



PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS

November 21, 2011

PVDR 1101.00

Mr. Doug Buch
PaveDrain, LCC
4880 W. Abbott Avenue
Greenfield, WI 53220

**RE: PAVEDRAIN CONCRETE BLOCK
STRUCTURAL ANALYSIS FOR AASHTO TRUCK LOADING**

Dear Mr. Buch:

We have completed our structural analysis of the PaveDrain concrete blocks and find them capable of supporting AASHTO HS-20 and H-20 truck loading.

We analyzed the the blocks as unreinforced concrete arches supporting a uniform truck tire load with impact per AASHTO standards. The arches were reviewed considering both a fixed end condition and a pinned end condition. We used the ASTM D 6684-04 specified minimum compressive strength of 4000 psi for the concrete. The actual tested strength of the PaveDrain units averages 8900 psi which is more than double the strength used in our structural calculations.

As with all vehicular traffic paving systems, the subgrade soil and base preparation for the PaveDrain blocks must be properly prepared and is critical to the performance of the system.

Sincerely,

PENNONI ASSOCIATES INC.

Germaine E. Lenz, PE, SECB
Structural Project Engineer

GEL/gel

Attachment: Calculations (4 pages)

cc: Khaled Hassan, Pennoni
Charlie Snyder, Pennoni



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Client: Mr. Doug Buch
Address: PaveDrain, LLC
4880 W. Abbott Avenue
Greenfield, WI 53220

Project Name: PaveDrain Inc. Lab Tests

Date Received: September 26, 2011

Unit Specification: ASTM D6684

Date of Compression Testing: October 4, 2011

Unit Designation and Description: Dry-Cast Articulating Concrete Block
5.65" Block

Laboratory Number: 10- 95209

Summary of Test Results

Physical Property	Specification Values	Average Test Results	Physical Property	Specification Values	Average Test Results
Net Compressive Strength	≥ 4000	9030 psi	Min. Faceshell Thickness (FST)		- in.
Gross Compressive Strength		8910 psi	Min. Web Thickness (WT)		- in.
Density	≥ 130	141.2 pcf	Equivalent Web Thickness		- in.
Absorption	0-9.1	6.3 pcf	Equivalent Thickness		- in.
Percent Solid		98.8 %	Net Cross-Sectional Area		16.05 in. ²
Moisture Content		N/A %	Gross Cross-Sectional Area		16.27 in. ²

Individual Unit Test Results

Specimen No.	Received Wt, W _R lb.	Cross-Sectional Area		Max. Load lb	Compressive Strength	
		Gross in. ²	Net [*] in. ²		Gross psi	Net psi
1	0.00	16.25	16.05	141800	8720	8830
2	0.00	16.32	16.09	141755	8680	8810
3	0.00	16.24	16.01	151770	9340	9470
Average	0.00	16.27	16.05	145108	8910	9030

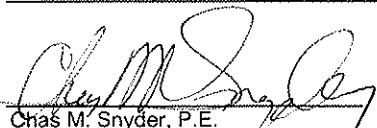
* Net area determined from absorption specimens unless solid units are used.

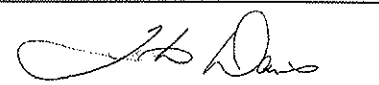
Specimen No.	Average Width	Average Height	Average Length	Average Min. FST	Average Min. WT
	in.	in.	in.	in.	in.
4	2.0	4.2	8.2	-	-
5	2.0	4.2	8.2	-	-
6	2.0	4.2	8.2	-	-
Average	2.0	4.2	8.2	-	-

Specimen No.	Received Wt, W _R **	Immersed Wt, W _I	Saturated Wt, W _S	Oven-Dry Wt, W _D	Absorption	Density	Net Volume	Net Area	Percent Solid	Moisture Content**
	lb	lb	lb	lb	pcf	pcf	ft ³	in ²	%	% of total absorption
4	0.00	3.36	5.82	5.57	6.3	141.3	0.0394	16.15	98.8	N/A
5	0.00	3.31	5.72	5.48	6.2	141.9	0.0386	16.17	97.8	N/A
6	0.00	3.33	5.79	5.54	6.3	140.5	0.0394	16.15	99.9	N/A
Average	0.00	3.33	5.78	5.53	6.3	141.2	0.0391	16.15	98.8	N/A

**Received weight determined at the time of unit delivery to the job site or from units sampled at that time and delivered to the laboratory in sealed containers for moisture content determination.

Remarks: The units were tested according to ASTM C140. This set meets the requirements of ASTM D6684.
These units are capable of supporting AASHTO HS-20 and H-20 loading with proper subgrade and base installation.


Chas M. Snyder, P.E.
Laboratory Manager


Quinton D. Davis, Jr.
Division Manager