

September 3, 2025

Chief Brendan Moran
Sugar Grove Fire Protection District
25 S. Municipal Drive
Sugar Grove, IL 60554

RE: Gravel Solar Farm Access Roads
Bluestem Solar, Orchard Solar, Fox East Solar, & Fox West Solar

Chief Moran:

As the site/civil engineer for these projects, we are proposing the use of gravel access roads within the solar field sites. These roads will serve multiple purposes, including initial construction access, ongoing maintenance, emergency response, and equipment access in the event of a fire.

To ensure the roads are capable of supporting fully loaded emergency vehicles, including 80,000-pound fire engines, we have evaluated the design of the proposed gravel roads using two different methods:

1. Federal Highway Administration (FHWA) Gravel Road Guidance

According to the *Gravel Roads Construction and Maintenance Guide* published by the FHWA, a gravel road designed for infrequent heavy truck traffic could require as little as 6.5 inches of gravel under worst-case conditions.

Table 3: Thickness Design Guidance for New or Reconstructed Rural Roads.
This table is a good guide for determining gravel layer thickness by considering subgrade support condition and projected daily volume of heavy trucks.

Estimated Daily Number of Heavy Trucks	Subgrade Support Condition	Suggested Minimum Gravel Layer Thickness, mm (in.)
0-5	Low	165 (6.5)
	Medium	140 (5.5)
	High	115 (4.5)
5-10	Low	215 (8.5)
	Medium	180 (7.0)
	High	140 (5.5)
10-25	Low	290 (11.5)
	Medium	230 (9.0)
	High	180 (7.0)
25-50	Low	370 (14.5)
	Medium	290 (11.5)
	High	215 (8.5)

However, based on my professional experience, a thickness of 6.5 inches would be insufficient for reliable long-term performance, particularly for emergency vehicle access.

2. Structural Number (SN) Methodology

A more rigorous approach involves calculating the Structural Number (SN), which evaluates the road's load-bearing capacity. The SN is calculated by multiplying the thickness of the gravel layer by a structural coefficient specific to the material used. For crushed stone, the coefficient is 0.10.

We are proposing 12 inches of clean, crushed stone (IDOT gradation CA-7), which yields an SN of:
12" x 0.10 = 1.20

This value falls well within the acceptable range (0.8 to 1.4) for supporting 80,000-pound emergency vehicles.

Subgrade Preparation

To ensure the subgrade provides adequate support, we recommend performing a proof roll prior to stone placement. This involves driving a fully loaded truck over the dry, compacted subgrade to identify any weak areas. If rutting is observed, those areas should be remediated by over-excavating and backfilling with additional stone until the subgrade passes the proof roll.

Please don't hesitate to contact me if you have any questions or require additional information regarding the design of these access roads.

Sincerely,



Robert G. Walker, P.E.
Managing Director – Aurora Office
Bono Consulting Civil Engineers

