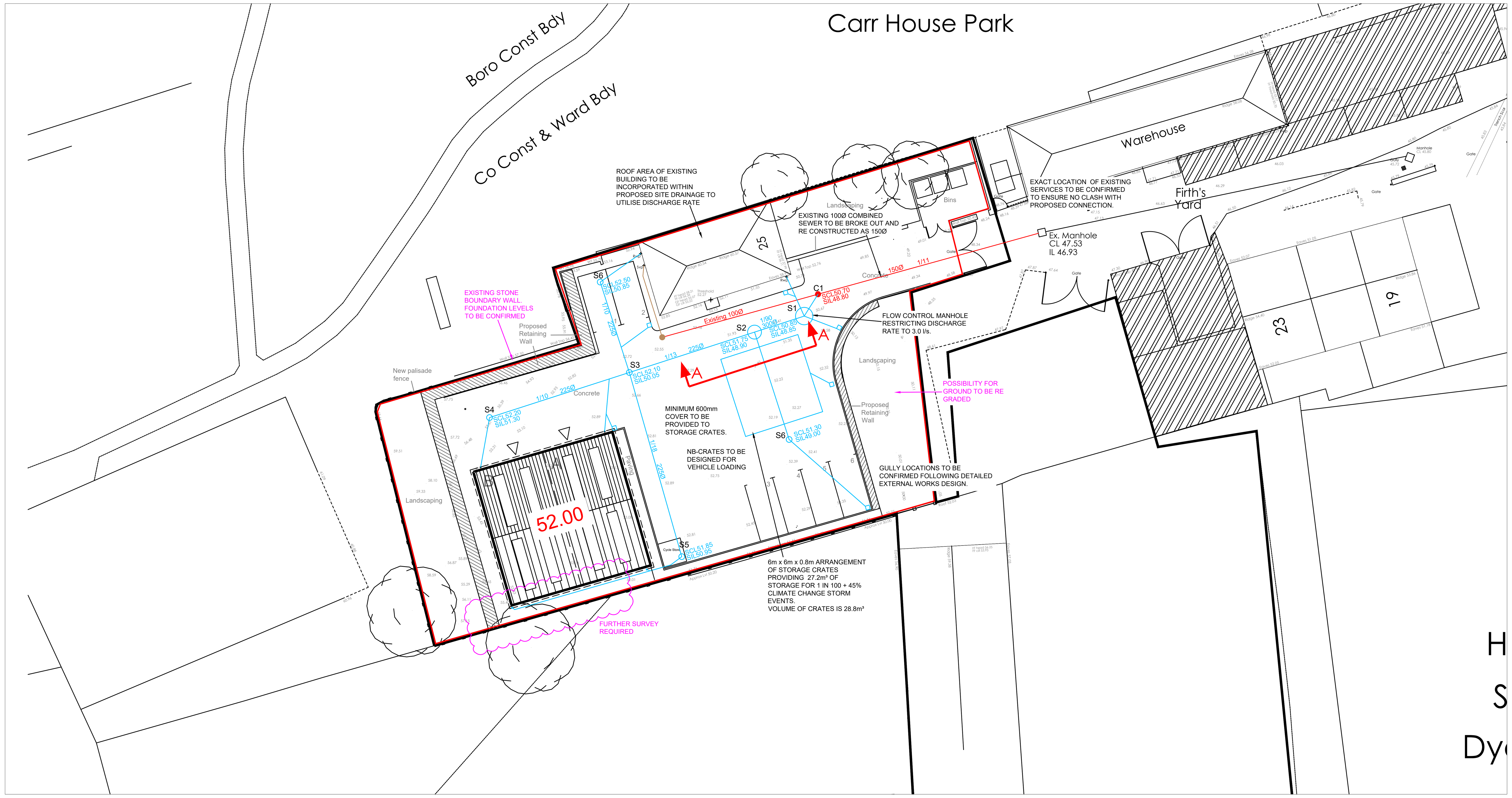

PROPOSED DRAINAGE

PROPOSED LEVELS

1. ALL ADOPTABLE SEWER WORKS AND MATERIAL TO BE IN ACCORDANCE WITH CODES FOR ADOPTION,THE RELEVANT BRITISH/EUROPEAN AND YORKSHIRE WATER'S STANDARDS/REQUIREMENTS/ADDENDUM TO THE MECHANICAL AND ELECTRICAL SPECIFICATION AND KITEMARKED.
2. MANHOLE COVERS SHALL/MUST HAVE A CLEAR OPENING OF 600mm AND SHALL BE CLASS D400 TO BS EN 124 WITH 150mm DEEP FRAMES IN HIGHWAYS.
3. FILLED GROUND MUST BE FILLED AND CONSOLIDATED UNDER THE SUPERVISION AND TO THE SATISFACTION OF YORKSHIRE WATER BEFORE ANY SEWER WORKS ARE CARRIED OUT.
4. YORKSHIRE WATER IS **NOT** OBLIGED TO ACCEPT FILTER DRAIN/LAND DRAINAGE RUNOFF INTO THE PUBLIC SEWER NETWORK OR ADOPTABLE DRAINAGE SYSTEM (DIRECTLY OR INDIRECTLY). AN ALTERNATIVE METHOD OF DISPOSAL OF THE LAND DRAINAGE RUNOFF WILL THEREFORE BE REQUIRED AND YOU WILL HAVE TO LIAISE WITH THE LOCAL AUTHORITY, LAND DRAINAGE SECTION WITH REGARD TO THE DISPOSAL OF THE FILTER DRAIN/LAND DRAINAGE RUNOFF.
5. COVER SLABS MUST CARRY THE BSI KITEMARK OR WILL BE REJECTED BY YORKSHIRE WATER INSPECTOR. WHERE THE CLEAR OPENING OF THE KITEMARKED PRODUCT IS DIFFERENT TO THAT OF THE COVER AND FRAME, A LOADING BEARING SLAB SHOULD BE FITTED ABOVE THE COVER SLAB TO BRING THE SIZE DOWN TO 600x600mm FOR THE YORKSHIRE WATER SPECIFIED COVER SIZE. PLEASE REFER TO CONCRETE PIPE SYSTEMS ASSOCIATION (CPSA), 'TECHNICAL BULLETIN' ISSUED AUTUMN 2004 FOR KITEMARKED COVER SLAB OPENING SIZES.
6. SULPHATE RESISTANT CEMENT (C20-DC2) AND PRECAST CONCRETE PRODUCTS MUST BE USED OR A LABORATORY REPORT PROVIDED PROVING THAT SUCH PRECAUTIONS ARE NOT NECESSARY.
7. THE ADOPTABLE SEWERS SHOULD BE A MINIMUM OF 1m AND MANHOLES 0.5m FROM KERB FACES AND MARGINS.
8. SEWERS MUST HAVE 5m CLEARANCE FROM TREES AND HEDGES (PLEASE ALSO REFER TO FIGURE 2.3 ON PAGE 33 IN "SEWERS FOR ADOPTION" 6th EDITION FOR RESTRICTION ON TREE PLANTING ADJACENT TO SEWERS).
9. SEWERS TO BE LAID IN CLASS "S" BEDDING (150mm GRANULAR BED AND SURROUND). WHERE DEPTH OF COVER TO TOP OF THE SEWER IS LESS THAN 1.2m IN HIGHWAYS AND VERGES (OR LESS THAN 900mm IN NONE VEHICULAR ACCESS AREAS) THEN A CONCRETE SLAB OVER SEWER SHALL BE PROVIDED ABOVE GRANULAR BED AND SURROUND.
10. BEDDING AND BACKFILL MATERIAL TO CONFORM TO THE REQUIREMENT OF WATER INDUSTRY SPECIFICATION 4-08-02 (TABLE A2).
11. THE CHAMBER SIZE OF MANHOLES WIT HMORE THAN ONE CONNECTION IN THEM MAY NEED OT BE INCREASED AN INCREMENT TO ACCOMMODATE THE CONNECTIONS AND BENDS.
12. YORKSHIRE WATER POLICY IS NOT TO ACCEPT TYPE "C" BRICK MANHOLES AND 1050mm DIAM. MANHOLE RINGS. INSTEAD IT IS PREFERRED THAT YOU USE A TYPE "B" MANHOLE WITH 1200mm DIAM. OR 1500mm DIAM. RINGS, WITH THE OPENING SIGHTED OVER THE CHANNEL WHERE DEPTH OF COVER TO PIPE SOFFIT IS 1-1.5m.
13. ADOPTABLE PLASTIC SEWER PIPES TO BE BSI KITEMARKED (CERTIFIED TO WIS 4-35-01 AND BS/EN13476). ADOPTABLE PLASTIC SEWER PIPES TO BE LAID IN MAXIMUM 3 METRE LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER LENGTHS. PLASTIC CHANNEL SECTIONS IN MANHOLES ARE NOT ACCEPTABLE AND YORKSHIRE WATER WOULD PREFER CLAYWARE CHANNELS IN MANHOLES. WE HAVE FOUND THAT PLASTIC CHANNELS ARE DIFFICULT TO SET IN CONCRETE BECAUSE THEY FLOAT AND A SATISFACTORY FINISHED CANNOT BE OBTAINED ON THE BENCHING.
14. THE MINIMUM CRUSHING STRENGTH FOR CLAY PIPES SHOULD BE AS FOLLOWS: 100mm DIA. 40KN/m, 150mm DIA. 40KN/m, 225mm DIA. 45KN/m AND 300mm DIA. 72KN/m.THE MINIMUM CRUSHING STRENGTH FOR CONCRETE PIPES SHOULD BE - CLASS 120 TO EN 1916/BS5911-1 2002. PLASTIC PIPES SHOULD CONFORM TO WIS 4-35-01 AND BS EN13476.
15. WHERE A B125 COVER AND FRAME HAS BEEN APPROVED, THIS MUST NOT BE COATED IN PLASTIC AND MUST HAVE LIFTING EYES SUITABLY SIZED TO ACCOMMODATE STANDARD LIFTING KEYS. SCREW DOWN COVERS ARE NOT ACCEPTABLE.
16. ALL HIGHWAY WORKS AND MATERIAL TO CONFORM WITH LEEDS CITY COUNCIL HIGHWAYS SPECIFICATION.
17. GULLY COVER AND FRAMES SHALL BE D400 DUCTILE IRON AND COMPLY WITH EUROPEAN STANDARD BS EN 124. THOSE SIGHTED IN ACCESSWAYS AND MEWS COURTS MUST BE SUITABLE FOR USE IN PEDESTRIAN AREAS.

RISK ASSESSMENT:
SIGNIFICANT RISKS THAT CANNOT BE DESIGNED OUT

RISK	LEVEL OF RISK (H/M)	SUGGESTED ACTION
DEEP EXCAVATIONS ASSOCIATED WITH NEW DRAINAGE WORKS	HIGH	ENSURE ALL EXCAVATIONS HAVE ADEQUATE TRENCH SUPPORTS
HANDLING LARGE DIAMETER MANHOLE RINGS AND CIRCULAR PIPES	HIGH	USE CORRECT LIFTING EQUIPMENT AND ENSURE OPERATIVES WEAR APPROPRIATE PROTECTIVE CLOTHING/HARD HATS/CORRECT PPE.
CONTACT WITH SEWAGE	MED	OPERATIVES TO USE CORRECT BREATHING EQUIPMENT/CORRECT PPE
NOISE	MED	OPERATIVES TO USE CORRECT EAR PROTECTION/CORRECT PPE
DRAINAGE EXCAVATIONS ADJACENT EXISTING BOUNDARY STRUCTURES	HIGH	ENSURE CORRECT SUPPORTS ARE PROVIDED TO TRENCHES AND BUILDINGS WHERE REQUIRED
DRAINAGE EXCAVATION IN PUBLIC HIGHWAY	HIGH	ENSURE CORRECT USE OF TRENCH SUPPORTS IN EXCAVATION AND SCREEN BARRIERS TO PROTECT MEMBERS OF THE PUBLIC
MAINTAIN ACCESS TO ADJACENT PROPERTIES AND OCCUPIERS	HIGH	ENSURE WORKS ARE PROTECTED WITH BARRIERS AND SIGNS TO GUIDE THE PUBLIC AWAY FROM THE WORKS
DRAINAGE EXCAVATIONS NEAR TO EXISTING SERVICES	HIGH	ENSURE WORKS ARE PROTECTED WITH BARRIERS AND SIGNS TO GUIDE MEMBERS OF THE PUBLIC AWAY FROM THE AREA
WORKING IN CONFINED SPACES. WORKING IN DRAINS AND MANHOLES	HIGH	CONFINED SPACES WORKING TRAINED PERSONNEL ONLY TO CARRY OUT WORKS UNDER A PERMIT TO WORK SCHEME IMPLEMENTED BY CONTRACTOR. GAS TESTING TO TAKE PLACE BEFORE ALL ENTRIES TO CONFINED SPACES.
WORKING IN HIGHWAYS / RISKS FROM VEHICLE AND PLANT	HIGH	ALL WORKS TO BE SIGNED AND FENCED FROM NORMAL VEHICULAR TRAFFIC. ALL WORKERS TO WEAR HIGH VISIBILITY CLOTHING. ALL PLANT TO HAVE VISUAL AND AUDIBLE WARNING SYSTEMS.
ROAD AND DRAINAGE CONSTRUCTION	HIGH	ALL EXCAVATIONS TO BE ADEQUATELY FENCED OFF AND SUPPORTED DURING CONSTRUCTION. ALL OPERATIVES TO BE TRAINED IN CORRECT METHODS OF LIFTING AND WORK IN ACCORDANCE WITH LOLER REGS

IT IS ASSUMED THAT WORKS ASSOCIATED WITH THIS DESIGN WILL BE UNDERTAKEN BY A PERSON OR PERSONS WHO ARE COMPETANT AND HAVE THE REQUIRED LEVEL OF EXPERIENCE AND EXPERTISE

Rev	Description	Date	Initials

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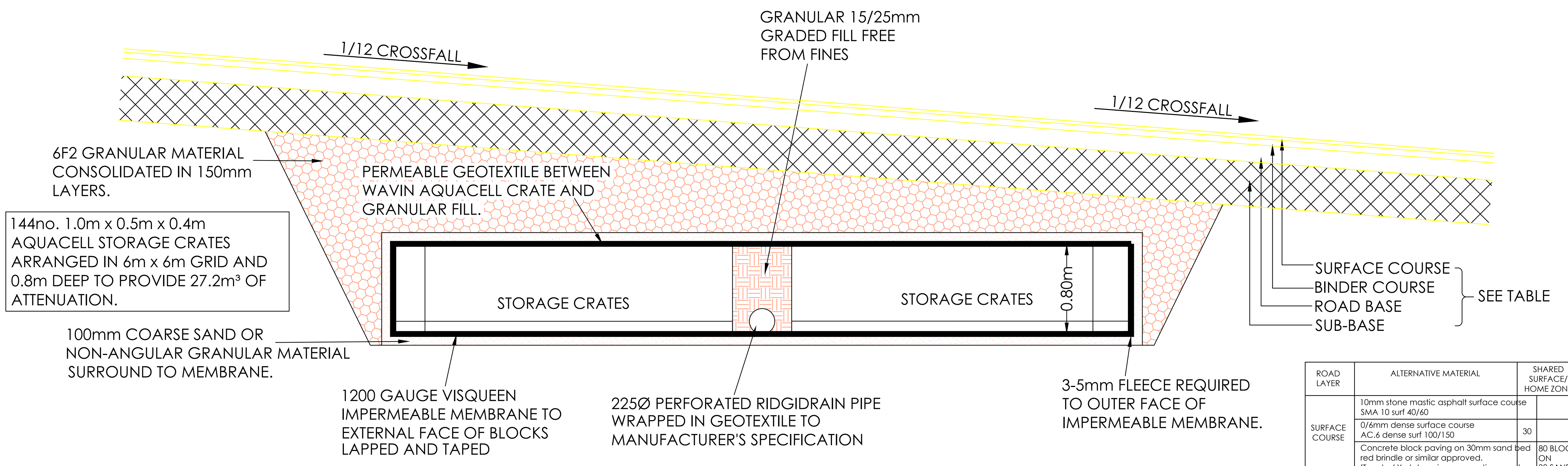
Client
MANSU GROUP

Project
10A HARTLEY STREET, DEWSBURY

Detail
ENGINEERING FEASIBILITY

PRELIMINARY ISSUE

Dwn	Chkd	Date	Scale	Dwg No.
JF	MH	APR'24	1:250@A1	E24/8170/001_01



SECTION A - A

Scale 1:25

ROAD LAYER	ALTERNATIVE MATERIAL	SHARED SURFACE/ HOME ZONE	LOCAL RESIDENTIAL STREET
SURFACE COURSE	10mm stone mastic asphalt surface course SMA 10 surf 40/60		
	0/6mm dense surface course AC.6 dense surf 100/150	30	30
	Concrete block paving on 30mm sand bed red brindle or similar approved. (Tegula / Yorkstone in conservation area)	80 BLOCK ON 30 SAND	N/A
BINDER COURSE	0/20 dense binder course AC.20 dense bin 100/150	55	55
BASE COURSE	0/32 dense / binder course AC.32 dense base / bin 100/50	85	85

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PRELIMINARY ISSUE

Client
MANSU GROUP

Project
10A HARTLEY STREET, DEWSBURY

Detail
CROSS SECTION THRO' STORAGE CRATES

Dwn	Chkd	Date	Scale	Dwg No.
JF	MH	APR'24	1:25@A1	E24/8170/001_02

Design Settings

Rainfall Methodology	FSR
Return Period (years)	2
Additional Flow (%)	0
FSR Region	England and Wales
M5-60 (mm)	18.000
Ratio-R	0.400
CV	0.750
Time of Entry (mins)	5.00
Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	75.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	0.200
Preferred Cover Depth (m)	1.200
Include Intermediate Ground	✓
Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
C1			50.700	600	1.900
S1			50.850	1500	2.000
S2	0.091	5.00	51.750	1200	2.850
S3			52.100	600	2.050
S4		5.00	52.200	600	0.900
S5		5.00	51.850	600	0.900
S6		5.00	52.500	600	1.650

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S4	S3	12.700	0.600	51.300	50.050	1.250	10.2	225	5.05	63.0
1.001	S3	S2	11.400	0.600	50.050	48.900	1.150	9.9	225	5.20	62.2
1.002	S2	S1	14.000	0.600	48.900	48.850	0.050	280.0	300	5.45	60.9
1.003	S1	C1	3.000	0.600	48.850	48.800	0.050	60.0	225	5.48	60.8
2.000	S5	S3	17.000	0.600	50.950	50.050	0.900	18.9	100	5.16	62.4
3.000	S6	S3	7.600	0.600	50.850	50.050	0.800	9.5	100	5.05	63.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	4.128	164.2	0.0	0.675	1.825	0.000	0.0	0	0.000
1.001	4.180	166.2	0.0	1.825	2.625	0.000	0.0	0	0.000
1.002	0.934	66.0	15.0	2.550	1.700	0.091	0.0	97	0.760
1.003	1.691	67.2	15.0	1.775	1.675	0.091	0.0	72	1.365
2.000	1.785	14.0	0.0	0.800	1.950	0.000	0.0	0	0.000
3.000	2.522	19.8	0.0	1.550	1.950	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	12.700	10.2	225	Circular_Default Sewer Type	52.200	51.300	0.675	52.100	50.050	1.825
1.001	11.400	9.9	225	Circular_Default Sewer Type	52.100	50.050	1.825	51.750	48.900	2.625
1.002	14.000	280.0	300	Circular_Default Sewer Type	51.750	48.900	2.550	50.850	48.850	1.700
1.003	3.000	60.0	225	Circular_Default Sewer Type	50.850	48.850	1.775	50.700	48.800	1.675
2.000	17.000	18.9	100	Circular_Default Sewer Type	51.850	50.950	0.800	52.100	50.050	1.950
3.000	7.600	9.5	100	Circular_Default Sewer Type	52.500	50.850	1.550	52.100	50.050	1.950

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S4	600	Manhole	Adoptable	S3	600	Manhole	Adoptable
1.001	S3	600	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.002	S2	1200	Manhole	Adoptable	S1	1500	Manhole	Adoptable
1.003	S1	1500	Manhole	Adoptable	C1	600	Manhole	Adoptable
2.000	S5	600	Manhole	Adoptable	S3	600	Manhole	Adoptable
3.000	S6	600	Manhole	Adoptable	S3	600	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
C1	50.700	1.900	600	1	1.003	48.800	225
S1	50.850	2.000	1500	1	1.002	48.850	300
				0	1.003	48.850	225
S2	51.750	2.850	1200	1	1.001	48.900	225
				0	1.002	48.900	300
S3	52.100	2.050	600	1	3.000	50.050	100
				2	2.000	50.050	100
				3	1.000	50.050	225
				0	1.001	50.050	225
S4	52.200	0.900	600	0	1.000	51.300	225
S5	51.850	0.900	600	0	2.000	50.950	100
S6	52.500	1.650	600	0	3.000	50.850	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m^3/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	0	0	0
100	45	0	0

Node S1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	48.850	Product Number	CTL-SHE-0085-3000-0800-3000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node S2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	48.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	124

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	34.0	0.0	0.800	34.0	0.0	0.801	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
30 minute winter	C1	28	48.832	0.032	2.9	0.0000	0.0000	OK
30 minute winter	S1	25	49.041	0.191	3.8	0.3370	0.0000	OK
30 minute winter	S2	26	49.041	0.141	11.4	4.9554	0.0000	OK
15 minute summer	S3	1	50.050	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	1	51.300	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S5	1	50.950	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	1	50.850	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
30 minute winter	S1	1.003	C1	2.9	0.801	0.043	0.0109	8.8
30 minute winter	S2	1.002	S1	3.8	0.314	0.058	0.5577	
15 minute summer	S3	1.001	S2	0.0	0.000	0.000	0.1122	
15 minute summer	S4	1.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S5	2.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S6	3.000	S3	0.0	0.000	0.000	0.0000	

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	C1	128	48.832	0.032	3.0	0.0000	0.0000	OK
60 minute winter	S1	50	49.234	0.384	3.9	0.6792	0.0000	SURCHARGED
60 minute winter	S2	50	49.235	0.335	14.4	11.7530	0.0000	SURCHARGED
15 minute summer	S3	1	50.050	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	1	51.300	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S5	1	50.950	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	1	50.850	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	S1	1.003	C1	3.0	0.808	0.045	0.0112	21.0
60 minute winter	S2	1.002	S1	3.9	0.316	0.060	0.9859	
15 minute summer	S3	1.001	S2	0.0	0.000	0.000	0.2267	
15 minute summer	S4	1.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S5	2.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S6	3.000	S3	0.0	0.000	0.000	0.0000	

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	C1	204	48.832	0.032	3.0	0.0000	0.0000	OK
60 minute winter	S1	59	49.405	0.555	4.3	0.9801	0.0000	SURCHARGED
60 minute winter	S2	59	49.405	0.505	18.9	17.7331	0.0000	SURCHARGED
15 minute summer	S3	1	50.050	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	1	51.300	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S5	1	50.950	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	1	50.850	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	S1	1.003	C1	3.0	0.808	0.045	0.0112	27.6
60 minute winter	S2	1.002	S1	4.3	0.331	0.065	0.9859	
15 minute summer	S3	1.001	S2	0.0	0.000	0.000	0.2267	
15 minute summer	S4	1.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S5	2.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S6	3.000	S3	0.0	0.000	0.000	0.0000	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m^3)	Flood (m^3)	Status
120 minute winter	C1	98	48.834	0.034	3.3	0.0000	0.0000	OK
120 minute winter	S1	98	49.879	1.029	3.9	1.8175	0.0000	SURCHARGED
120 minute winter	S2	98	49.879	0.979	16.9	28.3240	0.0000	SURCHARGED
15 minute summer	S3	1	50.050	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S4	1	51.300	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S5	1	50.950	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S6	1	50.850	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m^3)	Discharge Vol (m^3)
120 minute winter	S1	1.003	C1	3.3	0.830	0.049	0.0120	48.7
120 minute winter	S2	1.002	S1	3.9	0.305	0.060	0.9859	
15 minute summer	S3	1.001	S2	0.0	0.000	0.000	0.2267	
15 minute summer	S4	1.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S5	2.000	S3	0.0	0.000	0.000	0.0000	
15 minute summer	S6	3.000	S3	0.0	0.000	0.000	0.0000	