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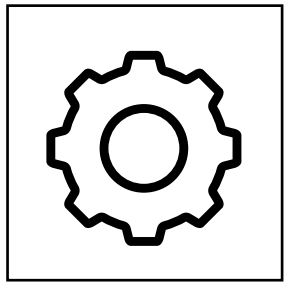
DESIGN CONSIDERATIONS FOR PLASTIC UNDERGROUND STORMWATER SYSTEMS FROM A FIELD PERSPECTIVE

Presented by: Amy Woods

TOPICS



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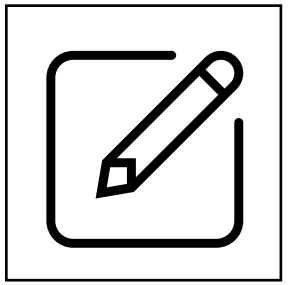
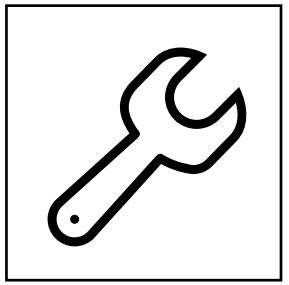


On-Site Problems Encountered



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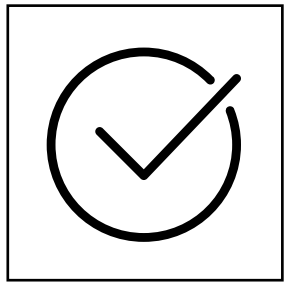
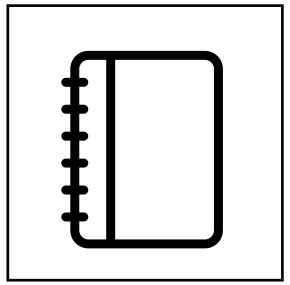
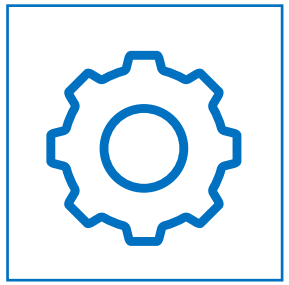


Post Construction



Recommendations

TOPICS



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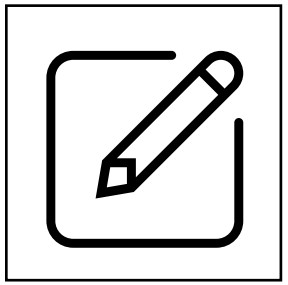

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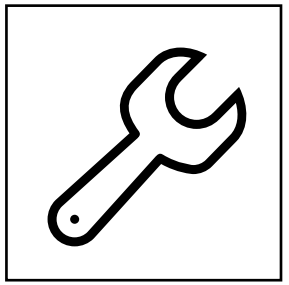

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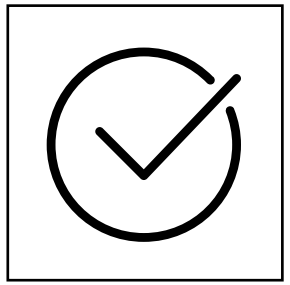

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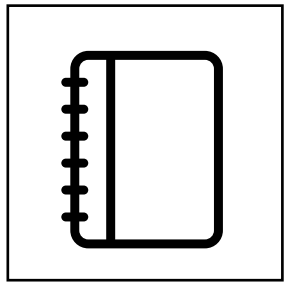


Recommendations

THE WAY WE USED TO DESIGN

[AVAILABLE LAND | $$$$]

HOW DO YOU SELECT THE BEST SYSTEM?

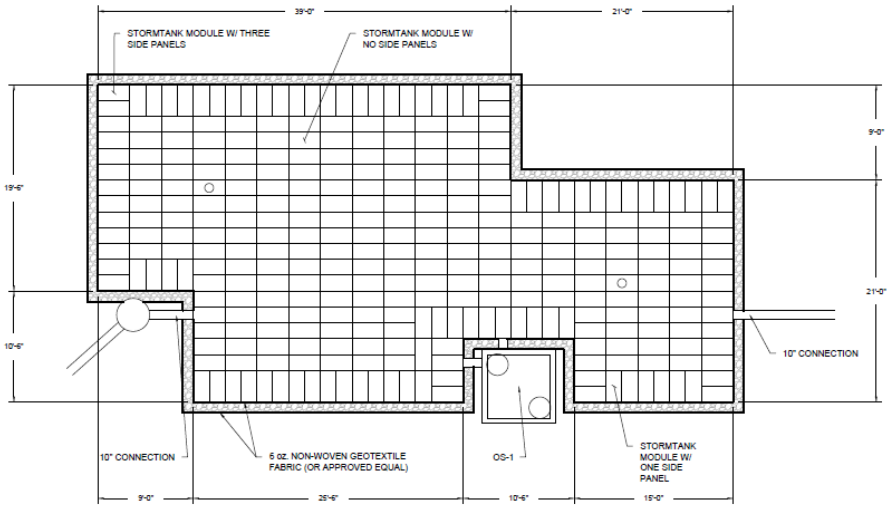
SYSTEM SIZE COMPARISON

- Space
- Stone
- Footprint Available
- Excavation/Haulage

SYSTEM LAYOUT

COMMON CONSIDERATIONS

- **SHAPE (SQUARE, RECTANGULAR, L, T)**
- **OBSTRUCTIONS (UTILITIES, TREES, ETC.)**
- **CONNECTIONS**
  - Structure abutment
  - Header Manifolds
  - Connection Direction




HIGH WATER TABLE

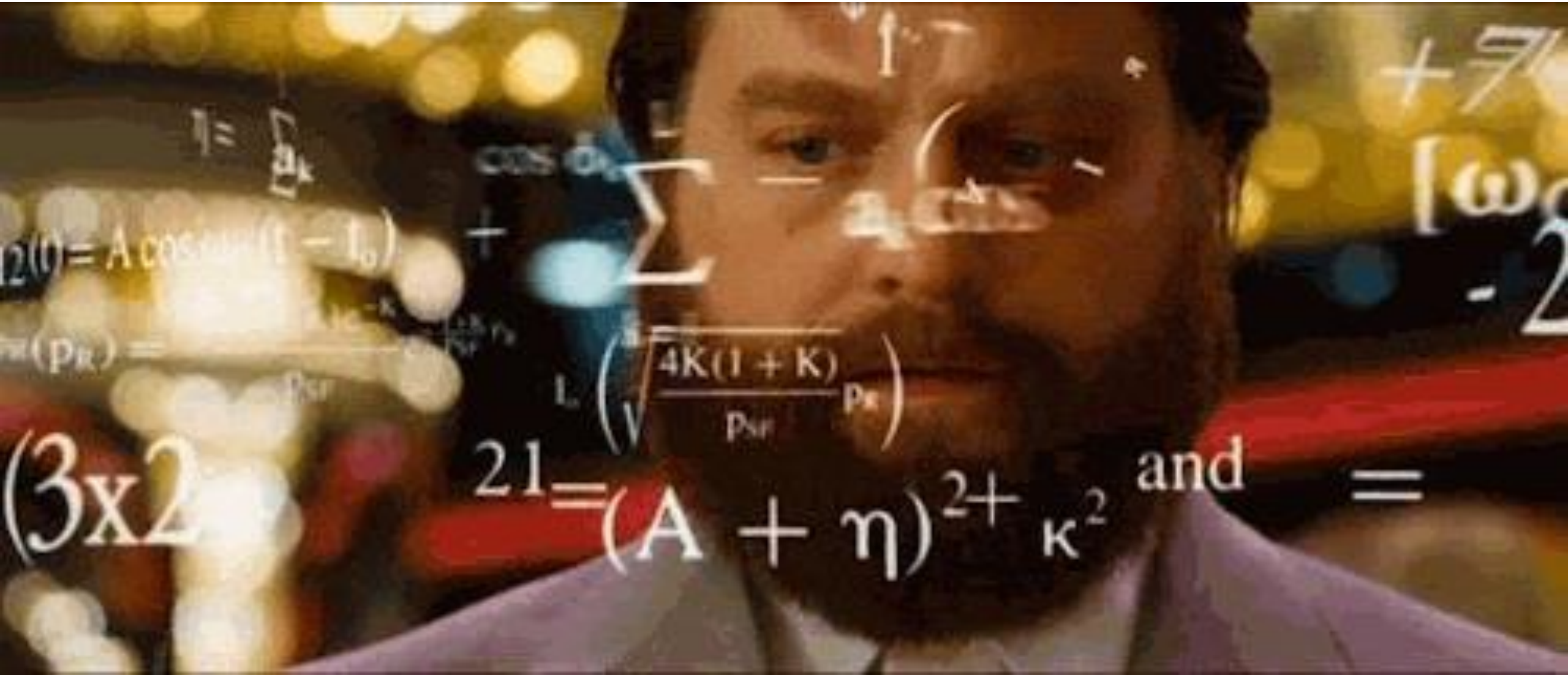
You will need a liner, or the system will fill with ground water

Plastic Floats… So what's the answer? Concrete??

Concrete can float too…

UNDERGROUND STORMWATER

WHAT IS THE UPLIFT PRESSURE?



WHAT IS THE UPLIFT PRESSURE?

- Water 10 kN/m3 (62.4pcf)
- Stone 19 kN/m3 (120 pcf)

💲 Concrete 23 kn/m3 (145 pcf)

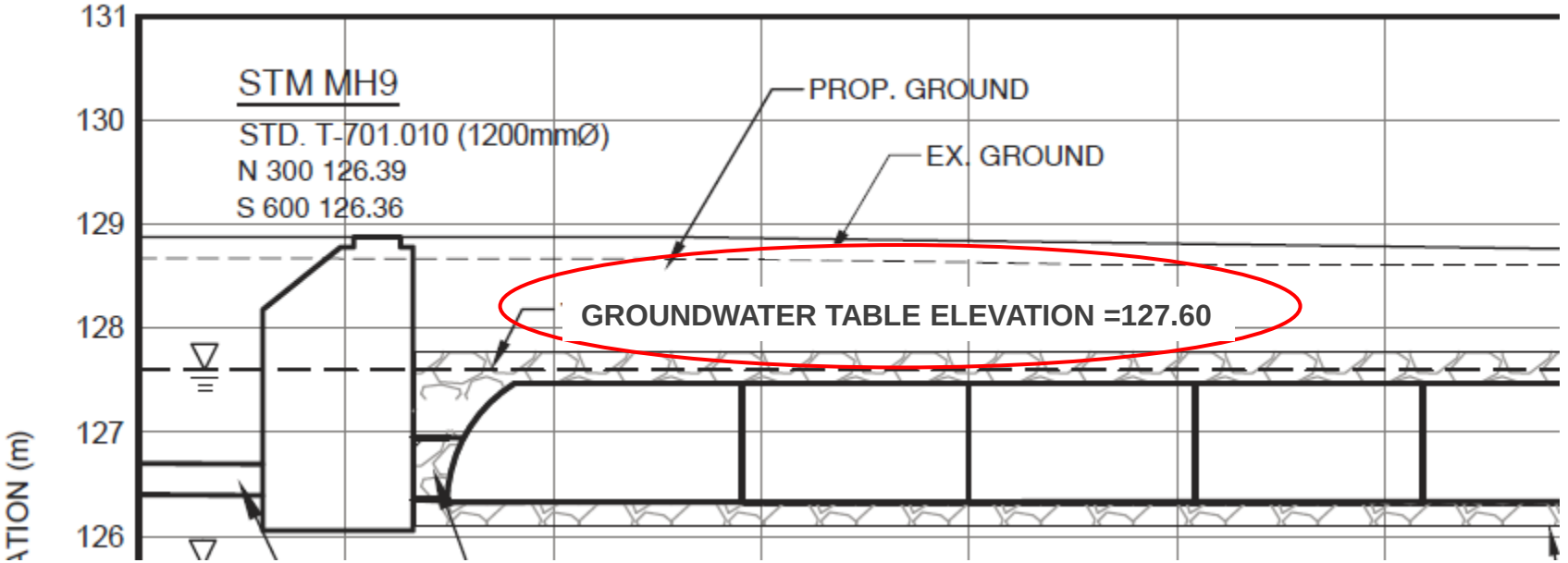
WHAT IS THE UPLIFT PRESSURE?

- Water 10 kN/m3 (62.4pcf)
- Stone 19 kN/m3 (120 pcf)

=

TO COUNTERACT UPLIFT PRESSURE

- soil cover (ballast) = ½ tank height



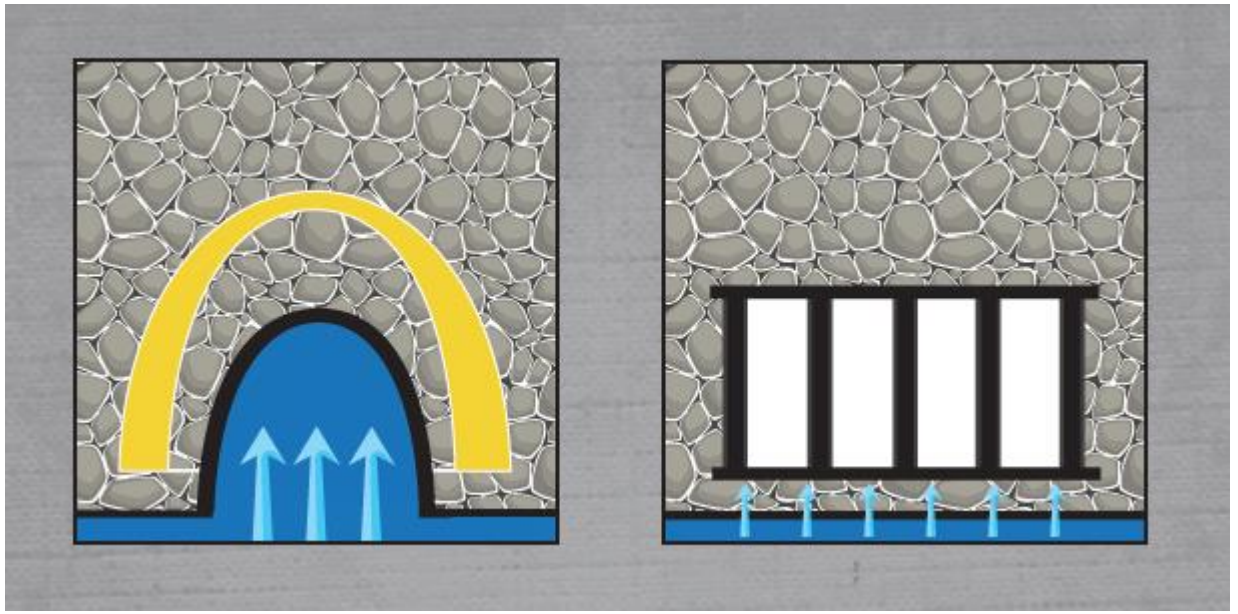
- Arch systems must have this UNDER the arches, above the liner

TO COUNTERACT UPLIFT PRESSURE

- soil cover (ballast) = ½ tank height

- Arch systems must have this UNDER the arches, above the liner

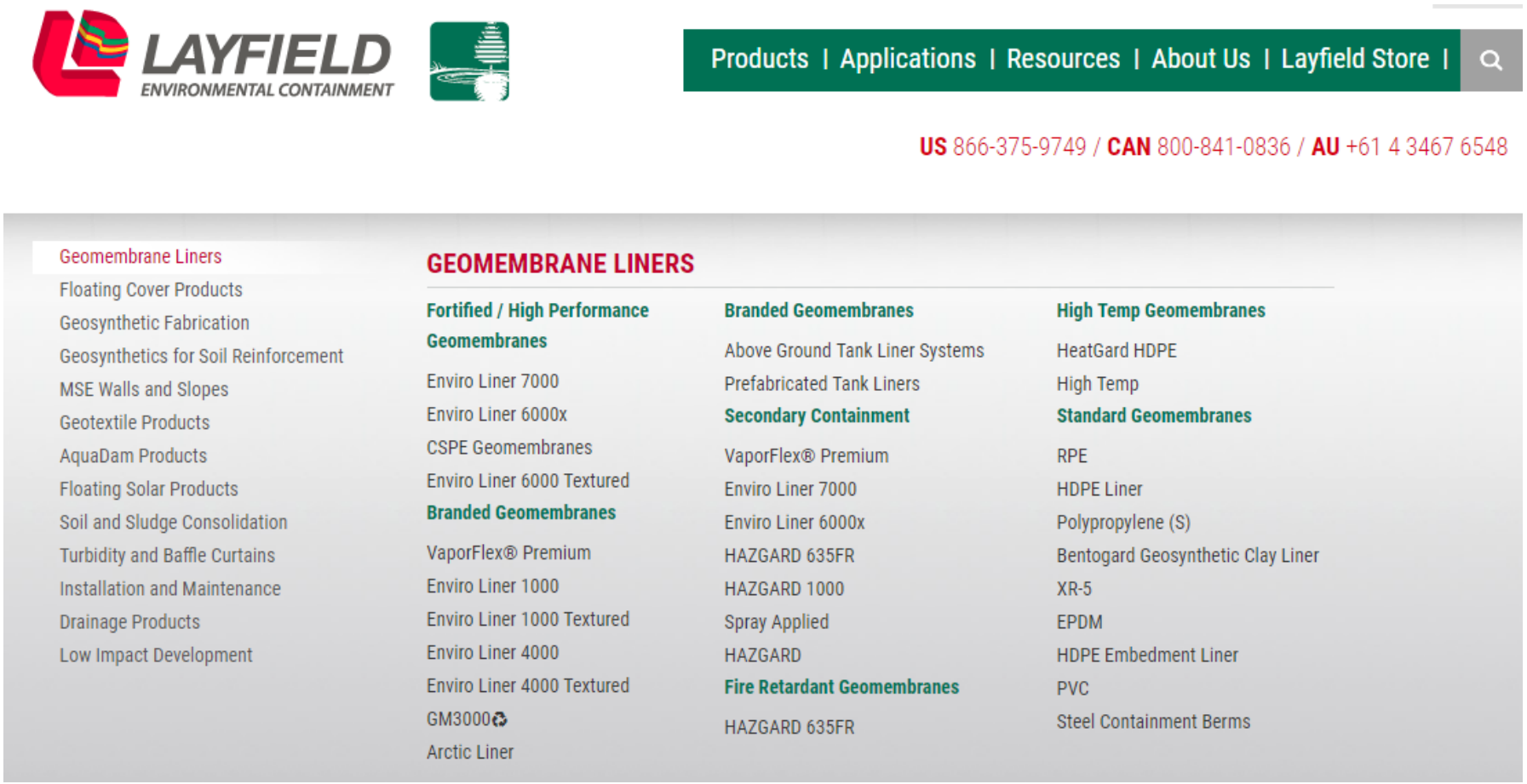
TO COUNTERACT UPLIFT PRESSURE



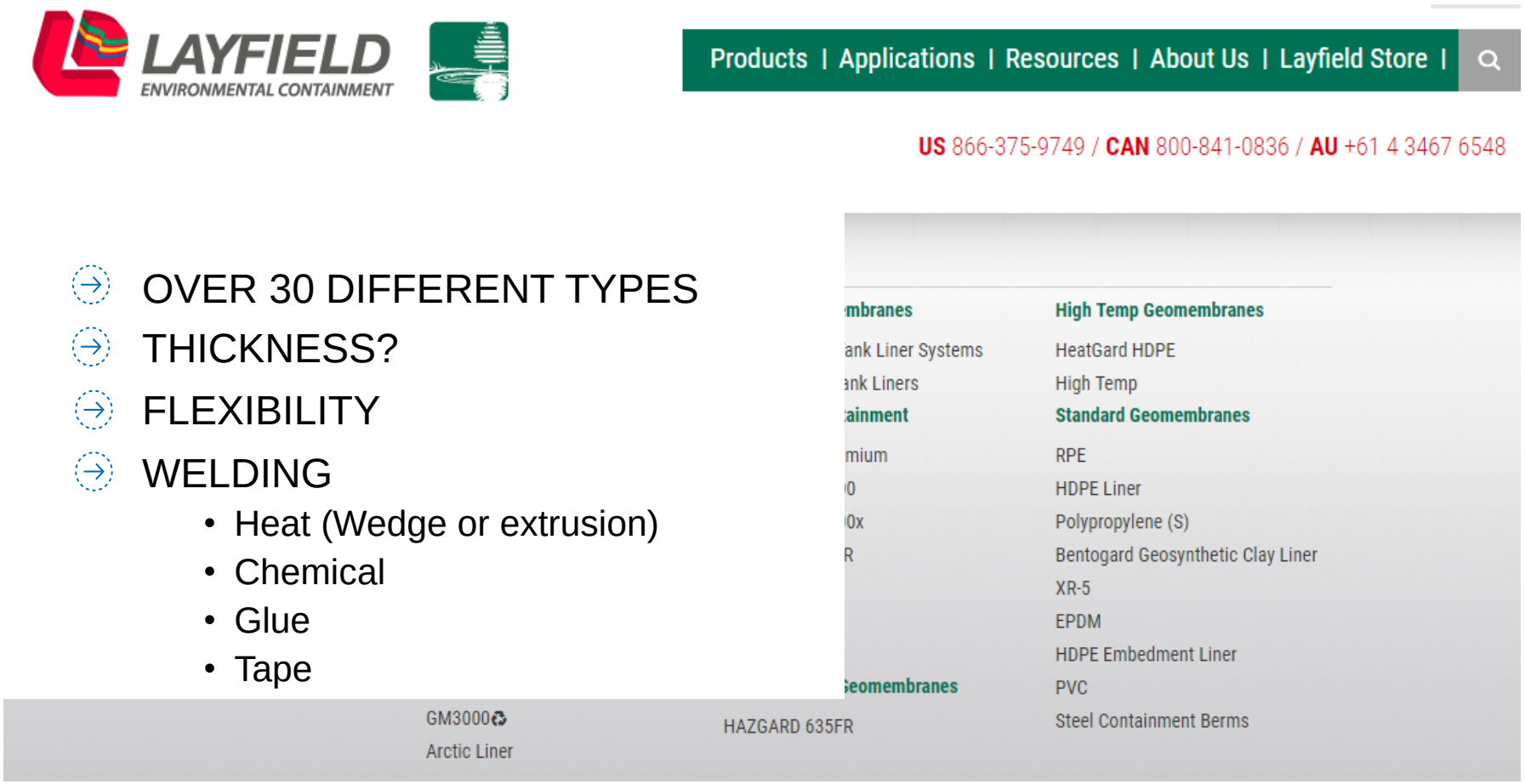
- Arch systems must have this UNDER the arches, above the liner
- Flat bottom systems can incorporate design cover ABOVE the tank

UNDERGROUND STORMWATER

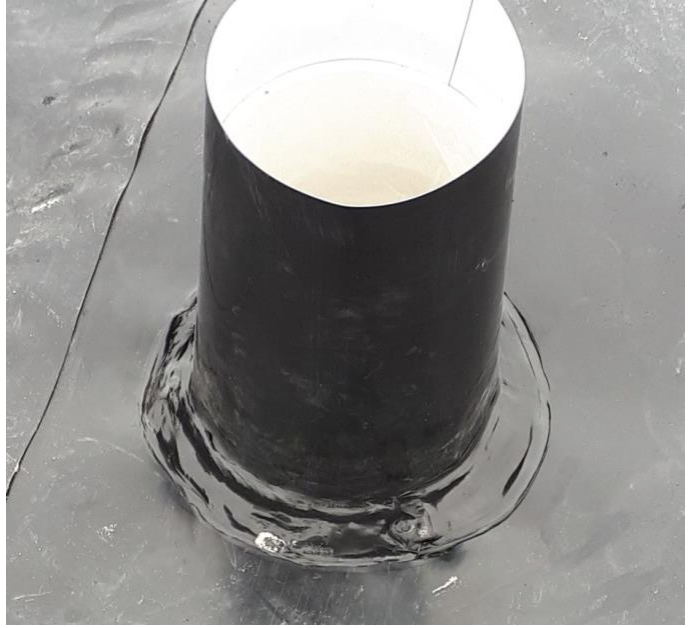
GEOMEMBRANE LINERS



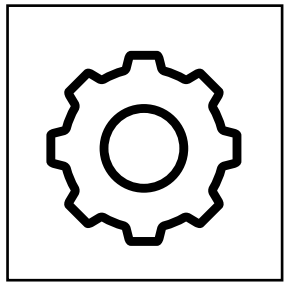
GEOMEMBRANE LINERS



- OVER 30 DIFFERENT TYPES
- THICKNESS?
- FLEXIBILITY
- WELDING
  - Heat (Wedge or extrusion)
  - Chemical
  - Glue
  - Tape

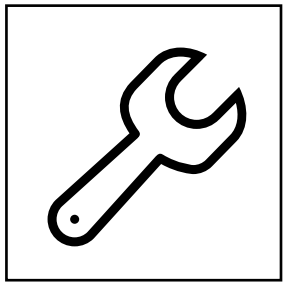


TOPICS



Design

On-Site Problems Encountered



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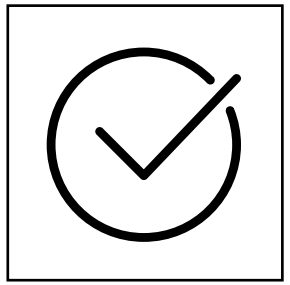

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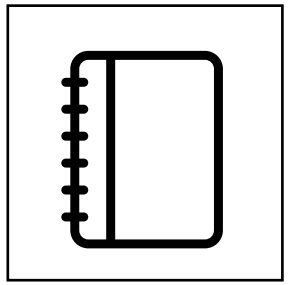


Recommendations

CONSTRUCTION BEGINS


ON
NG LTD

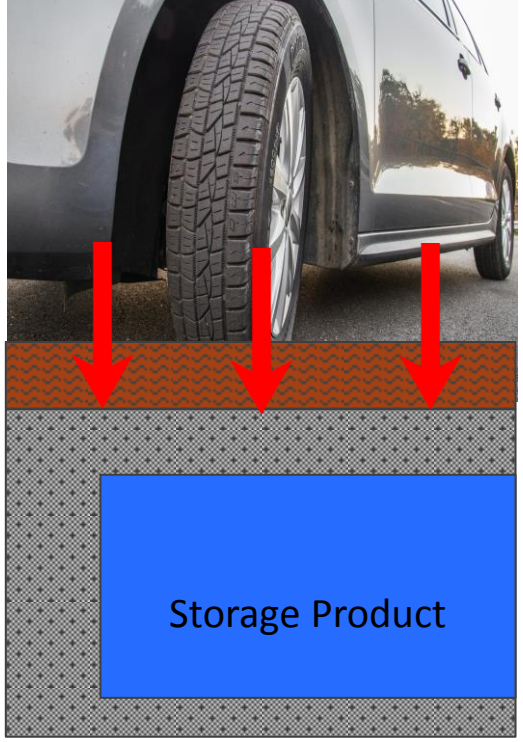

ON
NG LTD

Are the banks stable?

Excavation is too small...


What’s the temperature?

That’s a DEEP hole



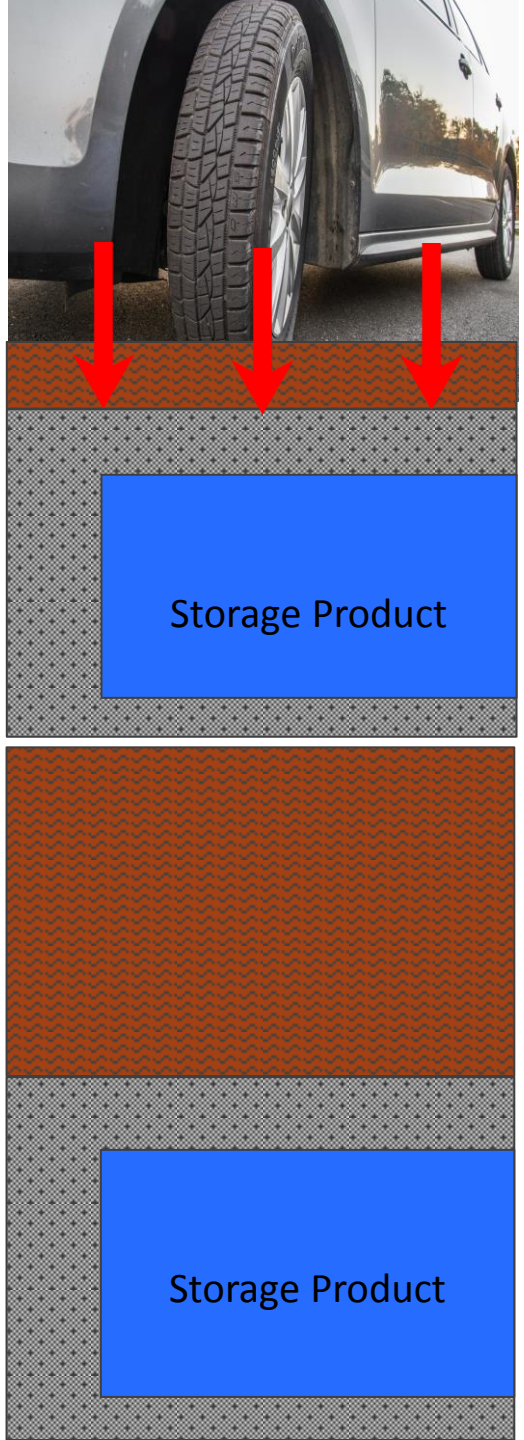
UNDERGROUND STORMWATER

DEPTH OF COVER

Need to calculate the minimum
amount of cover

MINIMUM COVER

- Vehicular Loading
- Distribute Live Load



UNDERGROUND STORMWATER

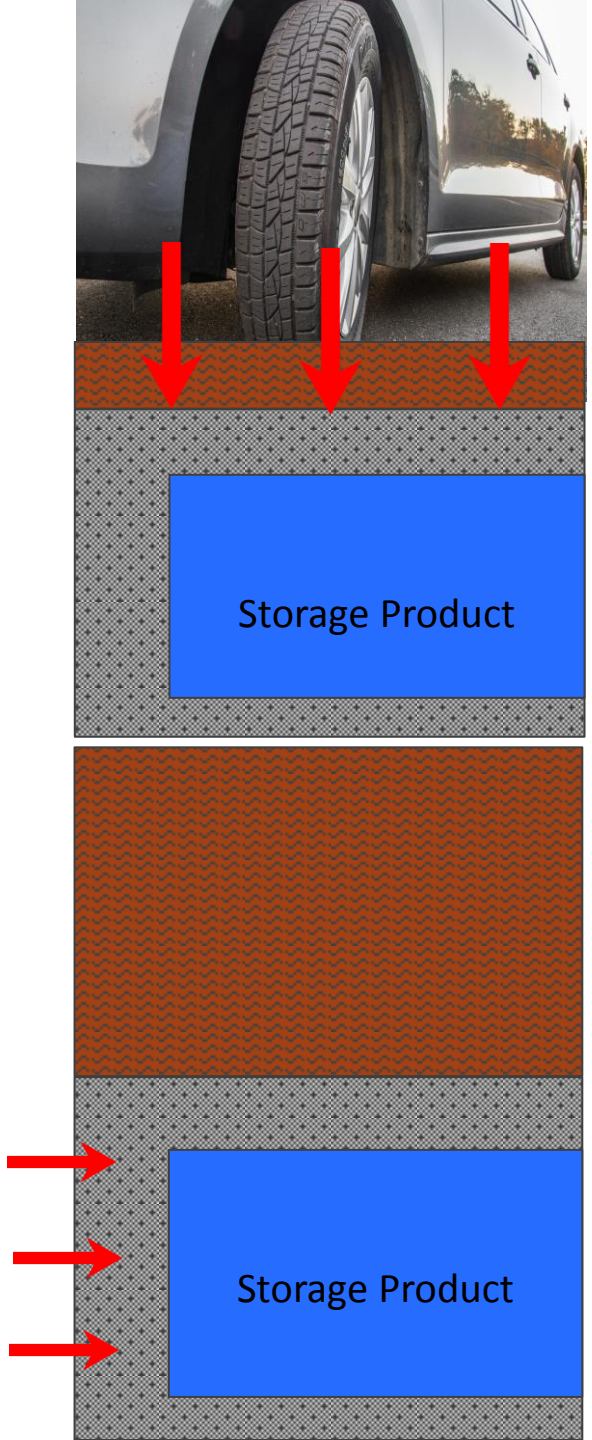
DEPTH OF COVER

Need to calculate the minimum AND maximum amount of cover

MINIMUM COVER

- Vehicular Loading
- Distribute Live Load

MAXIMUM COVER



UNDERGROUND STORMWATER

DEPTH OF COVER

Need to calculate the minimum AND maximum amount of cover

MINIMUM COVER

- Vehicular Loading
- Distribute Live Load

MAXIMUM COVER

- Lateral Load

BACKFILL MATERIAL

WHY IS IT IMPORTANT?

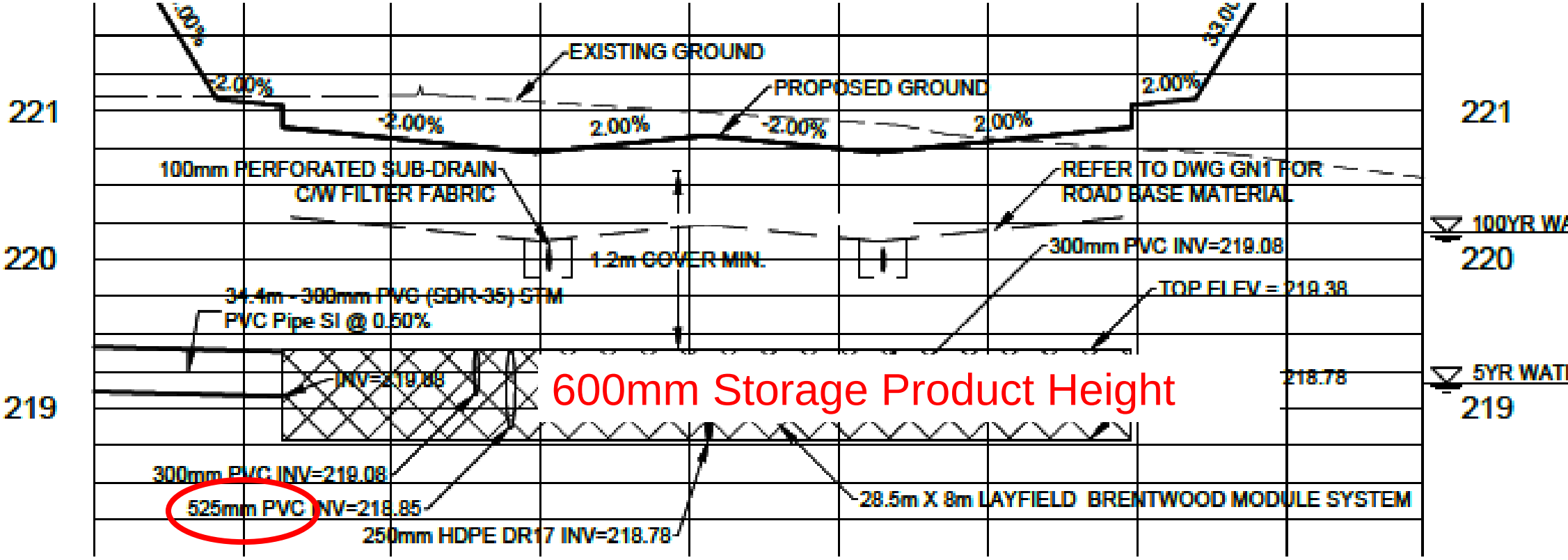
- Stone provides uniform load distribution
- Decreases load transmitted to and from the system
- 40% Void Space

WHAT IS ACCEPTABLE?

- Must be angular stone, no river rock or pea gravel
- ¾” or 19mm clear, minimal compaction required

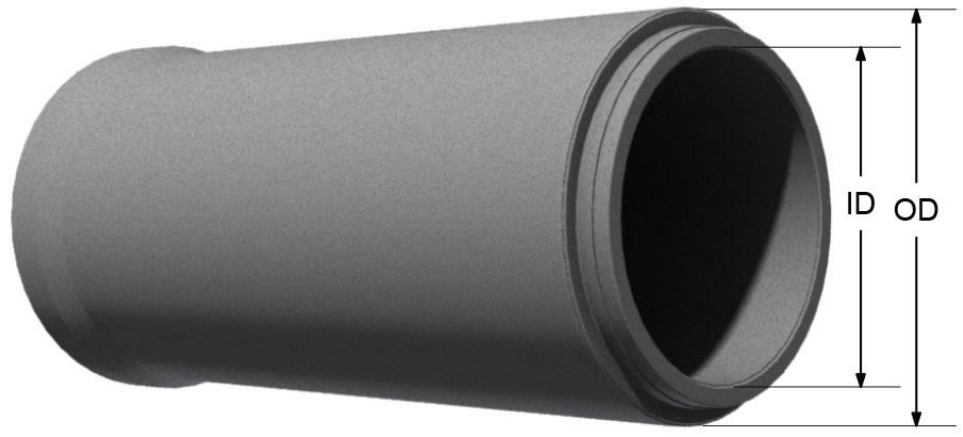
PROBLEMS ENCOUNTERED

inlet too big



CONCRETE PIPE DIMENSIONS

Diameter (mm)	Diameter (in.)	Length (m)	Style	Wall	Weight (kg/pc.)	Lifting Pins	Dimensions (mm)			
							Pipe I.D.	Pipe O.D.	Bell O.D.	Wall Thickne
250	10"	1.25	Belled	B	140	None	254	336	406	41
300	12"	2.44	Belled	C	515	None	305	444	510	70
375	15"	2.44	Belled	C	685	None	381	533	610	76
450	18"	2.44	Belled	B	740	None	447	585	711	64
525	21"	2.44	Belled	C	1100	None	533	711	806	89
600	24"	2.44	Belled	C	1335	None	610	808	900	95
675	27"	2.44	Belled	C	1600	None	685	890	1000	102
750	30"	2.44	Belled	C	1900	None	762	978	1099	108
	36"	2.44	Belled	C	2480	None	914	1156	1302	121
	42"	2.44	Straight	C	2977	4 T	1067	1333	N/A	133
	48"	2.44	Straight	B	3100	4 T	1219	1475	N/A	127
	48"	2.44	Straight	C	3690	4 T	1219	1512	N/A	146
	54"	2.44	Straight	C	4410	4 T	1372	1687	N/A	158
	60"	2.44	Straight	B	4716	8 T	1524	1828	N/A	152



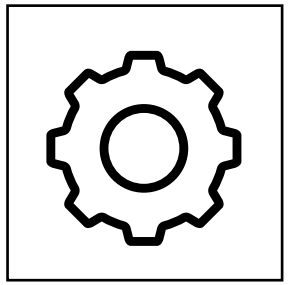
2
S-02a

PLAN VIEW - OPTION B

SCALE: 1:50


207

TOPICS



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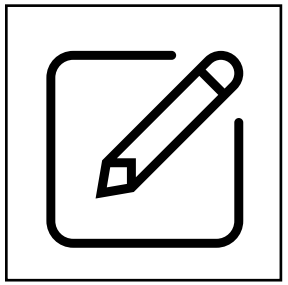

On-Site Problems Encountered

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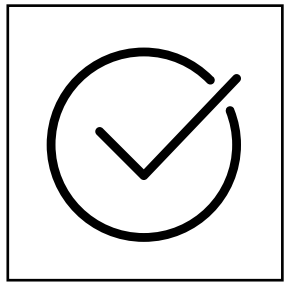

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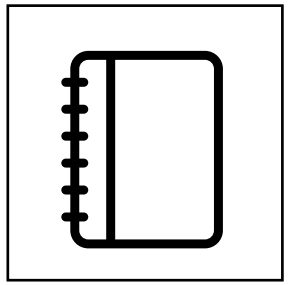


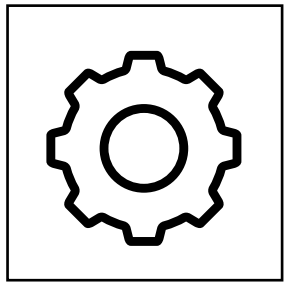
Recommendations

Tank's In! Are we done?


Backfill immediately!


CAT
CAT
adidas

TOPICS



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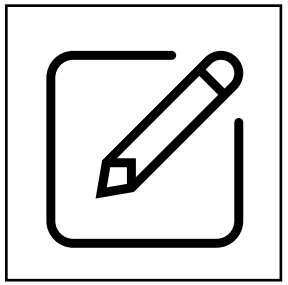

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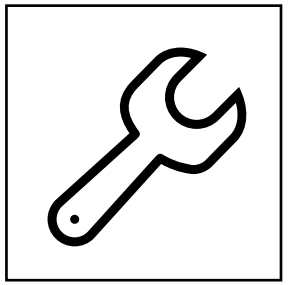

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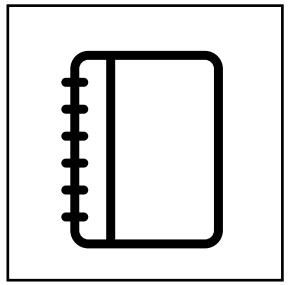
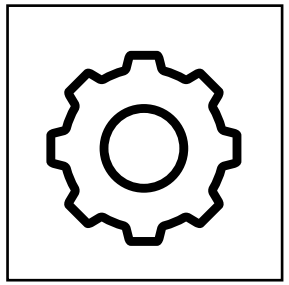


Recommendations

Where’s the tank?

TOPICS



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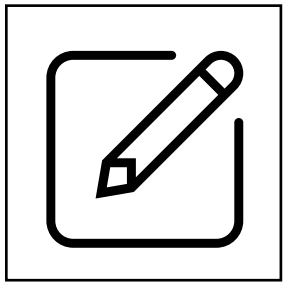

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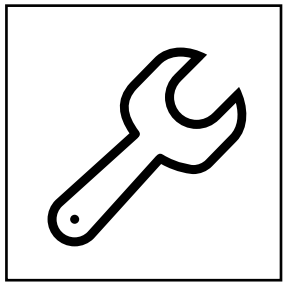

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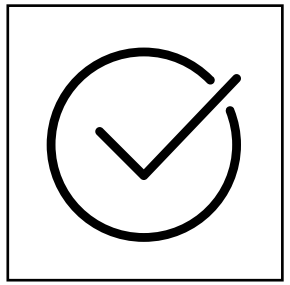

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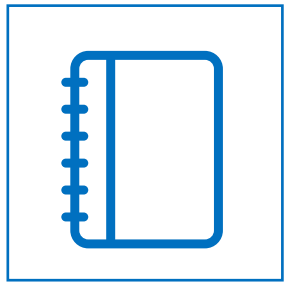

Recommendations

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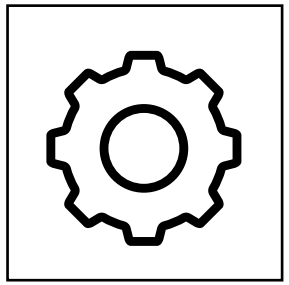


Design

Choose a system that works with your storage volumes and available footprint. Additional considerations:

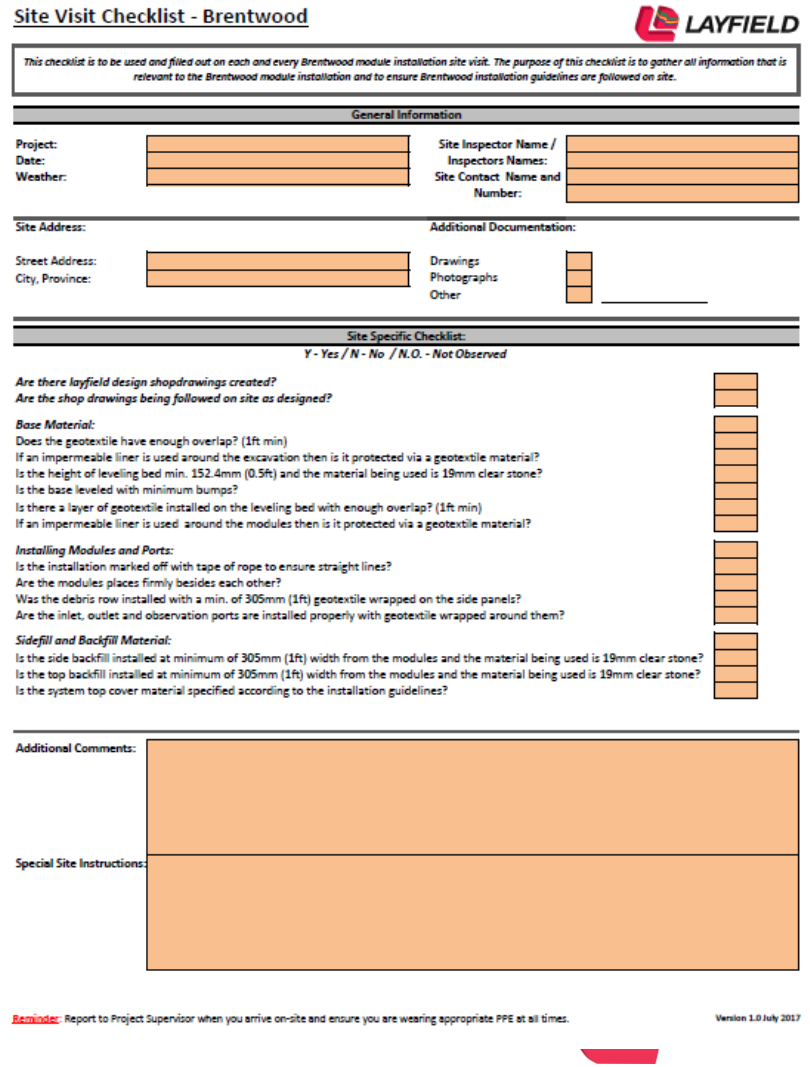
- Burial depth
- Temperature during installation
- High water table
- Liner Specification
- Inlet/Outlet dimensions

UNDERGROUND STORMWATER

TOPICS

On-Site Problems Encountered

- Ensure the excavation is large enough
- Specified granular materials on site.
- Backfill the system immediately
- Installation Checklist?



Site Visit Checklist - Brentwood

LAYFIELD

This checklist is to be used and filled out on each and every Brentwood module installation site visit. The purpose of this checklist is to gather all information that is relevant to the Brentwood module installation and to ensure Brentwood installation guidelines are followed on site.

General Information

Project:
Date:
Weather:

Site Inspector Name / Inspectors Names:
Site Contact Name and Number:

Site Address:

Street Address:
City, Province:

Additional Documentation:

Drawings
Photographs
Other

Site Specific Checklist:

Y - Yes / N - No / N.O. - Not Observed

Are there layfield design shopdrawings created?
Are the shop drawings being followed on site as designed?

Base Material:
Does the geotextile have enough overlap? (1ft min)
If an impermeable liner is used around the excavation then is it protected via a geotextile material?
Is the height of leveling bed min. 152.4mm (0.5ft) and the material being used is 19mm clear stone?
Is the base leveled with minimum bumps?
Is there a layer of geotextile installed on the leveling bed with enough overlap? (1ft min)
If an impermeable liner is used around the modules then is it protected via a geotextile material?

Installing Modules and Ports:
Is the installation marked off with tape of rope to ensure straight lines?
Are the modules places firmly besides each other?
Was the debris row installed with a min. of 305mm (1ft) geotextile wrapped on the side panels?
Are the inlet, outlet and observation ports are installed properly with geotextile wrapped around them?

Sidefill and Backfill Material:
Is the side backfill installed at minimum of 305mm (1ft) width from the modules and the material being used is 19mm clear stone?
Is the top backfill installed at minimum of 305mm (1ft) width from the modules and the material being used is 19mm clear stone?
Is the system top cover material specified according to the installation guidelines?

Additional Comments:

Special Site Instructions:

Reminder: Report to Project Supervisor when you arrive on-site and ensure you are wearing appropriate PPE at all times.

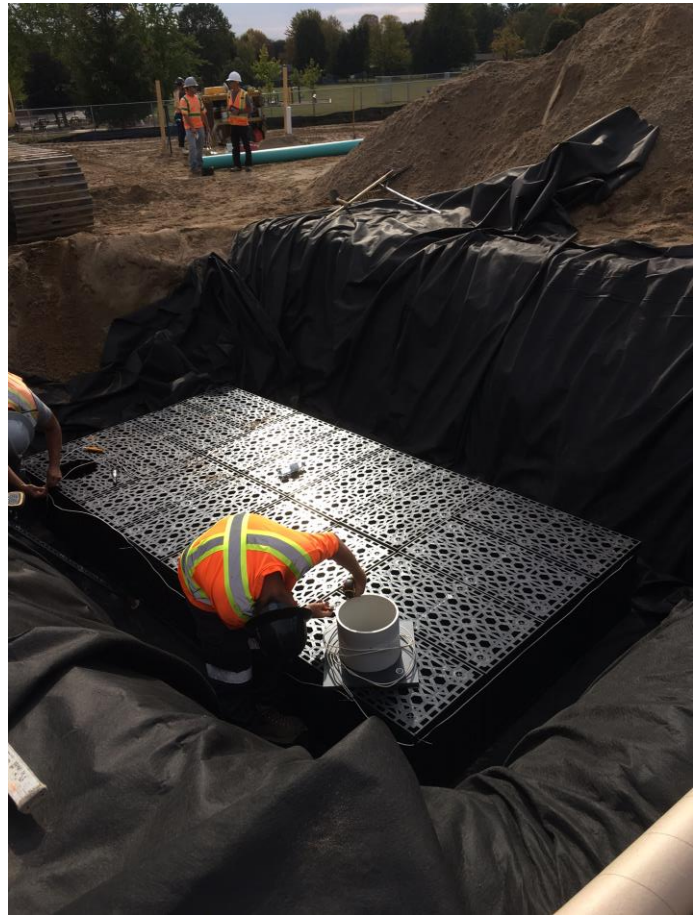
Version 1.0 July 2017

TOPICS

Installation Completed

Delineate and protect the tank during and after installation

- Magnetic Tape or Tracing Wire?
- Specify signage to show location of tank



TOPICS

Post Construction

Maintenance Schedule

- Frequency of inspections & Removals

Thank you!

Please feel free to contact me after the show with any questions you may have.

AMY WOODS, CET
Technical Product Manager

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Vaughan, Ontario

647.504.7837

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