PHOENIX

STORMWATER MANAGEMENT REPORT
29 MAPLE STREET
UXBRIDGE, ON

Prepared for:

TANNER TWINING
29 MAPLE STREET, UXBRIDGE ON

c/o

IBW SURVEYORS LTD

May 17, 2024

Phoenix Engineering Services
1021 Fairbairn St
Peterborough ON K9K 1C1
Tel: 705-755-0200

1. INTRODUCTION

Phoenix Engineering Services (**Phoenix**) was retained by IBW Surveyors Ltd. (**IBW**) to prepare a stormwater management Report (SWMR) in support of a rezoning application for redevelopment of a private residential property located at 29 Maple Street, Uxbridge, ON (**Figure 1**). The property owners are in process of redeveloping the single family residential property to create a 3-storey apartment building with 10 residential suites. It is assumed the existing water and sanitary sewer connections that service the existing residence will be upgraded as necessary to service the new building. Design of water and sewer service upgrades for the development is beyond the scope of the current report.

FIGURE 1: Location Plan – 29 MAPLE STREET, UXBRIDGE ON

2. SITE DESCRIPTION

IBW Surveyors Ltd. (IBW) conducted an existing conditions survey for the property and provided the information on plan A-0046564-SPv7 dated May 17, 2024 and included in **Appendix A**. The urban property is approximately 0.167 hectares in size and located on the north side of Maple Street, approximately 350 m northeast of the intersection of Main Street and Brock Street West in the Town of Uxbridge. There is a one-storey single family dwelling with a separate large garage and shed in the backyard. The combined rooftop area of residence and outbuildings is approximately 215 m^2. There is a gravel parking area across the front of the property and another gravel area near the garage at the rear of the property. The rest of the property is primarily manicured lawn with some trees. The front yard of the property slopes very gently to the street at less than 2% while the rear yard slopes very gently at nominally 1% to the northwest and northeast. There is a 1-storey residence on the property to the west and a 2.5-storey multi-unit residence on the property to the east. An abandoned rail corridor abuts the northwest corner of the subject property.

The proposed development includes a new 3-storey apartment building with a rooftop area of approximately 295 m^2. The proposed access driveway and parking area for 15 vehicles completed with permeable pavers back filled with gravel. There will be a manicured grass area in the front yard and a vegetated infiltration area at the rear of the property.

No soil Information or depth to groundwater for the site was provided. Based on well records in vicinity of the site, the soil is assumed to be predominantly silt and clay with low permeability and depth to groundwater is assumed to be greater than 2.5 m below the final grade for the purposes of this report. Due to the anticipated poor permeability of the soils and relatively shallow depth to clay, approximately 1 m below surface, an alternative to a standard soakaway pit backfilled with clean stone was investigated.

3. STORMWATER CALCULATIONS

Based on the small size of the property, approximately 0.167 hectares, and the fact the pre-development (0.022 ha) and post-development (0.029 ha) impermeable areas are similar, runoff volume calculations have been based on 25 mm of rainfall over the impervious areas for the pre-development

and post-development condition. It is anticipated that infiltration through the proposed pervious pavers will be similar to the existing gravel driveway and lawn areas.

The proposed addition of the infiltration gallery topped with topsoil and sod at the rear of the property will improve the quality and reduce the quantity of stormwater surface runoff to the northwest and northeast. The proposed installation of a subsurface stormwater detention / infiltration chamber in the front yard area will manage the runoff from the impervious roof of the apartment.

The calculations for runoff to be managed from the impervious areas are presented in (Table 1).

TABLE 1: Volume Calculations

PRE-DEVELOPMENT	Area (m^2)	Rainfall (mm)	Runoff Volume (m^3)
House, Garage and Shed	215	25	5.38
POST-DEVELOPMENT	Area (m^2)	Rainfall (mm)	Runoff Volume (m^3)
Apartment	295	25	7.38
Net Change			2.00

MANAGEMENT OF RUNOFF

Based on a review of the architectural drawings, runoff from the impervious roof top of the apartment building will be directed to the front of the building. Downspouts will be directed into a 100mm diameter PVC pipe and discharge into an underground stormwater detention / infiltration chamber located under the grassed front yard.

The proposed installation consists of a Stormtank Module 20 Series with a chamber footprint of 7.0 m x 5.0 m and height of 600mm. The location of the detention / infiltration system is indicated on the drawing in **Appendix A**.

Calculations for sizing the detention / infiltration chamber are based on 7.38 m^3 of storage volume required and a Factor of Safety of 2.5 has been applied for total capacity. Void space of the selected

installation modules is greater than 90%.

Capacity Required = 7.38 m^3 x 2.5 = 18.45 m^3

Capacity Provided = 7.0 m x 5.0 m x 0.6 m x 0.9 = 18.9 m^3

These figures do not include additional storage capacity of approximately 9 m^3 within the void space of clean stone granular backfill.

Reference documents for the Stormtank system are provided in **Appendix B**. The system will be set on a granular leveling pad and enclosed on all sides by a free-draining granular backfill. Non-woven geotextile will be used to separate the granular backfill from native material and also to prevent the granular backfill from entering the open chambers. The Stormtank installation provides high void space, in excess of 90%, compared to 40% porosity for a granular soakaway pit and allows for a much shallower installation over a given footprint compared to stone backfill.

The access driveway and parking lot will utilize a flexible permeable paving grid system, EasyPave Pro by Vodaland or equivalent, and backfilled with gravel for heavy loads. This type of installation will have similar infiltration characteristics as the existing gravel driveway. In fact, it is expected that the installation will increase infiltration compared to the existing gravel driveway and parking area due to the HDPE cells tending to direct runoff downwards rather than simple sheet flow across the surface. If desired, some of the paver cells can be backfilled with topsoil and seed to border wheel track paths along the driveway, and coloured caps may be utilized to delineate parking stalls. Reference documents for the EasyPave Pro (Heavy Loads) are included in **Appendix C**.

A low berm and shallow swale adjacent to the west side of the property will direct surface runoff into a 23 m long French drain adjacent to the west side of the parking lot and connected to the infiltration gallery at the north end of the property. Similarly, a 23 m long French drain along the east side of the parking lot will also direct runoff into the infiltration gallery.

Runoff from the permeable paver driveway will generally flow northerly across the permeable pavers and into an infiltration gallery along the north and northwest limits of the parking lot. The infiltration gallery has been sized to accommodate 25mm of rainfall over an area of 755 m^2 or 18.9 m^3 of runoff. The required volume of the infiltration gallery is 18.9 m^3 / 40% = 47 m^3, assuming clear stone backfill

with 40% porosity. Recommended base of the infiltration gallery should be set 0.3 m below the invert of the French drain pipes entering the gallery, or approximately 0.8 m below finished grade.

The infiltration gallery can be readily accommodated within an area of 112 m^2 as indicated on the site plan in **Appendix A**. The potential storage capacity of the French drains has not been included in the above calculations.

4. CONCLUSION

Stormwater runoff from the impermeable roof of the building can be readily managed on the site through the installation of an underground stormwater detention / infiltration chamber at the front of the property. Drainage from the access driveway and parking lot will be managed with the installation of flexible permeable pavers for the access driveway and parking lot, French drains and an infiltration gallery at the rear of the property.

Should you have any questions or concerns, please contact the undersigned.

Respectfully submitted,
Phoenix Engineering Services

Steve Clark, M.Sc., P.Eng.
Senior Project Engineer

APPENDIX

A SITE PLAN – IBW SURVEYORS

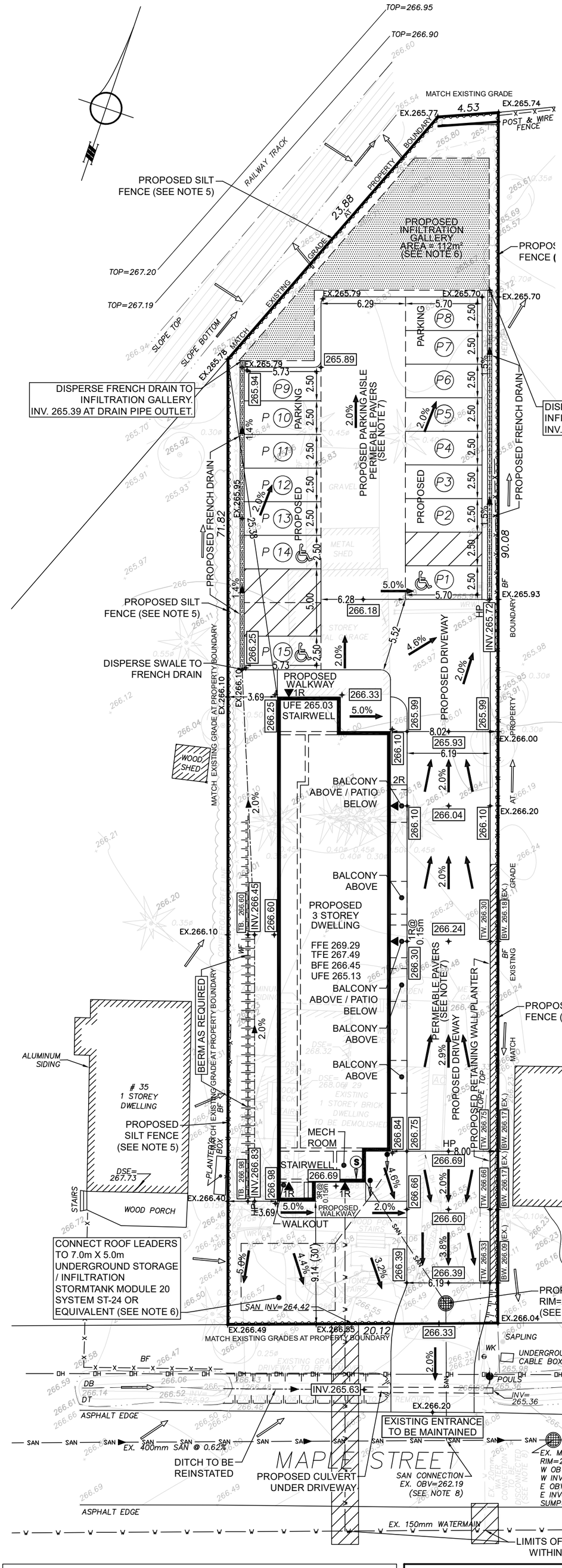
SITE PLAN/GRADING PLAN OF 29 MAPLE STREET

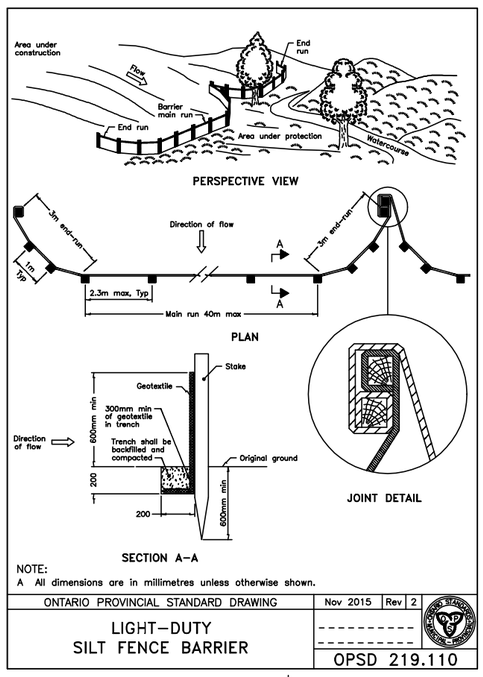
TOWNSHIP OF UXBRIDGE

REGIONAL MUNICIPALITY OF DURHAM

SCALE 1 : 250

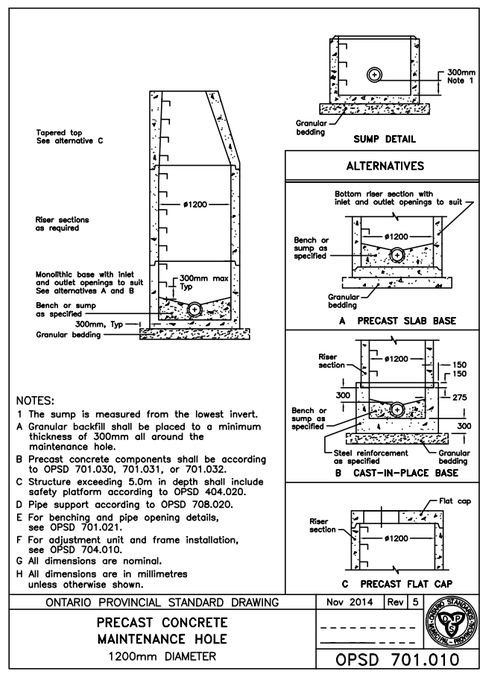
0 1 2 3 4 5 10 15





NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		OPSD 701.010

GENERAL NOTES

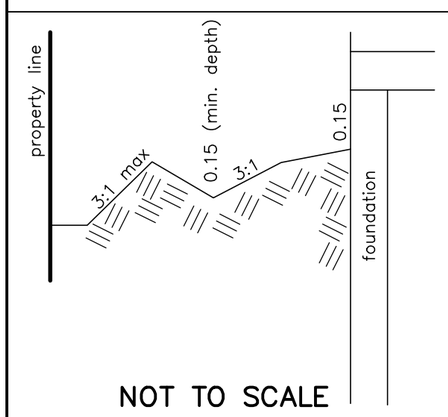
1. GENERALLY, DRIVEWAY TO BE LOCATED TO MAXIMIZE SHEET FLOW DRAINAGE FROM HOUSE, DRIVEWAY, ETC.
2. GENERALLY, DRIVEWAYS TO BE GRADED WITH 2.0% MIN. CROSS FALL.
3. GENERALLY, HOUSE TO BE CONSTRUCTED UPON A 300MM, (MIN. VERTICAL) APRON WITH THE TOE OF THE APRON MEETING EXISTING GRADE OF LOT.
4. GRADING OF THE APRON (I.E. WITHIN 2-4 M OF THE BUILDING) SHOULD BE MAINTAINED AT STANDARD GRADE OF BETWEEN 2% AND 5%. (MIN.)
5. AREAS DISTURBED BY LOT GRADING SHALL BE LIMITED TO THOSE AREAS NECESSARY TO CONSTRUCT HOME & DRIVEWAY.
6. DOWNSPOUTS TO BE CONSTRUCTED TO SPLASH BLOCKS.
7. MAINTAIN MINIMUM 1.22M COVER FOR FOOTINGS.
8. STEP FOOTINGS WHERE REQUIRED.
9. DRIVEWAYS TO DRAIN TO STREET.

UNDERSIDE OF FOOTING MAY BE LOWER THAN ELEVATION NOTED DUE TO EXISTING CONDITIONS, EXACT DEPTH OF FOOTING TO BE DETERMINED ON SITE DURING EXCAVATION FOR FOOTING

PLAN NOTES

1. ELEVATIONS ARE GEODETIC AND REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD28) BY BY DIRECT MEASUREMENT TO A REAL TIME NETWORK.
2. DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE METRIC AND CAN BE CONVERTED TO IMPERIAL BY DIVIDING BY 0.3048.
3. PROPERTY DIMENSIONS SHOWN HEREON ARE IN ACCORDANCE WITH IBW SURVEYORS RECORDS. (PROJECT NUMBER A-036606)
4. CONTOURS SHOWN ARE DRAWN AT 0.20 METRE INTERVALS.
5. SILT FENCE TO BE USED ALONG PERIMETER OF CONSTRUCTION IN ACCORDANCE WITH OPSD 219.110
6. THIS GRADING PLAN IS TO BE INTERPERETED ALONG WITH A STORMWATER MANAGEMENT REPORT BY PHOENIX ENGINEERING SERVICES. SEE REPORT FOR INFILTRATION GALLERY CALCULATIONS
7. PERMEABLE PAVERS AS NOTED ON THIS PLAN ARE TO BE EASYPAVE PRO (HEAVY LOADS) OR AN APPROVED EQUIVALENT
8. SEE SITE SERVICING PLAN BY D.G. BIDDLE & ASSOCIATES FOR SITE SERVICING DETAILS (123807)

TYPICAL BERM SWALE DETAIL

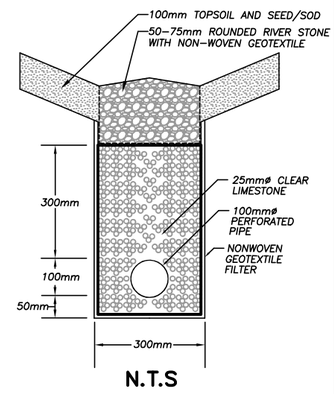


NOT TO SCALE

PHOENIX ENGINEERING SERVICES
1021 FAIRBAIRN ST
PETERBROUGH ON K9K 1C1
LICENSED PROFESSIONAL ENGINEER
S. J. CLARK
MAY 17, 2024
PROVINCE OF ONTARIO

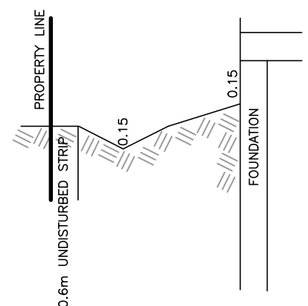
SEALED FOR STORMWATER MANAGEMENT, GRADING, EROSION AND SEDIMENT CONTROL ONLY

FRENCH DRAIN DETAIL



N.T.S

TYPICAL SWALE DETAIL



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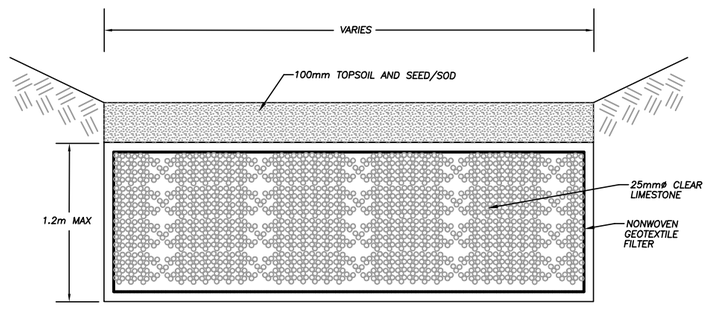
INFILTRATION GALLERY DETAIL



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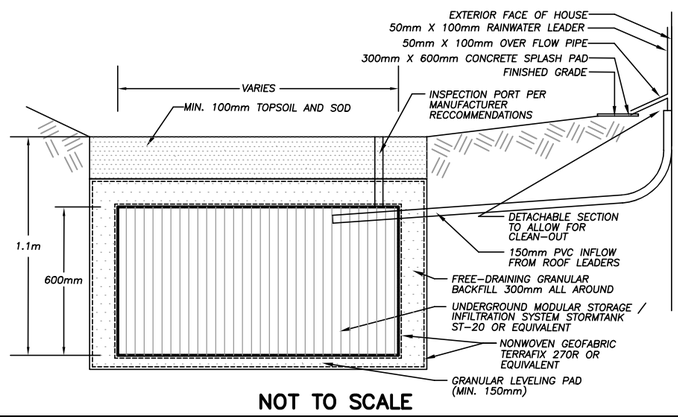
MODULAR UNDERGROUND RAINWATER STORAGE / INFILTRATION SYSTEM



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LEGEND

FFE	FIRST FLOOR ELEVATION		SWALE DRAINAGE
TFE	TOP OF FOUNDATION ELEVATION		SHEET DRAINAGE
BFE	BASEMENT FLOOR ELEVATION		EXISTING DRAINAGE
UFE	UNDERSIDE OF FOOTING ELEVATION		ROOF LEADER
123.45	EXISTING SPOT ELEVATION	S	SUMP OUTLET
100.00	PROPOSED ELEVATION	AC	AIR CONDITIONER
EX.100.00	EXISTING ELEVATION	MH	MAINTENANCE HOLE
	SILT FENCE	POULS	UTILITY/LIGHT STANDARD POLE
ø	ROUND	TB	TERMINAL BOX
BF	BOARD FENCE	WK	WATER KEY
CSP	CORRUGATED STEEL PIPE	–OH–	OVERHEAD UTILITY WIRES
DB	TOP OF DITCH		CONIFEROUS TREE W/TRUNK DIAMETER
DSE	DOOR SILL ELEVATION		CONIFEROUS SAPLING
DT	BOTTOM OF DITCH		DECIDUOUS TREE W/TRUNK DIAMETER
GSE	GARAGE SILL ELEVATION		ACCESSIBLE PARKING
INV	INVERT ELEVATION AT CENTRE		
BF	BOARD FENCE		
WF	WIRE FENCE		
WRW	WOOD RETAINING WALL		
GSE	GARAGE SILL ELEVATION		

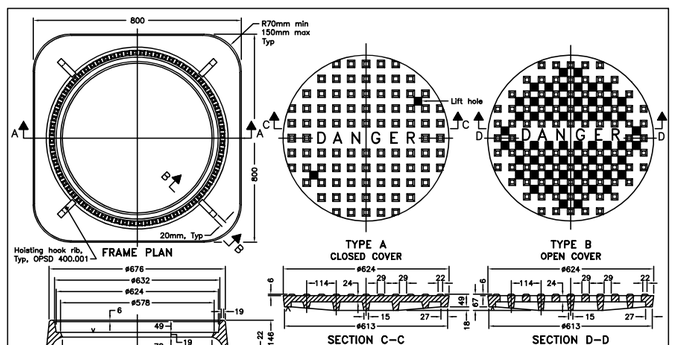
SITE STATISTICS

ZONING	–	RM
LOT AREA	–	1668.3 m²
BUILDING AREA	–	294.6 m²
LOT COVERAGE	–	17.7 %
BUILDING HEIGHT	–	±8.5 m
NUMBER OF STOREYS	–	2

IBW SURVEYORS

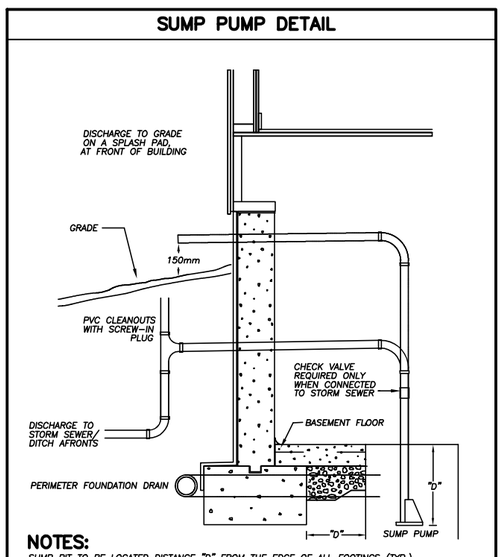
IBWSURVEYORS.COM | 1.800.667.0696

PARTY CHIEF: GB	DRAWN BY: CF	CHECKED BY: KM	A-046564
FILE: A–046564–SP_v7	PLOT DATE: MAY 17, 2024		



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 4
CAST IRON, SQUARE FRAME WITH CIRCULAR CLOSED OR OPEN COVER FOR MAINTENANCE HOLES		OPSD 401.010

SUMP PUMP DETAIL



NOTES:
SUMP PIT TO BE LOCATED DISTANCE "D" FROM THE EDGE OF ALL FOOTINGS (TYP.)
SUMP PIT BASE TO BE CONTINUOUS WITH (OR BE MECHANICALLY CONNECTED TO) THE PIT WALLS.

NOT TO SCALE

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK. THE WORK AND DRAWINGS HEREIN WERE COMPLETED FOR THE EXCLUSIVE USE OF OUR CLIENT AND NO LIABILITY IS ASSUMED TO ANY THIRD PARTIES OR SUBSEQUENT OWNERS.

APPENDIX

B STORMTANK REFERENCE DOCUMENTS

STORMTANK® MODULE 20 SERIES

Subsurface Stormwater Storage

FEWER UNITS, FASTER INSTALLATION. INTRODUCING A NEW STORMWATER SOLUTION BUILT AROUND THE CONTRACTOR.

- **EASY ASSEMBLY.** The Module 20 Series' simplified design can be assembled in under 90 seconds.
- **FAST INSTALLATION.** The Module 20 Series covers a larger footprint, resulting in fewer total Modules required to be assembled and installed.
- **COST SAVINGS.** With fewer total units needed, material and labor costs are lowered, while allowing more resources to finish the project.

MADE IN USA

A BRAND OF BRENTWOOD

THE MODULE 20 SERIES

The new StormTank Module 20 Series is a subsurface stormwater storage unit rated for use under standard load applications, such as parking lots and athletic fields. Created for project professionals to achieve quick turnaround, the Module 20 Series was designed with the contractor in mind.

The Module 20 Series' larger, simplified design allows for quick assembly and requires fewer total units without sacrificing storage capacity, reducing installation time and labor costs.

NOT YOUR AVERAGE CRATE SYSTEM

- Extensively tested in a full-scale installation setting
- Simple to assemble, install, and clean
- Available in three heights: 18-, 24-, and 36-inch

WHEN EXTREME STRENGTH & FLEXIBILITY ARE AT THE TOP OF THE LIST, USE OUR MODULE 25 SERIES.

THE MODULE 25 SERIES

The StormTank Module 25 Series' flexible, stackable design easily conforms around existing structures and tight constraints. It is load-rated for extreme applications, like heavy truck or under fire access roads, offering maximum strength while allowing for utilization of valuable land.

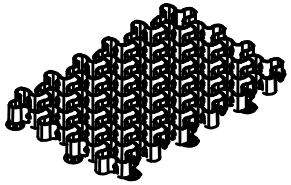
STORMTANK
Expect Results

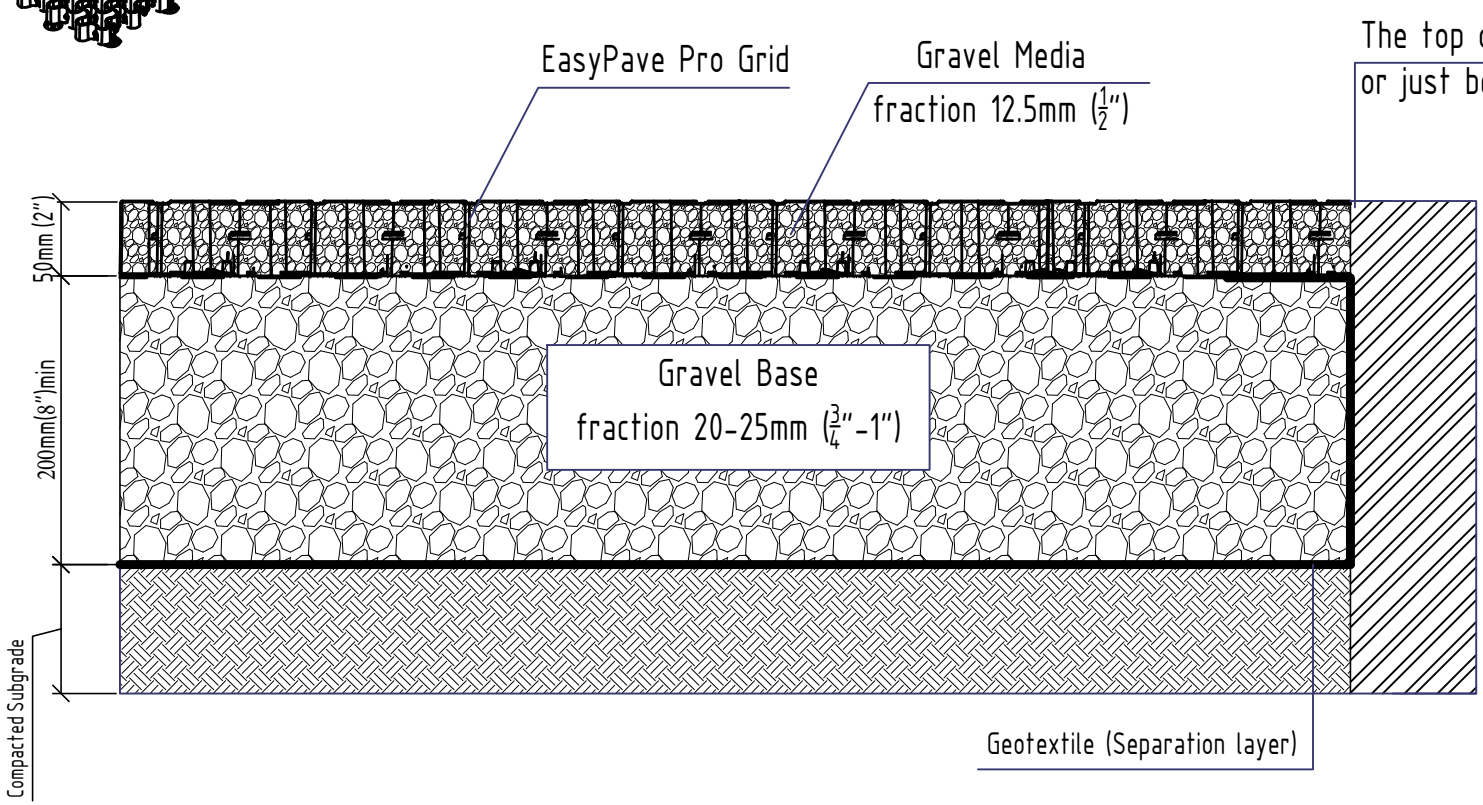
STORMTANK.COM
info@stormtank.com
+1.610.374.5109

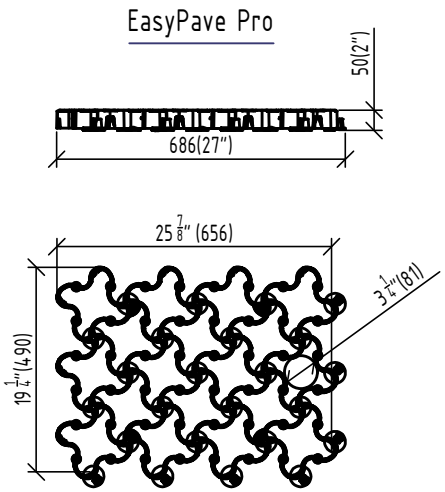
APPENDIX

C VODALAND PERMEABLE PAVERS

EasyPave Pro Gravel fill (Heavy Loads)







NOTES:

1. The base height shown in the cross-section depends on specific site and loading conditions.
2. Layers shown in cross-section need to be compacted.
3. Geo-textile is to be used for stability and to prevent mixing between layers.
4. Anchors are recommended for sloped installations.
   Please follow guidance of your local engineer for slope requirements.
5. This drawing is for conceptual design and information use only.

Application

Heavy Load Parking Lots, Emergency & Fire Lanes, Service Roads

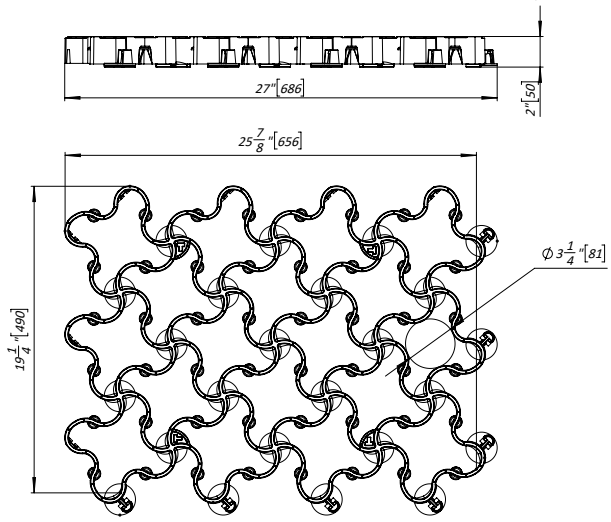
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:	FINISH:	DEBURR AND BREAK SHARP EDGES	DO NOT SCALE DRAWING	REVISION	
			VODALAND		
	NAME	SIGNATURE	DATE	TITLE: EasyPave Pro Gravel fill (Heavy Loads)	
DRAWN					
CHK'D					
APPV'D					
APPV'D					
MATERIAL: Plastic				ARTICLE: 8103-BK	

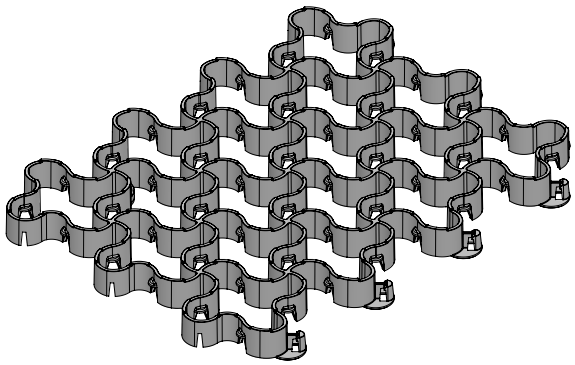
VODALAND

SPECIFICATION SHEET

PERMEABLE PAVING GRID SYSTEM

PERMEABLE PAVING GRID, EASYpave PRO





Technical Product information:

Dimensions:	24.7” (629mm) x 17.1”(434mm) x 2” (50mm) - (1 Unit)
Wall height:	2” (50mm)
Material:	100% recycled polypropylene
Load Class:	H20 based on AASHTO M306(Equivalent to Load Class D)
Temperature Range:	-40 deg C to +40 deg C
Colour:	Black
UV Protection:	UV Stabilizer Added
Moisture Absorption:	0.01%
Solubility:	Resistant to acids, alkalis, alcohols, oil, diesel, gasoline,(de-icing salt, ammonia, acid rain, etc)
Meeting Standard:	DIN 1072
Application:	Commercial parking lots, driveways with snow, truck yards, storage lots, roadways, fire lanes, military applications etc.
Backfill:	Any angular or round aggregate(stone) be used Recommend size: 1/2” or smaller
Base:	3/4” Crush stone (Gravel)

Delivery:

Pallet Dimensions:	W48” x D40” x H78”
Quantity per pallet:	320 Unit
Weight per pallet:	1241 lbs (incl. pallet)
Coverage per unit:	3.5 sq.ft

*Deviation of mechanical properties of the material - unto +/- 10%

REVISED: 2024

Vodaland Canada Inc.
1-5900 Ambler Dr, Mississauga, ON L4W 2N3 • Phone: 905-238-1771 • Email: info@vodaland.ca

Product:

Description	Item #	Height	Length	Width
EasyPave PRO paving grid - Black	8103-BK	2” (50mm)	24.87”(656mm)	19.25”(490mm)

Accessories:

Description	Item #	Qty per pack	Weight
EasyPave Anchors	6842-10	10pcs	1.0 lb
Geotextile NT10 (18’x 12’)	860110-183-2	1 pc	6.0 lb

Vodaland Canada Inc.
1-5900 Ambler Dr, Mississauga, ON L4W 2N3 • Phone: 905-238-1771 • Email: info@vodaland.ca