

Memo



To: Olson Brothers Pro Vac, LLC
CES – Dan Smith

From: Keith Schembs, LEG, Kyle Billingsley, PE

Date: April 25, 2025

Re: Pervious Asphalt Pavement Section Design

As requested, we are providing this pervious asphalt pavement section design for the proposed new hard surfacing to be installed at 2511 Inter Avenue in Puyallup, Washington. The site is currently a gravel surfaced contractor's yard. We previously prepared a *Stormwater Soils Report: Infiltration* and a *Soils Report: Supplemental Infiltration testing*, dated December 10, 2021 and February 14, 2022, respectively.

Our understanding of the project is based on our conversations with you; our review of the provided Cover Sheet by C.E.S. NW Inc. dated October 21, 2020; our review of the available geologic and soils data, our previously prepared reports and subsurface explorations; our groundwater monitoring throughout the 2020/21 wet season; our understanding of the City of Puyallup development codes; and our experience in the area. We have prepared this pavement section design in accordance with the 1993 AASHTO flexible pavement design method using subsurface soil properties estimated from our onsite explorations, assumed traffic loading conditions, and reduced layer coefficients for permeable pavement applications.

The AASHTO 93 design method quantifies traffic loading in terms of 18-Kip ESALs (equivalent single axle loads). The estimated ESALs over the entire design life were determined using assumed vehicle loads, assumed Average Weekday Daily Traffic (AWDT), and extending the daily value over a 20-year design life. We assumed that each vacuum truck applies an average of 1.11 ESALs and equivalent subgrade modulus values of 25 ksi and 7 ksi for permeable ballast and subgrade soils, respectively. Our traffic assumptions should be verified prior to construction, and we should be notified and allowed to review our design if not correct. The AASHTO 93 design calculation output is included as Figure 1.

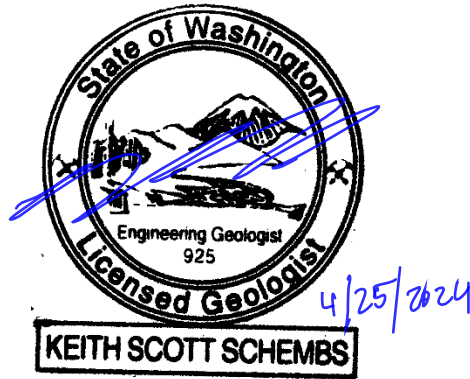
MINIMUM PAVEMENT SECTION THICKNESS RECOMMENDATIONS

Section	Recommended Section Thickness (inches)
Pervious Pavement	4.0
Permeable Ballast	8.5
Notes: "Permeable Ballast" per WSDOT 9-03.9(2)	

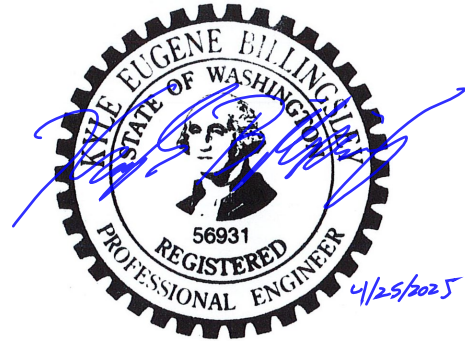
The above recommended section thicknesses meet the AASHTO 93 design standards based on the assumed traffic loading with a 85 percent reliability. Additional loading may contribute to premature failure of the pavement section. The permeable ballast section is a minimum recommended section. Actual permeable ballast section should be determined by the civil engineer for storage capacity and may exceed the minimum structural thickness referenced above.

We have appreciated working for you on this project. Please do not hesitate to call at your earliest convenience if you have any questions or comments.

Respectfully submitted,
GeoResources, LLC



Keith S. Schembs, LEG
Principal



Kyle E. Billingsley, PE
Senior Geotechnical Engineer

KSS:KEB/keb

Doc ID: CES.ProVac.InterAve.M_PerviousHMA

Attachments: Figure 1: AASHTO 93 Design and ESALs

1993 AASHTO Empirical Equation for Flexible Pavements

Equation Solver

Variable Descriptions and Typical Values

Precautions

Type in data in the grey boxes and click the calculate button to see the output. To make additional calculations, change the desired input data and click the calculate button again. Click on the text descriptions of the input or output variables for more information.

INPUT

1. Loading

Total Design ESALs (W_{18}):

2. Reliability

Reliability Level in percent (R): ▼

Combined Standard Error (S_0):

3. Servicability

Initial Servicability Index (p_i):

Terminal Servicability Index (p_t):

4. Layer Parameters

Number of Base Layers: ▼

	a	m	M_R	Min. Depth
Surface	<input type="text" value="0.4"/>	1.0	N/A	<input type="text" value="0"/>
Base 1	<input type="text" value="0.1"/>	<input type="text" value="1"/>	<input type="text" value="25000"/>	<input type="text"/>
Subgrade	N/A	N/A	<input type="text" value="7000"/>	N/A

OUTPUT

1. Calculation Parameters

Standard Normal Deviate (z_R):

ΔPSI :

Design Structural Number (SN):

2. Layer Depths (to the nearest 1/2 inch)

Surface:

Base 1:

Total SN based on layer depths:

[See Solution Details](#)

Comments

Type	Load Factor	% Total of AADT	Lane AWDT	ESALS/Day
Vac Truck	1.11	100.0%	19	21.1
			Total Daily	21.1
			Total Year	5,483
			Design Life	20
			Total Life	109,668