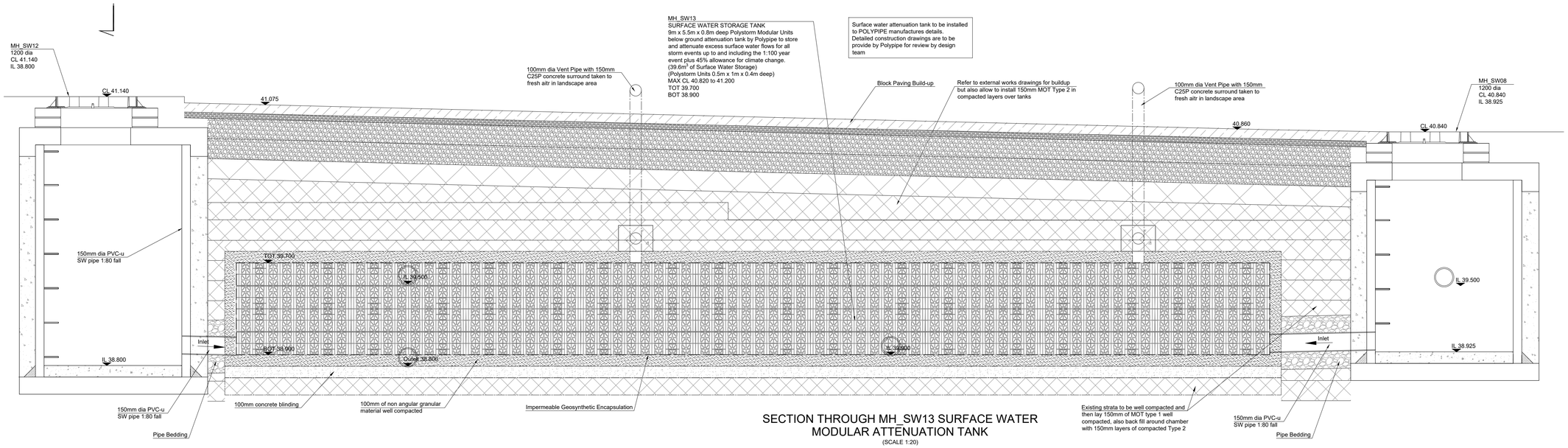

SECTION THROUGH MH_SW18 SURFACE WATER MODULAR ATTENUATION TANK (PART SECTION 1 of 2)

(SCALE 1:20)




SECTION THROUGH MH_SW18 SURFACE WATER MODULAR ATTENUATION TANK (PART SECTION 2 of 2)

(SCALE 1:20)




SECTION THROUGH MH_SW13 SURFACE WATER MODULAR ATTENUATION TANK

(SCALE 1:20)

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DRAWING STATUS

ISSUE

DRAWING TITLE

PROPOSED SURFACE WATER AND FOUL WATER DRAINAGE DETAILS (SHEET 2 OF 2)

PROJECT

STARBUCKS POD,
SCOURS LANE,
TILEHURST,
READING, RG30 6AX


simpson | tws
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Purpose of Issue: ISSUE

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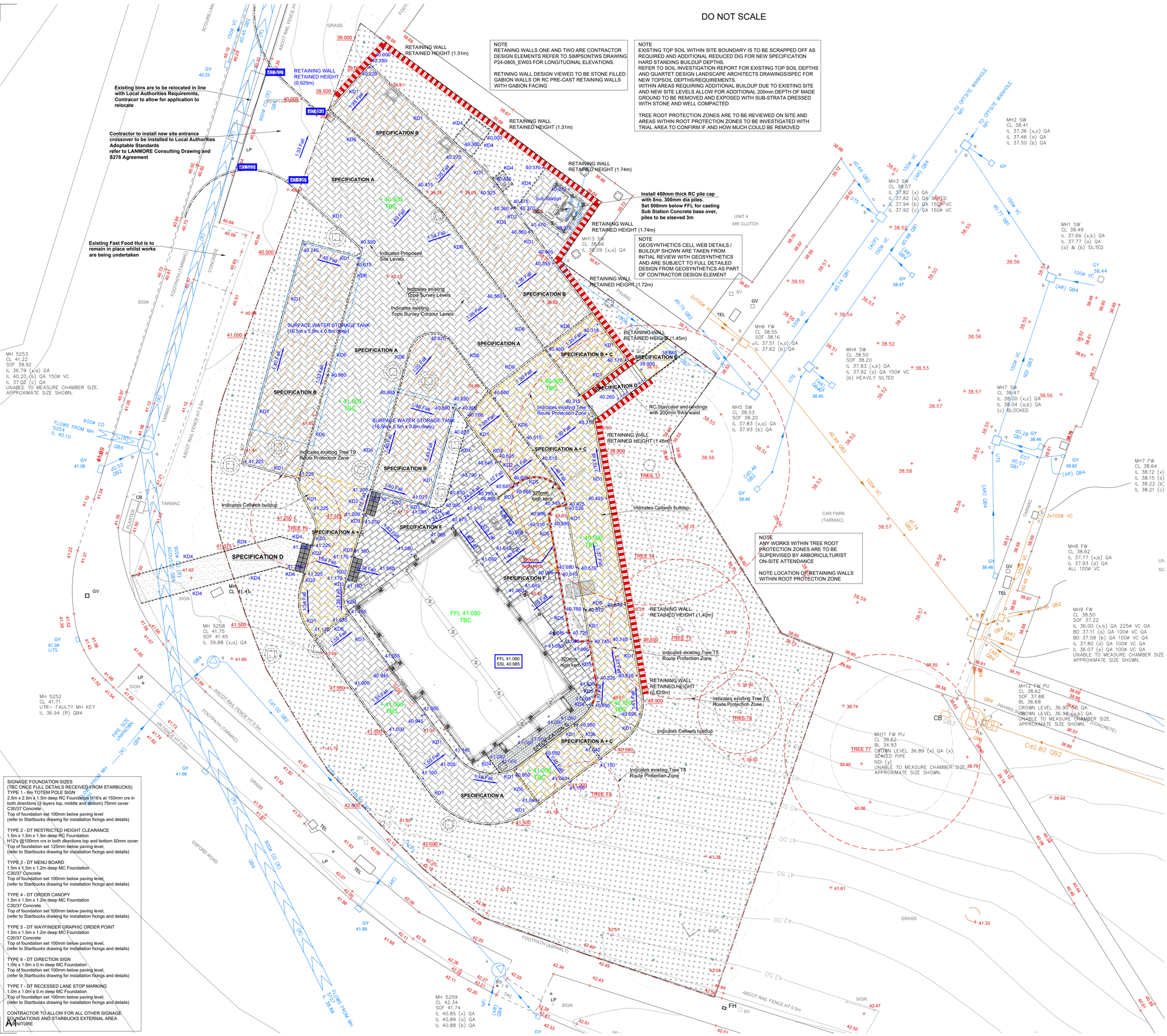
|---|---|---|
| P24-0805 | PH03 | P1 |

A1

## APPENDIX B - SIMPSONTWS EXTERNAL WORKS DRAWINGS

- P24-0805_EW01 - PROPOSED EXTERNAL WORKS LAYOUT AND PROPOSED LEVELS
- P24-0805_EW02 - PROPOSED EXTERNAL WORKS DETAILS

DO NOT SCALE




NOTE
RETAINING WALLS ONE AND TWO ARE CONTRACTOR DESIGN ELEMENTS REFER TO SIMPSONTWS DRAWING P24-0805_EW03 FOR LONGITUDINAL ELEVATIONS.

RETINING WALL DESIGN VIEWED TO BE STONE FILLED GABION WALLS OR RC PRE-CAST RETAINING WALLS WITH GABION FACING

NOTE
EXISTING TOP SOIL WITHIN SITE BOUNDARY IS TO BE SCRAPPED OFF AS REQUIRED AND ADDITIONAL REDUCED DIG FOR NEW SPECIFICATION HARD STANDING BUILDUP DEPTHS.
REFER TO SOIL INVESTIGATION REPORT FOR EXISTING TOP SOIL DEPTHS AND QUARTET DESIGN LANDSCAPE ARCHITECTS DRAWINGS/SPEC FOR NEW TOPSOIL DEPTHS/REQUIREMENTS.
WITHIN AREAS REQUIRING ADDITIONAL BUILDUP DUE TO EXISTING SITE AND NEW SITE LEVELS ALLOW FOR ADDITIONAL 200mm DEPTH OF MADE GROUND TO BE REMOVED AND EXPOSED WITH SUB-STRATA DRESSED WITH STONE AND WELL COMPACTED

TREE ROOT PROTECTION ZONES ARE TO BE REVIEWED ON SITE AND AREAS WITHIN ROOT PROTECTION ZONES TO BE INVESTIGATED WITH TRIAL AREA TO CONFIRM IF AND HOW MUCH COULD BE REMOVED

NOTE
GEOSYNTHETICS CELL WEB DETAILS / BUILDUP SHOWN ARE TAKEN FROM INITIAL REVIEW WITH GEOSYNTHETICS AND ARE SUBJECT TO FULL DETAILED DESIGN FROM GEOSYNTHETICS AS PART OF CONTRACTOR DESIGN ELEMENT

NOTE
ANY WORKS WITHIN TREE ROOT PROTECTION ZONES ARE TO BE SUPERVISED BY ARBORICULTURIST ON-SITE ATTENDANCE

NOTE LOCATION OF RETAINING WALLS WITHIN ROOT PROTECTION ZONE

SIGNAGE FOUNDATION SIZES
(TBC ONCE FULL DETAILS RECEIVED FROM STARBUCKS)
TYPE 1 - 6m TOTEM POLE SIGN
2.5m x 2.5m x 1.5m deep RC Foundation H16's at 150mm crs in both directions (3 layers top, middle and bottom) 75mm cover
C30/37 Concrete
Top of foundation set 100mm below paving level
(refer to Startbucks drawing for installation fixings and details)

TYPE 2 - DT RESTRICTED HEIGHT CLEARANCE
1.5m x 1.5m x 1.5m deep RC Foundation
H12's @100mm crs in both directions top and bottom 50mm cover
Top of foundation set 125mm below paving level,
(refer to Startbucks drawing for installation fixings and details)

TYPE 3 - DT MENU BOARD
1.5m x 1.5m x 1.2m deep MC Foundation
C30/37 Concrete
Top of foundation set 100mm below paving level,
(refer to Startbucks drawing for installation fixings and details)

TYPE 4 - DT ORDER CANOPY
1.5m x 1.5m x 1.2m deep MC Foundation
C30/37 Concrete
Top of foundation set 100mm below paving level,
(refer to Startbucks drawing for installation fixings and details)

TYPE 5 - DT WAYFINDER GRAPHIC ORDER POINT
1.5m x 1.5m x 1.2m deep MC Foundation
C30/37 Concrete
Top of foundation set 100mm below paving level,
(refer to Startbucks drawing for installation fixings and details)

TYPE 6 - DT DIRECTION SIGN
1.0m x 1.0m x 0.m deep MC Foundation
Top of foundation set 100mm below paving level,
(refer to Startbucks drawing for installation fixings and details)

TYPE 7 - DT RECESSED LANE STOP MARKING
1.0m x 1.0m x 0.m deep MC Foundation
Top of foundation set 100mm below paving level,
(refer to Startbucks drawing for installation fixings and details)

CONTRACTOR TO ALLOW FOR ALL OTHER SIGNAGE FOUNDATIONS AND STARBUCKS EXTERNAL AREA FURNITURE

A4

**GENERAL NOTES**

STEELWORK

All steelwork to be designed in accordance with BS EN 1993-1-1, 2005 unless stated otherwise, all steel shall be to BS EN 10025.
All structural steelwork is to be grade S355 except where noted otherwise
All steelwork is to be shot blasted to SA 2.5 or equivalent to remove all loose rust and mill scale and primed with Epoxy Zinc Phosphate primer to DFT 100 microns before delivery to site, in accordance with BS 5493: 1977 Code of Practice for Protected Coating of Iron and Steel Structures against Corrosion. Following installation the steelworks shall be cleaned and prepared and any damage caused to the protective coating during construction shall be spot primed prior to final decoration.

Any connection shall be made using a minimum of 4no. M16 bolts or as specified on the drawings and details.
All bolts shall be grade 8.8.
All welds shall be 8mm fillet, except where specified otherwise.
All welds are to be full profile and continuous. all end plates/capping plates are to be F.S.B.W. to RHS/CHS with plate edges prepared.
All end plates/capping plates to be profiled to shape of section.
All end plates to be a laminar-free material.
For factored design loads refer to calculations and all connection shall be designed for the loads noted in SIMPSON TWS Calculation package.
At beam to column connections, the centre line of the column shall coincide with the centre line of the beam unless noted otherwise.
Steelwork built into masonry walls or in contact with masonry shall be painted with 3 coats of RIW or similar approved bitumastic paint.
All steelwork below ground to be encased in minimum 75mm structural grade concrete wrapped in D49 mesh.

FIRE PROTECTION

All structural steelwork requires a minimum protection period to be confirmed by Others

CONCRETE

The concrete used shall be as follows:
Concrete characteristic design strength at 28 days;
Blinding — Grade C20
Reinforced concrete — Grade C32/40
Mass concrete strip footings and pad foundations:
Crushing strength: 25 N/mm2
Minimum Cement Content: 280 kg/m3
Maximum Water Cement ratio: 0.55
Maximum aggregate size: 20mm

Foundations shall be taken to a firm bearing strata to the satisfaction of the Building Inspectors and Engineers.
All excavations are to be lined with blinding concrete or similar approved below specified formation levels or bottomed out in accordance with the specifications.
The integrity of the excavations is to be maintained by the contractor at all times.
All disturbed ground to be reinstated with granular fill in accordance with the specification and to the approval of the engineer.
Soft spots at new foundation levels are to be excavated and back filled with blinding concrete to the approval of the engineer.
The removal of excess water from the site is the responsibility of the contractor. The contractor must satisfy himself with respect to the ground water conditions on site & take measures to deal with the likely perched ground water conditions which exist.
Where existing redundant drains occur under new foundations and slabs they are to be grubbed out and back filled with mass concrete.

Reinforcement-grades;
High yield - grade 500 N/mm2 (clause e30/150) (deformed type 2)
Plain bars - grade 250 N/mm2 (clause e30/140).
Fabric - grade 500 N/mm2 - (clause e30/210).

The minimum lap lengths to be as follows:
A393 MESH – 500mm
Loose bar reinforcement – 50 times the smaller bar diameter
Unless noted otherwise concrete cover to outermost reinforcement to be:
40mm against blinding, 35mm all other faces

LOAD BEARING MASONRY

The following materials where specified are to have a minimum average compressive strength of:-
Engineering brickwork. 50N/mm²
Common brickwork. 20.5N/mm²
Mortars shall be as follows 1:3 (cement: sand) below DPC level and 1:1:6 (cement: lime: sand) above DPC level.

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**KEY**

- SPECIFICATION A — Access Road and Drive Through Areas Porous Block Paviour (200x100x80mm Blocks)
- SPECIFICATION B — Car Parking Bay Areas Porous Block Paviour (200x100x80mm Blocks)
- SPECIFICATION C — For SPECIFICATION A and B Areas Requiring Full Depth CellWeb Root Protection AREA
- SPECIFICATION D — Resin Bonded Pedestrian Footpath Link Areas
- SPECIFICATION E — Resin Bonded Pedestrian Footpath Link Areas Requiring CellWeb Root Protection AREA
- SPECIFICATION F — Pedestrian Terracing Areas Porous Block Paviour (400x200x50mm Blocks)
- SPECIFICATION G — Back of House Areas Porous Block Paviour (400x400x50mm Flag Paving)

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**KERB KEY**

- KERB TYPE 1 (KD1)
- KERB TYPE 2 (KD2)
- DROP KERB 3 (DK3)
- KERB TYPE 4 (KD4)
- KERB TYPE 5 (KD5)
- KERB TYPE 6 (KD6)
- RETAINING WALL

**LEVELS KEY**

00.000 - PROPOSED LEVELS AND FALLS
00.000 TBC - PLANNING DRAWING LEVELS
00.000 - CONTOUR LEVELS AT TREE ROUTE ZONES
00.00 - EXISTING TOPO LEVELS
00.000 *SECTION 278 LEVELS*

Refer to SIMPSONTWS DRG P24-0805_EW02 FOR DETAILS

| | | | |
|---|---|---|---|
| P1 | ISSUED FOR PLANNING CONDITION 6 | GB | 11.06.26 |
| T2 | SW & FW MANHOLE POSITIONS ADDED | GB | 26.05.26 |
| T1 | ISSUED FOR TENDER | GB | 13.05.26 |
| MK | REVISION | BY | DATE |

DRAWING STATUS

ISSUE

DRAWING TITLE

PROPOSED EXTERNAL WORKS LAYOUT AND PROPOSED LEVELS

PROJECT

STARBUCKS POD,
SCOURS LANE,
TILEHURST,
READING, RG30 6AX


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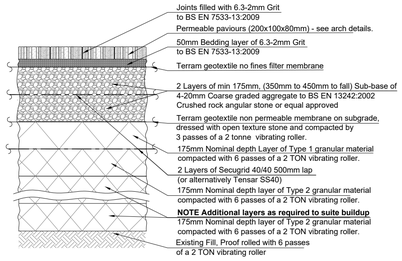
| Drawn | Ch'kd | Scales | Date |
|---|---|---|---|
| GB | - | 1:150 | 08/04/26 |

Purpose of Issue: ISSUE

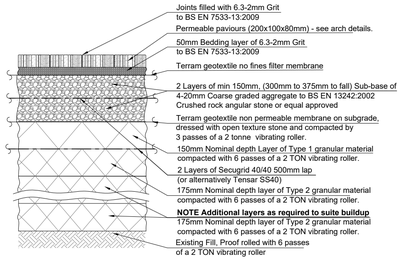
| Project Number | Drawing Number | Revision |
|---|---|---|
| P24-0805 | EW01 | P1 |

DO NOT SCALE



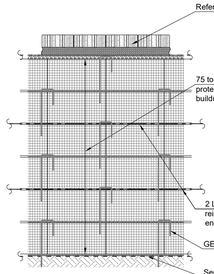

SPECIFICATION - A
TYPICAL BUILDUP DETAIL OF PERMEABLE
ACCESS ROAD, DRIVE THROUGH AND LOADING BAY AREA

(Scale 1:20)

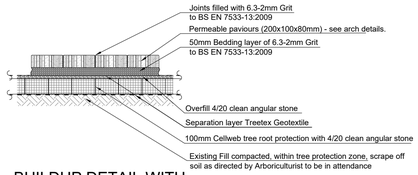



SPECIFICATION - B
TYPICAL BUILDUP DETAIL OF PERMEABLE
CAR PARKING BAY AREA

(Scale 1:20)




BUILDUP DETAIL WITH
FULL DEPTH CELLWEB AREA

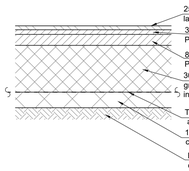



BUILDUP DETAIL WITH
MINIMAL DEPTH CELLWEB AREA

NOTE
Geosynthetics Cell Web details / buildup shown are taken from initial review with Geosynthetics and are subject to full detailed design from Geosynthetics as part of contractor design element

SPECIFICATION - C
TYPICAL BUILDUP DETAIL FOR SPECIFICATION A and B AREAS WITH REQUIRED OPTION FOR
FULL DEPTH CELLWEB AREA AND MINIMAL DEPTH CELLWEB AREA

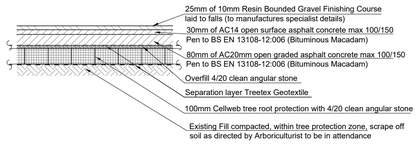
(Scale 1:20)




Core drill 75mm holes in the 80mm tarmac and fill with shingle. This will then make the surface permeable. Spacings of holes 600mm staggered centers

SPECIFICATION - D
RESIN BOUNDED PEDESTRIAN FOOTPATH
LINK AREA BUILDUP

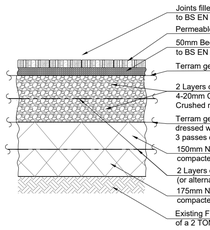
(Scale 1:20)




SPECIFICATION - E
RESIN BOUNDED PEDESTRIAN FOOTPATH
LINK AREA WITH CELLWEB BUILDUP

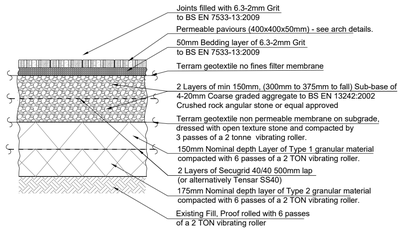
(Scale 1:20)

NOTE
Geosynthetics Cell Web details / buildup shown are taken from initial review with Geosynthetics and are subject to full detailed design from Geosynthetics as part of contractor design element




SPECIFICATION - F
TYPICAL BUILDUP DETAIL OF PERMEABLE
PEDESTRIAN TERRACING AREA

(Scale 1:20)




SPECIFICATION - G
TYPICAL BUILDUP DETAIL OF PERMEABLE
PEDESTRIAN TERRACING AREA

(Scale 1:20)

**GENERAL NOTES**

STEELWORK

All steelwork to be designed in accordance with BS EN 1993-1-1, 2005 unless stated otherwise, all steel shall be to BS EN 10025.
All structural steelwork is to be grade S355 except where noted otherwise
All steelwork is to be shot blasted to SA 2.5 or equivalent to remove all loose rust and mill scale and primed with Epoxy Zinc Phosphate primer to DFT 100 microns before delivery to site, in accordance with BS 5493: 1977 Code of Practice for Protected Coating of Iron and Steel Structures against Corrosion. Following installation the steelworks shall be cleaned and prepared and any damage caused to the protective coating during construction shall be spot primed prior to final decoration.

Any connection shall be made using a minimum of 4no. M16 bolts or as specified on the drawings and details.
All bolts shall be grade 8.8.
All welds shall be 8mm fillet, except where specified otherwise.
All welds are to be full profile and continuous. all end plates/capping plates are to be F.S.B.W. to RHS/CHS with plate edges prepared.
All end plates/capping plates to be profiled to shape of section.
All end plates to be a laminar-free material.
For factored design loads refer to calculations and all connection shall be designed for the loads noted in SIMPSON TWS Calculation package.
At beam to column connections, the centre line of the column shall coincide with the centre line of the beam unless noted otherwise.
Steelwork built into masonry walls or in contact with masonry shall be painted with 3 coats of RIW or similar approved bitumastic paint.
All steelwork below ground to be encased in minimum 75mm structural grade concrete wrapped in D49 mesh.

FIRE PROTECTION

All structural steelwork requires a minimum protection period to be confirmed by Others

CONCRETE

The concrete used shall be as follows:
Concrete characteristic design strength at 28 days;
Blinding Grade C20
Reinforced concrete Grade C32/40
Mass concrete strip footings and pad foundations:
Crushing strength: 25 N/mm2
Minimum Cement Content: 280 kg/m3
Maximum Water Cement ratio: 0.55
Maximum aggregate size: 20mm

Foundations shall be taken to a firm bearing strata to the satisfaction of the Building Inspectors and Engineers.
All excavations are to be lined with blinding concrete or similar approved below specified formation levels or bottomed out in accordance with the specifications.
The integrity of the excavations is to be maintained by the contractor at all times.
All disturbed ground to be reinstated with granular fill in accordance with the specification and to the approval of the engineer.
Soft spots at new foundation levels are to be excavated and back filled with blinding concrete to the approval of the engineer.
The removal of excess water from the site is the responsibility of the contractor. The contractor must satisfy himself with respect to the ground water conditions on site & take measures to deal with the likely perched ground water conditions which exist.
Where existing redundant drains occur under new foundations and slabs they are to be grubbed out and back filled with mass concrete.

Reinforcement-grades;
High yield - grade 500 N/mm2 (clause e30/150) (deformed type 2)
Plain bars - grade 250 N/mm2 (clause e30/140).
Fabric - grade 500 N/mm2 - (clause e30/210).

The minimum lap lengths to be as follows:
A393 MESH – 500mm
Loose bar reinforcement – 50 times the smaller bar diameter
Unless noted otherwise concrete cover to outermost reinforcement to be:
40mm against blinding, 35mm all other faces

LOAD BEARING MASONRY

The following materials where specified are to have a minimum average compressive strength of:-
Engineering brickwork. 50N/mm²
Common brickwork. 20.5N/mm²
Mortars shall be as follows 1:3 (cement: sand) below DPC level and 1:1:6 (cement: lime: sand) above DPC level.

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEER'S & SUB-CONTRACTORS DRAWINGS AND DETAILS AND THE PROJECT SPECIFICATION. WHERE ANY DISCREPANCY MAY EXIST BETWEEN THESE NOTES & THE SPECIFICATION, THE SPECIFICATION SHALL PREVAIL.
2. ALL SETTING-OUT TO BE CHECKED AGAINST ARCHITECT'S LATEST SETTING OUT DRAWING.
3. NO DIMENSIONS ARE TO BE SCALED FROM THIS DRAWING.
4. NO DEVIATION MAY BE MADE FROM THE DETAILS SHOWN ON THIS DRAWING WITHOUT PRIOR AGREEMENT OF THE ENGINEERS.
5. ANY DISCREPANCY BETWEEN THIS DRAWING AND ANY OTHER DOCUMENT SHOULD BE REFERRED IMMEDIATELY TO THE ENGINEER.
6. ALL WORKMANSHIP, MATERIALS AND LOADINGS TO BE IN STRICT ACCORDANCE WITH THE LATEST EDITIONS OF:
   - EC0 - BASIC STRUCTURAL DESIGN
   - EC1 - ACTIONS ON STRUCTURES
   - EC2 - DESIGN OF CONCRETE STRUCTURES
   - EC3 - DESIGN OF STEEL STRUCTURES
   - EC7 - GEOTECHNICAL DESIGN
   - THE BUILDING REGULATIONS, MANUFACTURER'S SPECIFICATIONS AND RECOMMENDATIONS.

CONTRACTOR IS TO ALLOW FOR ALL TEMPORARY WORKS AS NECESSARY TO UNDERTAKE AND MAINTAIN THE STRUCTURAL INTEGRITY OF THE PROPOSED BUILDING AND SURROUNDING STRUCTURES AT ALL TIMES

CONTRACTOR TO PROVIDE FULL DESIGN AND FABRICATION DRAWINGS FOR RETAINING WALLS AND GEOSYNTHETICS CELLWEB TREE PROTECTION SYSTEM TO BE INSTALLED AS PER MANUFACTURS RECOMENDATIONS

NOTE:
Contractor is responsible for liasing between Retaining Wall Designer and Installer and GEOSYNTHETICS Cell web system and final design aspects for acceptance by Contract Administrator and Clients Design Team

NOTE:
Retaining Wall and GEOSYNTHETICS Cellweb details shown are for indication. All final design and working details are to be designed by Contractors specialist contractor to manufacturer details and provide detailed design and drawings for approval by Clients Design Team
GEOSYNTHETICS details
Jamie Leake tel 01455 241507
jamie.leake@geosyn.co.uk

NOTE:
For all dimensions and setting out refer to architects drawings

NOTE
Refer to M&E spec and drawings for additional excavation locations for incoming and redirected services on site

NOTE:
THE CONTRACTOR IS TO REFER TO ALL RELEVANT INFORMATION
PROJECT MANAGERS CONTRACT DOCUMENTATION,
ARCHITECTS SPEC AND DRAWING
M&E SPEC AND DRAWINGS
QUARTET DESIGN ARBORICULTURAL CONSULTANTS
SPEC AND DRAWINGS
SOIL INVESTIGATION REPORT,
TOPO SURVEY,
SUBSCAN SURVEY,
UTILITIES REPORT,

NOTE:
THE CONTRACTOR IS TO REFER TO STARBUCKS DEVELOPER DRIVE THOUGH SPECIFICATION AND ALL DRAWINGS

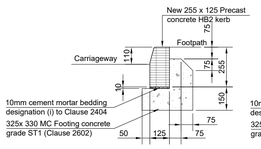
CONTRACTOR IS TO CHECK WITH DESIGN TEAM FOR THE LATEST REVISION SPECIFICATION AND ALL DRAWINGS

Contractors Design & Tender Requirements

The contractor's is to ensure full compliance with the Project Managers, Architects, M&E, Arboriculturist, Engineers and Tenants specifications / requirements.

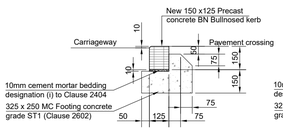
Contractor is to allow for detailed design of all retaining walls, Geosyntheticx Cellweb and detailed fabrication drawings including full dimensioned drawings for approval by Design Team

Contractor is to Allow for liasing with Thames Water and making applications for off site connections to existing public sewer system for seperate surface water and foul water connections and for all application fees




HALF BATTERED KERB DETAIL
(KD1)

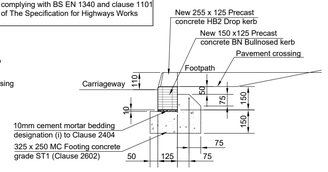
(Scale 1:20)




FLUSH KERB DETAIL
(KD2)

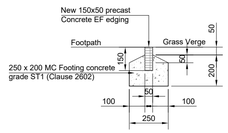
(Scale 1:20)

NOTE:
All kerbs hall bee precast concrete kerbs complying with BS EN 1340 and clause 1101 of The Specification for Highways Works



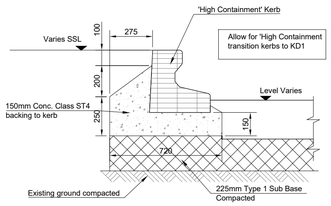

DROP KERB DETAIL
(DK3)

(Scale 1:20)



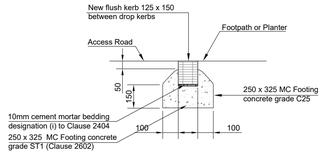

KERB EDGING DETAIL
(KD4)

(Scale 1:20)




HIGH CONTAINMENT KERB DETAIL
(KD5)

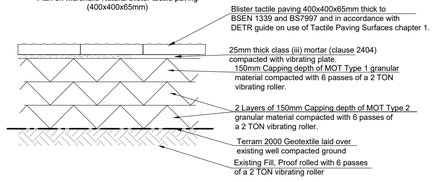
(SCALE 1:25)




DEMARCATION KERB DETAIL
(KD6)

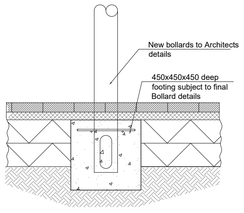
(Scale 1:20)

Plan on Marshalls Natural blister tactile paving
(400x400x65mm)




SPECIFICATION
TYPICAL BUILDUP OF DETAIL OF
BLISTER TACTILE PAVING

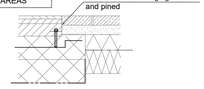
(Scale 1:20)




BOLLARD DETAIL

(Scale 1:20)

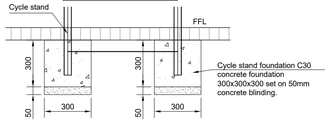
DETAIL SIMILAR BETWEEN
LANDSCAPED AREAS




HARD STANDING CELLWEB
AREAS EDGE FIXING DETAIL

(Scale 1:20)

NOTE,
For Cycle stand type and colour
refer to Architects drawings




CYCLE STAND PAD FOOTINGS

(SCALE 1:20)

| | | | |
|---|---|---|---|
| P1 | ISSUED FOR PLANNING CONDITION 6 | GB | 11.06.26 |
| T1 | ISSUED FOR TENDER | GB | 13.05.26 |
| MK | REVISION | BY | DATE |

DRAWING STATUS

ISSUE

DRAWING TITLE

PROPOSED EXTERNAL
WORKS DETAILS

PROJECT

STARBUCKS POD,
SCOURS LANE,
TILEHURST,
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| Drawn | Ch'kd | Scales | Date |
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| GB | - | 1:20 | 08/04/26 |

Purpose of Issue
ISSUE

| Project Number | Drawing Number | Revision |
|---|---|---|
| P24-0805 | EW02 | P1 |

A1

## APPENDIX C - PRODUCT DATA

- HYDRO INTERNATIONAL HYDRO BRAKE FLOW CONTROL ATTENUATION RESTRICTOR OPERATION AND MAINTENANCE MANUAL
- POLYPIPE POLYSTORM MODULAR UNITS AND INSTALLTION DETAILS
- CELLWEB INSTALLATION DETAILS

# Hydro-Brake® Vortex Flow Control

Reduce Storage Needs by Controlling Flow.

## Product Profile

The Hydro-Brake® Vortex Flow Control is a versatile, self-activating device with a unique geometry designed to harness the energy of vortex flow.

The Hydro-Brake® is used to maximize savings on new construction projects by minimizing stormwater detention volumes. Also an economical retrofit solution, the Hydro-Brake® can be installed in over-discharging ponds and catch basins to restrict the outflow without requiring the construction of additional detention volumes.

With large openings that guard against blockages and an installation base upwards of 25,000 units, the Hydro-Brake® is a trusted and proven solution used to reduce the rate of stormwater runoff.

## Applications

- Outlet flow control for stormwater detention
- Outlet flow control for dams and flood reservoirs
- Reduction of runoff volume from sites
- “Blue roof” stormwater detention schemes
- Erosion control and energy dissipation

## Advantages

- Reduced stormwater storage volumes by up to 40%
- Up to 50% savings in project storage costs
- Self-activating with no moving parts or power requirements
- Available in wall-mounted or floor-mounted geometries
- Area of opening is 3-6 times larger than the equivalent orifice
- Virtually maintenance free
- Proven performance with over 25,000 installations worldwide

## How it Works

The Hydro-Brake® operates on simple fluid hydraulics. Flow enters the volute tangentially through the inlet. Under low flow conditions, the Hydro-Brake® acts as a large orifice and water passes directly from the inlet to the outlet (Fig.1a).

As flow increases and reaches the Flush-Flo™ point, high peripheral velocities initiate the throttling action. As head increases, the valve approaches the Switch-Flo™ and Kick-Flo™ points and an air-filled core starts to form in the volute. As head continues to increase, the air core fully stabilizes and the valve discharge is throttled to that of a smaller orifice (Fig.1b).

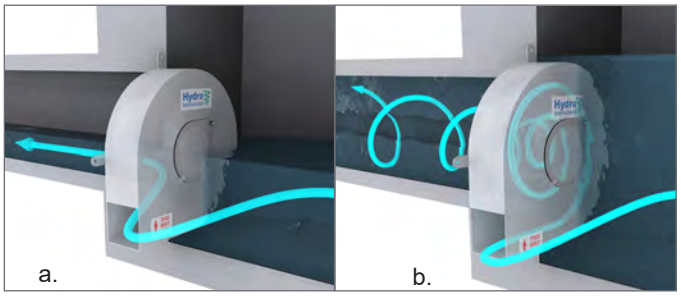



Fig.1 The Hydro-Brake® operates like (a) a large orifice under low flow conditions, and (b) a small orifice under higher flow / higher head conditions when a vortex air core forms within the device and throttles the flow.

The Hydro-Brake® Vortex Flow Control optimizes flow control to allow for higher discharge rates at lower heads than conventional flow control options. The head/discharge curves shown below illustrate the behavior of a Hydro-Brake® Vortex Flow Control compared to an orifice (Fig.2).

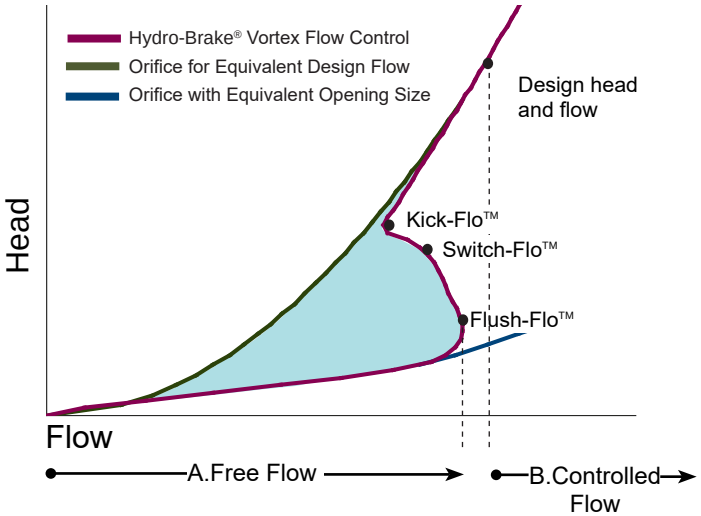



Fig.2 The characteristic of the Hydro-Brake® vs. an equivalent orifice.

# Hydro-Brake® Vortex Flow Control

## Sizing & Design

Three series of Hydro-Brake® Vortex Flow Controls are available to suit various applications and design constraints. Refer to the Hydro-Brake® Design Chart for typical sizing guidelines (Table 1).

Table 1. Hydro-Brake® Vortex Flow Control design chart.

| Series | S Series | V Series | C Series |
|---|---|---|---|
| Typical Geometry | | | |
| Models | SH<br>STH SXH<br>SMH SMXH | SV<br>SXV<br>SMV | C<br>CX<br>CH |
| Typical Applications | • Flow control at the inlet of the storm drain system<br>• Outlet flow control for stormwater detention systems | • Erosion control & energy dissipation<br>• Roof runoff control for “Blue Roof” detention schemes | • Outlet flow control for flood dams and levees<br>• Outlet flow control for stormwater detention systems |
| Typical Mount Style | Wall Mount | Downspout/Roof Mount<br>Floor Mount<br>Pipe Mount | Floor Mount |
| Typical Diameter Range* | 2 - 16 in (5 - 41 cm) | 2 - 16 in (5 - 41 cm) | 3 - 20 in (7.5 - 51 cm) |
| Typical Flow Range** | 0.05 - 5.6 cfs (1 - 157 L/s) | 0.05 - 6.0 cfs (1 - 174 L/s) | 0.18 - 14.3 cfs (5.3 - 405 L/s) |

*Listed diameter ranges are typical guidelines only. Hydro-Brake® Vortex Flow Controls can be manufactured to any specified diameter up to 6’.
**Flow ranges listed are for 4’ - 6.5’ of head.
Contact Hydro International for site-specific sizing and design requirements.

## Optional Design Accessories

### Pivoting Bypass Door

For maintenance access to the outlet pipe.

### Curved Backplate

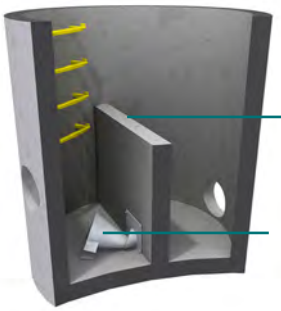
To allow for flush-mounting to the wall of a round manhole.

### Vortex Suppressor Pipe

To eliminate air core for emergency bypass.

## Typical Chamber Configurations

Wall Mounted SXH Model for Catch Basin Inlet Control



Large Storm Bypass Weir

Floor Mounted CH Model for Small Storm Flow Control

Pipe Mounted SXV Model for Energy & Velocity Dissipation

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

# Technical Abstract
# Downstream Defender®

## Performance Verification of Very Fine Sediment Removal with 50-Micron Silica Sand

The Downstream Defender® is an advanced Hydrodynamic Vortex Separator that removes sediment, oil and floatables from stormwater runoff. It has flow modifying internal components to stabilize the flow regime within the device, providing higher pollutant removal capabilities and protection from high scour velocities during intense storm events (Fig.1).

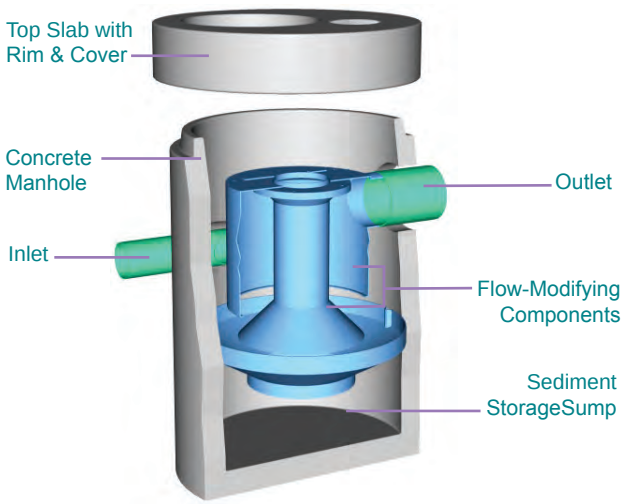



Fig.1 The flow modifying components stabilize the flow regime to provide higher pollutant removal capabilities.

### Verification of Fine Sediment Removal

Although runoff from intense storm events has enough energy to mobilize large pollutants such trash and coarse sediments, small storm events tend to mobilize very fine sediment. To evaluate the ability of the Downstream Defender® to capture these pollutants, a full-scale 4-ft diameter unit was tested under controlled laboratory conditions (Fig.2).

Test procedures were based on requirements to obtain General Use Level Designation (GULD) for Pretreatment by the Washington Department of Ecology (WA DOE) and a Certificate of Technology Assessment under the New Environmental Technology Evaluation (NETE) Program by the Ontario Ministry of the Environment.

Clean water from a 23,000 gal reservoir was pumped to the Downstream Defender® for 4 test runs with target flow rates of 0.4 cfs to 2.2 cfs with no bypassed flows, and inlet concentrations of 200 to 300 mg/L (Fig.3). A very fine gradation of test sediment was produced by mechanically sieving U.S. Silica grade F-110 sand with a #200 sieve to ensure that all test sediment was less than 75-micron with an approximate mean particle size of 50-micron.

Five influent and effluent grab samples were collected per test run, for a total of 18 sample pairs. All samples were analyzed for Total Suspended Solids (TSS) by APHA SM2540D. Background influent and effluent samples were analyzed to ensure the reservoir supplied clean water. The average removal efficiency was calculated for each flow rate.

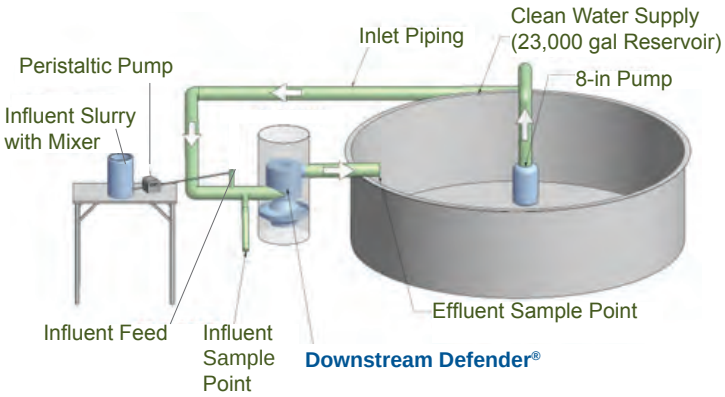



Fig.2 Hydro International's Portland, Maine test facility.

Fig.3 Grab samples were taken from the effluent discharge (pictured, left) and the influent to determine removal efficiency.