STORMWATER ENGINEEERING REPORT &
SITE BASED STORMWATER MANAGEMENT PLAN
MULTI USE COMMERCIAL DEVELOPMENT

PROJECT NO. 19539

GATES ROAD
FLAGSTONE QLD 4280
January 2020

Revision	Date	Description	Author	Approved	Signed
Draft	10/01/20	Issue For review	AvT		
A	29/02/20	Issue For review	AvT	PC	
B	12/03/20	Issue For review	AvT	PC	

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2020/1109

Date: 10 June 2020

Queensland Government

1 INTRODUCTION

1.1 Objectives & Description of proposed development

Infinitec Solutions has been commissioned to undertake the Stormwater Engineering Report and Site Based Stormwater Management Plan for the proposed Multi Use Commercial Development site at Gates Road, Flagstone QLD 4280.

Street Address	Gates Road, Flagstone QLD 4280
RP Description	Lot 25012-25016 on SP303119
Total Site Area	5104 m^2
Proposed Use	Multi Use Commercial Development
Local Authority	EDQ / Logan City Council

Based on the requirements of the EDQ, LCCand the Queensland Urban Drainage Manual (QUDM), the objectives of this study is to:

- Make an assessment of the pre and post development stormwater conditions and discharges from the site to ensure that there is no adverse impacts on either the adjoining properties or the existing stormwater infrastructure
- Determine the impact (if any) of local and regional flooding on the project site
- Identify the lawful point of discharge from the site
- Based on best engineering practices, develop a strategy to manage the quantity and quality of the stormwater leaving the site.

It is understood that a Development Application will be submitted to EDQ for the purposes of obtaining approval to redevelop land. The development proposal is for a proposed multi use commercial development. Refer attached Appendices for drawings, locality plan and details.

1.2 Risk classification for the site

The proposed development will require only minor earthworks to fill the site in the recently created subdivision to achieve the required pavement levels and grades. Prior to the start of construction erosion and sediment control measures will be installed in accordance with the preliminary design drawings included in this report.

The erosion and sediment control measures will be maintained throughout the construction period until suitable ground cover is achieved.

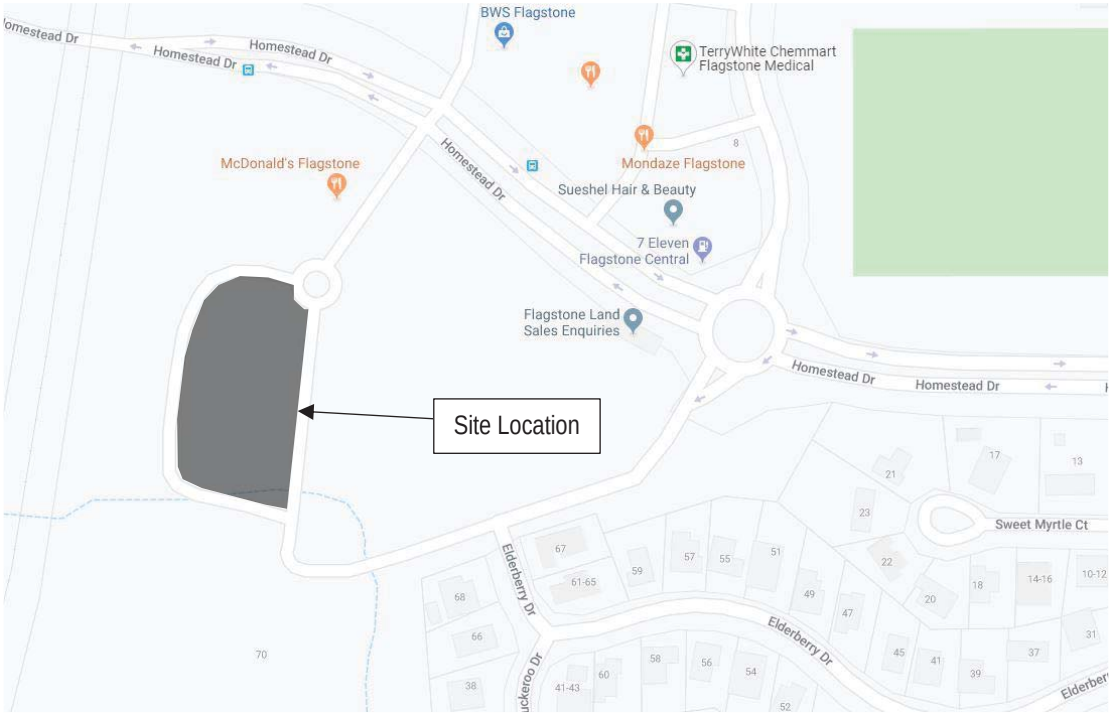
The construction contractor will be responsible for ensuring that soil and debris does not leave the site and is not deposited on external roads due to the proposed earthworks and construction activity.

ESC measures will have to be designed, installed & maintained in accordance with the IECA standards.

2 SITE CHARACTERISTICS

2.1 Location

The site is located at Gates Road, Flagstone QLD 4280. Please refer to locality plan below.



SITE LOCATION MAP

2.2 Topography

The site grades down from a maximum elevation of approximately RL 47.25 at the north of site to a minimum elevation of approximately RL45.39 in the south-western corner of site.

2.3 Site survey plan

Detailed survey has been completed and relevant contours and details are shown in the attached survey plan, prepared by Skyline Surveyors.

2.4 Existing land use

The site is currently vacant undeveloped land.

2.5 Proposed land use

The proposed use is for the construction of a new multi-use commercial development consisting of a service station, two low impact industrial buildings and associated parking. Refer attached site plan prepared by the Architect.

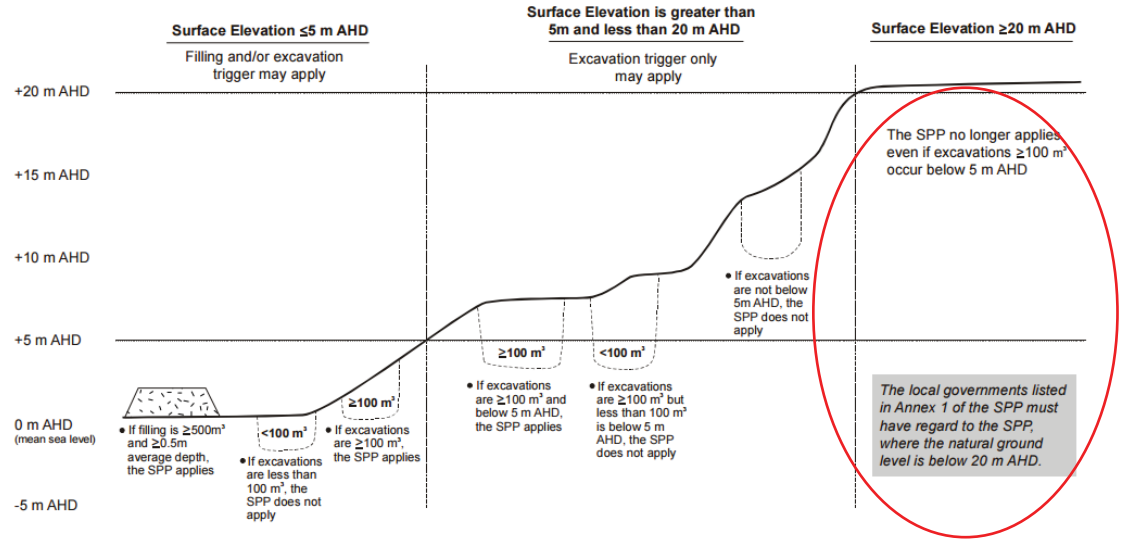
2.6 Soils

A detailed geotechnical investigation will be carried out by other companies during detailed design.

Logan is currently listed in Table 4: Acid sulphate soils-affected local government areas in State Planning Policy July 2017(SPP 2017), indicating that this development application may require compliance with the SPP 2017 acid sulphate soils development objectives.

This policy also states that developments below 20.0m AHD that involve a Material Change of Use or operational works, involving: (a) excavating or otherwise removing 100 cubic metres or more of soil or sediment, or (b) filling of land with 500 cubic metres or more of material with an average depth of 0.5 metres or more and are required to be assessed against the SPP 2017 acid sulphate soils

development objectives. The figure below (Adapted from SPP Water Quality State Interest Guideline 2017) provides a visual aid to determining assessable development.



Areas and Development to which SPP 2017 Applies

2.7 Watercourses

According to Logan City Council the development site is not affected by flooding.

2.8 Vegetation within the waterway corridor

Not applicable to this project report.

3 DATA

3.1 Description of Existing Sewer Infrastructure

An existing sewer connection to the proposed site exists from the sewer manhole on the existing sewer main located at the southern part of the site on Commercial Circuit. It is proposed that this connection will be reused for the proposed development.

For more details refer to the engineering plans in Appendix A.

Internal house drainage design for this proposed development will be by others.

3.2 Description of Existing Water Infrastructure

An existing water main runs along Commercial Circuit and Gates Road. It is proposed to establish a new water connection from the aforementioned water main at the north-eastern corner of Commercial Circuit and Gates Road to service the proposed development. Several hydrants exists on Commercial Circuit to service the proposed development.

For more details refer to the engineering plans in Appendix A.

The Internal water supply design for this proposed development will be by others.

4 WATER QUANTITY (HYDROLOGY & HYDRAULICS)

4.1 Methodology adopted

Cardno previously completed an EDQ approved Engineering report and stormwater management plan for the original development as part of the Flagstone City Stage 7 masterplan which was prepared for Peet Flagstone City Pty Ltd. Document No. 7217/43/R11V1, Version 2, dated 14 January 2015. PDA Development Approval DEV/2014/637.

Stormwater runoff mitigation measures were addressed for the entire catchment in the report for the developed case model and the report was inclusive of the current proposed development site. The stormwater runoff was modelled and validated using the XP storm software for all storm events up to and including a Q100 event. A detention basin with a base area of 984m^2 was designed to service all the lots on the multi-use development.

In summary, stormwater detention for this site is not required as it already been included and adequately accounted for within the original reconfiguration of a lot development application as such on site detention is not required.

5 WATER QUALITY

5.1 Pollutants and concern

The State Planning Policy July 2017 applies for stormwater quality management and management of new or expanded non-tidal artificial waterways applies to development that is outlined below.

SPP2017 PART E: INTERIM DEVELOPMENT ASSESSMENT REQUIREMENTS. STATE INTEREST – WATER QUALITY	YES / NO
Material change of use for urban purposes that involves a land area greater than 2500 square metres that:	
will result in an impervious area greater than 25 per cent of the net developable area	YES
will result in six or more dwellings	NO
Reconfiguring a lot for urban purposes that involves a land area greater than 2500 square metres and will result in six or more lots	N/A
Operational works for urban purposes that involve disturbing more than 2500 square metres of land	N/A

As the development does not have one or more applicable items in the above Table, the State Planning Policy is not applicable and compliance are not expected by the local government authority.

However, stormwater quality treatment is required by EDQ.

To achieve the above State Planning Policy outcomes the development is to:

- avoid or minimise development impacts arising from altered stormwater quality and flow by providing for development and construction activities in accordance with acceptable design objectives
- avoid or minimise development impacts of waste water (other than contaminated stormwater) on water quality objectives
- avoid or minimise development impacts arising from the creation or expansion of non-tidal artificial waterways such as urban lakes

Development:

- avoids or otherwise minimises adverse impacts on the environmental values of receiving waters, arising from:
  - (a) altered stormwater quality or flow, and
  - (b) wastewater (other than contaminated stormwater and sewage), and
  - (c) the creation or expansion of non-tidal artificial waterways, and
- complies with the SPP code: Water quality (Appendix 9.6).

The proposed development will comply with the State Planning Policy and a copy of the Code is attached in the appendices.

5.2 Receiving waters, Environmental Values and Water Quality Objectives

Water quality parameters and the proposed limits applicable to the proposed site have been selected in accordance with South East Queensland Healthy Waterways Partnership's Water by Design WSUD Technical Design Guidelines for South East Queensland Version 1 (2006) and MUSIC Modelling Guidelines for South East Queensland Version (2010).

It is proposed that best practice stormwater treatment be used and therefore it is required to be demonstrated that achieve the following load reduction targets:

Pollutant Types	Water Quality Objective (WQO)
Total Suspended Solids (TSS)	80% reduction of average annual load
Total Phosphorus (TP)	60% reduction of average annual load
Total Nitrogen(TN)	45% reduction of average annual load
Litter/gross pollutants	90% reduction of average annual load

5.3 Stormwater Quality

Cardno previously completed an EDQ approved Engineering report and stormwater management plan for the original development as part of the Flagstone City Stage 7 masterplan which was prepared for Peet Flagstone City Pty Ltd. Document No. 7217/43/R11V1, Version 2, dated 14 January 2015. PDA Development Approval DEV/2014/637.

The software program Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6, was used to assess pollutant generation and the performance of the stormwater treatment measures for the proposed development.

Selection and testing of stormwater management options was undertaken in accordance with MUSIC Modelling Guidelines prepared by Water by Design (2010). The selected option was a 480m2 size filter area bioretention basin which achieved the SPP pollutant reduction targets for the total site area of all the lots in the multi-use development.

In summary, stormwater quality management for this site is not required as it already been included and accounted for within the original reconfiguration of a lot development application, as such on site treatment is not required.

5.4 Service Station Treatment and Assessment

The treatment of the water runoff from the service station has been excluded from the MUSIC model as these areas will be treated separately.

Service Station Assessment is based on the recommendations of the acceptable solutions from the BCC Guidelines for Stormwater from Service Stations & Fuel Dispensing Areas (FDA) will be used as a reference for stormwater treatment for the service station areas under the building canopy and areas outside of the canopy.
Under Canopy Areas:

- All ground surfaces within the FDA shall be constructed of concrete with all gaps and/or cracks filled so that the impervious barrier and integrity is maintained.
- The FDA shall be delineated by painted line-work on the ground. Other methods of delineating the FDA may be used e.g. Roll-over bunds, different colour concretes, etc.
- Signs indicating fate of flow such as “flows to containment vessel” shall be provided in locations around the under-canopy area
- The roof or canopy shall overhang by a horizontal distance of ¼ of the roof height out from the vertical above the boundary of the demarcated FDA.
- Preference is for stormwater from roofed areas to be collected in tanks for non-potable use (e.g. toilet flushing or garden watering). Alternatively, it may be diverted directly to on-site stormwater infrastructure.
- Bulk fuel transfers may be carried out under the canopy area within a defined Tanker Delivery Standing Area graded and drained to the underground containment vessel.

Areas Outside of Canopy:

- All ground surfaces not under canopy shall be constructed of concrete or equivalent with all gaps and/or cracks filled so that the impervious barrier and integrity is maintained.
- Drainage separation options may include grading, bunding, kerbing and/or channelling.
- Bulk fuel transfers shall be carried out in a defined Tanker Delivery Standing Area. This area shall normally be drained to the uncovered area stormwater treatment system. However, during fuel delivery operations, automatic diversion valves shall be used to divert such drainage to the under-canopy containment vessel. The Tanker Delivery Standing Area in uncovered locations shall be sized so that the drainage area has a radius of at least 3 meters and a storage volume equivalent to that of the largest tanker storage compartment that is expected on site at any given time
- Signs indicating fate of flow such as “flows to creek” shall be provided in locations around the uncovered area.

Service Station Treatment

The fuel dispensing areas shall be graded to a suitable underground containment and treatment vessel (i.e. sump/tank) compatible with petroleum products and other likely chemicals. It is proposed that a SPEL Puraceptor containment system be installed to capture and retain flows from the fuel dispensing areas.

The SPEL Puraceptor (model P.040.C1.2C) is a 6 minute full retention tank that will hold and treat all the stormwater runoff from the associated forecourt area catchment area of 448m^2. Based on a rainfall duration of 5 minutes and a rainfall intensity of 212 mm/hr for 20 ARI the associated runoff is approximately 23l/s. The proposed SPEL Puraceptor P.040.C1.2C can treat up to 40l/s, therefore it is considered to be suitable for this application.

The SPEL Puraceptor P.040.C1.2C has a spill containment capacity of 9000l which is sufficient to hold the contents of a fuel tanker in case of an emergency spill. However this should be reviewed and confirmed once and operator has been selected and fuel supply vehicle sizes can be verified.

Refer to Appendix F for the SPEL Puraceptor Operations and Maintenance Manual.

6 MAINTENANCE PLANS

6.1 Inspections forms and plans

As part of the detailed design and documentation phase, a set of maintenance plans and controls will be put in place for the owners and operators of the premises to provide clarity in the obligations of each of the parties.

The SPEL treatment devices are to be maintained in accordance with the manufacturers operations and maintenance guidelines attached in the appendices. Refer to the appendices for installation and maintenance details.

6.2 Responsibilities for maintenance of structural controls

Maintenance of the stormwater treatment systems is to be the responsibility of the property owner.

7 ASSET HAND OVER

7.1 Process and timing for asset handover to council

Not Applicable to this project.

8 ATTACHMENTS

8.1 **Proposed Site Plan by Verve Building & Design Co.**

8.2 **Preliminary Erosion and Sediment Control Layout Plan 19539-P001A**

8.3 **Preliminary Erosion and Sediment Control Notes and Details 19539-P002A**

8.4 **Preliminary Civil Details 19539-P003A**

8.5 **Preliminary Stormwater Layout Plan 19539-P004A**

8.6 **Preliminary Sewer and Water Connections 19539-P005A**

8.7 **Survey Plan by Skyline Surveyors Plan no. 8873 Det**

8.8 **SPEL Installation and Maintenance Documentation**

D.A ISSUE

PROPERTY DESCRIPTION

LOTS 25012, 25013, 25014,
25015 & 25016 on SP303119

COUNCIL: LOGAN CITY COUNCIL

DEVELOPMENT ASSESSMENT

TOTAL SITE AREA - 5,104m²

STAGE 1

DEVELOPMENT SITE AREA - 4,404m²

LANDSCAPED AREA - 1,422m²
(INCLUDES STAGE 2 AS LANDSCAPED SPACE - 774m2)

SITE COVER - 27.4%
(INCLUDES ALL ROOFED AREAS, FOR ALL BUILDINGS)

IMPERVIOUS AREAS

- PRE SITE DEVELOPMENT - 0m²
  (INCLUDES BUILDING ROOFED AREAS)
- POST SITE DEVELOPMENT - 2,982m²
  (INCLUDES BUILDING ROOFED AREAS)

BUILDING AREAS - GFA

- T1 - FUEL SALES/SHOP - 300m²
  (EXCLUDES REFUSE/SERVICES)
- T2 - LOW IMPACT INDUSTRY - 440m²
  (EXCLUDES REFUSE/SERVICES)

TOTAL BUILDING GFA - 740m²

EXTERNAL/OTHER AREAS

- FUEL DISPENSING FORECOURT - 600m²
- T1 REFUSE/SERVICES - 20m²
- T2 REFUSE/SERVICES - 43m²

TOTAL AREAS - 663m²

STAGE 2

DEVELOPMENT SITE AREA - 700m²

LANDSCAPED AREA - 35m²

SITE COVER (ALL STAGES) - 39.2%
(INCLUDES ALL ROOFED AREAS, FOR ALL BUILDINGS)

IMPERVIOUS AREAS
(STAGE 2 DEVELOPMENT SITE AREA)

- PRE SITE DEVELOPMENT - 0m²
  (INCLUDES BUILDING ROOFED AREAS)
- POST SITE DEVELOPMENT - 600m²
  (INCLUDES BUILDING ROOFED AREAS)

BUILDING AREAS - GFA

- T3 - LOW IMPACT INDUSTRY - 600m²

COMMERCIAL CIRCUIT
ENTRY/EXIT
ALL TURN FUNCTIONS
EXIT ONLY
ALL TURN FUNCTIONS
T1 TENANCY
BOUNDARY
T2
LOW IMPACT
INDUSTRY
REFUSE
ROLLER DOOR
SHOWROOM
DELIVERY/REFUSE
COLLECTION BAY
FILL
BOX
CANOPY LINK OVER
T1
SERVICE
STATION
FUEL DISPENSING
FORECOURT
PMT
T3
LOW IMPACT
INDUSTRY
T3 TENANCY
CANTILEVERED AWNING
FOR STREET ACTIVATION.
FUEL RETAILER
PYLON SIGN
GATES ROAD

Consulting Engineer

VERVE BUILDING DESIGN CO.
BUILDING DESIGNERS LICENCE No. 1002212
OFFICE 2, LEVEL 1, 488 LUTWYCHE ROAD, LUTWYCHE QLD 4030
PH. 07 3857 0942
E: info@vervebd.com.au
imagine □ create □ deliver

□ commercial / industrial / retail
□ fast food restaurant design
□ travel centre / service stations
□ project concept to completion

Revision and approvals				
Code	Date	Drn	Description	Dwn
A	15.03.2020	GN	ISSUE FOR APPROVAL	

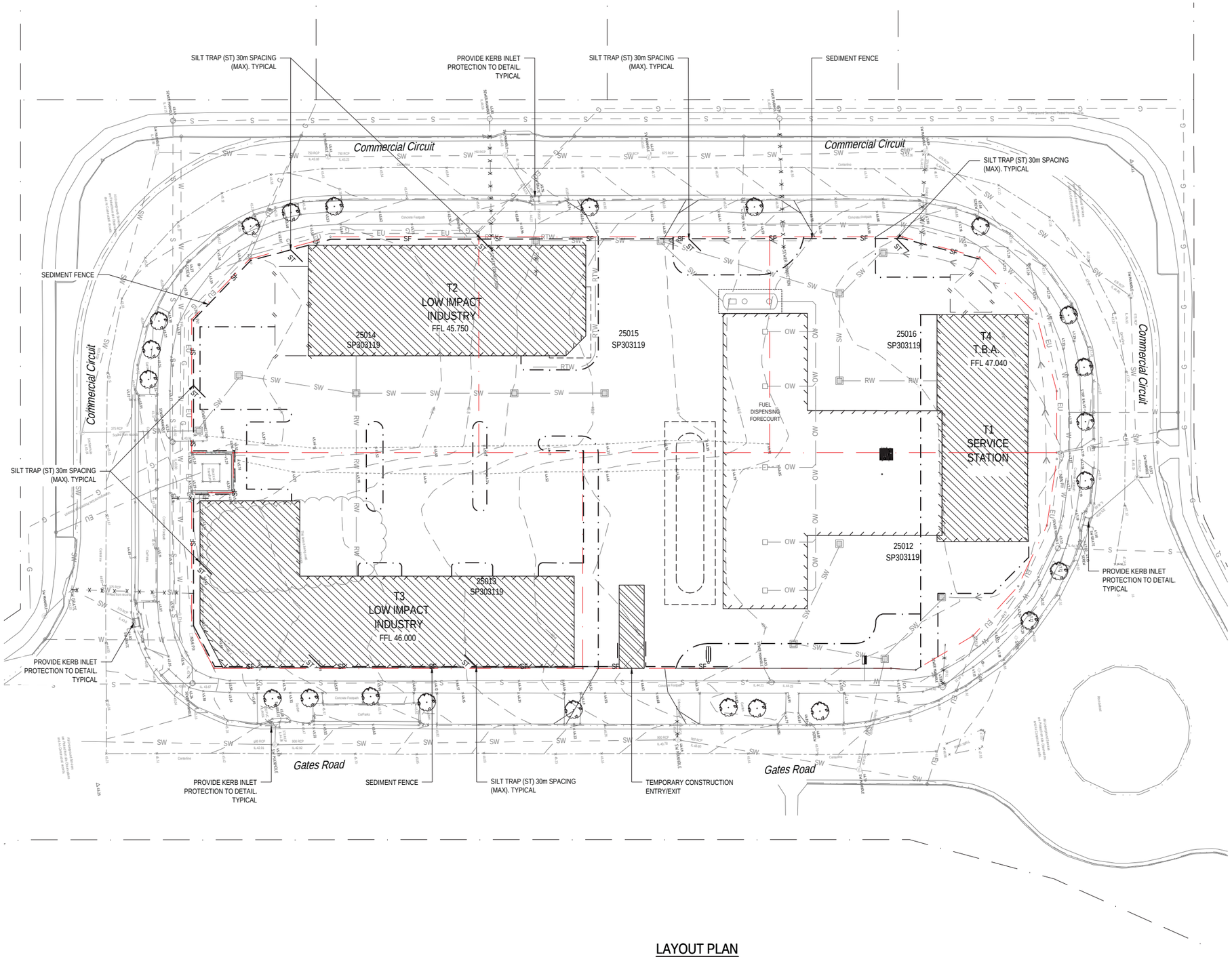
Project Description
PROPOSED MIXED USE DEVELOPMENT
GATES ROAD, FLAGSTONE

Drawing Title
PROPOSED SITE PLAN
STAGE 1 & STAGE 2

Scale 1:250 @ A1 / 1:500 @ A3
Drawn GN
Approved
Issued

Drawing Number 19042-DA01

Revision A



LEGEND

- EXISTING PROPERTY BOUNDARY
- EXISTING CONTOUR - MAJOR
- EXISTING BUILDING
- ABANDON EXISTING SERVICE
- EXISTING ROAD CROWN
- EXISTING EDGE OF BITUMEN
- EXISTING KERB AND CHANNEL
- EXISTING STORMWATER DRAINAGE
- EXISTING STORMWATER TABLE DRAIN
- EXISTING WATER MAIN
- EXISTING SEWER MAIN
- EXISTING ELECTRICAL
- EXISTING ELECTRICAL UNDERGROUND
- EXISTING ELECTRICAL OVERHEAD
- EXISTING COMMUNICATIONS
- EXISTING FIBRE OPTIC COMMUNICATIONS
- EXISTING GAS
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- CONTOUR - MAJOR
- CONTOUR - MINOR
- BUILDING
- EARTHWORKS TOP OF BATTER
- EARTHWORKS BOTTOM OF BATTER
- ROAD CONTROL LINE
- EDGE OF BITUMEN
- SHOULDER
- KERB
- KERB AND CHANNEL
- CONCRETE FOOTPATH
- RETAINING WALL
- STORMWATER DRAINAGE
- ROOFWATER DRAINAGE
- OILY WATER
- SEWER
- WATER
- SEDIMENT FENCE
- EXISTING SURFACE LEVEL (ESL)
- FINISHED SURFACE LEVEL (FSL)
- BULK EARTHWORKS LEVEL (BEL)

EROSION CONTROL LEGEND

- SEDIMENT FENCE
- PROPOSED SILT FENCE SILT TRAP
- FABRIC WRAPPED ROCK TRAP
- CHECK DAMS
- CUT OFF DRAIN

CONTRACTOR TO ENSURE SURROUNDING ROADS ARE KEPT CLEAN AND FREE OF DEBRIS DURING CONSTRUCTION. TYPICAL.

CONTRACTOR TO PROVIDE TRAFFIC CONTROL (AS REQUIRED) AND ENSURE WORK ZONES ARE SAFE DURING CONSTRUCTION. TYPICAL.

SITE TO BE CLEARED IN PREPARATION FOR BUILDING CONSTRUCTION.
ALL EXISTING STRUCTURES (INCLUDING ANY PILES) AND SITE IMPROVEMENTS TO BE DEMOLISHED AND REMOVED, UNLESS NOTED OTHERWISE.

LAYOUT PLAN

SCALE 1:250

0 5 10 12.5

SCALE 1:250

scales quoted apply to original drawing scale

NOT FOR CONSTRUCTION

Rev	Description		Date
B	PRELIMINARY ISSUE	GP	12.03.20
A	PRELIMINARY ISSUE	GP	20.02.20

all horizontal information is to AMG
all vertical information is to AHD
DO NOT SCALE FROM DRAWING

Client: evansbuilt

infinitec
GROUND FLOOR, 230 LUTWYCHE ROAD, WINDSOR QLD 4030
P: 07 3857 8577 www.infinitec.com.au

Drawn	GP
Checked	PC
Signed	
RPEQ	6324

Project: GATES ROAD, FLAGSTONE

Title: PRELIMINARY EROSION AND SEDIMENT CONTROL LAYOUT PLAN

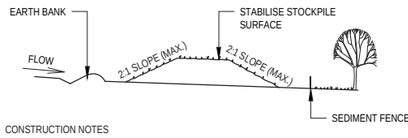
Drawing Number: 19539-P001

Scale: AS INDICATED

Rev: B

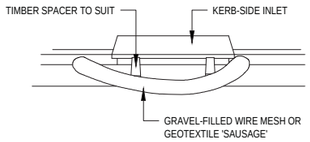
NOTES - EROSION AND SEDIMENT CONTROL

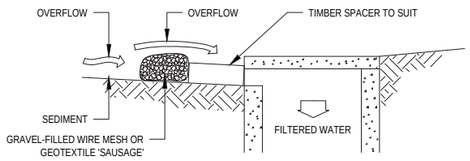
1. THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH STATUTORY REQUIREMENTS AND LOGAN COUNCIL'S EROSION AND SEDIMENT CONTROL STANDARD, AND "SEDIMENT BASIN DESIGN, CONSTRUCTION AND MAINTENANCE GUIDELINES". THESE MEASURES ARE TO BE REGULARLY INSPECTED AND MAINTAINED.
2. THE SEDIMENT & EROSION CONTROL PLAN IS TO BE READ IN CONJUNCTION WITH THE ENGINEERING PLANS.
3. THE SITE SUPERINTENDENT SHALL ENSURE THAT ALL SEDIMENT AND EROSION CONTROL WORKS ARE LOCATED AS INSTRUCTED IN THE DRAWINGS.
4. INFORM ALL CONTRACTORS OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.
5. THE SEDIMENT & EROSION CONTROL PLAN PRESENTS CONCEPTS ONLY, THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT & MANAGEMENT OF A DETAILED SCHEME MEETING COUNCIL'S DESIGN, AND ALL OTHER REGULATORY AUTHORITY REQUIREMENTS. PAY ALL FEES.
6. WORKS ARE TO BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
   - A) INSTALL SEDIMENT FENCING WHERE SHOWN ON THE PLAN & TO SEDIMENT FENCE DETAIL.
   - B) CONSTRUCT TEMPORARY CONSTRUCTION ENTRY/EXIT AS SHOWN ON THE PLAN & TO TEMPORARY CONSTRUCTION ENTRY/EXIT DETAIL.
   - C) CONSTRUCT LOW FLOW DIVERSION BANKS WHERE SHOWN ON THE PLAN AND TO DIVERSION BANK DETAIL.
   - D) PROVIDE TEMPORARY ACCESS TO THE SEDIMENT BASINS AND PROTECT THIS WITH SEDIMENT FENCING.
   - E) PLACE SEDIMENT FENCING DOWNSLOPE OF LANDS TO BE DISTURBED FOR CONSTRUCTION OF THE SEDIMENT BASINS.
   - F) CONSTRUCT SEDIMENT BASINS GENERALLY IN ACCORDANCE WITH COUNCIL'S SEDIMENT BASIN GUIDELINES.
   - G) STABILISE LAND SURFACES DISTURBED BY CONSTRUCTION OF THE SEDIMENT BASINS AS SOON FINAL LEVELS ARE ESTABLISHED.
   - H) CLEAR THE SITE AND STRIP AND STOCKPILE EXCESS FILL AT THE LOCATION SHOWN ON THE PLAN OR AS DIRECTED BY THE SITE SUPERINTENDENT TO STOCKPILE DETAIL.
   - I) UNDERTAKE ALL ESSENTIAL CONSTRUCTION WORKS.
   - J) INSTALL MESH AND GRAVEL INLET PROTECTION FOR ADJACENT KERB INLETS.
   - K) INSTALL GEOTEXTILE INLET FILTERS AROUND ALL DROP INLETS ON SITE.
   - L) GRADE LOT AREAS TO FINAL GRADES WITHIN 20 DAYS OF COMPLETION OF CONSTRUCTION WORKS.
   - M) REMOVE TEMPORARY EROSION CONTROL MEASURES AFTER PERMANENT WORKS HAVE BEEN COMPLETED.
7. UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF MINIMUM WORKABLE SIZE.
8. MAINTAIN AND MANAGE ENVIRONMENTAL PROTECTION MEASURES THROUGHOUT CONTRACT.
9. AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.
10. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) SHALL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
11. WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED OUT.
12. TEMPORARY EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
13. ALLOW FOR THE ESTABLISHMENT OF OTHER EROSION PROTECTION MEASURES.
14. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED TO ENSURE THAT THEY OPERATE EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.
15. ACCEPTABLE RECEPTORS SHALL BE USED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.
16. RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER SHALL BE DISPOSED OF IN ACCORDANCE WITH REGULATORY AUTHORITY REQUIREMENTS. PAY ALL FEES AND PROVIDE EVIDENCE OF SAFE DISPOSAL.



CONSTRUCTION NOTES
1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

STOCKPILE
NOT TO SCALE

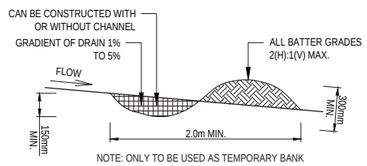




NOTE: THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN AN APPROVED SWMP/ESCP.

CONSTRUCTION NOTES
1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

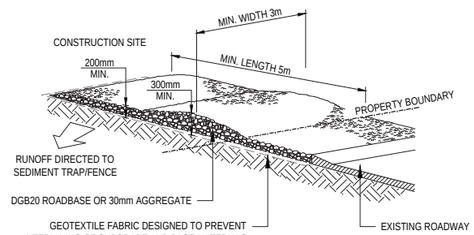
MESH AND GRAVEL INLET FILTER
NOT TO SCALE



NOTE: ONLY TO BE USED AS TEMPORARY BANK WHERE MAXIMUM UPSLOPE LENGTH IS 80m.

CONSTRUCTION NOTES
1. BUILD WITH GRADIENTS BETWEEN 1 PERCENT AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

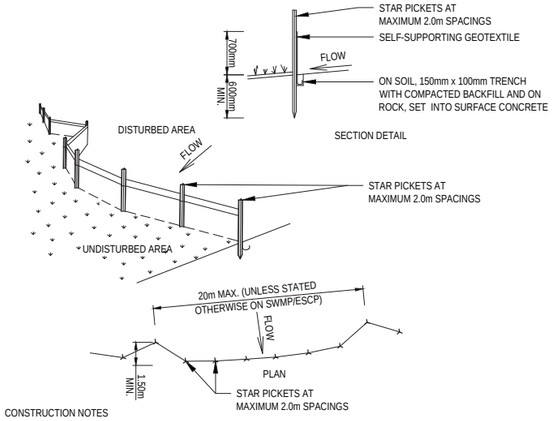
DIVERSION BANK (LOW FLOW)
NOT TO SCALE



GEOTEXTILE FABRIC DESIGNED TO PREVENT INTERMIXING OF SUBGRADE AND BASE MATERIALS AND TO MAINTAIN GOOD PROPERTIES OF THE SUB-BASE LAYERS. GEOFABRIC MAY BE A WOVEN OR NEEDLE-PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N

CONSTRUCTION NOTES
1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15m LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3m WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE

TEMPORARY CONSTRUCTION ENTRY/EXIT
NOT TO SCALE



CONSTRUCTION NOTES
1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50L/s IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.5m INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

SEDIMENT FENCE
NOT TO SCALE

0 0.2 0.4 0.6 0.8 1.0

SCALE 1:20

scales quoted apply to original drawing scale

NOT FOR CONSTRUCTION

Rev	Description		Date
A	PRELIMINARY ISSUE	GP	20.02.20

all horizontal information is to AMG
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Client: evansbuilt

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Drawn	GP
Checked	PC
Signed	
RPEQ	6324

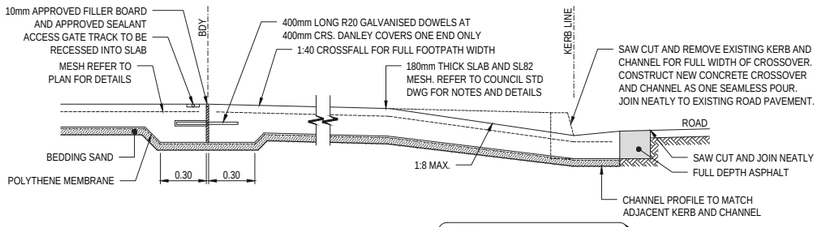
Project: GATES ROAD, FLAGSTONE

Title: PRELIMINARY EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

Drawing Number: 19539-P002

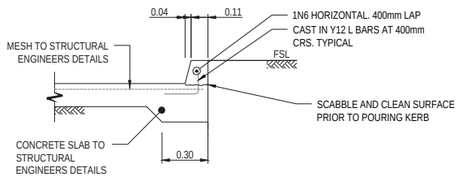
Scale: AS INDICATED

Rev: A

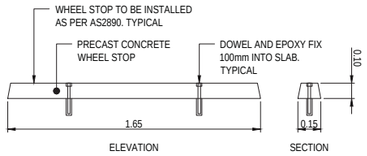


CROSSING SLAB DETAIL
SCALE 1:20

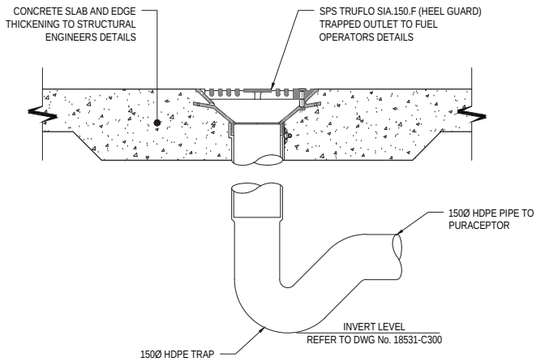
NOTE
CONTRACTOR TO ARRANGE INSPECTION OF THE CROSSOVER WITH COUNCIL PRIOR TO POURING OF CONCRETE



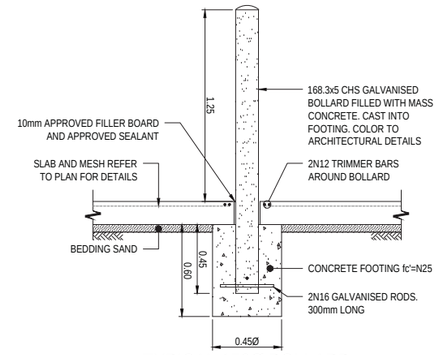
150mm BARRIER KERB DETAIL
SCALE 1:20



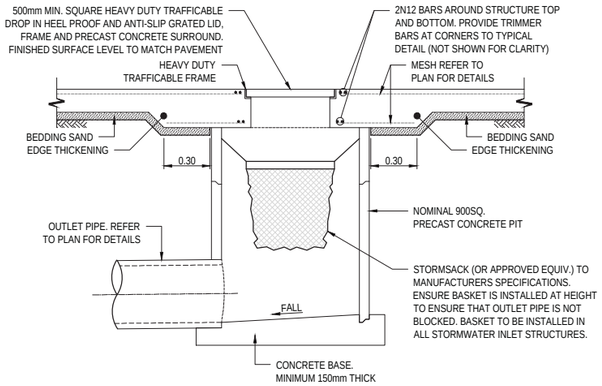
TYPICAL WHEEL STOP DETAIL
SCALE 1:20



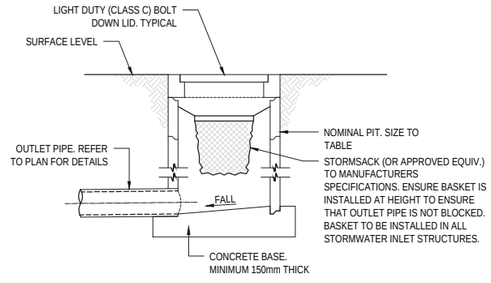
TYPICAL OW PIT (SPS TRUFLO SIA.150.F)
NOT TO SCALE



TYPICAL 150Ø BOLLARD
SCALE 1:20



SERVICE CENTER - GRATED PIT DETAIL
SCALE 1:20



TYPICAL GRATED PIT (G.PIT) DETAIL
SCALE 1:20

STORMWATER PIT SIZE TABLE				
MINIMUM DEPTH	MAXIMUM DEPTH	OPTION 1	OPTION 2	MINIMUM GRATE SIZE
0	1200	600x900	1050Ø	600SQ
1200	2000	900SQ	1200Ø	800SQ
MINIMUM PIT SIZE BASED ON DEPTH. SIZE TO BE INCREASED TO ALLOW FOR INLET AND OUTLET PIPES TO MANUFACTURERS SPECIFICATION. ALL STRUCTURES WITHIN FOOTPATHS OR PEDESTRIAN AREAS ARE TO BE HEEL PROOF, NON-SLIP AND BOLT DOWN.				

0 0.2 0.4 0.6 0.8 1.0
SCALE 1:20
scales quoted apply to original drawing scale

NOT FOR CONSTRUCTION

Rev	Description		Date
A	PRELIMINARY ISSUE	GP	20.02.20

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Client: evansbuilt

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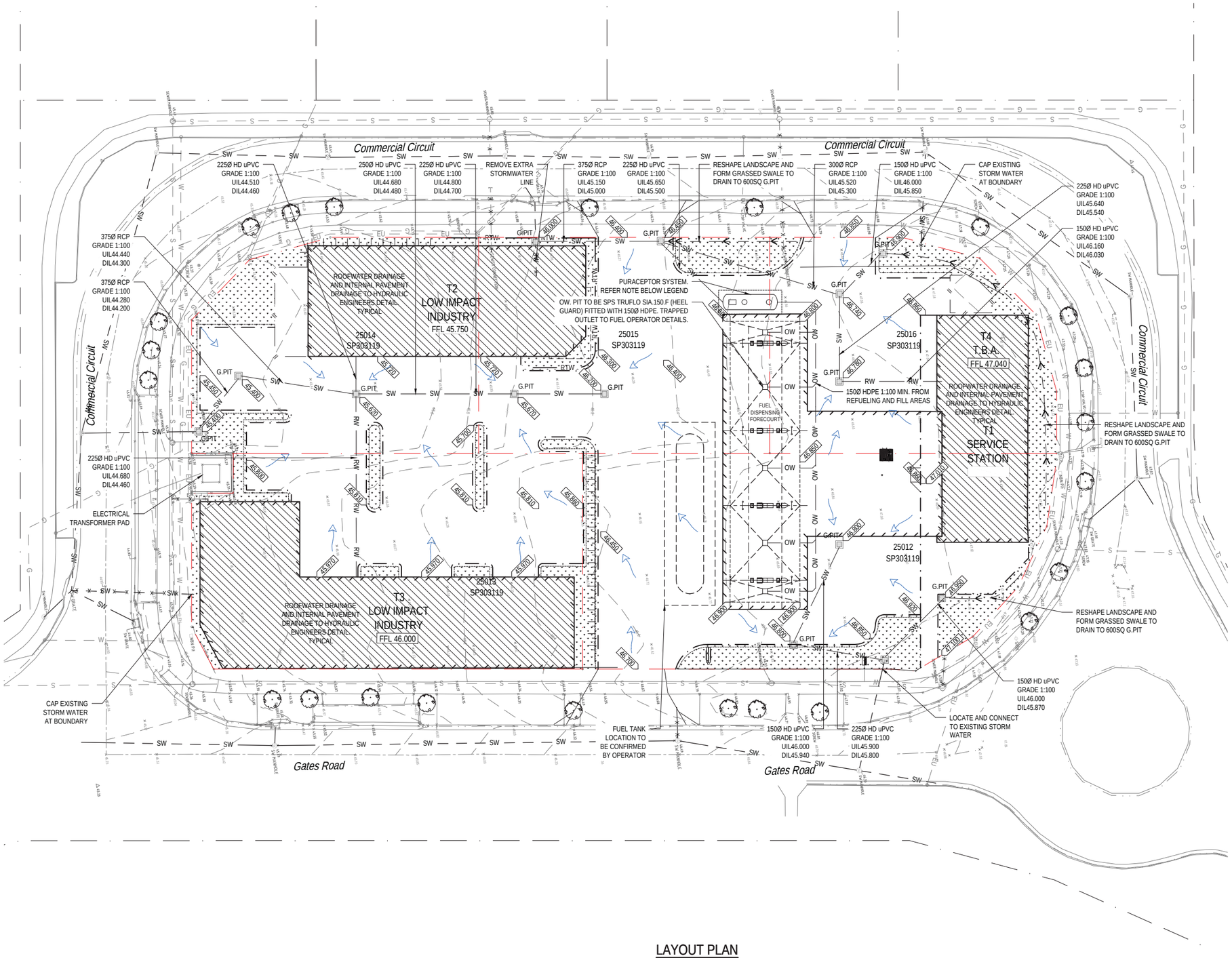
Drawn	GP
Checked	PC
Signed	
RPEQ	6324

Project: GATES ROAD, FLAGSTONE
Title: PRELIMINARY CIVIL DETAILS
Drawing Number: 19539-P003
Scale: AS INDICATED
Rev: A



LEGEND

- EXISTING PROPERTY BOUNDARY
- EXISTING CONTOUR - MAJOR
- EXISTING BUILDING
- ABANDON EXISTING SERVICE
- EXISTING ROAD CROWN
- EXISTING EDGE OF BITUMEN
- EXISTING KERB AND CHANNEL
- EXISTING STORMWATER DRAINAGE
- EXISTING STORMWATER TABLE DRAIN
- EXISTING WATER MAIN
- EXISTING SEWER MAIN
- EXISTING ELECTRICAL
- EXISTING ELECTRICAL UNDERGROUND
- EXISTING ELECTRICAL OVERHEAD
- EXISTING COMMUNICATIONS
- EXISTING FIBRE OPTIC COMMUNICATIONS
- EXISTING GAS
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- CONTOUR - MAJOR
- CONTOUR - MINOR
- BUILDING
- EARTHWORKS TOP OF BATTER
- EARTHWORKS BOTTOM OF BATTER
- ROAD CONTROL LINE
- EDGE OF BITUMEN
- SHOULDER
- KERB
- KERB AND CHANNEL
- CONCRETE FOOTPATH
- RETAINING WALL
- STORMWATER DRAINAGE
- ROOFWATER DRAINAGE
- OILY WATER
- SEWER
- WATER
- SEDIMENT FENCE
- EXISTING SURFACE LEVEL (ESL)
- FINISHED SURFACE LEVEL (FSL)
- BULK EARTHWORKS LEVEL (BEL)

NOTE:
PURACEPTOR TO MANUFACTURERS SPECIFICATIONS, MODEL TBC WITH HEAVY DUTY TRAFFICABLE LIDS AND VENT. PROVIDE VENT TO MANUFACTURES DETAILS. HYDRAULIC ENGINEER TO PROVIDE MINIMAL ROOFWATER DRAINAGE TO PURACEPTOR TO MAINTAIN WATER LEVELS TO MANUFACTURERS SPECIFICATIONS

NOTE:
1. HEEL PROOF GRATES TO BE USED TO ALL TRENCHES AND PITS
2. SPEL STORMSACKS ARE TO BE FITTED TO ALL GRATED PITS

LAYOUT PLAN
SCALE 1:250

0 5 10 12.5
SCALE 1:250
scales quoted apply to original drawing scale

NOT FOR CONSTRUCTION

Rev	Description		Date
B	PRELIMINARY ISSUE	GP	12.03.20
A	PRELIMINARY ISSUE	GP	20.02.20

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all vertical information is to AHD
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Client: evansbuilt

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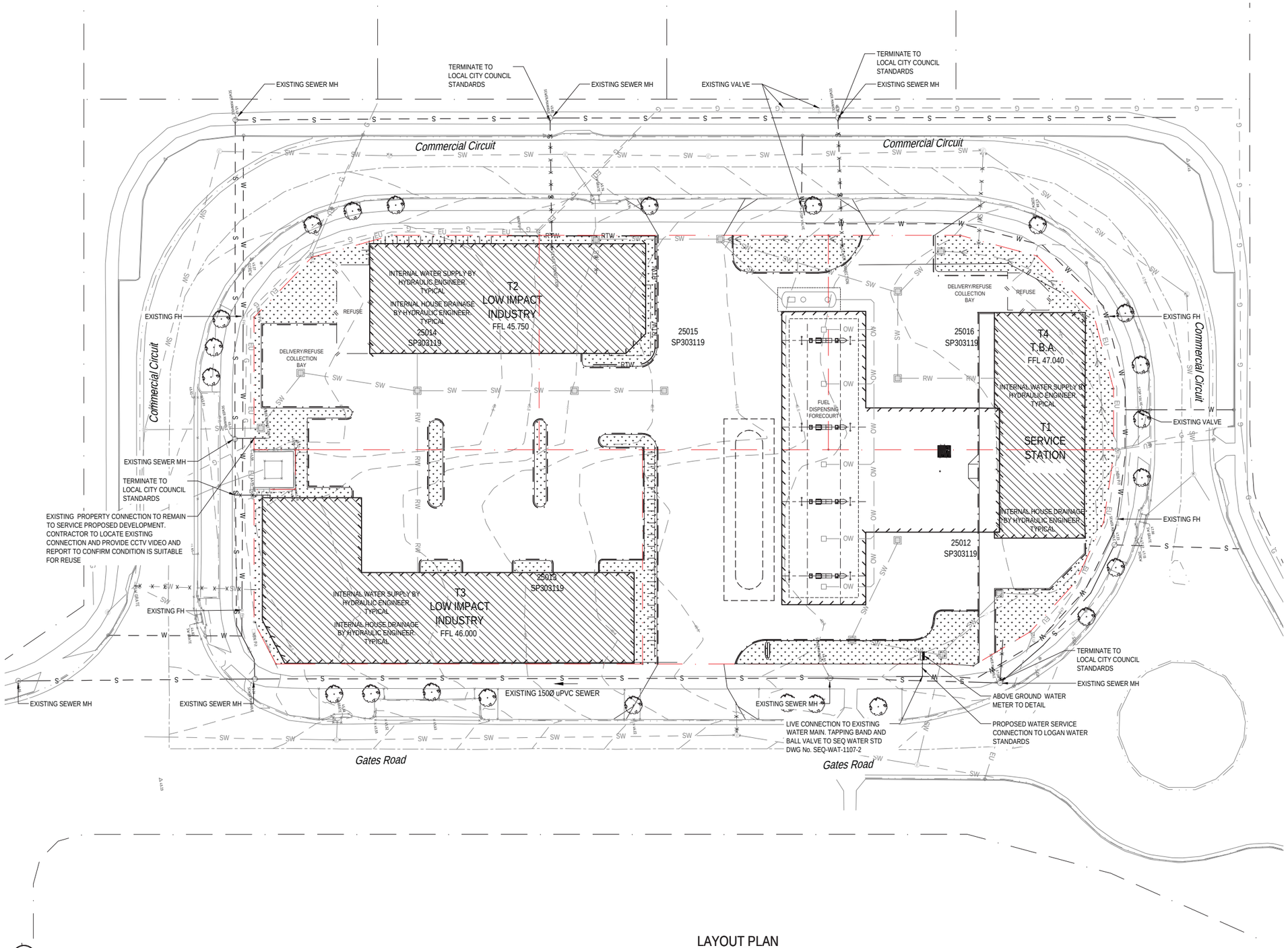
Signed	
RPEQ	6324

Project: GATES ROAD, FLAGSTONE
Title: PRELIMINARY STORMWATER LAYOUT PLAN
Drawing Number: 19539-P004
Scale: AS INDICATED
Rev: B



LEGEND

- EXISTING PROPERTY BOUNDARY
- EXISTING CONTOUR - MAJOR
- EXISTING BUILDING
- ABANDON EXISTING SERVICE
- EXISTING ROAD CROWN
- EXISTING EDGE OF BITUMEN
- EXISTING KERB AND CHANNEL
- EXISTING STORMWATER DRAINAGE
- EXISTING STORMWATER TABLE DRAIN
- EXISTING WATER MAIN
- EXISTING SEWER MAIN
- EXISTING ELECTRICAL
- EXISTING ELECTRICAL UNDERGROUND
- EXISTING ELECTRICAL OVERHEAD
- EXISTING COMMUNICATIONS
- EXISTING FIBRE OPTIC COMMUNICATIONS
- EXISTING GAS
- PROPERTY BOUNDARY
- EASEMENT BOUNDARY
- CONTOUR - MAJOR
- CONTOUR - MINOR
- BUILDING
- EARTHWORKS TOP OF BATTER
- EARTHWORKS BOTTOM OF BATTER
- ROAD CONTROL LINE
- EDGE OF BITUMEN
- SHOULDER
- KERB
- KERB AND CHANNEL
- CONCRETE FOOTPATH
- RETAINING WALL
- STORMWATER DRAINAGE
- ROOFWATER DRAINAGE
- OILY WATER
- SEWER
- WATER
- SEDIMENT FENCE
- EXISTING SURFACE LEVEL (ESL)
- FINISHED SURFACE LEVEL (FSL)
- BULK EARTHWORKS LEVEL (BEL)

LAYOUT PLAN

SCALE 1:250

0 5 10 12.5

SCALE 1:250

scales quoted apply to original drawing scale

NOT FOR CONSTRUCTION

Rev	Description		Date
B	PRELIMINARY ISSUE	GP	12.03.20
A	PRELIMINARY ISSUE	GP	20.02.20

all horizontal information is to AMG
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Client: evansbuilt

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Checked	PC
Signed	
RPEQ	6324

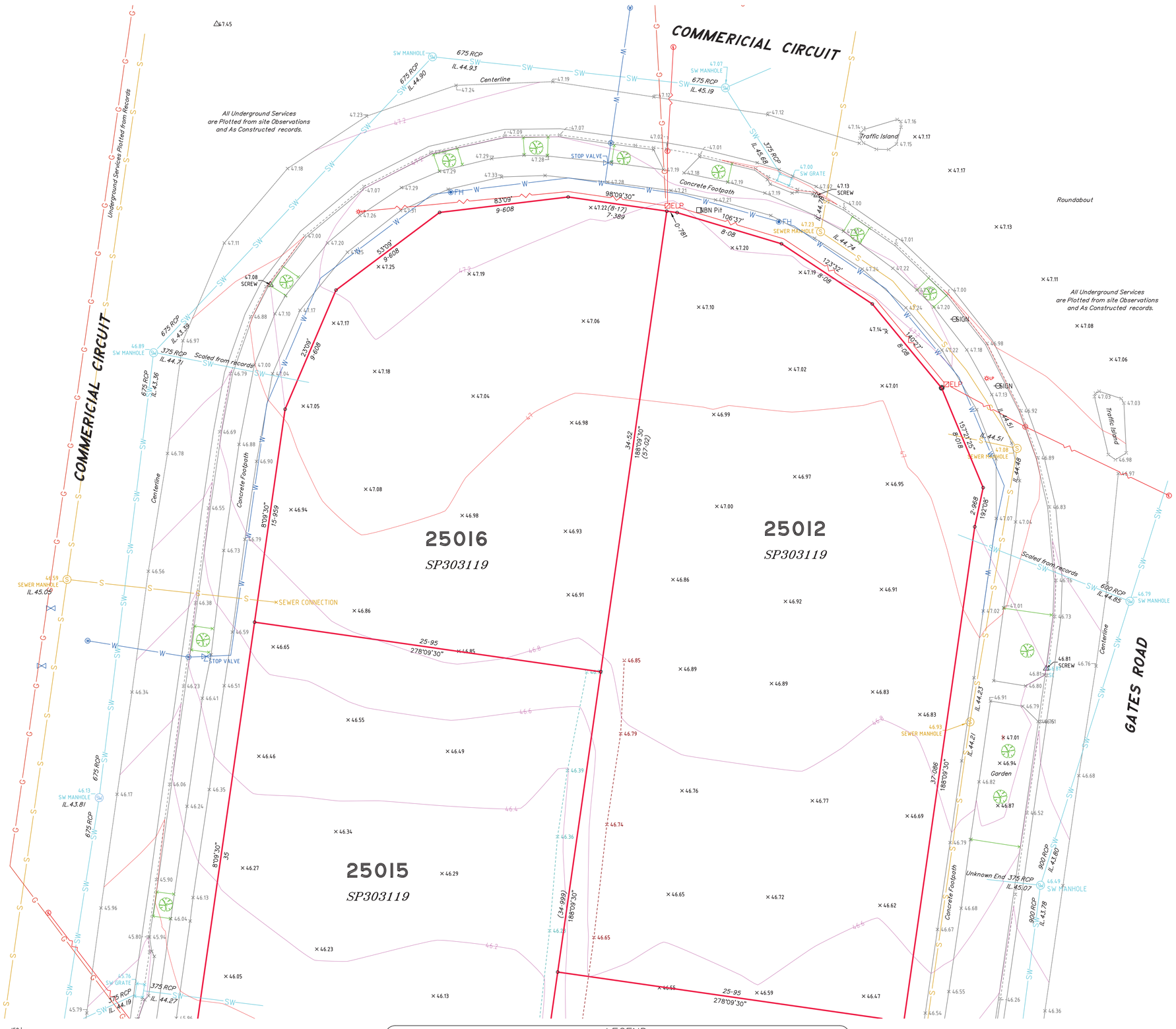
Project: GATES ROAD, FLAGSTONE

Title: PRELIMINARY SEWER AND WATER CONNECTION LAYOUT PLAN

Drawing Number: 19539-P005

Scale: AS INDICATED

Rev: B



0 50|mm 100|mm 150|mm

Client: **EVANS LONG**

CONTOUR AND DETAIL SURVEY

Over Lots 25012–25016 on SP303119

Commercial Road, Flagstone. Sheet 1 of 2

Local Government: Logan City Council Locality: Flagstone

Plan No:	8873.Det	Scale:	1:150@A1
Prepared By:	MJW	Date:	29/11/2019

Skyline Surveyors
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Brightwater Corporate Centre
69 Attenuata Drive
MOUNTAIN CREEK QLD 4557
E: corey@skysurv.com.au
W: www.skysurv.com.au
PHONE
07 5493 4877

Notes:

– Levels are to AHD Derived from PSM150556

– The levels shown were taken on the surveyed date and may not represent the Local Authority's definition of Natural Ground Level. Please contact this office for a quote or further advice.

– The title boundaries as shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey. Services shown hereon have been located where possible by field survey. If not able to be located, services have been plotted from relevant authority records and have been noted accordingly on this plan.
Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

LEGEND

SW STORM WATER	FIRE HYDRANT	ELP ELECTRICITY PILLAR
S SEWER MAIN	SIGN	T TELECOMMUNICATIONS MARKER
G GAS MAIN	PALM TREE	G GAS LINE MARKER
W WATER MAIN	TREE	W WATER LINE MARKER
C COMMUNICATION CABLES	WM WATER METER	SW STORMWATER M/H
T TELSTRA CONDUIT	SURVEY STN	WV WATER VALVE
ELECTRICITY	PERMANENT SURVEY MARK	S SEWER MANHOLE
	PP POWER POLE	TRAFFIC LIGHTS
	LP STREET LIGHT	TRAFFIC SIGNAL CONTROL BOX
	E ELECTRICITY MARKER	TELSTRA PIT

Scale 1:150 – Lengths are in Metres.

2 0 2 4 6 8 10 12 14 16 18 20

25015
SP303119

25014
SP303119

25013
SP303119

COMMERICIAL CIRCUIT

COMMERICIAL CIRCUIT

GATES ROAD

This Area is being used to Stockpile Quarry Materials

All Underground Services are Plotted from site Observations and As Constructed records.

Scale 1:150 – Lengths are in Metres.

0 50|mm 100|mm 150|mm

Client: EVANS LONG

CONTOUR AND DETAIL SURVEY

Over Lots 25012–25016 on SP303119
Commercial Road, Flagstone. Sheet 2 of 2

Local Government: Logan City Council Locality: Flagstone

Plan No: 8873 Det Scale: 1:150@A1

Prepared By: MJW Date: 29/11/2019

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LEGEND

- SW STORM WATER
- S SEWER MAIN
- G GAS MAIN
- W WATER MAIN
- C COMMUNICATION CABLES
- T TELSTRA CONDUIT
- ELECTRICITY
- FIRE HYDRANT
- SIGN
- PALM TREE
- TREE
- WM WATER METER
- SURVEY STN
- PERMANENT SURVEY MARK
- PP POWER POLE
- LP STREET LIGHT
- E ELECTRICITY MARKER
- ELP ELECTRICITY PILLAR
- T TELECOMMUNICATIONS MARKER
- G GAS LINE MARKER
- W WATER LINE MARKER
- SW STORMWATER M/H
- WATER VALVE
- S SEWER MANHOLE
- TRAFFIC LIGHTS
- TRAFFIC SIGNAL CONTROL BOX
- TELSTRA PIT

SPEL Separator Commisioning Operation and Maintenance

SPEL

Puraceptor Class 1

Operation and Maintenance Manual

Introduction

Congratulations on your purchase of a SPEL Environmental Stormwater Quality Improvements Device. With proper care and by following a few simple guide lines your system will give you many years of dependable service.

Important

Only qualified personnel should maintain, operate and repair you Stormwater system. Any wiring of equipment should be performed by a qualified electrician.

Warning

Operation may cause injury. Take all necessary precautions, wear protective equipment, refer to Engineers Department. For your own safety, read all instruction manuals prior to working on equipment.

Safety Precautions

- Follow all “occupation, health and safety” regulations.
- Ensure maintenance personnel are aware of “Confined Spaces” guidelines, which must be followed.
- Make sure that there is sufficient oxygen and that there are no poisonous gases present.
- Check the explosion risk before wielding or using electric hand tools.
- Do not ignore health hazards. Observe strict cleanliness.
- Ensure that the lifting equipment (where required) is in good condition.
- All personnel who are to work with these systems should be vaccinated against diseases that can occur.
- Keep a first aid kit handy.

Health & Safety

Maintenace should be carried out by a competent contractor in accordance with the above procedures. Health and Safety at Work legislation and good building practice.

A warning notice should be visible at the top of each access shaft - ‘danger, harmful fumes’ and ‘ respirators should be worn in this tank.’ Before entering persons must be qualified in accordance with ‘confined space’ requirements

Information contained in this data sheet is approximate and for general guidance only. In accordance with the companies policy of constant improvement and development SPEL Products reserves the right to change the specification without prior notice.

SPEL ENVIRONMENTAL

Puraceptor Class 1

SPEL **Operation and Maintenance Manual**

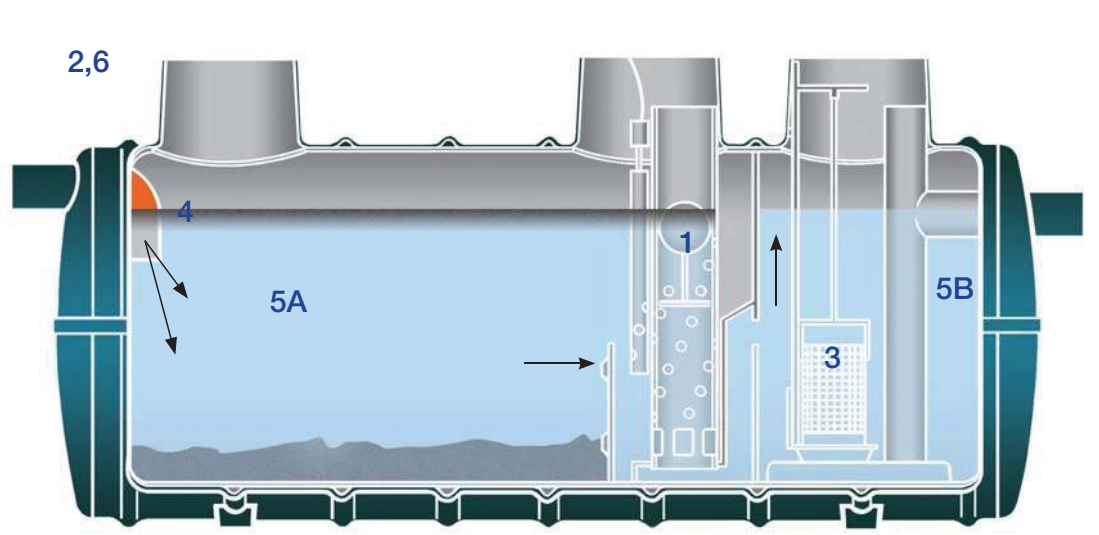
- Service Stations
- Fuel Depots
- Windfarms
- Switchyards
- Sub Stations
- Power Stations
- Industrial Locations

Contents

SPEL PURACEPTOR™ CLASS 1

Oil containment

"How it works"



SPEL PURACEPTOR™ is a FULL RETENTION separator that treats all flows and is sized to contain more than the anticipated maximum oil spillage enabling it to be fully operational at all times.

It has two chambers, a coalescer and is fitted with an automatic closure device specifically designed to treat and contain major oil spills thereby making it suitable for high risk applications.

It achieves a water discharge quality of 5mg light liquids per litre complying to European Standard BS EN 858.1. 2006. Treatable flow rates range from 2LPS to 200LPS. Pipe sizes range from 100mm to 450mm (larger sizes on request).

Careful and proper planning by corporate Australia and government bodies is essential when designing and implementing systems that are effective in protecting our environment.The proven and independently accredited SPEL PURACEPTOR™ (complies to European Standard BS EN 858.1 2006) is an Australian made stormwater treatment and oil containment device that can contain and prevent light liquid pollutants from discharging into our waterways.

1 AUTOMATIC CLOSURE DEVICE
The AUTOMATIC CLOSURE DEVICE (A.C.D.) is a precisely engineered device comprising a water-bouyant ball that is sensitive to any change in the water density as a consequence of light liquids build up, thereby automatically activating a process of depressing the A.C.D. to SHUT OFF the separator, preventing pollutants from discharging to drains and waterways.

2 FULL RETENTION
All liquid is treated. There is no by-pass operation.

3 COALESCER EQUIPPED
Provides a coalescing process for the separation of smaller globular of light liquid pollutants to reduce the light liquid content in the outlet to **5mg/litre or less.**

4 INLET DIP PIPE - FLAME TRAP
For minimum turbulence and to prevent fire and inflammable vapours passing through to the drainage system.

5 TWO CHAMBER
A non-turbulant flow through two horizontal treatment chambers, utilising the underflow principle to retain light liquids in all flow conditions.

A. CONTAINMENT CHAMBER: Where Total Suspended Solids (TSS) silt, sediments, sludge and gross pollutants are trapped and settle on the chamber floor and where light liquids are contained.

B. COALESCER CHAMBER: Where light liquids separation is enhanced reducing it to **5mg/litre** or less prior to discharge.

6 GRAVITY OPERATED
Will function in the event of power failure and fits into existing pipe drainage systems or new sites.

7 MAINTENANCE
Easy and safe with no entering of the tank required.

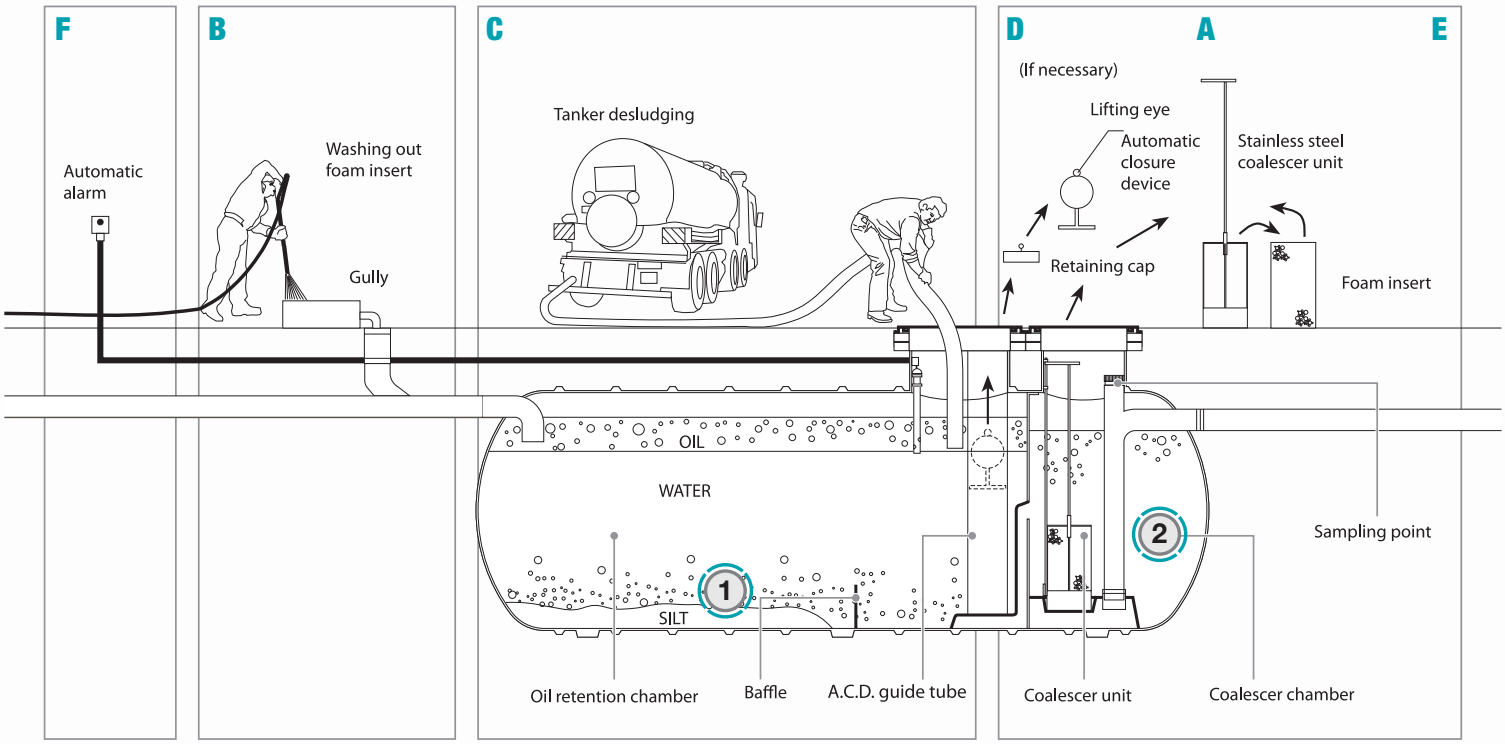
SPEL ENVIRONMENTAL

SPEL PURACEPTOR™

Puraceptors™ should be inspected at three - six - or twelve monthly intervals depending on site conditions, to determine the depth of retained pollutants and silt in both chambers and the correct operating of the ACD (automatic closure device). When the depth of the oil/fuel retained has reached the predetermined design level, (approx. 50mm) or after a spill it should be cleaned out.

1 **CONTAINMENT CHAMBER:** Where silt, sediments, sludge, gross pollutants settle out and light liquids are retained. The auto closure device operates in its retaining tube next to the oil alert sensor probe.

2 **COALESCER CHAMBER:** Where light liquids separation is enhanced prior to discharge and where the coalescer unit is incorporated, the coalescer should be removed and cleaned in accordance with the requirements set out in the coalescer data sheet.



MAINTENANCE PROCEDURE

A Coalescer unit
Use the lifting handle or the chain and lift the coalescer unit out of the tank and place it near the Puraceptor™. In a retained area so pollutants do not escape.

B Cleaning foam insert
Remove foam insert and wash with normal water pressure ensuring the dirty water runs into the Puraceptor™.

C Sucking out oil/fuel and silt
Suck off the retained oil from both chambers of the Puraceptor™ and then the silt deposited on the bottom, leaving sufficient water to ensure the (auto closure device) ACD remains floating.

D Sucking out complete contents (if necessary)
If the quantity of pollutants exceeds recommended level, the complete contents of the Puraceptor™ may need to be removed. After sucking out completely, remove the ACD. Using a pole with a hook, lift out the ACD using the lifting eye on the float, if fitted.

Important note:
When cleaning out, ensure both chambers are sucked out equally starting with the first chamber and then the second chamber and back again. Ensuring even water pressure against baffle wall.

E Re-insert coalescer unit and ACD
Re-insert the foam insert into the stainless steel coalescer unit and re-insert the coalescer unit into the Puraceptor™ as provided with the SPEL lifting/location/locking system.

Partially fill the Puraceptor™ with clean water (if necessary) to ensure the ACD when re-inserted remains floating. Re-insert the ACD.

Finally check the ACD is floating after it has been replaced to safeguard against its removal by unauthorised persons, unless depth of tank precludes doing so from ground level.

F SPEL automatic alarm/monitoring system
The SPEL automatic alarm/monitoring system probe should be lifted out of the probe protection tube, wiped clean and re-inserted. the system should now be reset according to instructions.

SPEL COALESCER UNITS

The SPEL Puraceptor™ Class 1 separator and the SPEL Stormceptor™ Class 1 by-pass separators incorporate coalescer units. The coalescer units provide a coalescence process for the separation of small globules of light liquid pollutants before final discharge to the surface water drain.

Coalescers are found in the second chamber of the SPEL Puraceptor™ and the second chamber of the SPEL Stormceptor™ Class 1

Prior to installation

1. Remove any strapping / ropes which have been used to hold the coalescer units from shifting in transit.
2. The access shaft(s) above the coalescer units should be covered to prevent ingress of concrete, dust, debris etc., which could clog the foam inserts.
3. On completion of installation, check that the coalescer unit is inserted securely into the base socket.

On heavily polluted sites silt and contaminants may build up in the coalescer unit foam inserts and add significantly to it's weight. Use lifting chain sets that are on hooks at ground level for safe lifting with a tripod or hoist.

Installation

During installation, it is important that the foam inserts are not clogged with dust, debris or drops of wet concrete. To safeguard against this, we recommend covering the access shaft with a sheet of polythene, if not already covered.

Commissioning

On completion of installation, check the foam insert is fitted inside the stainless steel coalescer unit and the coalescer unit is inserted securely into the base socket.

Maintenance

1. Lift handle and coalescer unit out of the tank and place in a retained area so pollutants do not escape.
2. Remove foam insert and wash with normal water pressure ensuring the dirty water runs into the Puraceptor™ / Stormceptor™.
3. Make sure the hole in the centre of the coalescer foam is facing towards the manhole when installed in the tank.
4. Re-insert the foam insert into the stainless steel coalescer unit and re-insert the coalescer into the Puraceptor™ / Stormceptor™. After the tank has been cleaned.

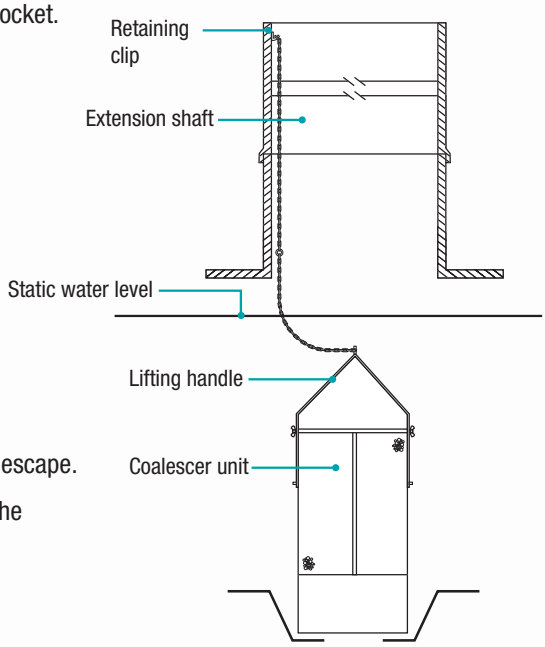


Figure 1. Coalescer unit with lifting chains

SPEL COALESCER UNITS GUIDE RAIL SYSTEM/LIFTING, LOCATING AND LOCKING SYSTEM

SPEL coalescer unit guide rail system

This facilitates easy insertion and removal of coalescer units. The system is robust, manufactured throughout in stainless steel and is action positive, leaving no doubt the coalescer unit is located properly.

Brackets fixed to the top and bottom of the coalescer unit simply engage the stainless steel guide rail fixed to the top of the stub access shaft. The coalescer is then lowered in the normal way, being guided at the correct angle into the conical base unit which finally locates the coalescer unit into it's final position.

Extension guide rails can be incorporated into the SPEL extension shafts to suit (preferably when ordered with the separator).

However, when the separator is full of water, debris or sludge accumulated over a period could prevent the coalescer unit from re-seating correctly after servicing.

The coalescer unit lifting / locating / locking system ensures the coalescer unit is seated correctly and can be locked into position to prevent tampering.

The stainless steel lifting handle can be extended to suit deep tank inverts and provide easy access for lifting manually or with a tripod and hoist utilising the lifting hook.

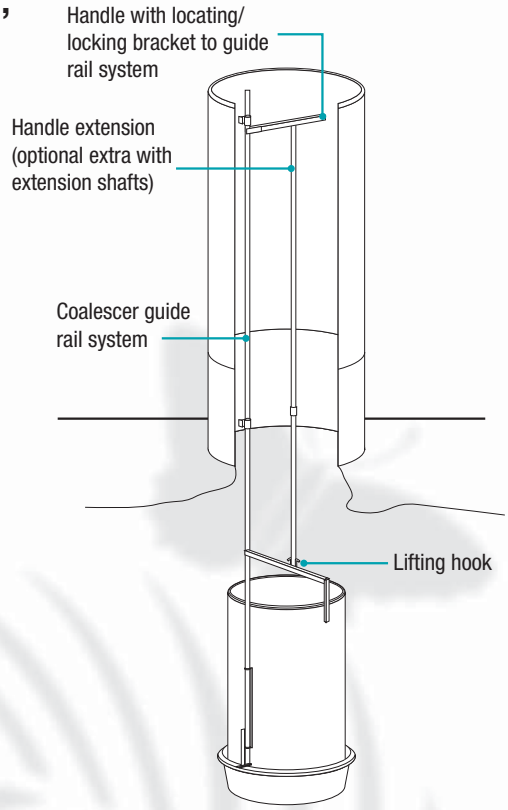


Figure 2. SPEL coalescer unit guide rail system/lifting, locating and locking system

SPEL AUTO CLOSURE DEVICE (ACD)

• SPEL ACDThe Automatic Closure Device (ACD) is found in the first chamber of a Puraceptor™. The purpose of the ACD is to close the separator off automatically when the maximum storage capacity of light liquid is attained.

The ACD is to ensure that in the event of a major spillage, pollutants do not pass into the drainage system; it should not be regarded as a substitute for an automatic alarm / monitoring system.

Prior to installation

Prior to installation the ACD retaining tube should be covered to prevent ingress of concrete etc., which could fall onto the ACD and upset it's calibration.

Operation and Maintenance

If the tank should fill with light liquid, the ACD which is calibrated for a specific gravity of 0.85, will automatically sink and close off the SPEL Puraceptor™.

Normally routine maintenance would include removing light liquid intercepted within the Puraceptor™. If a SPEL automatic alarm / monitoring system is incorporated, it will automatically indicate when the Puraceptor™ should be emptied. Only in an emergency will the Puraceptor™ fill to it's maximum and operate the ACD.

In such an event the Puraceptor™ should be completely sucked out and the ACD lifted out. Check that the ACD is in good working condition – ie. Lifting hook secure and sealed; float not leaking; knuckle joint free and clean; sealing ring intact and complete. Clean with warm soapy water before re-inserting.

To re-insert the ACD, partially fill the Puraceptor™ with clean water (if necessary) to ensure the ACD when re-inserted remains floating. Re-insert the ACD.

Finally check the ACD is floating after it has been replaced to safeguard against it's removal by unauthorised persons, unless depth of tank precludes doing so from ground level.

SPEL Puraceptor™ Class 1 separators – Two Chamber Models

Commissioning

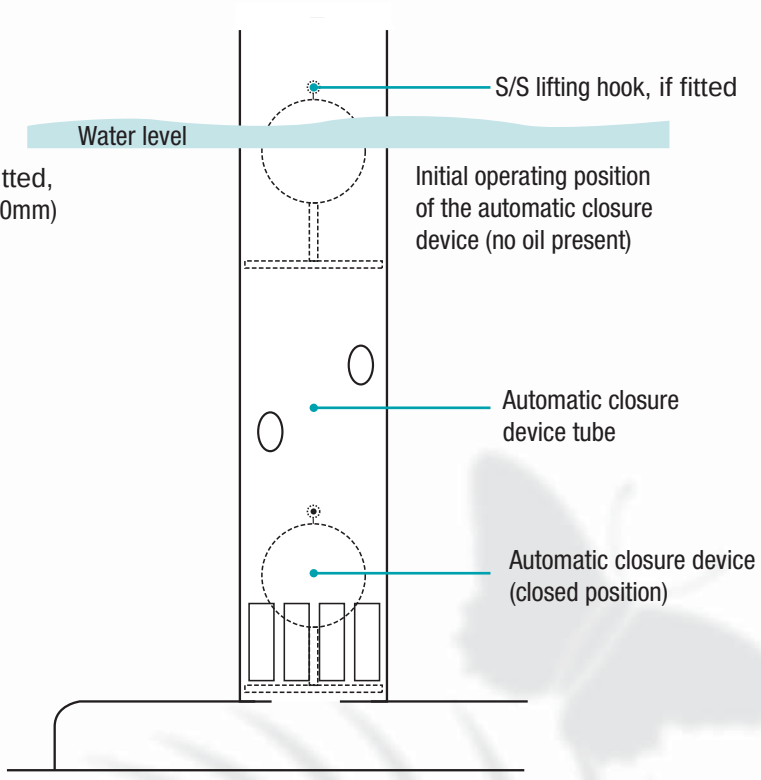
After the tank has been installed, leave the water in.

1. Remove the ACD from the packing box, taking care not to cause damage.

2. Insert the ACD into the retaining tube using the lifting eye, if fitted, ensuring it floats correctly with the float (top section approx. 50mm) just visible above the water level.

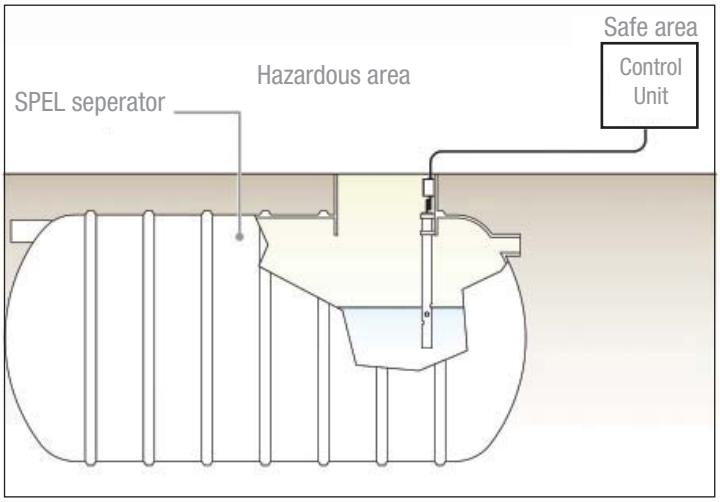
Note: If the tank's invert depth exceeds 1metre, it is advisable to remove the retaining cap prior to installation and only replace after inserting the ACD, if it is possible to do so from ground level.

Automatic closure device SPEL Puraceptor™ Class 1 separators (two chamber)



SPEL Automatic Alarm/Monitoring System

The SPEL automatic alarm/monitoring system provides a audible warning alarm when the level of the oil in the SPEL separator reaches approximately 10% of the storage volume under static liquid level conditions. This is a early warning system that is used for spills or lack of maintenance.
The system comprises of a probe mounted in the main separation chamber which senses when the designed volume of light liquids has accumulated and sends a signal to the electronic control unit activating a red 'empty now' warning light and an audible alarm,



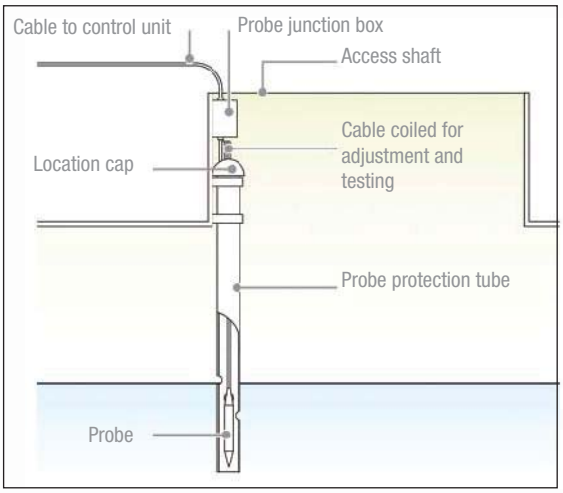
Operation

The probe is freely suspended in the probe protection tube in the separator at the correct level. When the oil-layer or depth of hydrocarbons reaches the predetermined level, the top of the probe will be immersed in the oil, breaking the circuit and activating the alarm. It is a 'fail-safe' system providing complete assurance that it is operative. If a fault occurs it will be signalled immediately.

Installation

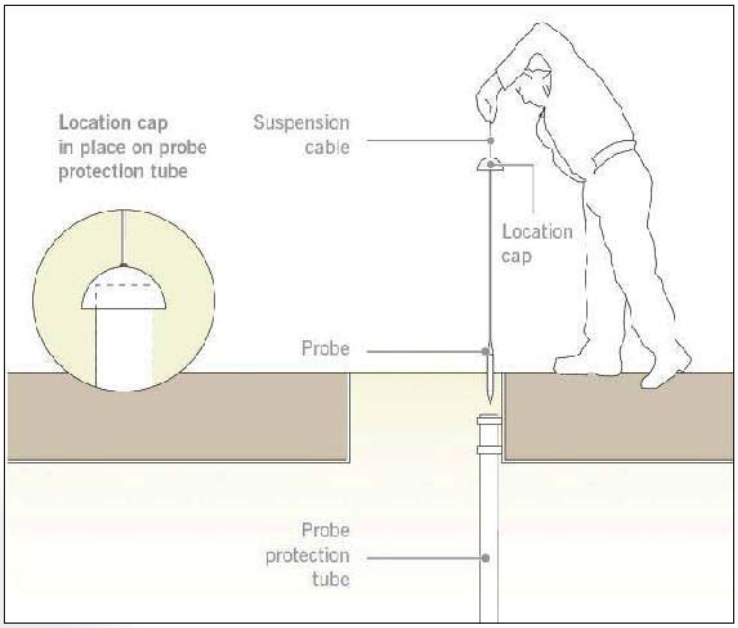
Control unit (general positioning)

The control unit has been designed to be located indoors and outdoors, within a nonhazardous area. It should be wall mounted and positioned such that the LED display and push switches on the front panel can be readily seen and accessed. The unit can be secured to the wall by using the four mounting holes provided. Included within the control is an intrinsically safe circuit (approved according to ATEX Directive 94/9/EC), to which the probe unit is connected.



Maintenance

When the separator is maintained, lift the probe out of the probe protection tube, check it operates the alarm (see under Tests Ref. 10.2) and at the same time wipe oil and contaminants from the probe to prevent a fake alarm after re-inserting.



Insert probe onsite

The probe protection tube is factory fitted and the probe matched to ensure the alarm is activated when the light liquids reach approximately 10% of the storage volume the SPEL separator is designed for.

All that is required on site is to undertake the electrical installation in accordance with the instructions provided and lower the probe with the pre-fixed location cap into the probe protection tube. When the cap locates onto the top of the probe protection tube, the probe is suspended at the correct level.

Control unit (electrical connections)

1. Mains voltage connection;

The control unit should be connected to a suitable 220/240V AC supply and fused at 3 amps.

Note: This appliance must be earthed.

2. Control unit/probe junction box connection

Wiring from the control unit to the probe junction box in the separator chamber requires a 3-core screened. 0.75mm core section cable.

Maximum cable length: 300 metres.

3. Probe connection

A 5 metre 3-core probe cable is normally fitted to the junction box and the probe.

After all connections have been made, the cables must be secured by tightening each entry gland.

Probe

The probe is installed freely suspended in the SPEL separator within the probe protection tube. The 3-core cable is connected into the junction box mounted in the access shaft above the probe protection tube. Extra cable is provided to enable raising the junction box where extension shafts are incorporated.

Important note: In all cases good, standard electrical practice should be followed and the installation must conform to the Australian Wiring Rules – AS 3000 – 2007. In essence, the installation must be such that the intrinsic safety is no compromised by:

- Exposure to risk of mechanical damage
- Unauthorised modification of interference
- Exposure to moisture, dust and foreign bodies
- Excessive heat
- Invasion of intrinsically safe circuit by other electrical equipment or circuitry

Certificate of conformity

The alarm device has been approved to be used in explosion-hazardous areas. The control unit and probe are approved according to ATEX Directive 94/9/EC. These approvals mean that the probes can be installed in Zone 0, which is continuously explosion-hazardous.

The SPEL oilset control unit must be located in the safe area, but it can be connected to the probe without any barrier.

Tests (10.2)

The function can be tested by lifting the probe within the probe protection tube. In approximately 5 seconds, the alarm is given by a red light and audible signal. Both relays release. Push the RESET button - the buzzer goes off and relay pulls in.

When the probe is placed in water again, relay pulls in and the red light goes off.

Cable break and short circuit test

Also the function can be tested in case of cable fault or short circuit. First cause short circuit in probe cable terminals 1 and 2. Then the yellow light of short circuit is lit. Both the relays pick up and the buzzer goes on. Remove the short circuit and reset the buzzer.

Simulated Function Test

The function of probe, cable and electronics can be tested. Push the TEST button for 2 to 5 seconds. Both relays pick up, and the red light is lit. When the TEST button is released, the red light goes off and relay returns to its normal position. The buzzer and relay must be reset.

Installation

Important note: It is important that installation is carried out by a competent technician familiar with this type of equipment or contact our Special Products Division for installation, commissioning and maintenance service.

PHONE: +61 (0)2 8838 1055
FAX: +61 (0)2 8014 8699

SPARE PARTS LIST

DATE: _____

INVOICE NO: _____

TYPE: _____

MODEL: _____

SERIAL NO: _____

JOB NO: _____

LINE	DESCRIPTION	QTY	PART No.
1			
2			
3			
4			
5			
6			
7			
8			

For all spare parts enquiries, please ring 13 SPEL or 13 77 35

SPEL ENVIRONMENTAL
PHONE: +61 (0)2 8838 1055
FAX: +61 (0)2 8014 8699
STORMWATER SOLUTIONS - STORMWATER QUALTIY IMPROVEMENT DEVICES

MAINTENANCE SERVICE LEDGER

MODEL No	
INSTALLATION ADDRESS	
INITIAL OPERATING DATE	
WORKING CAPACITY	
PRIMARY CHAMBER SPILL CAPACITY	
OIL ALERT PROBE trigger threshold	
MINUMUM MAINTENANCE FREQUENCIES	***ANNUALLY from the initial operational date or if indicated by the oil alert probe alarm***

Note: Oil Alert Probe alarm is triggered when fuel/oil hydrocarbons reaches 10% of primary chamber capacity.

MAINTENANCE RECORD

SERVICE DATE	COALESCER FLUSHED	PRIMARY CHAMBER SEDIMENT REMOVED & HYDROCARBONS SKIMMED	SECONDARY CHAMBER SEDIMENT REMOVED & HYDROCARBONS SKIMMED	OIL ALERT PROBE CLEANED & ALARM CHECKED	SERVICE MANAGER NAME & SIGNATURE

MAINTENANCE RECORD

SERVICE DATE	COALESCER FLUSHED	PRIMARY CHAMBER SEDIMENT REMOVED & HYDROCARBONS SKIMMED	SECONDARY CHAMBER SEDIMENT REMOVED & HYDROCARBONS SKIMMED	OIL ALERT PROBE CLEANED & ALARM CHECKED	SERVICE STATION MANAGER NAME & SIGNATURE

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS

SPELFilter System

Technical & Design Manual

CHAPTER 1

INTRODUCTION

SPEL Environmental is a manufacturer of stormwater treatment technologies. SPEL Filter™ (1) is a stormwater filtration device designed to remove fine sediments, heavy metals, nitrogen and phosphorus from stormwater runoff.

SPEL Filter™ relies on a spiral wound media filter cartridge with approximately 43 square feet of active filtration area. The filter cartridges are housed in a concrete structure that evenly distributes the flow between cartridges. System design is offline with an external bypass that routes high intensity storms away from the system to prevent sediment resuspension. Flow through the filter cartridges is gravity driven and self-regulating, which makes the SPEL Filter™ system a low maintenance, high performance stormwater treatment technology. This manual provides detailed technical information on the SPEL Filter™ system including its capabilities and limitations. The manual describes the steps involved in designing a SPEL Filter™ system as well as the installation and maintenance requirements of the system.

SPEL Environmental is a complete stormwater solutions provider. We are always willing to assist design professionals to achieve the most efficient, economical systems for their clients and projects.

PRINCIPLES OF OPERATION

The SPELFilter system removes contaminants from stormwater runoff via media filtration. This Technical and Design Manual describes the principles by which the SPELFilter system works to improve the quality of the environment throughout the United States.

MEDIA FILTRATION

Media filtration has long been used in drinking water and wastewater treatment processes. This technology has proven effective at removing sediments, nutrients, heavy metals, and a wide variety of organic contaminants. The target pollutants, hydraulic retention time, filter media, pretreatment, and flow rate all affect the removal efficiency of the filter.

MECHANISMS OF REMOVAL

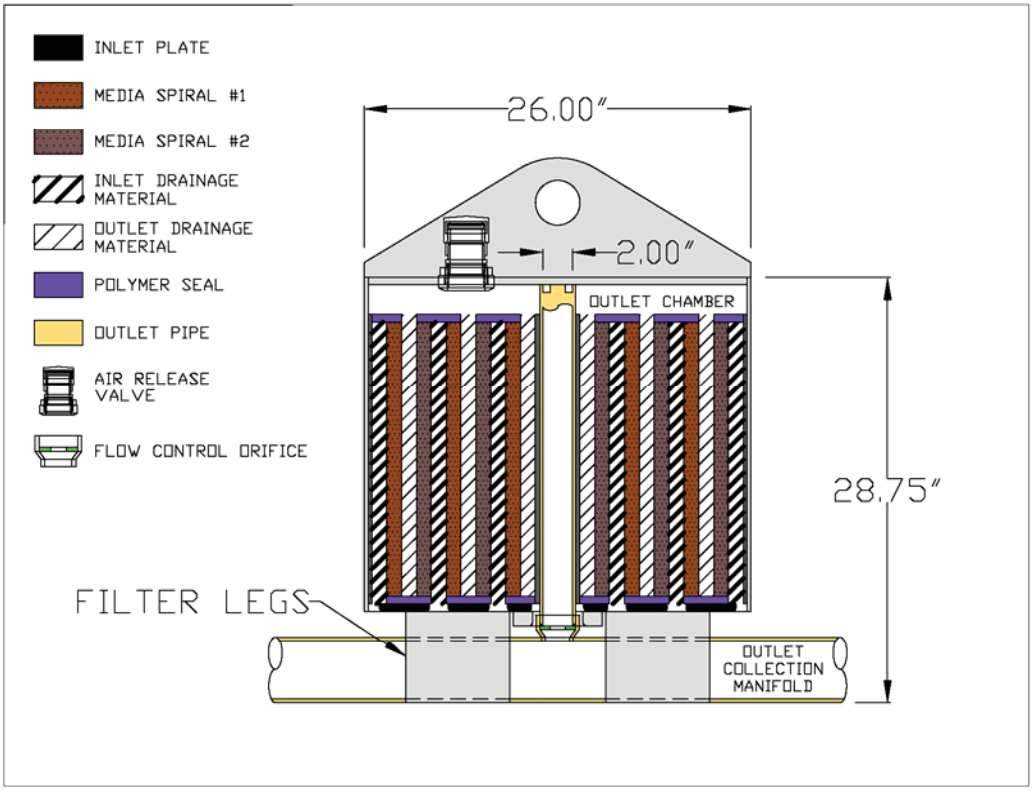
The SPELFilter removes pollutants from water by two mechanisms: 1) interception/attachment and 2) adsorption. Interception occurs when a pollutant becomes trapped within the filter media. A sediment particle, for example, may be carried into the filter media by the water and become stuck in the interstices of the media. Such a particle will typically remain trapped within the media until the media is removed or the filter is backwashed.

Attachment occurs when pollutants bind themselves to the surface of the filter media, and this happens primarily through adsorption. Adsorption is a surface process by which dissolved ions are removed from a solution and chemically bind themselves to the surface of the media. This occurs when the surface of the filter media particle contains sites that are chemically attractive to the dissolved ions. The SPELFilter system uses a proprietary media containing activated alumina, zeolite and pearlite to enhance adsorption of anions such as phosphates and nitrogen (ammonia and organic).

THE SPEL FILTER CARTRIDGE

The main building block of the SPELFilter stormwater filtration system is the SPELFilter cartridge (SFC), shown in Figure 1. The SFCs are housed in a structure which may be a vault, manhole or other structure. This structure contains the inlet and outlet pipes as well as an internal manifold that delivers treated water to the outlet of the SPELFilter system.

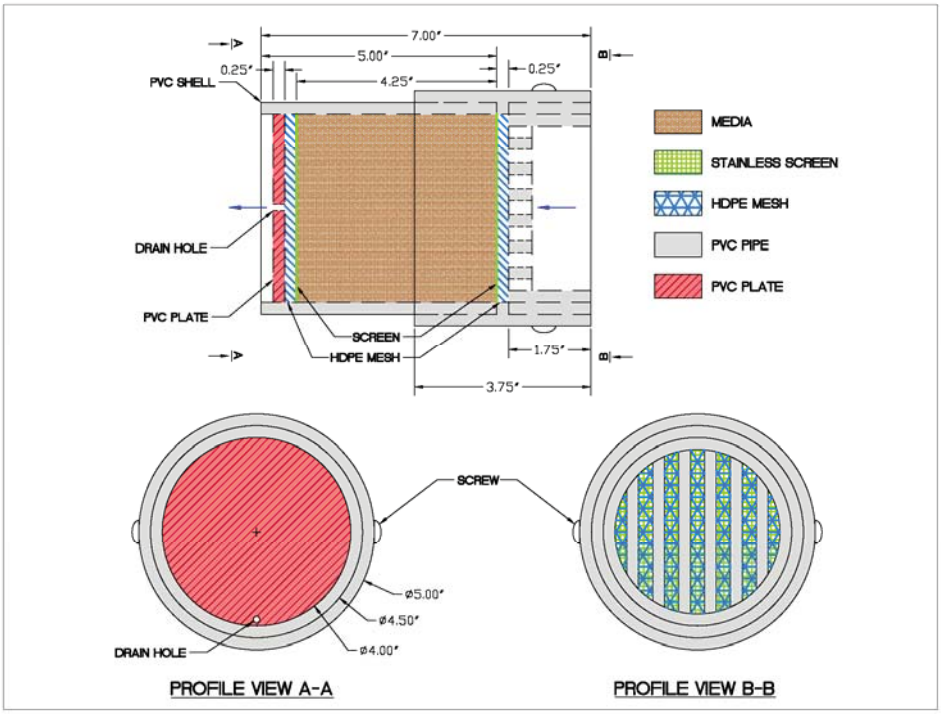
PRINCIPLES OF OPERATION



Stormwater runoff enters the manhole or concrete structure via an inlet pipe and begins to fill the structure. When the water surface elevation in the vault/manhole reaches operating level, water flows through the SFC driven by a hydrostatic head. Within the SFC, the water flows through a proprietary filter media and drains via a vertical pipe. The vertical drain is connected to the under drain system which conveys filtered water to the outfall. During a typical storm event, the SPELFilter system has four cycles:

1. Vault fill and air release;
2. Uniform bed load hydrodynamic filtration;
3. Uniform bed load siphon filtration; and
4. Siphon break and hydrodynamic backwash.

PRINCIPLES OF OPERATION



PRINCIPLES OF OPERATION

The Filter has been extensively tested in the laboratory. This testing has been carried out using SIL-CO-SIL 106 as a sediment source. SIL-CO-SIL 106 is a silica product containing approximately 90% fine sediments (d50 = 23 microns), and is widely accepted as a sediment source for stormwater simulations by regulatory agencies such as the Washington State Department of Ecology (TAPE) program, New Jersey Department of Environmental Protection (TARP), as well as other leading agencies.

The SFC needs only 71cm of depth of water to begin full flow operation. Once the full flow operation has been achieved, the SFC will operate to a depth of 16cm at which time the siphon will break and the system will backwash. At this point the only flow is from the drain down cartridge which will drain the vault to a depth below 3cm.

Each SFC has a maximum nominal flow of 2.8LPS. At this flow, each cartridge can treat 68kg of the total sediment load before maintenance. In addition, through the use of different size flow control orifice(s), the SFC flow is regulated. As the flow is lowered, the treated sediment load increases. For example, when the flow is lowered to 0.94LPS, the cartridge is able to treat 136kg of the total sediment load before maintenance.

DESIGN GUIDELINES

CHAPTER 2

DESIGN GUIDELINES FOR THE SPELFilter SYSTEM

Designing a SPELFilter system is done in four phases: (1) determine the treatment train design; (2) locate the system on the site and incorporate it into the plans; (3) determine the number of cartridges, size of the flow restrictor disks and number of drain down modules necessary; and (4) select a system configuration. It is important to realize that the design process can be iterative until the desired design parameters are satisfied. Again, it is important to note that the SPELFilter systems are designed offline. This section details the design process and provides examples for each of the three steps. During the design process, the engineer must consider factors in addition to regulatory requirements. These include:

- Site specific constraints
- Proposed system location
- System configuration (flow through or extended detention
- Pretreatment
- Efficiency requirements
- Pollutant loading (sediment load)
- Treatment flow rates and hydraulics
- Maintenance intervals

SPELFilter TREATMENT TRAIN DESIGN

On-line and Off-line Systems:
SPELFilter systems are usually designed to treat moderate to low flow rates. In the vast majority of applications, the peak design flow through the storm drain system will be significantly greater than the treatment design flow through SPELFilter. Because of this difference, a bypass structure is required for most SPELFilter installations. Therefore, SPELFilter systems are installed offline, utilizing an external bypass to route high flows around the system.

A schematic of an offline SPELFilter system is shown in Figure 3 below. The bypass structure diverts low flows to the SPELFilter system and allows high flows to pass to a separate outfall. The bypass structure will feature flow controls designed by an engineer to ensure that the required treatment flows are sent to the SPELFilter. The two effluent streams (the treated effluent from the SPELFilter and the high intensity bypass) may be combined into a single stream or discharged to separate outfalls. These configurations typically involve higher flow per cartridge, but reduced treated sediment load per cartridge. These configurations are, however, usually limited more by flow sediment capacity.

DESIGN GUIDELINES

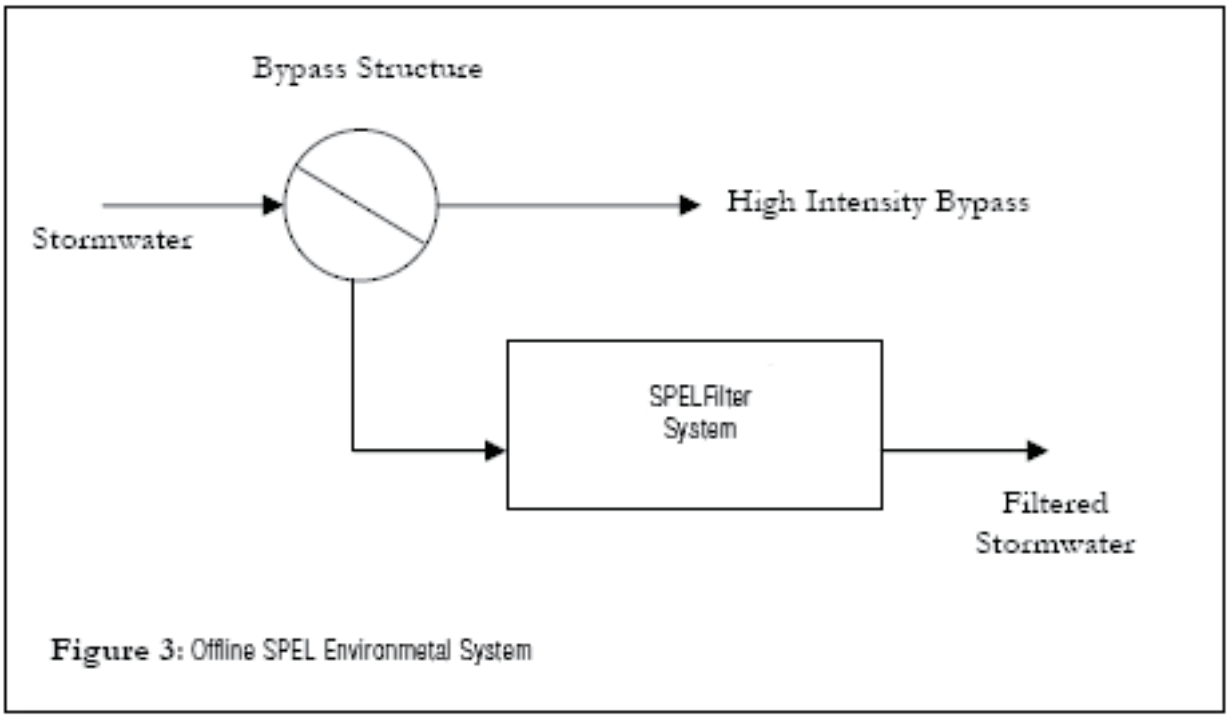


Figure 3: Offline SPEL Environmetal System

In SPELFilter installations sediment will accumulate in the vault as well as in the filter cartridges. In offline installations high intensity flows are routed away from the vault minimizing the risk of resuspending this accumulated sediment. In online applications it is possible for high flows to mobilize and release this sediment.

Pretreatment

The SPELFilter system is designed to remove a minimum of 80% of suspended sediments. If the anticipated sediment load is particularly heavy or if there will be a significant oil load, the system may require pretreatment.

Pretreatment may also be required by local regulations. Pretreatment systems will remove a portion of the influent pollutant load. SPEL Environmental Stormceptor Class 1 system is an ideal hydrodynamic separator that removes sediments and floatables from stormwater runoff.

DESIGN GUIDELINES

Figure 4 shows a schematic of a typical SPELFilter installation with pretreatment. Note that the pretreatment structure is downstream from the bypass. The system will work as long as 28" of head is achieved to activate the cartridge flow and will continue to work until it reaches the siphon break level (6"). Consult SPEL Environmental for verification based on your particular site conditions.

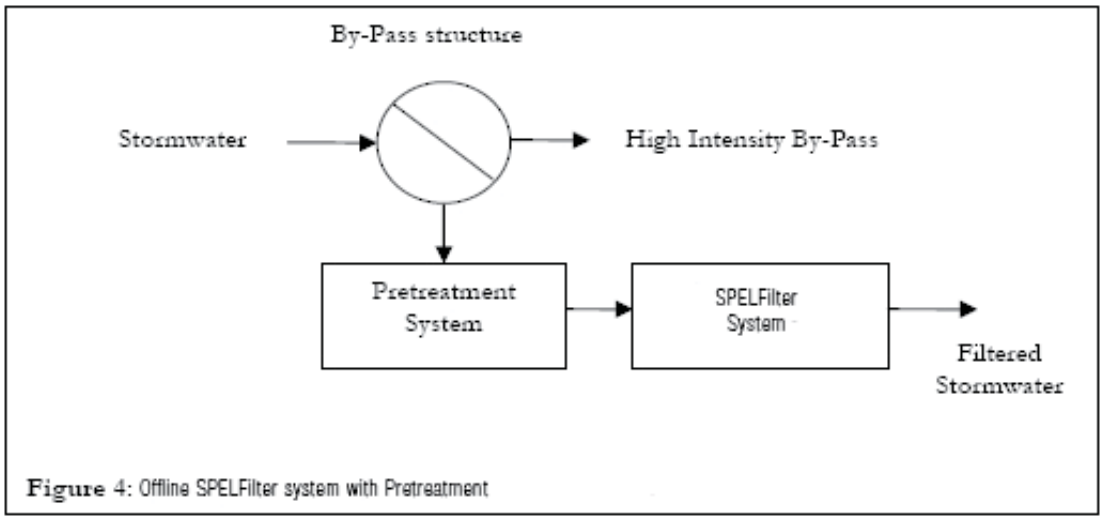


Figure 4: Offline SPELFilter system with Pretreatment

Extended Detention Systems

In some applications, SPELFilter systems will be installed in conjunction with extended detention systems. Extended detention systems attenuate peak flow rates within the storm drain system. In these cases, the SPELFilter is placed downstream from an extended detention system, as shown in Figure 5.

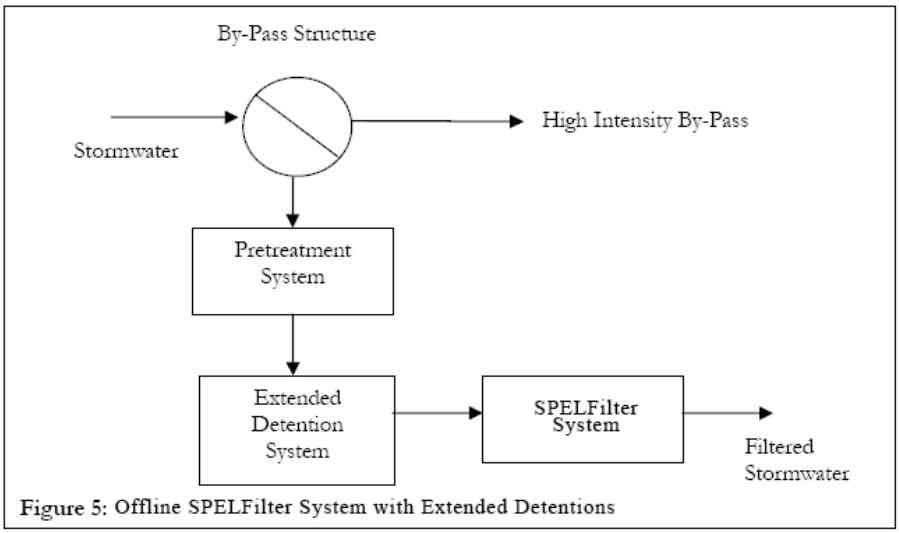


Figure 5: Offline SPELFilter System with Extended Detentions

DESIGN GUIDELINES

SELECTION THE NUMBER OF CARTRIDGES

Each SPELFilter system relies on a collection of individual cartridges to achieve the desired removal efficiency and it is important to correctly determine the number of filter cartridges required. Too few cartridges will result in a system that does not meet the performance specifications while too many cartridges will result in a system larger than necessary for the site.

To accurately determine the number of cartridges required for a SPELFilter installation, three factors must be considered:

- The flow capacity of the system
- Treated sediment load of the system
- Jurisdiction – specific sizing requirements (water quality volume)

Each of the above factors when evaluated will determine a minimum of cartridges required to address that design parameter. Calculations for all three factors need to be done to determine which design parameter is the limiting factor. In each case it will be the computation that results in the highest minimum number of cartridges, the one that will determine the cartridge count. In other words, whichever item requires the most cartridges to meet any one particular design parameter will determine the minimum number of cartridges required for the system.

Required Data
To ensure that the correct number of cartridges is specified for the SPELFilter system, the designer must be aware of the local regulatory requirements for stormwater treatment. Depending on the jurisdiction in which the project site is located, the engineer may have to meet minimum treatment flow rates, treatment volumes or some other criteria such as filter bed area. Some jurisdictions specify a methodology for calculating a minimum treatment flow rate for a given site. Other jurisdictions may require extended detention upstream from the filtration system or have volume-based rather than flow-based requirements.

DESIGN GUIDELINES

Flow Capacity
At many sites regulatory requirements will specify a minimum treatment flow rate (QTRT) that must be passed through the stormwater treatment system.These regulatory requirements may also specify pretreatment or extended detention practices that need to be included in the site design. Some jurisdictions specify that the stormwater filtration systems be designed on the basis of filter area following prescribed methodologies.

In most cases pretreatment can be provided by a hydrodynamic separator like the SPEL Environmental Stormceptor Class 1 system. Regardless of the pretreatment design, the minimum number of SPELFilter cartridges can be determined by dividing the treatment flow rate by 2.83LPS and rounding up to the next whole number. This calculation provides the minimum number of SFCs that will be necessary to fully treat the water quality flow from the site. This computation does not take into account the sediment load portion of the design, which needs to be performed as well. The design flow per cartridge will ultimately be determined by the cartridge sediment load (Table 1). The step-by-step procedure is shown below.

1.Determine the required treatment flow rate (QTRT) based on locally approved methodologies for the project site. This may involve the use of the Rational Method, TR-55 or another locally specified hydrologic model. If a locally approved methodology is not specified, SPEL Environmental recommends using one of these commonly accepted models.

2.Using the treatment flow rate, calculate the minimum numbers of SPELFilter cartridges required to treat that flow.

DESIGN GUIDELINES

Sediment Load Capacity
Once the minimum number of SFCs required to treat the flow is known, the engineer must ensure that the number of SFCs specified will be capable of handling the sediment load from the site. SPELFilter systems are typically designed around a maintenance cycle. It is important to note that the number of SFCs required to treat the anticipated total system sediment load is a minimum number.

For any site, it is necessary to calculate the minimum number of SFCs required to treat both the peak flow rate and the total system sediment load (as discussed in this section). The number of SFCs required for the site is the greater of the calculated numbers. To ensure that the SPELFilter will function acceptably with annual maintenance, it is necessary to calculate the incoming annual sediment load from the site.

$$V_{TRT}\left(ft^3\right) = P * A * c * \frac{1ft}{12in} * \frac{43560\,ft^2}{acre} * \%\,Capture$$

Equation 2

1. Calculate the annual treated runoff volume according to Equation 2. In Equation 3, VTRT is the annual treated runoff volume, P is the Equation 2 average annual precipitation (in inches), A is the area of the site (in acres), c is the runoff coefficient of the site (c is dimensionless), and % Capture is the fraction of the total runoff that is treated by the stormwater quality system. If % Capture is not otherwise specified, a default value of 0.90 can be used.

$$L = V_{TRT} * TSS_{IN} * \frac{28.3L}{ft^3} * \frac{kg}{10^6\,mg} * \frac{2.2lbs}{kg}$$

Equation 3

2. Using the annual treated runoff volume, calculate the anticipated total system sediment load to SPELFilter according to Equation 3. In Equation 3, L is the mass of sediment that SPELFilter is exposed to annually (in pounds), VTRT is the annual treated runoff volume as calculated in step 1 (in ft3), and TSSIN is the influent concentration of TSS in the runoff (in mg/L). The influent TSS concentration (TSSIN) depends greatly on the site and the surrounding land use. In the absence of readily available data, SPEL Environmental recommends using a minimum event mean concentration (EMC) TSS value of 60 mg/l. The impact of the on the filter cartridge will also be less if the filtration system is preceded by pretreatment. In these cases, the influent TSS to the SPELFilter system need to be reduced to reflect pretreatment sediment removal. SPEL Environmental can assist with these calculations.

DESIGN GUIDELINES

3. Once the total annual system sediment load (L) is calculated, the engineer must ensure that the number of cartridges specified will be able to remove that sediment load at the specified design flow rate. Divide the total system sediment load L by the capacity of each SFC and note the associated SFC flow rate. Round up to the next whole number to get the minimum number of SFCs required to treat this sediment load at the required flow rate per SFC.

Water Quality Volume
In some cases the SPELFilter system will have to be placed downstream from an extended detention facility or local regulations will specify a treatment volume rather than a treatment flow rate. In these cases the minimum number of SFCs may not be determined using the treatment flow rate calculation. Instead, the minimum number of cartridges for this system depends on the controlled discharge rate QTRT from the upstream detention facility or the filtration system.

1. Determine the WQv for the site. This may vary significantly from one jurisdiction to the next based on local regulations. Maryland for instance requires that new developments treat the first one inch of water coming off of the site.

2. Most jurisdictions will also specify a drain down time for the detention system. This is usually in the 24 to 40 hour range. It is recommended that the maximum drain down time not exceed 40 hours, beyond which the detained water could potentially become anoxic. SPELFilter systems should instead be designed with an initial drain down time of less than 40 hours. Then, as the filter cartridges become occluded, the drain down time will gradually increase to 40 hours. Once it takes in excess of 40 hours for the detention system to fully drain out then the SPELFilter system should be maintained.

3. Once you have determined the WQv and the drain down time, the quantity of SPELFilter cartridges can be determined by dividing the WQv by the drain down time and then dividing the resulting number by the treatment flow rate of a SPELFilter cartridge. For volume based SPELFilter systems, the treatment flow rate of each cartridge should be limited to 15 gpm. For example if:

WQv = 10,000cf
Drain down time = 24hrs (1440min)
SFC flow rate = 15gpm
Number of SFC's = ((10,000cf/86,400)*448.83)/15gpm
Number of SFC's = 4

DESIGN GUIDELINES

PREPARING SITE PLANS FOR THE SPELFILTER SYSTEM

Once the SPELFilter system has been selected, the chosen system must be included on the site plans.

Location
The location of SPELFilter on the site will be determined by several factors; maintenance access, the unit's footprint, available drop, available depth, and the surface elevation of the receiving waters must all be considered when selecting the system's location. The location and configuration must be in compliance with MCDPS's underground SWM Structure regulations.

The SPELFilter system must be installed in an area that is accessible to maintenance equipment. The maintenance of a SPELFilter system requires a vacuum truck as well as the removal and replacement of the filter cartridges. The manhole covers, and or Access Hatches of the SPELFilter must be placed in locations that can be easily reached by such a vehicle.

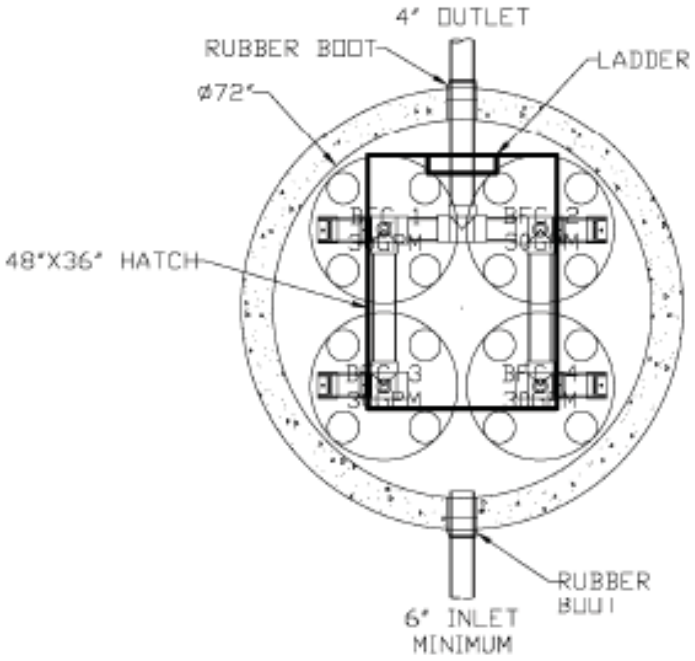
The SPELFilter should be placed in a location that minimizes its interference with other existing or planned underground utilities. Standard Details and Notes All of the standard details and notes for the plans are available in AutoCAD and .pdf format from SPEL Environmental.

DESIGN GUIDELINES

SPELFilter SYSTEM CONFIGURATION

There are four (4) types of SPELFilter systems:

1.) Manhole: Standard precast manholes with O-Ring gasket joints
2.) Precast vault: Monolithically poured concrete vault (base and walls)
3.) Box culvert vault: Must be made by an approved supplier
4.) Cast in place vault: Custom designed for site.

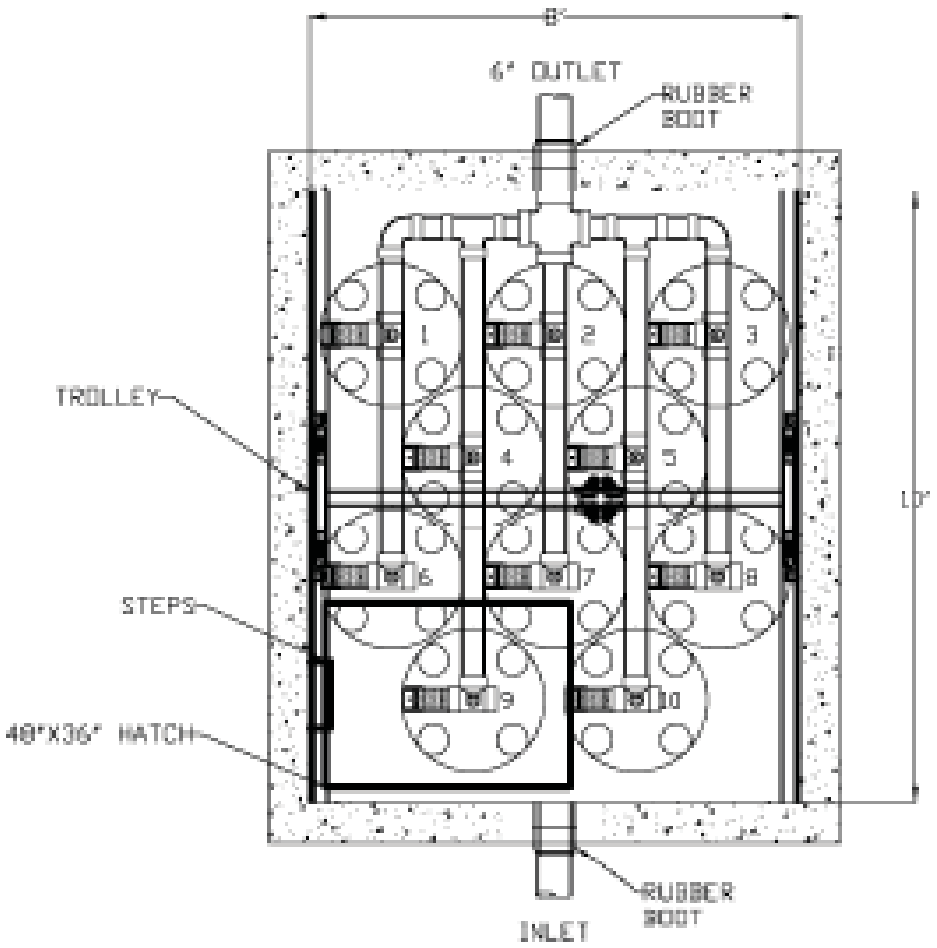


Manhole SPELFilter systems have a small footprint, and can be fit into site plans easily without interfering with other underground utilities. Manhole SPELFilter systems are ideal for applications downstream from water quality detention structures. Please consult with the SPEL Environmental for more details.

Access to the Manhole SPELFilter for inspection or maintenance is achieved through a minimum 900mm x 900mm or diameter frame and cover. In each Manhole SPELFilter system, the SFCs are arranged so that a maintenance worker can stand on the floor of the manhole while installing or removing the cartridges. Please refer to Appendix C for engineering drawings showing the available Manhole SPELFilter configurations.

DESIGN GUIDELINES

Precast Vault SPELFilter



The minimum system drop is typically 71cm however this can be reduced on a site specific basis by SPEL Environmental in conjunction with an engineer.

Box Culvert SPELFilter

Like the manhole SPELFilter, access to the box culvert SPELFilter is provided through the hinged access hatch. The box culvert SPELFilter is constructed in 10' x 6' sections. Each vault has at least one access hatch. The SFCs and outlet manifolds are arranged to allow maintenance personnel to stand on the concrete floor while working inside the structure. The SPELFilter cartridges and under drain manifold components are supplied by SPEL Environmental together with the precast vaults. Please refer to Appendix C for a complete set of box culvert SPELFilter configurations. Available precast vault and box culvert filter systems include:

DESIGN GUIDELINES

Cast-in-place SPELFilter

For sites requiring more than 66 SFCs or for projects on which a large precast vault or box culvert SPELFilter is not feasible, SPEL Environmental can supply custom-designed SPELFilter systems. These custom systems utilize a cast in place vault or other system, and can be designed around specific site constraints. High flow rates, shallow installations, very flat sites, limited footprints, and other design considerations can be addressed with a cast

CHAPTER 3

INSTALLATION

SPELFilter systems are installed along with the storm drain. Installation procedures vary depending on the configuration of the SPELFilter system. Installation instructions for manhole SPELFilter systems and precast vault SPELFilter systems are contained in this section.

Custom SPELFilter systems may have particular installation issues that will be addressed during the design. Installation instruction for a custom SPELFilter will be included with the custom design documents.

INSTALLATION OF A SPELFILTER SYSTEM

1. Contact utility locator to mark any nearby underground utilities and make sure it is safe to excavate.
2. Reference the site plan and stake out the location of the SPELFilter manhole/vault.
3. Excavate the hole, providing any sheeting and shoring necessary to comply with all federal, state and local safety regulations.
4. Level the subgrade to the proper elevation. Verify the elevation against the manhole/vault dimensions, the invert elevations, and the site plans. Adjust the base aggregate, if necessary.
5. Have the soil bearing capacity verified by a licensed engineer for the required load bearing capacity. On solid subgrade, set the first section of the SPELFilter manhole/vault.
6. Check the level and elevation of the first section to ensure it is correct before adding any riser sections.
7. If additional section(s) are required, add a watertight seal to the first section of the SPELFilter manhole/vault. Set additional section(s) of the manhole/vault, adding a watertight seal to each joint.
8. Install the trolley system (if applicable). See separate instruction sheet.
9. Install the PVC outlet manifold. Glue all PVC joints with the exception of the SPELFilter cartridge coupling.
10. Install the PVC outlet pipe in SPELFilter manhole/vault.
11. Install the inlet pipe to the SPELFilter manhole/vault.
12. After the site is stabilized, remove any accumulated sediment or debris from the vault and install the SPELFilter cartridges.

Tool List:

- PVC glue and primer
- Crane / lifting mechanism to lower cartridges in to the vault (each cartridge weighs 350 lb)
- Screwdriver or nut driver for Fernco couplers
- Soft blow hammer
- Saw (in case PVC manifold length needs to be adjusted)

INSTALLATION

Trolley Installation Instructions

1. Attach the mounting brackets to the track.
2. Mark a horizontal line 6” down from the ceiling of the vault structure on the two long walls.
3. Each track is split in sections. The length and number of sections vary depending on the vault. It is generally better to start installing longer track sections first. Hold a section in place and align the top of the brackets with the horizontal line on the wall. Mark the center of the hole in each bracket and remove the track.
4. Using a hammer drill and ¼” bit, drill a hole approximately 3” deep at each mark.
5. Hold the track back in place and realign the brackets with the holes. Place a plastic spacer block behind each bracket and using the supplied ¼” x 3¼” anchor bolts mount the track in place. Only install one section of track at this stage.
6. Repeat this procedure on the opposite wall of the vault directly across from the first section.
7. Bolt the 4 trolleys to the aluminum I-beam as shown in the attached diagram. Make sure that the wheels for each trolley are mounted an equal distance from the top of the I-beam.
8. Lift the I-beam in to place and insert the trolleys in to the track.
9. Using the supplied couplers, install the second sections of track via the same procedure. Continue until the track runs the length of the vault or as designed.

CHAPTER 4

MAINTENANCE

The SPELFilter system requires periodic maintenance to continue operating at the design efficiency. The maintenance process comprises the removal and replacement of each SPELFilter cartridge and the cleaning of the vault or manhole with a vacuum truck. SPELFilter maintenance should be performed by a SPEL Environmental certified maintenance contractor.

The maintenance cycle of the SPELFilter system will be driven mostly by the actual solids load on the filter. The system should be periodically monitored to be certain it is operating correctly. Since stormwater solids loads can be variable, it is possible that the maintenance cycle could be more or less than the projected duration.

The SPELFilter systems in New Development applications are designed to treat the WQv in 24 hours initially. Later in the cycle these cartridges will flow at a slower rate, and when the WQv does not drain down within +/- 40 hours after the storm event, the system must be maintained.

When a SPELFilter system is first installed, it is recommended that it be inspected every six (6) months. When the filter system exhibits flows below design levels the system should be maintained. Filter cartridge replacement should also be considered when sediment levels are at or above the level of the 4 inch manifold system. Please contact SPEL Environmental for maintenance cycle estimations or assistance at 13 SPEL.

MAINTENANCE

1. Remove the manhole covers and open all access hatches.
2. Before entering the system make sure the air is safe per OSHA Standards or use a breathing apparatus. Use low O2, high CO, or other applicable warning devices per regulatory requirements.
3. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry.
4. Using a small lift or the boom of the vacuum truck, remove the used cartridges by lifting them out.
5. Any cartridges that cannot be readily lifted directly out of the vault should be removed from their location and carried to the lifting point using the Trolley system installed in the Vault (if applicable).
6. When all cartridges are removed, remove the balance of the solids and water; then loosen the stainless clamps on the couplings in the pipe manifold; remove the drain pipes as well. Carefully cap the manifold and rinse the floor removing the balance of the collected solids.
7. Clean the manifold pipes, inspect, and reinstall.
8. Install the exchange cartridges and close all covers.
9. The used cartridges must be sent back to SPEL Environmental for exchange/recycling and credit on undamaged units.

CHAPTER 5

COSTS & AVAILABILITY

SPELFilter systems are available throughout the Australia and New Zealand from SPEL Environmental or from an authorized representative. Material, installation, and maintenance costs can vary significantly with location. For SPELFilter pricing in your area, please contact SPEL Environmental at 13 SPEL or an authorized representative directly.

SPELFilter cartridges and outlet components can be shipped anywhere in the continental Australia. Manholes and precast vaults are also supplied by SPEL Environmental as part of a complete stormwater filtration system.

OPERATING SEQUENCE

APPENDIX
A

The cycle operation of a SPELFilter is as follows:

A. Vault Fill and Air Release: Water enters the system through an inlet pipe which fills the SPELFilter vault. As the vault fills, water enters the cartridge through the inlet plate on the bottom.

As the water level rises in the vault, air from inside the SFC is exhausted via an air release valve. This operation is critical for the proper functioning of the siphon, which drives the SPELFilter during periods of low water level in the vault. (Refer to Figure A-1) for details on this operation).

OPERATING SEQUENCE

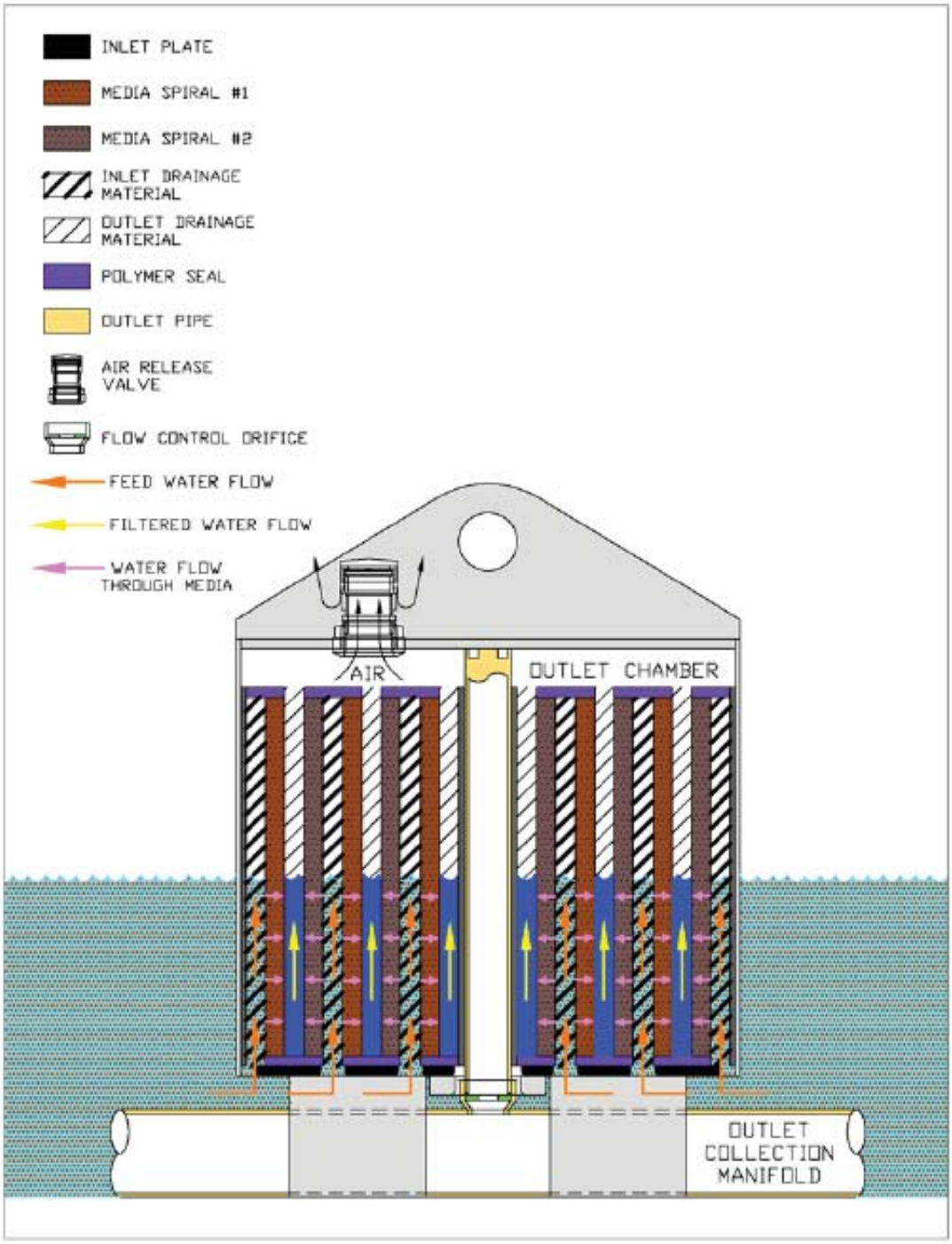


Figure A-1: Vault filling operation and release

OPERATING SEQUENCE

B. Filtration: As water enters the continuous inlet drainage spiral, air is exhausted. Water then flows horizontally through the engineered media. Next it flows to the outlet drainage spiral which is also one continuous piece material. Filtered water then flows vertically to the outlet chamber located at the top of the filter media inside of the cartridge. Finally, filtered water flows in to the center outlet drain and leaves the system via the outlet manifold below the inlet plate. (Figure A-2)

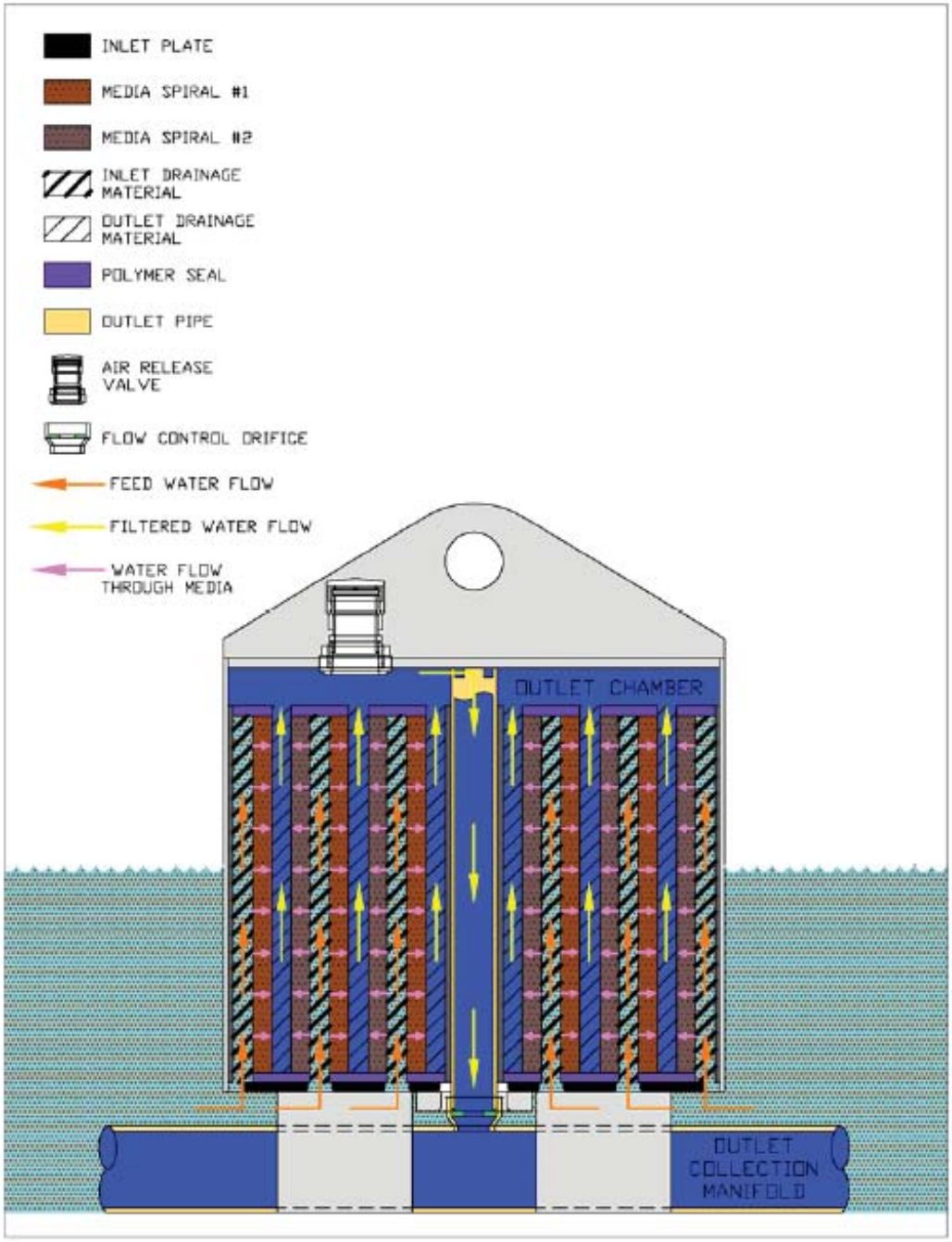


Figure A-3: Siphon filtration

OPERATING SEQUENCE

C. Siphon Filtration: After the water level in the vault falls below the top of the filter cartridge, a siphon is established and water will continue to flow (Figure A-3) until the siphon is broken. During siphon the water level in the vault will decrease until it reaches the base of the SFC; air then enters the filter cartridge and breaks the siphon. This cause's filtration flow to stop and hydrodynamic backwash begins.

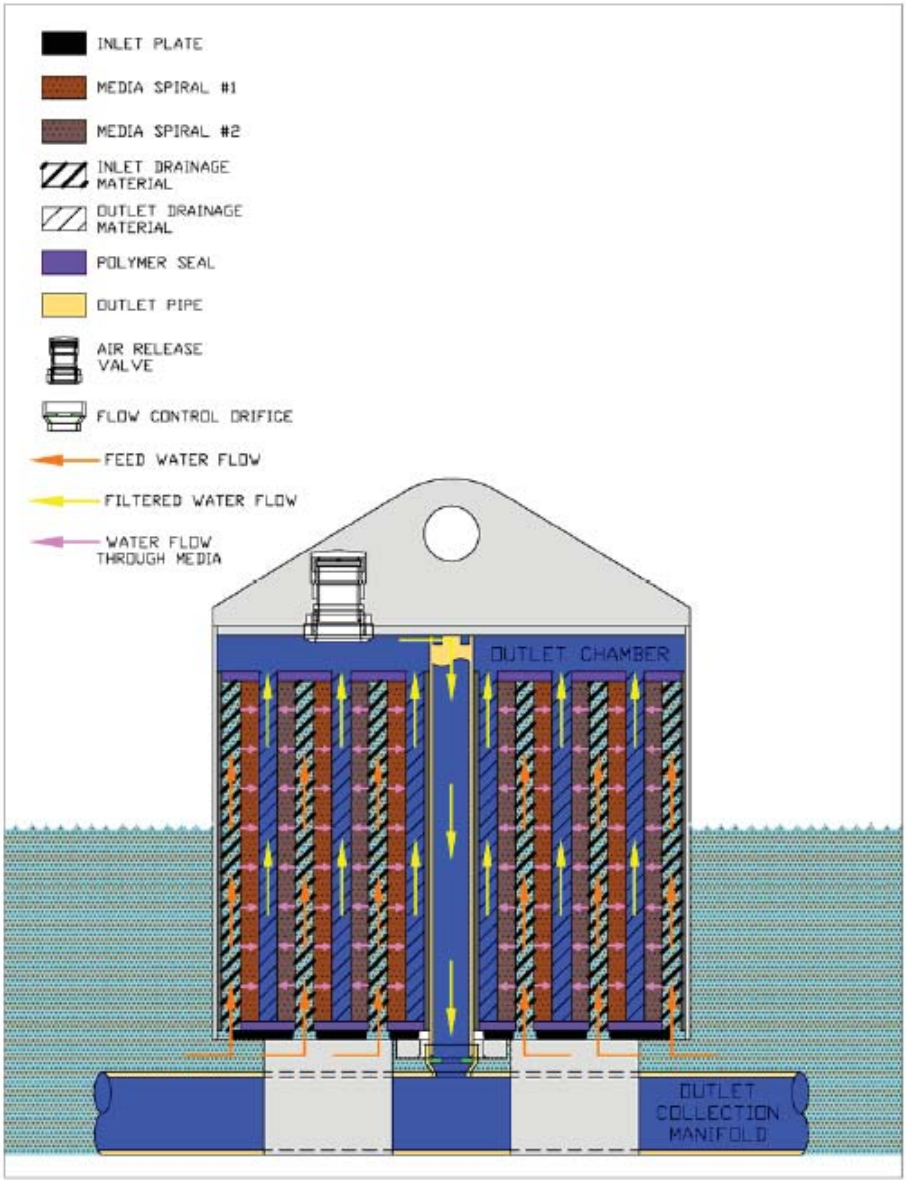


Figure A-3: Siphon filtration

OPERATING SEQUENCE

D. When air enters the filter, the siphon breaks (Figure A-4), and a gravity-driven backwash occurs with all of the water flowing from the outlet chamber backwards through the filter media (Figure A-5). This backwash has the effect of dislodging particles captured in the filtration layers and re-establishing porosity. Dislodged particles are transported back in to the filter vault and accumulate on the filter vault floor.

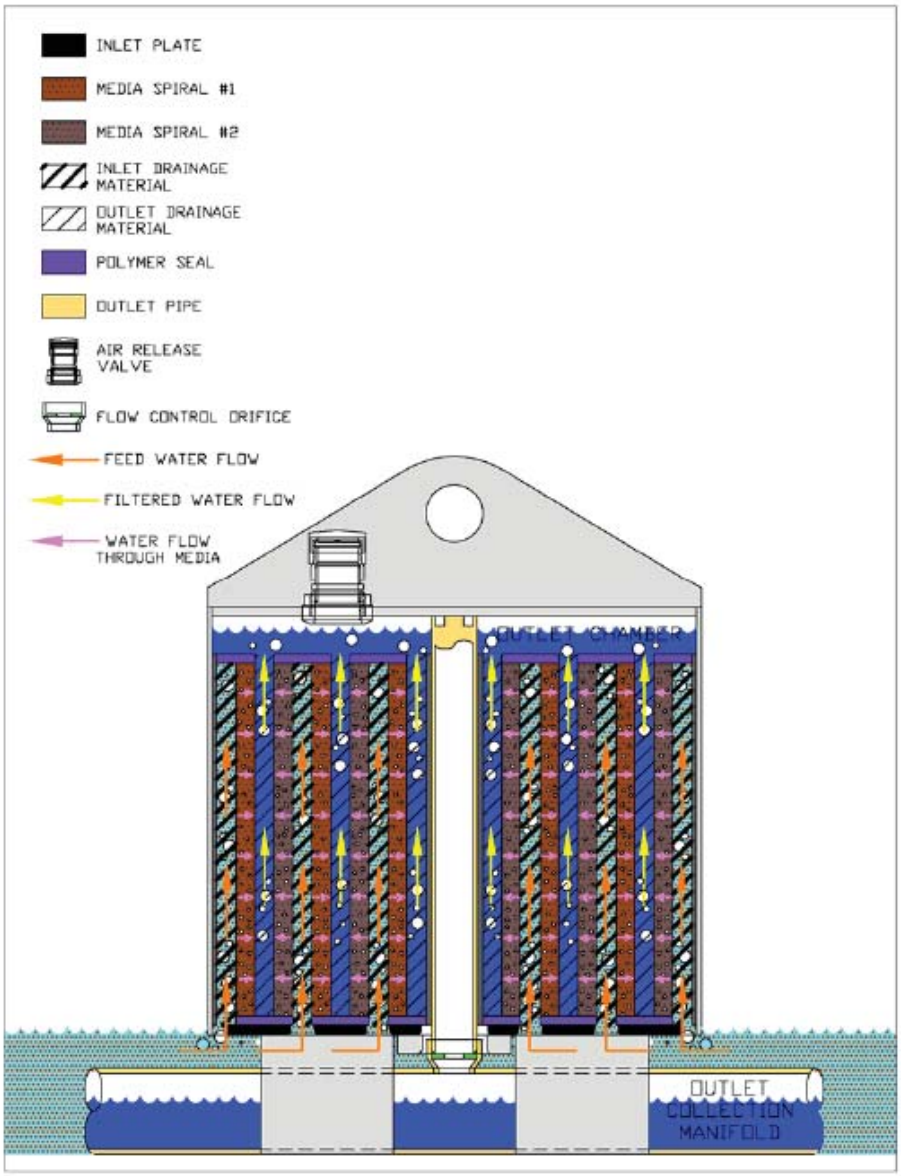


Figure A-4: Siphon Break

OPERATING SEQUENCE

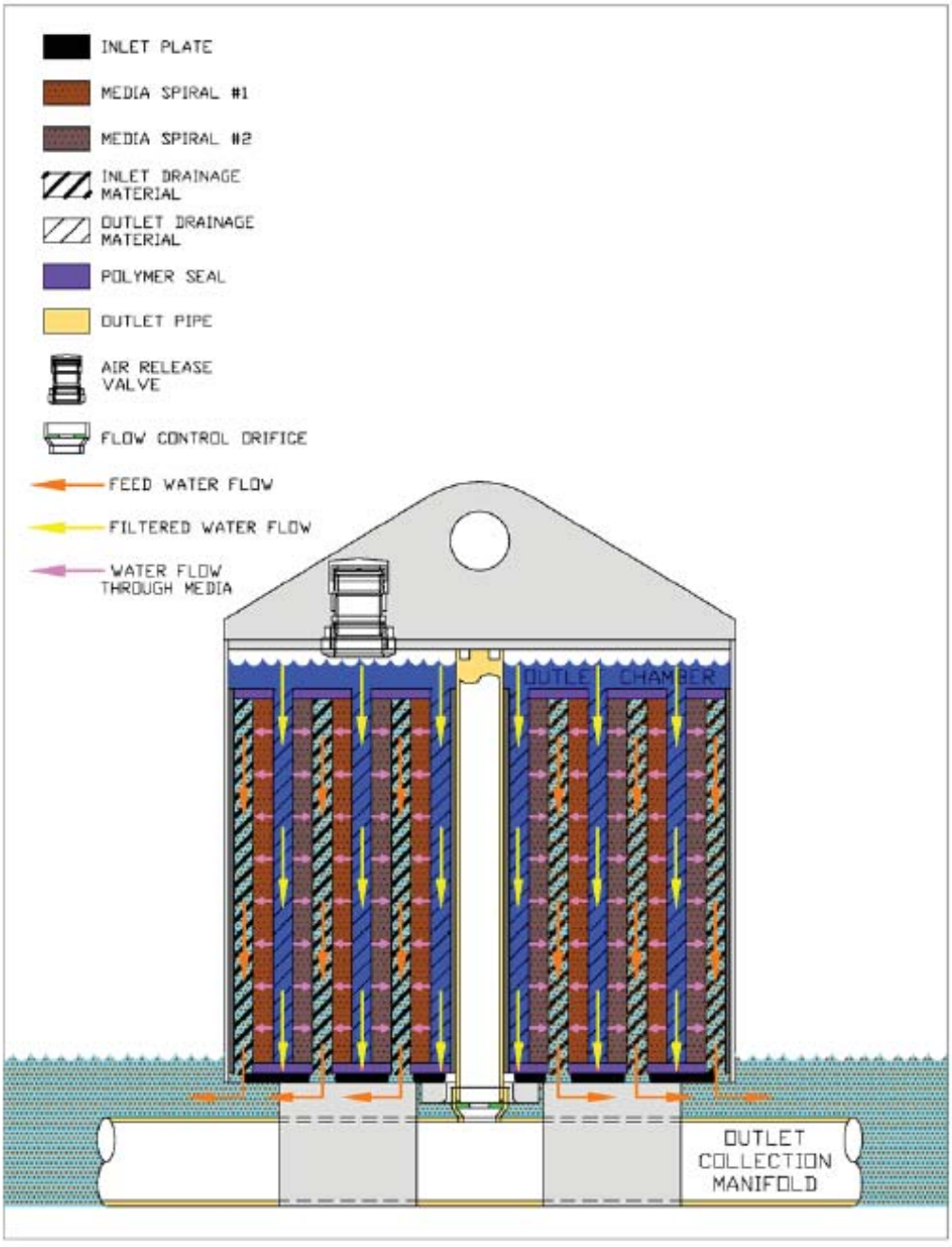
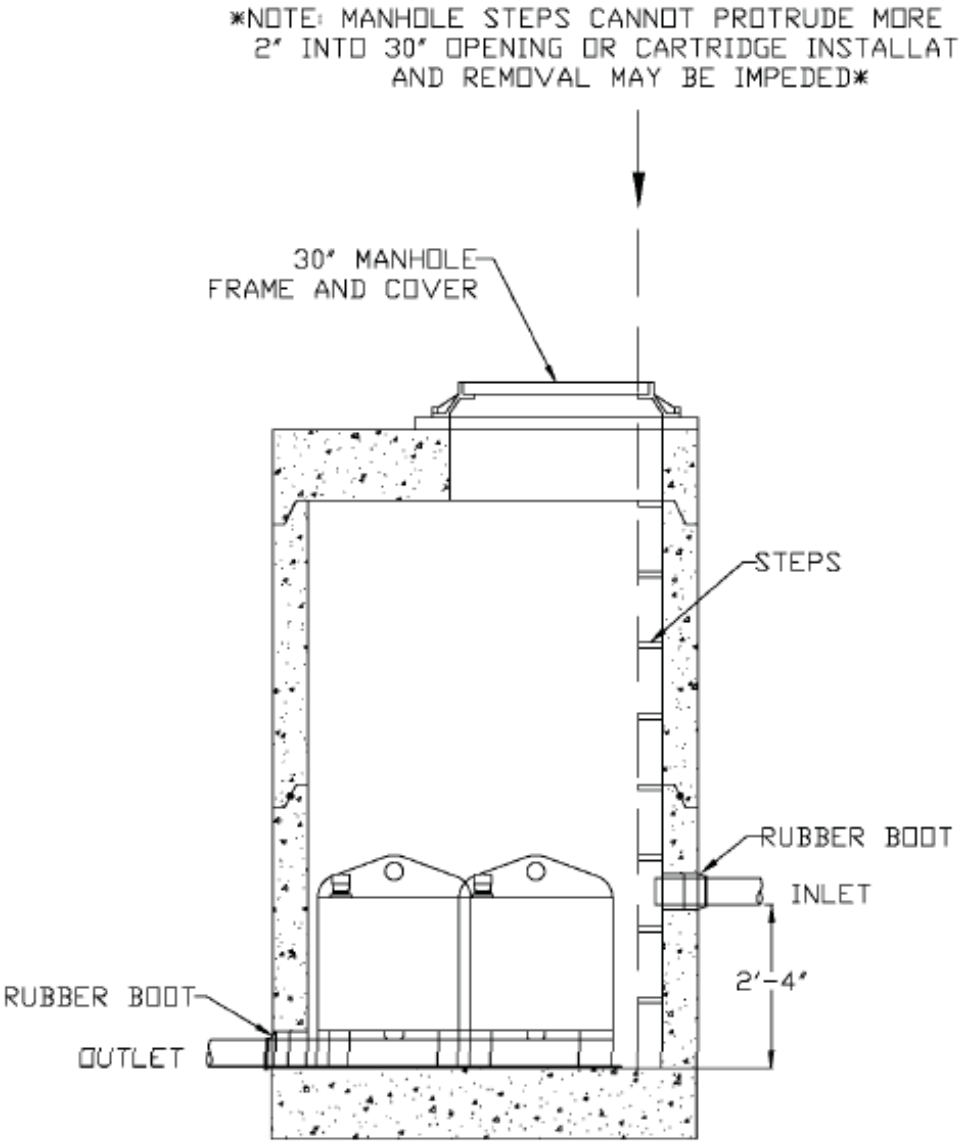
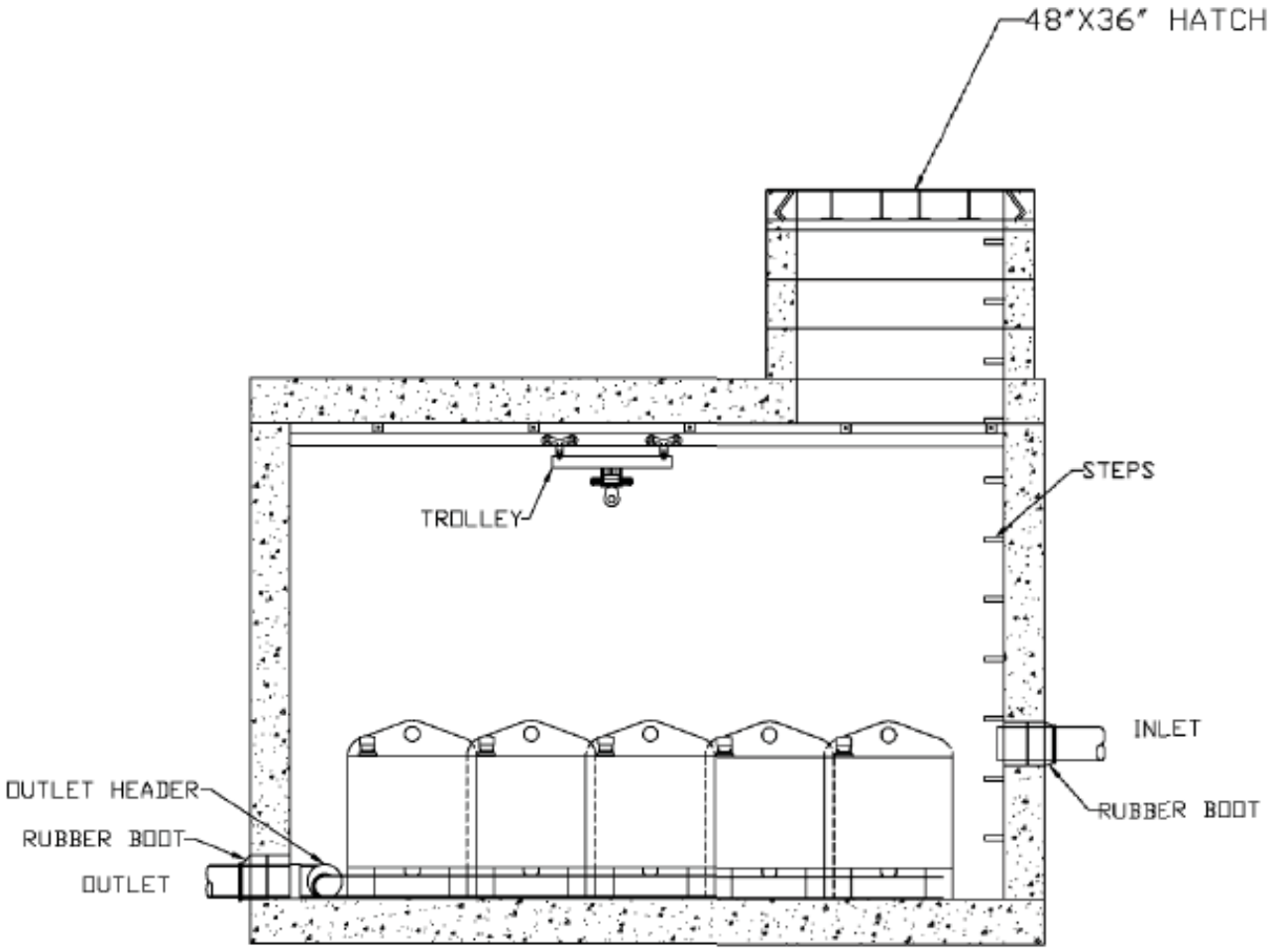


Figure A-5: Backwash

SYSTEM DRAWINGS



SYSTEM DRAWINGS



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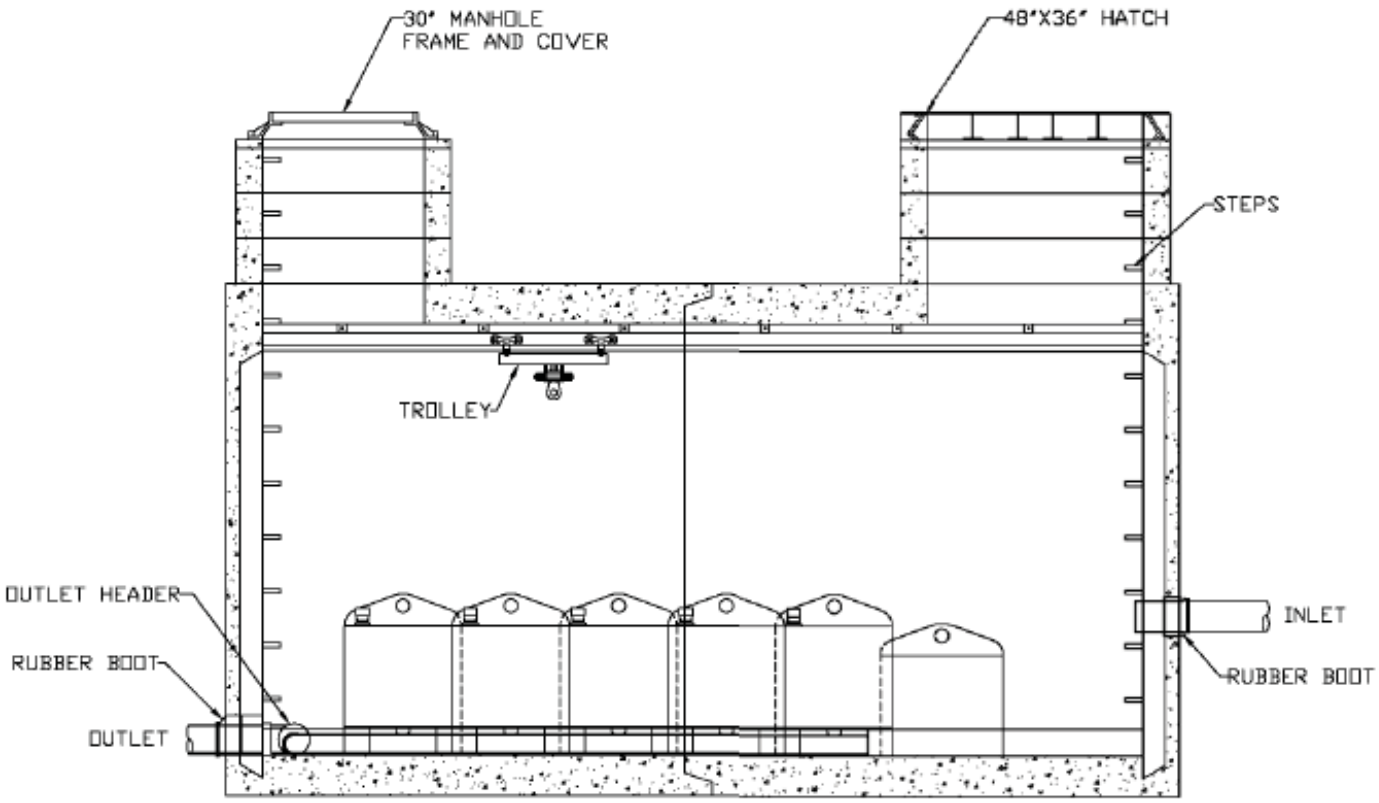

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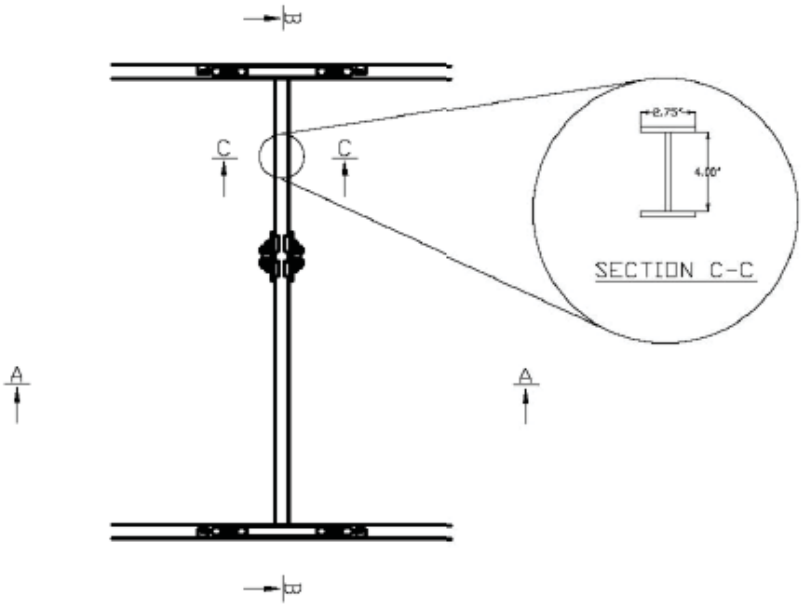
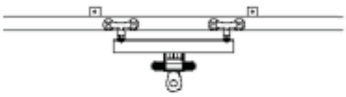
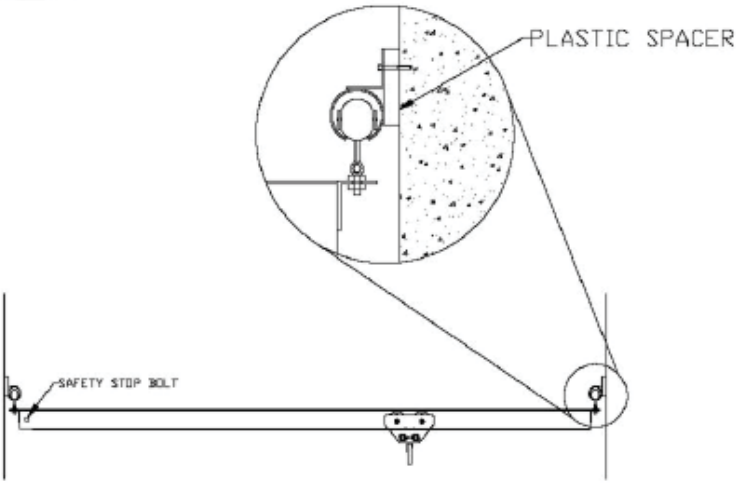


PLAN VIEW



SECTION A-A



SECTION B-B

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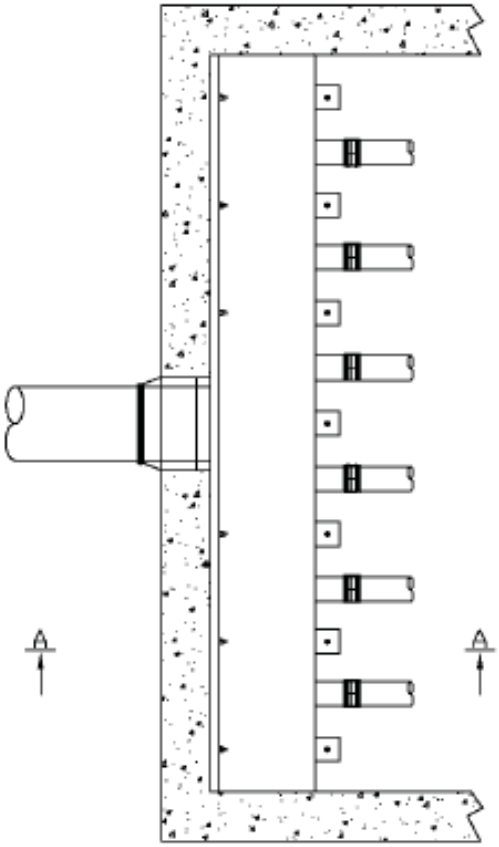

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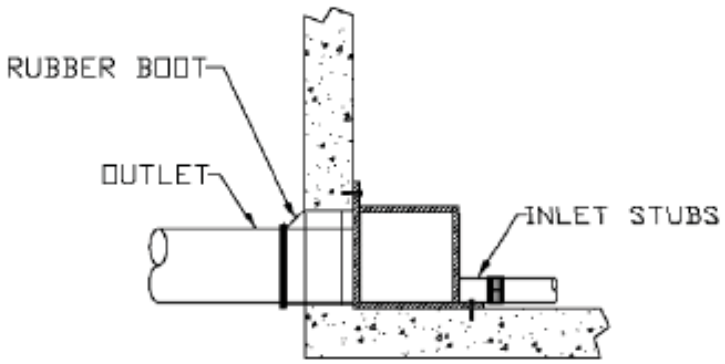

SECTION A-A

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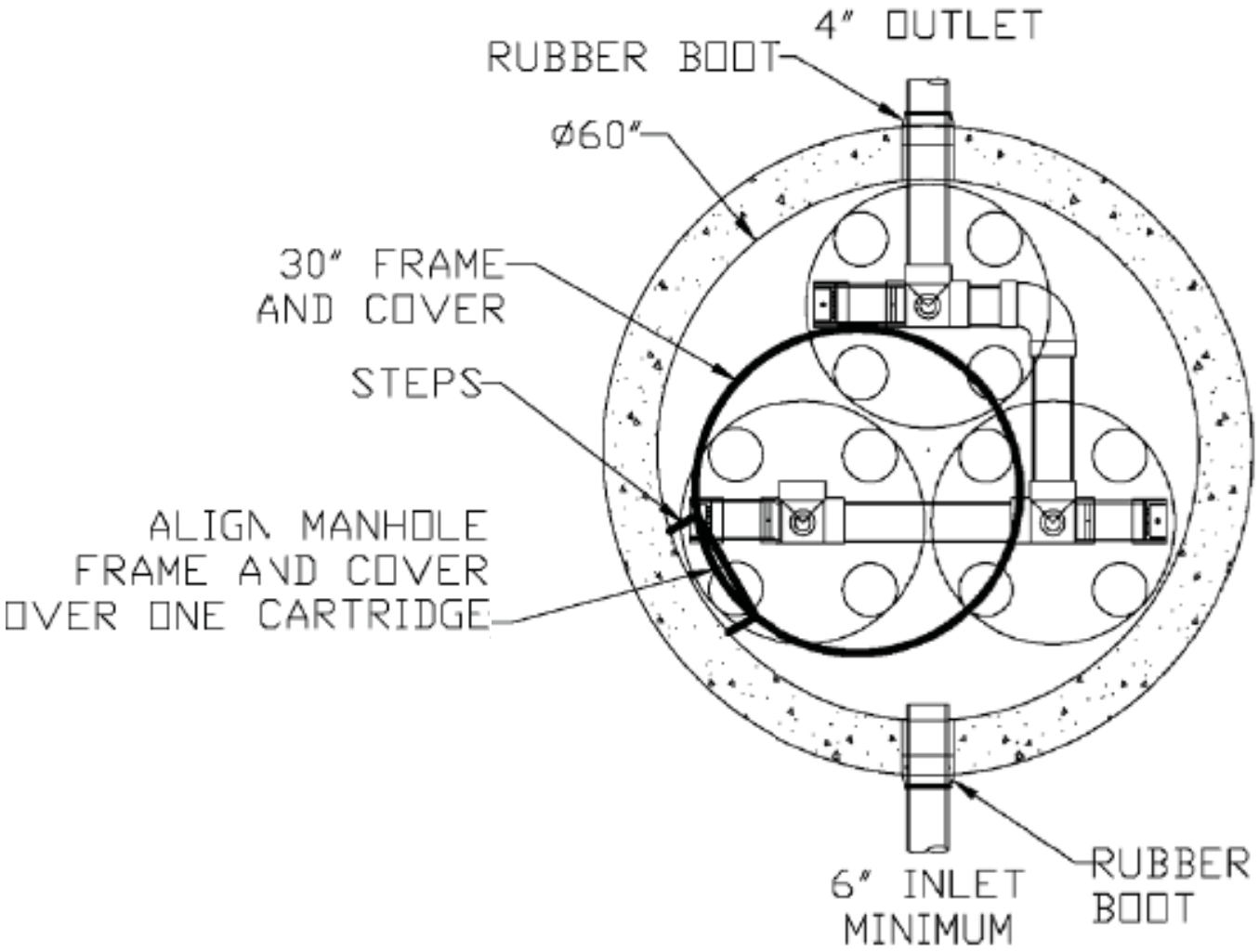

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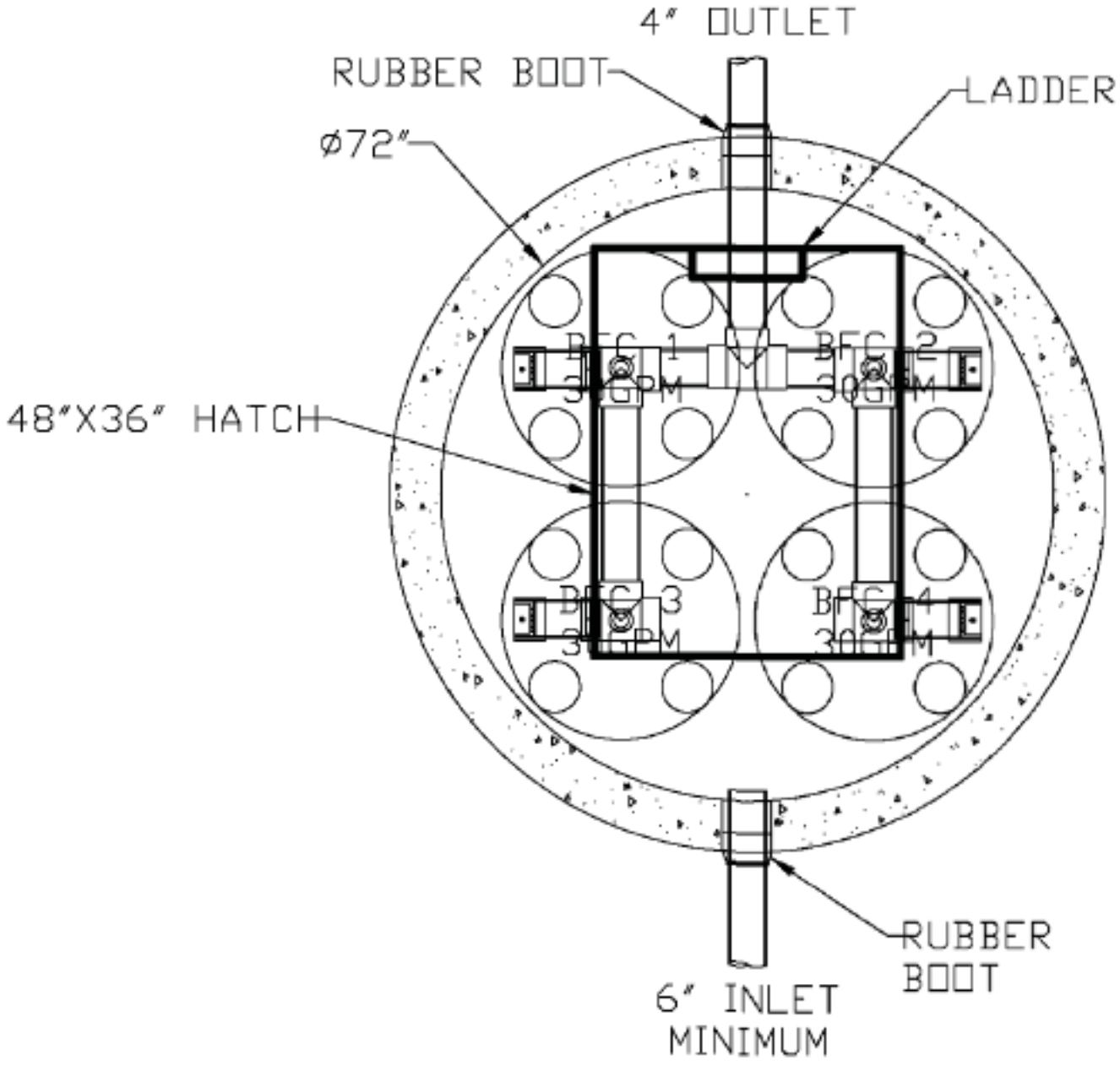

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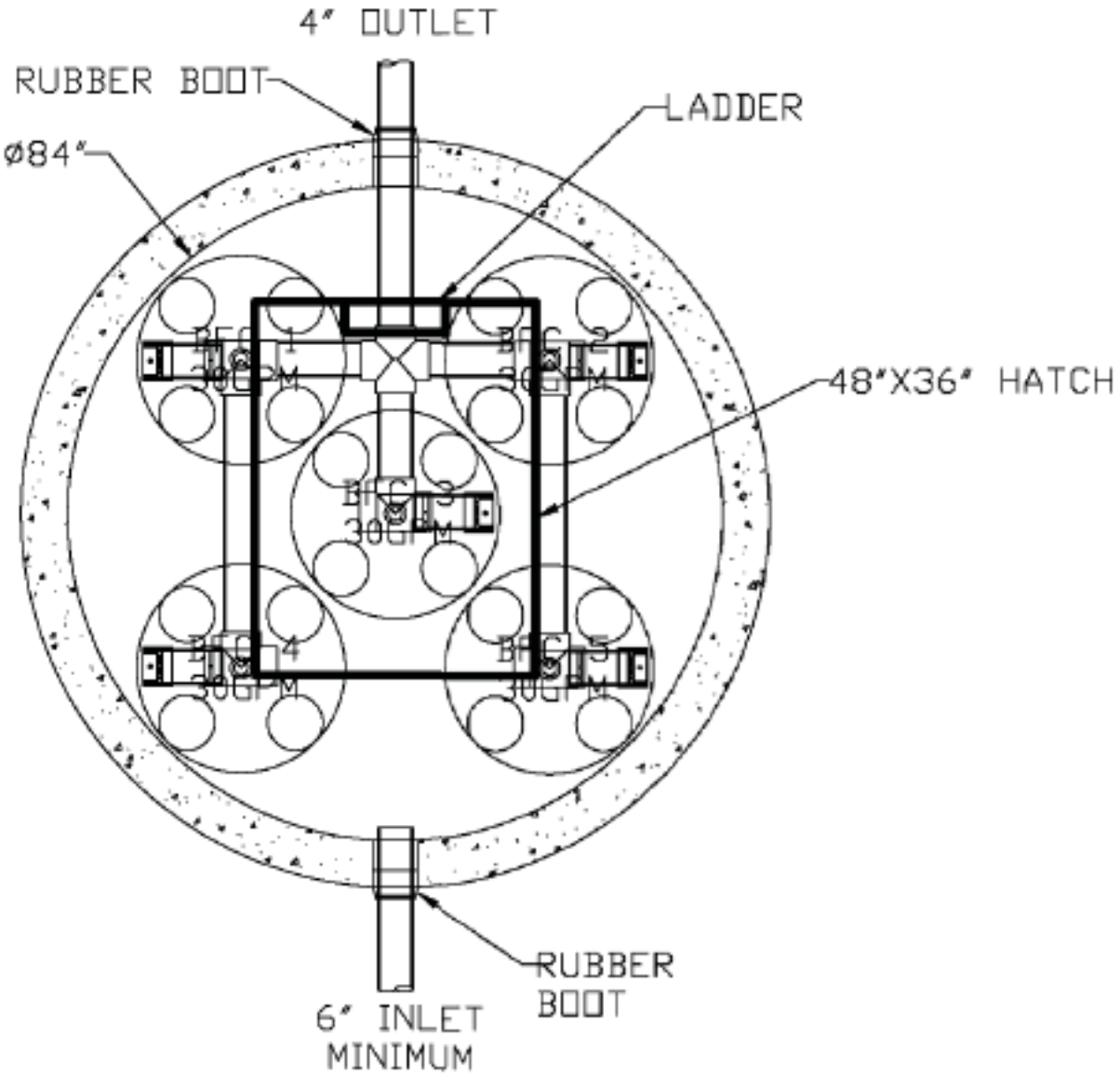

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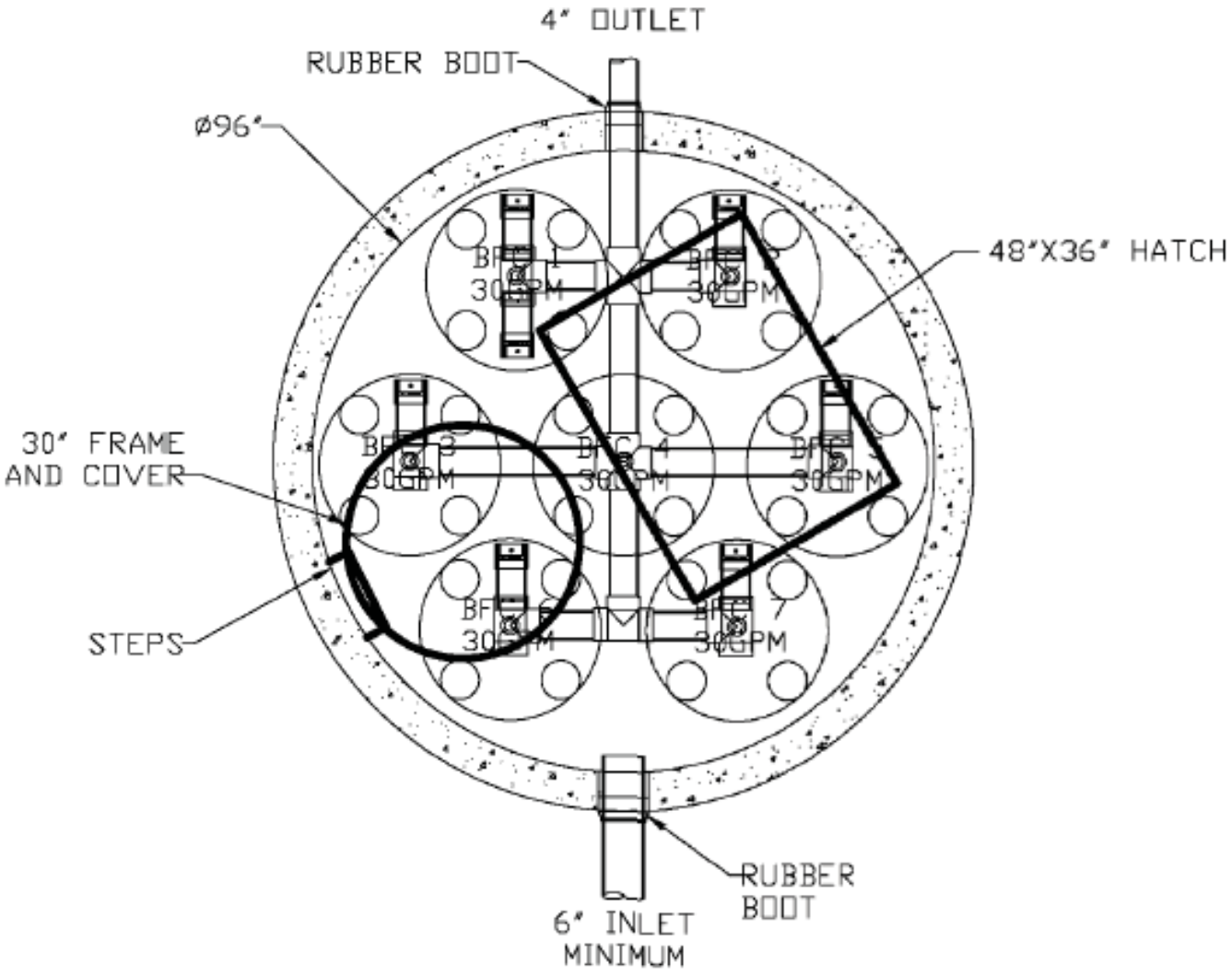

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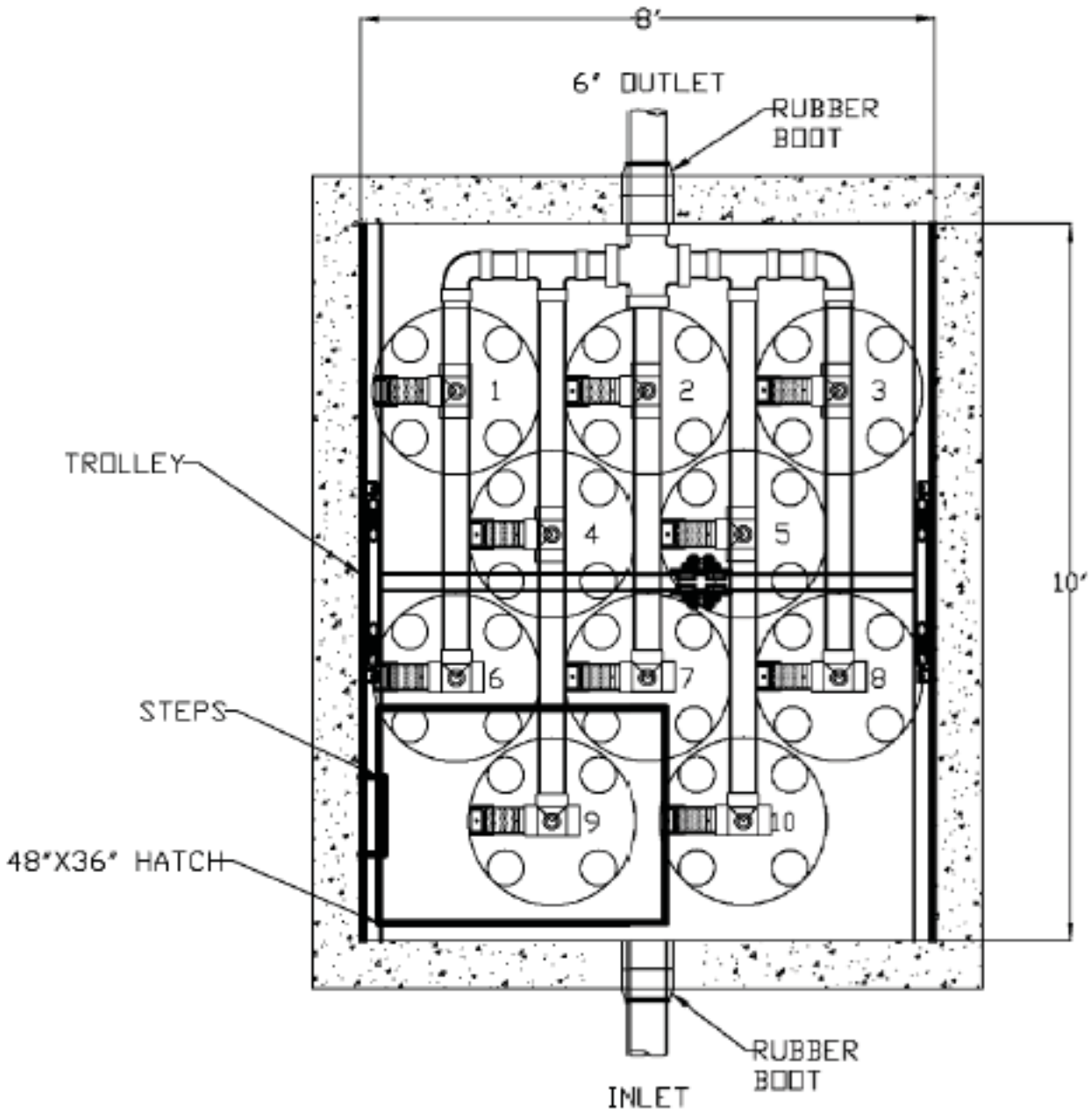

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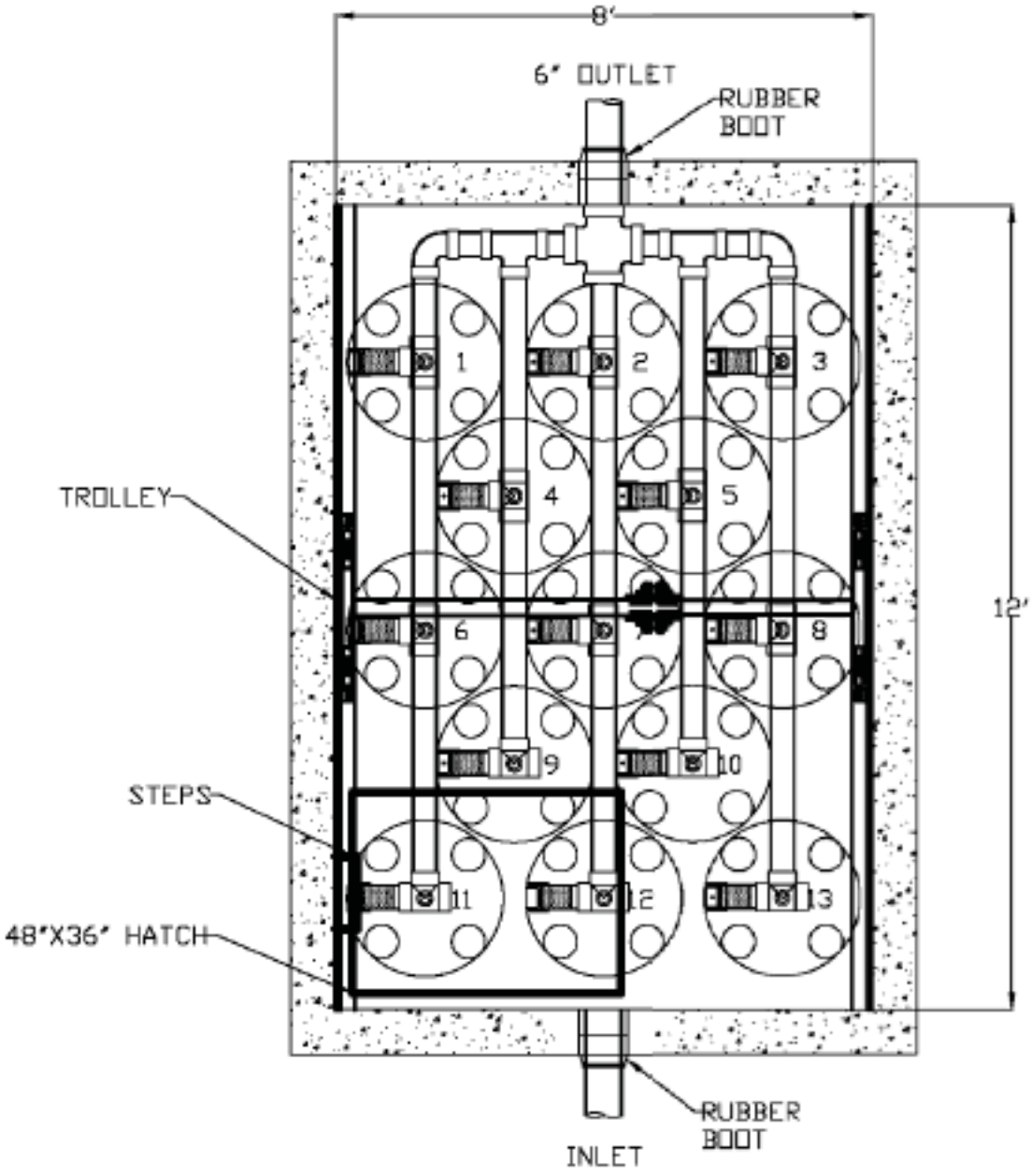

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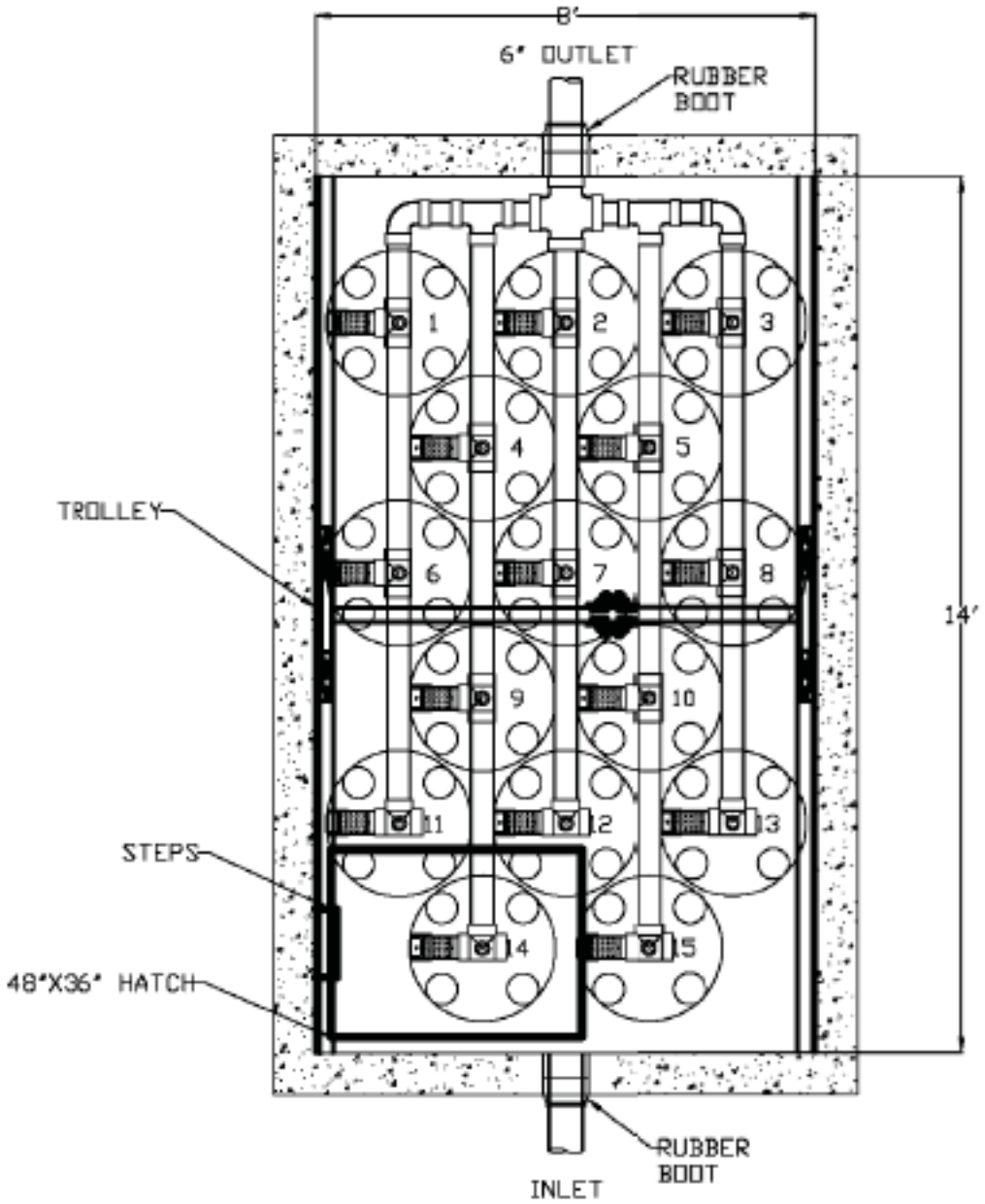

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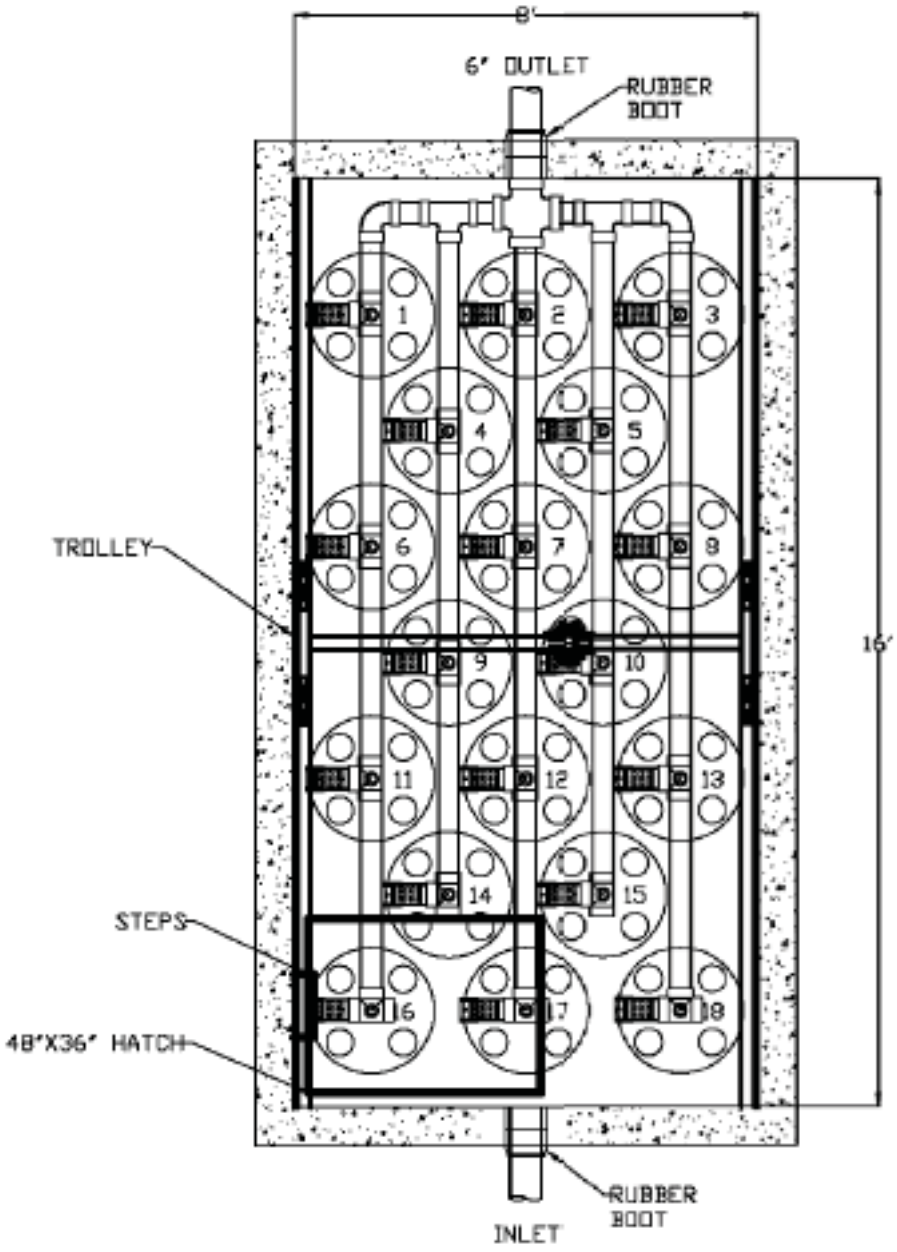

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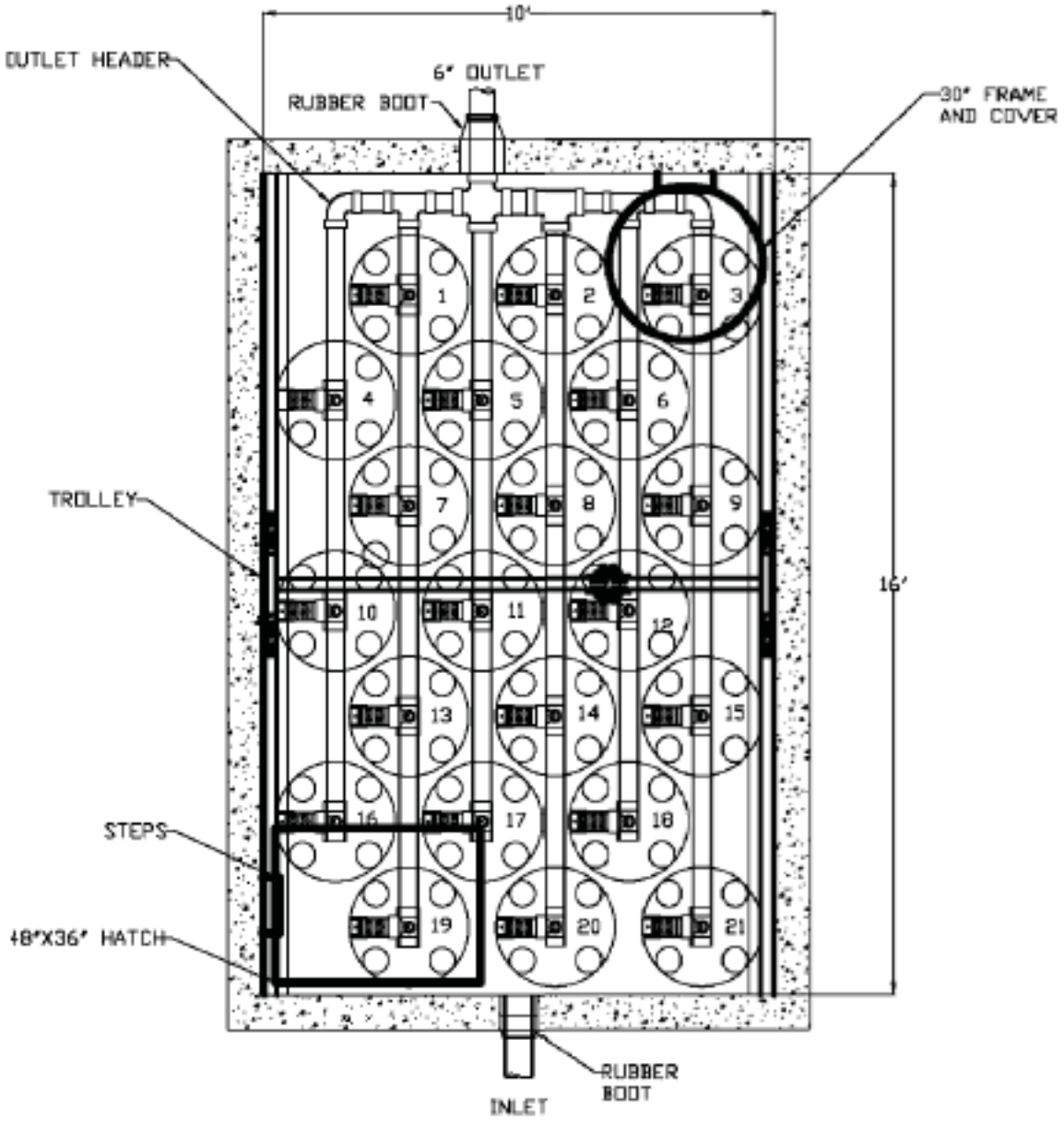

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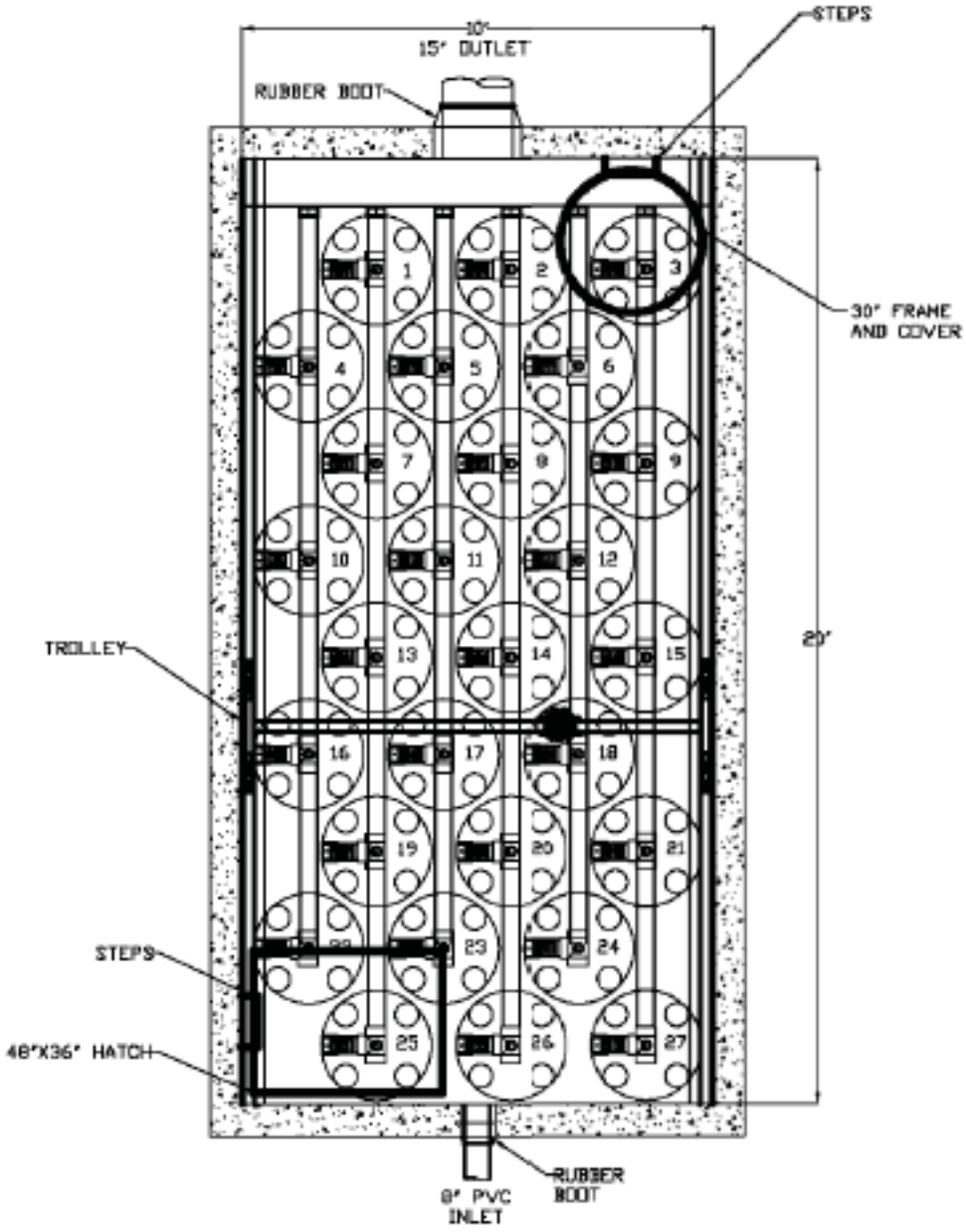

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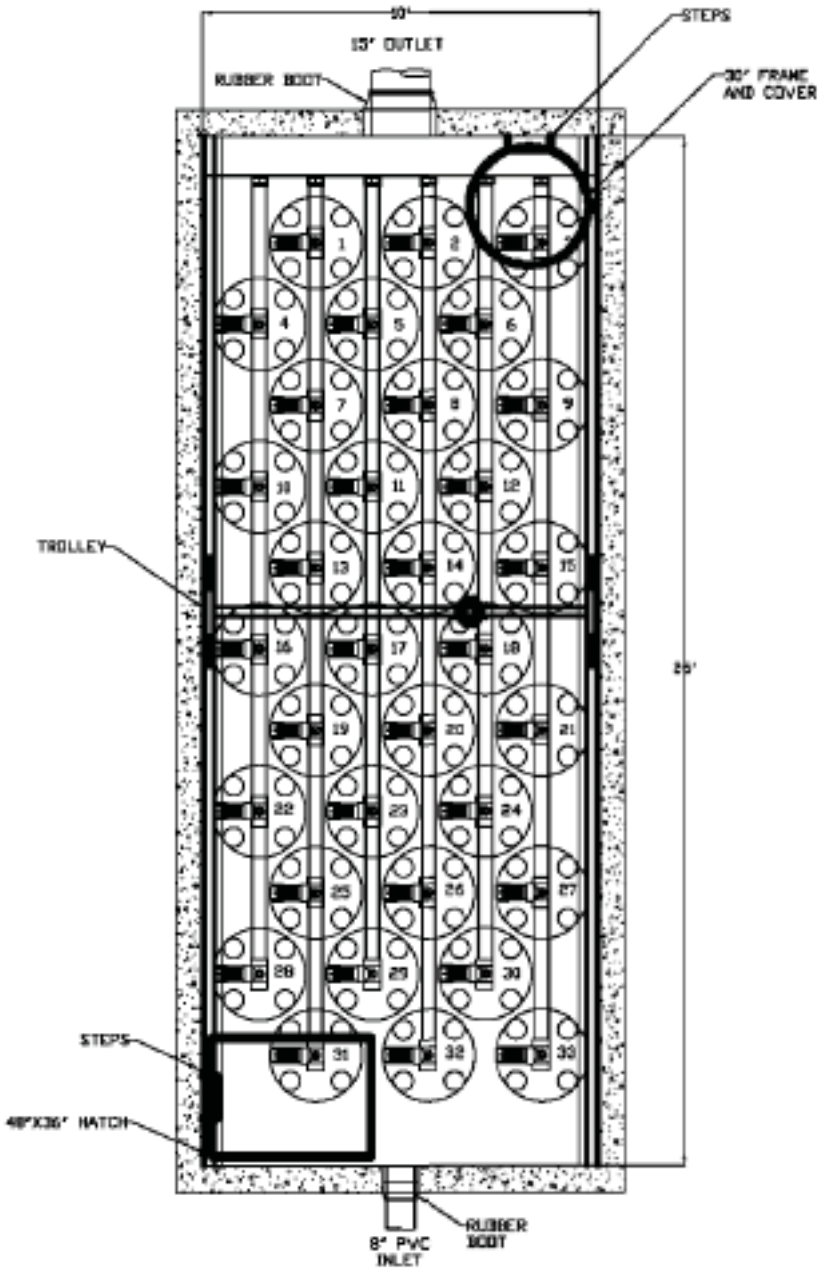

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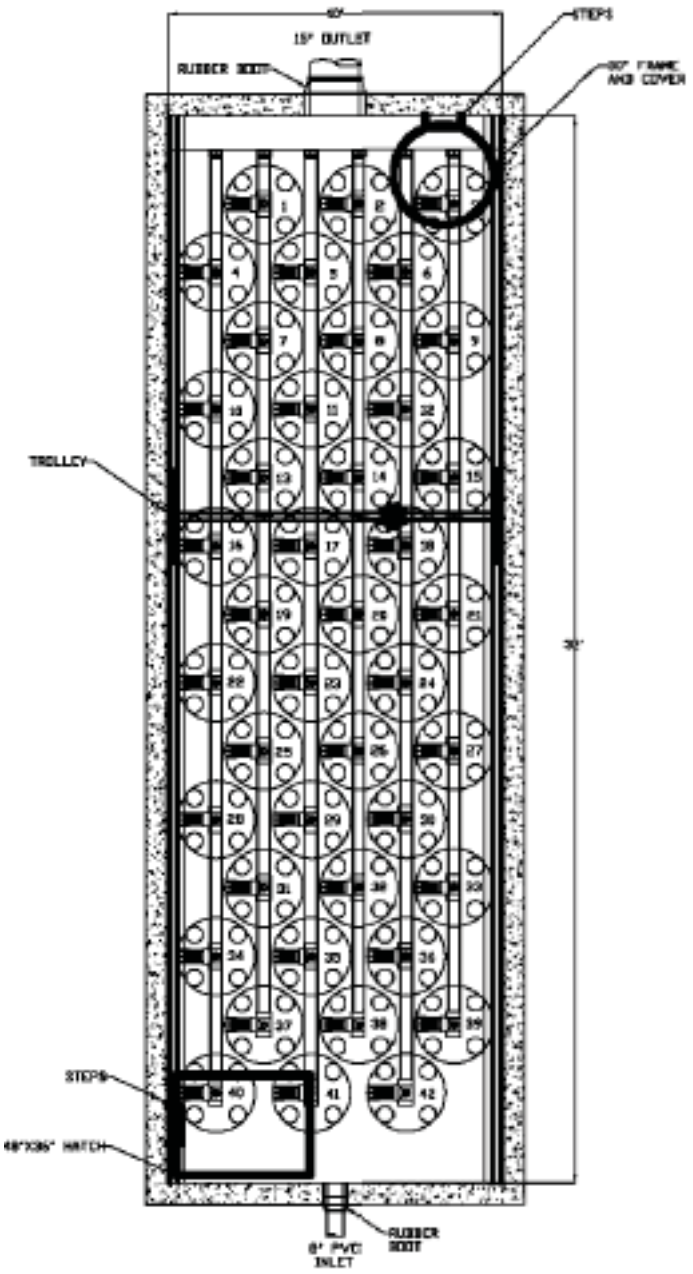

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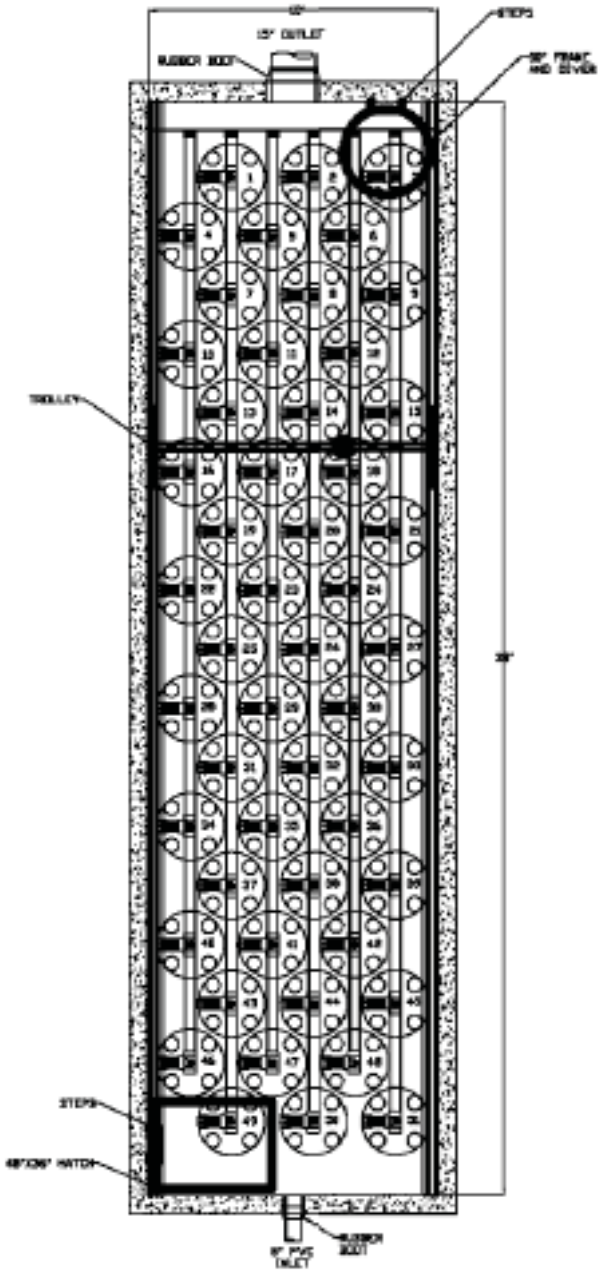

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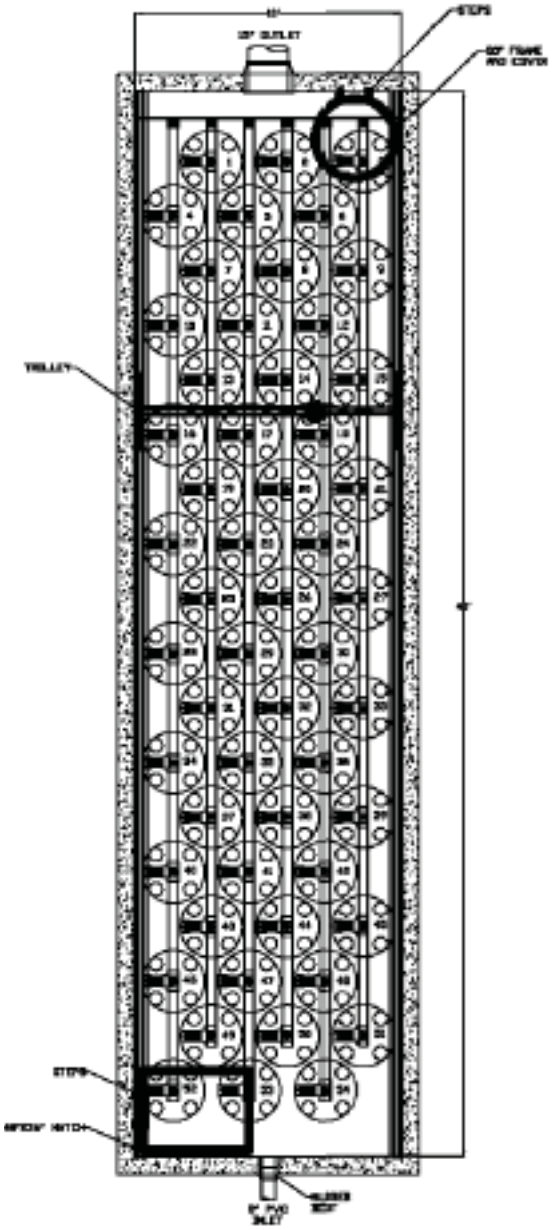

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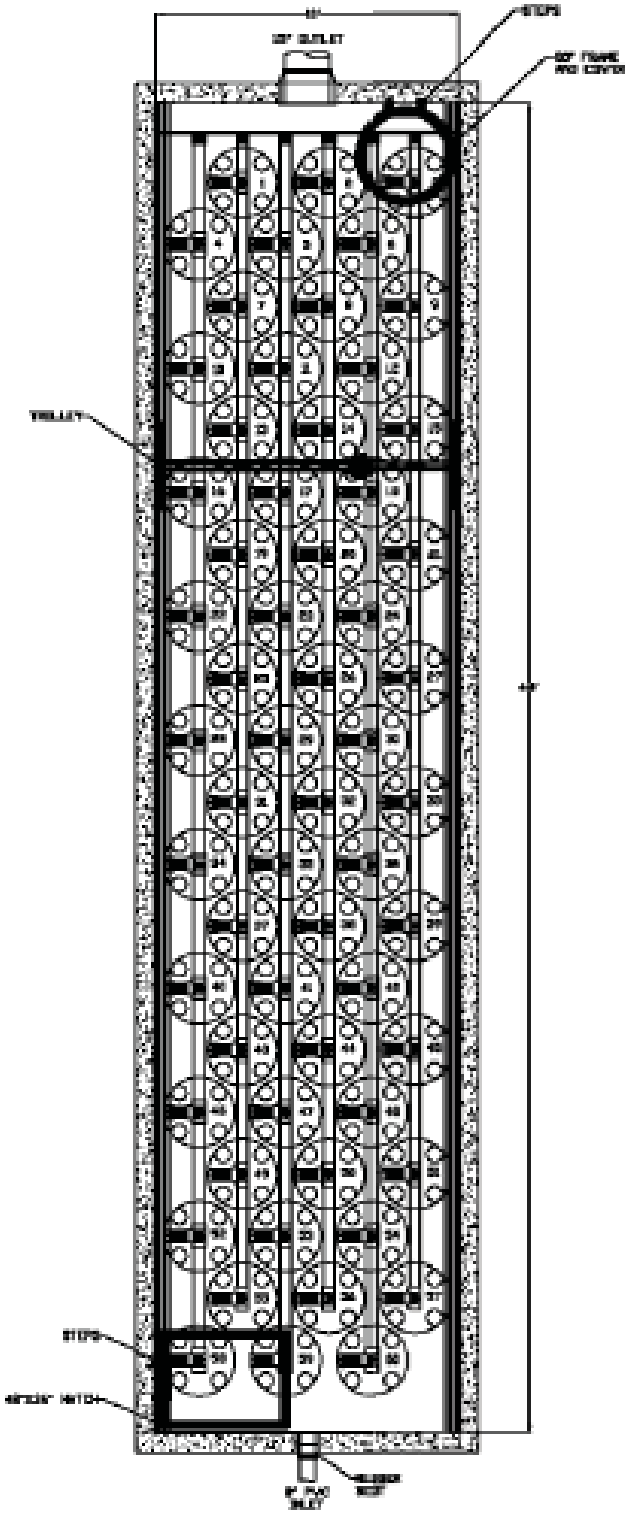

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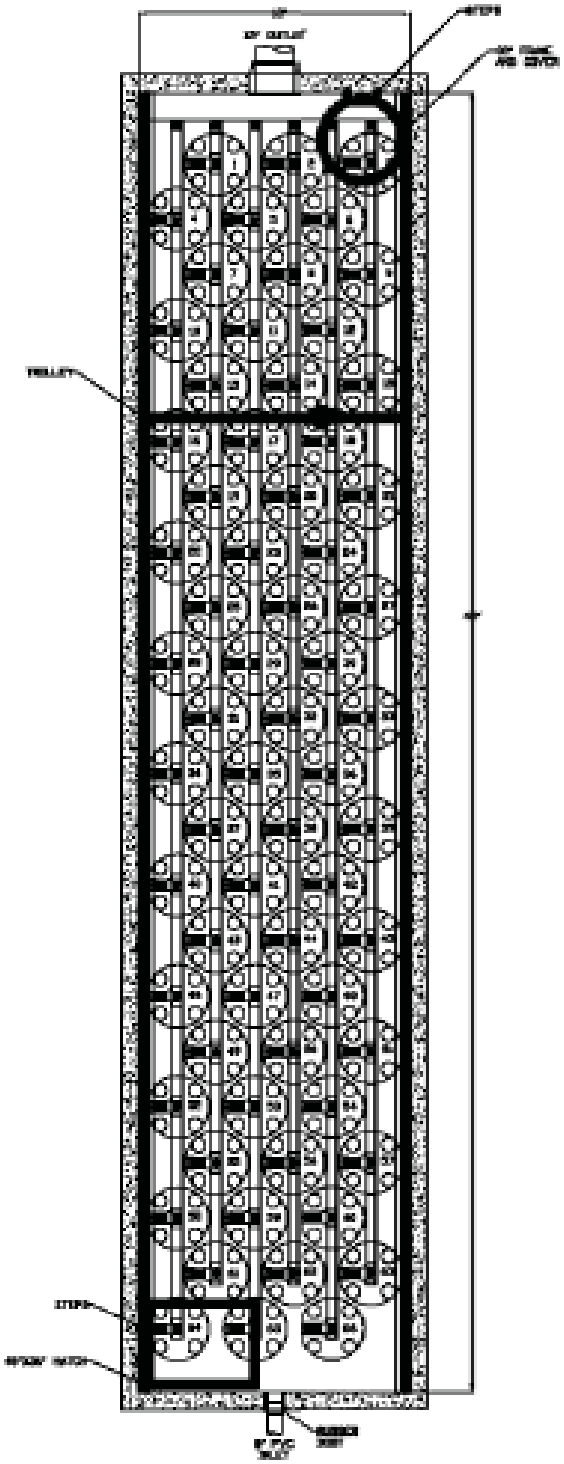

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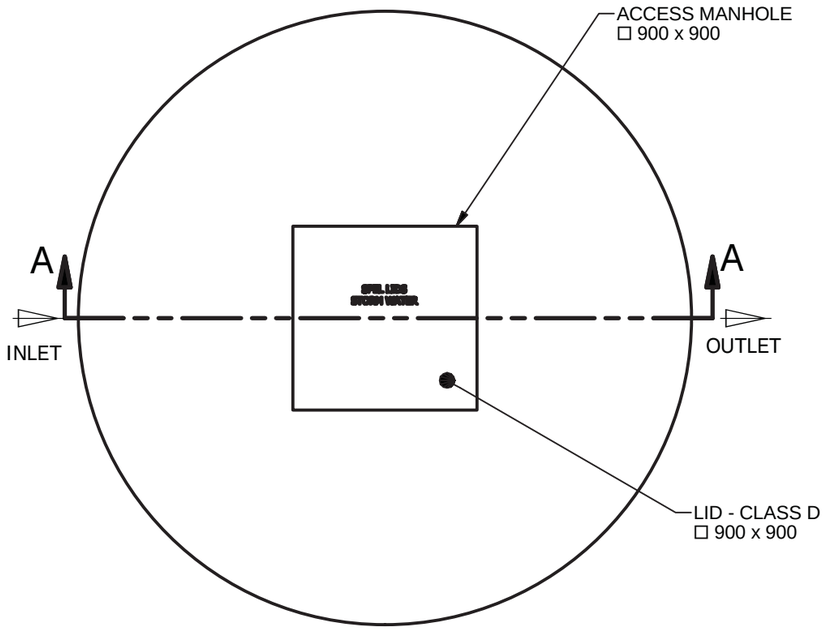
NOT FOR CONSTRUCTION



PLAN VIEW

Site Level Confirmation		
Finished Surface Level (FSL)	RL:	
Access Cover Thickness		mm
Inlet Invert Level	RL:	
Outlet Invert Level	RL:	
Company:		
Name:		
Date:		

APPROVED..... ☐

NAME.....

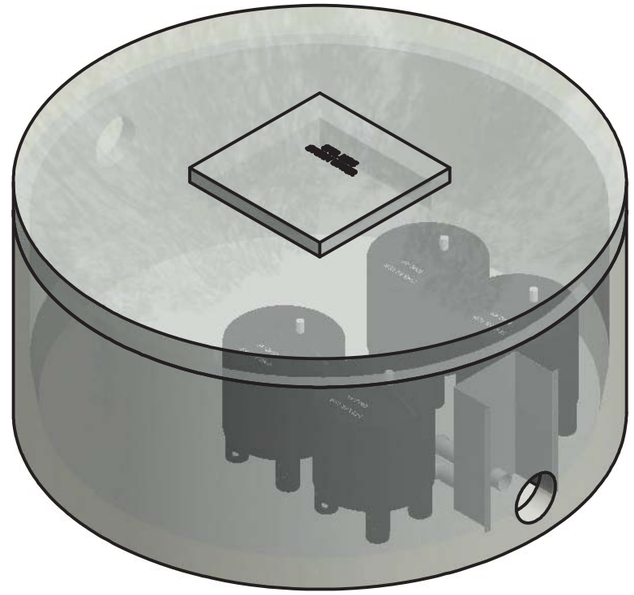
SIGNED.....

DATE...../...../.....

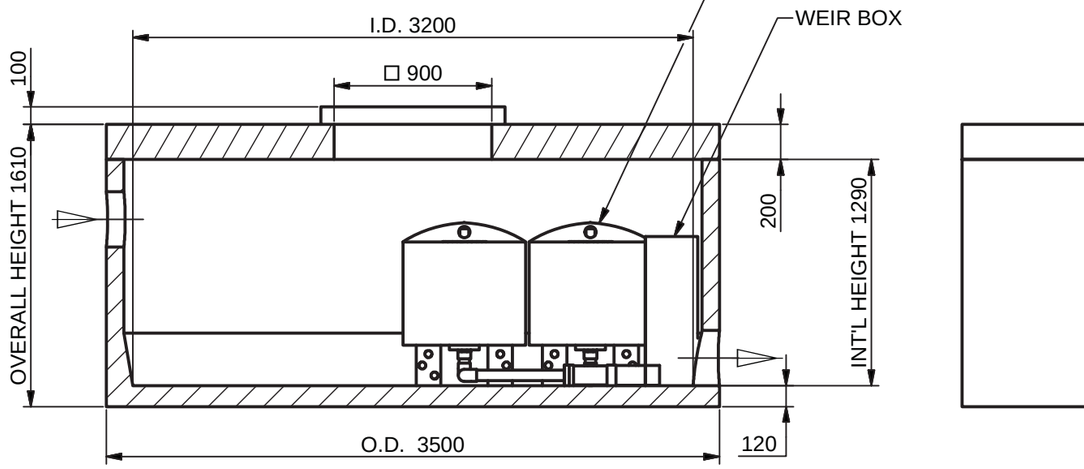
TANK WEIGHTS	
TANK	LID
5.5 t	4.8 t

NOTE:
LIFTING WEIGHTS MAY VARY
DEPENDING ON CUSTOM DESIGN

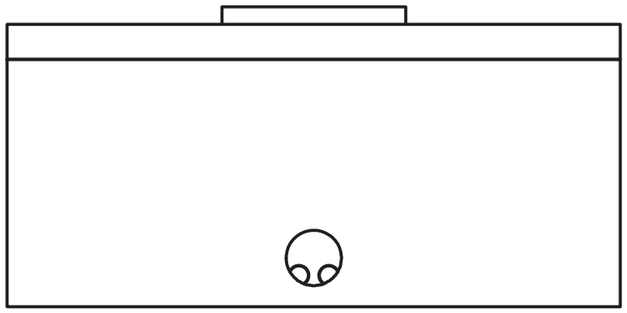
REVISION HISTORY				
REV	DESCRIPTION	BY	DATE	CHECKED BY
1	INITIAL RELEASE	P.Z.	27/03/2018	



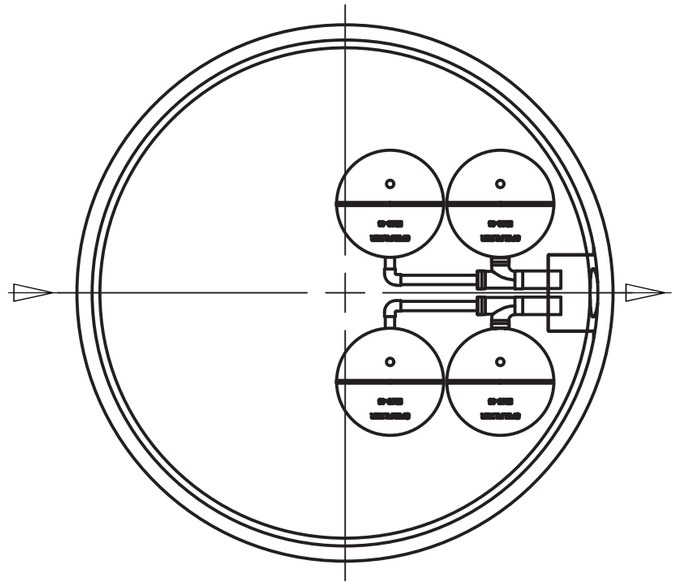
ISOMETRIC VIEW



SECTION A-A



SIDE VIEW



PLAN VIEW
COVER & LID REMOVED FOR CLARITY

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

CLIENT:

DISTRIBUTOR :

Drawn	P.Z.	Date 27-03-18
Check		Date
Verified		Date
Approved		Date
Request No.	RN1829	

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

PROJECT :

TITLE
SPEL PRECAST TANK
10.2 kL CLASS D
SF.320D/04-29.CON.300
4 SPEL FILTER CARTRIDGES

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE :

DWG No. SP18-SF10800-P

C:\Vault Working Folder\Designs\SPEL\PRODUCTS\FILTER\EMC-45\STANDARD\04 FILTERS\CONCRETE\PROJECTS\SPEL PRECAST T44 TANK\SP

APPROVED..... ☐

NAME.....

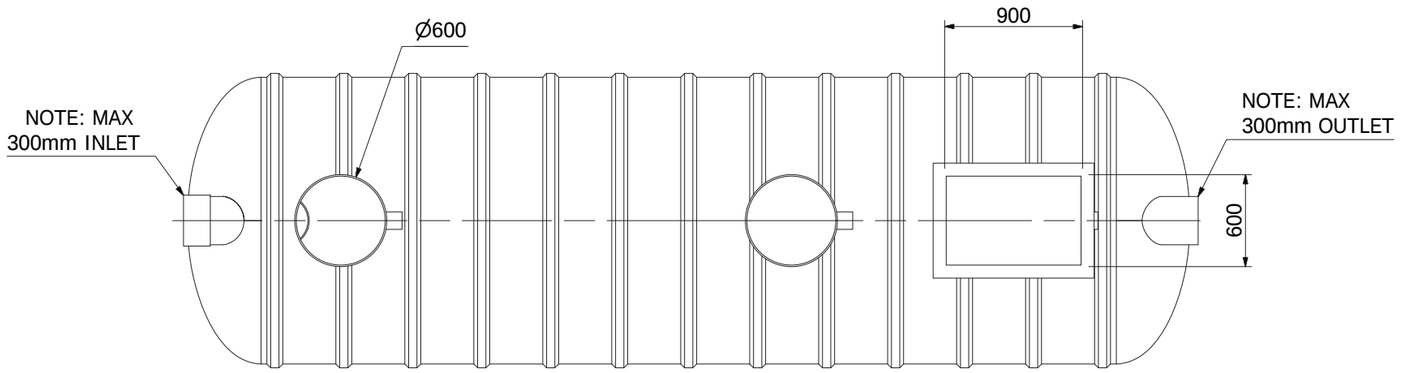
SIGNED.....

DATE...../...../.....

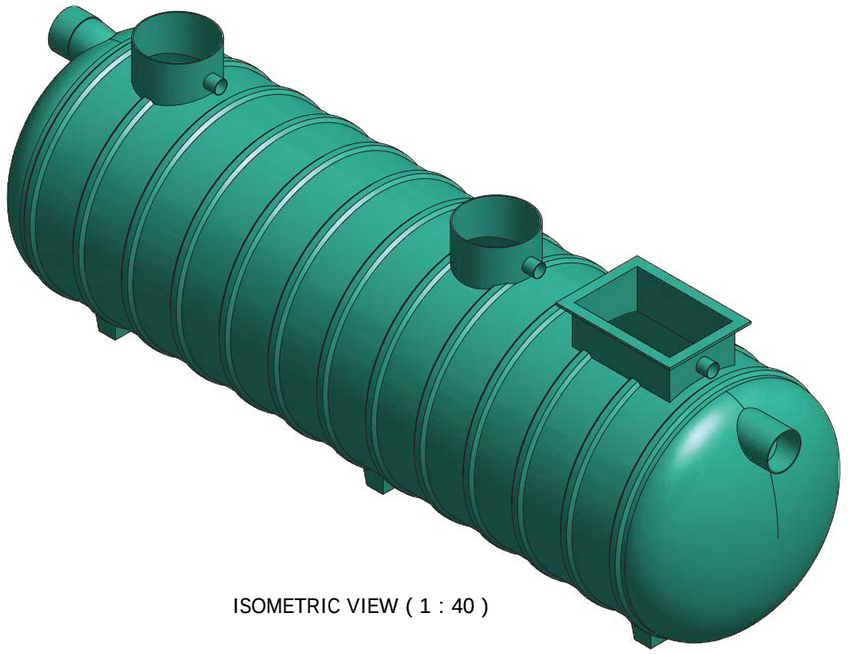
ISSUE FOR APPROVAL

NOT FOR CONSTRUCTION

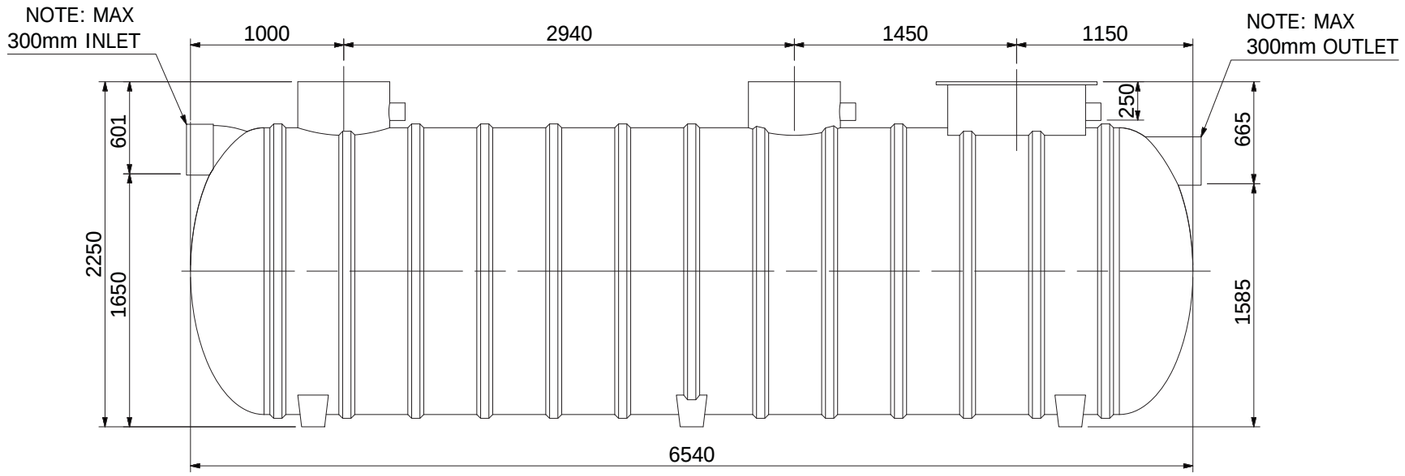
REVISION HISTORY				
REV	DESCRIPTION	DESIGNER	DATE	APPROVED
1		N.G	29/09/2014	



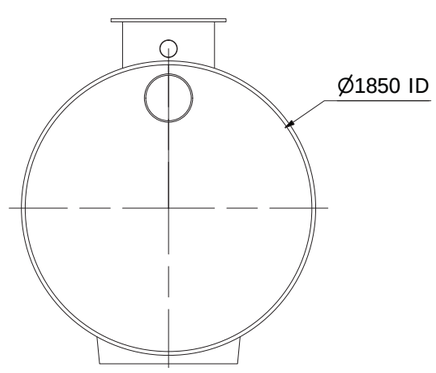
PLAN VIEW (1 : 40)



ISOMETRIC VIEW (1 : 40)



ELEVATIOIN VIEW (1 : 40)



RHS END VIEW (1 : 40)

APPROXIMATE:
WORKING CAPACITY = 14400L
SPILL CAPACITY = 7000L
SILT CAPACITY = 3500L
TOTAL MASS = 1240KG
MATERIAL = FIBREGLASS

TOLERANCE: ALL DIMENSIONS ±10mm UNLESS OTHERWISE STATED.

CLIENT:

DRAWN BY: N.G	DATE: 3/10/2014
CHECKED BY:	DATE:
VERIFIED BY:	DATE:
APPROVED BY:	DATE:
DRAWING REQUEST NUMBER: D20669	

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS
100 Silverwater Road Silverwater NSW 2128
PH: 1300 773 500 | E: sales@spel.com.au
www.spel.com.au

TITLE:
SPEL PURACEPTOR
P.040.C1.2C.A
STD PURACEPTOR
GENERAL ARRANGEMENT

PROJECT NUMBER:	SIZE:	SHEET:	REV:
	A3	1	1

SCALE:	DWG No:
N.T.S	SP14-PC5820-S