Supplementary Material: Geometry-Informed Material Recognition

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1. Additional GeoMat Focus Scale Samples

In this section, we provide additional samples (image patches and corresponding depth maps) for each category. Specifically, each row of Figs. 1 and 2 shows a sample at each scale (100x100, 200x200, 400x400, and 800x800) for each category. Each sample was extracted from a different surface when possible (i.e. when the samples for a category were created from at least four surfaces).
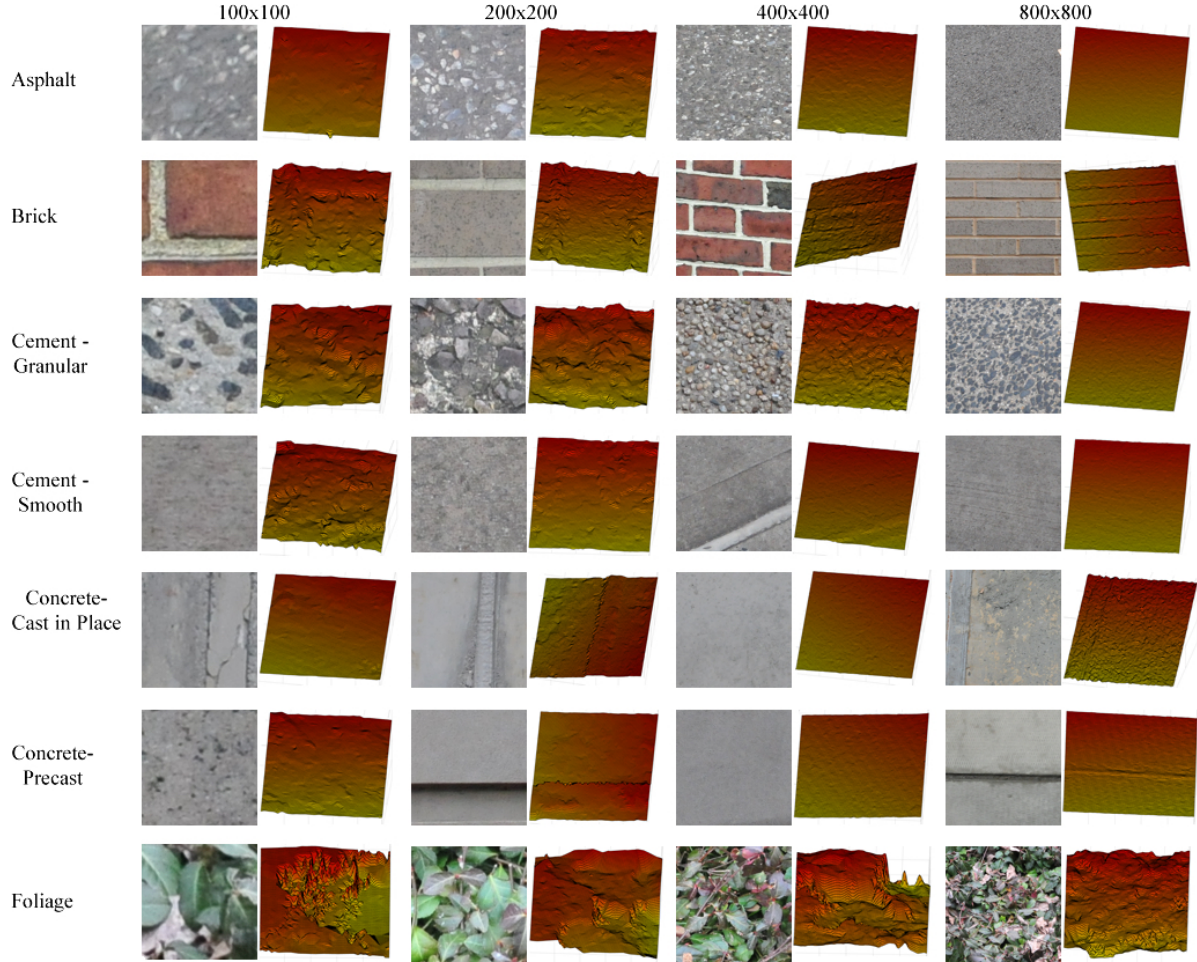

Figure 1: Four samples per category (one at each scale) for Asphalt, Brick, Cement - Granular, Cement - Smooth, Concrete - Cast In Place, Concrete - Precast, and Foliage.
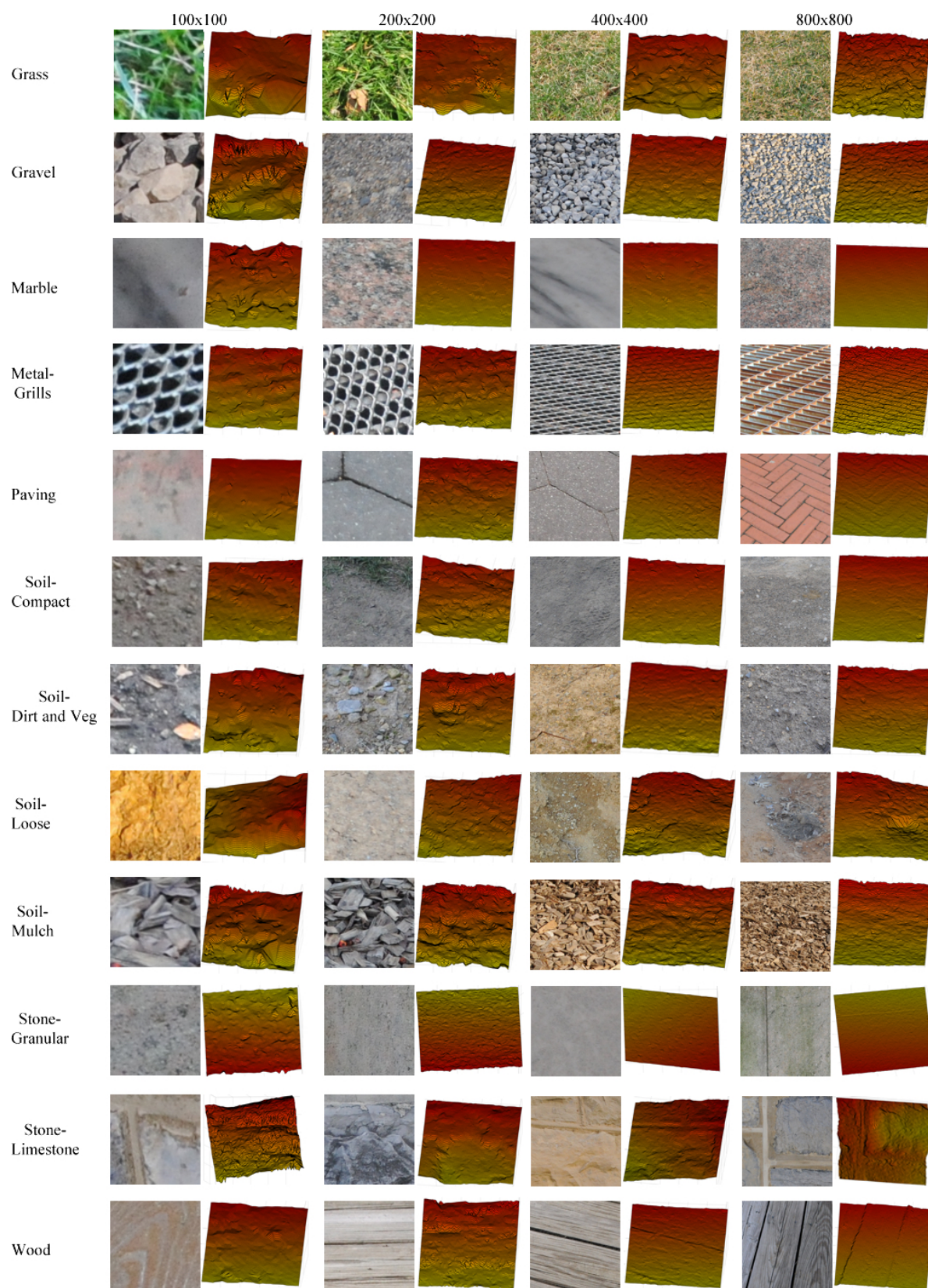
Figure 2: Four samples per category (one at each scale) for Grass, Gravel, Marble, Metal - Grills, Paving, Soil - Compact, Soil - Dirt and Veg, Soil - Loose, Soil - Mulch, Stone - Granular, Stone - Limestone, and Wood.

2. Focus Scale Experiments

This section contains all the experiments for classification using the focus scale part of the GeoMat dataset. The classificaton accuracy for using only N_{3D} is 32.50. Table 1 presents all the results for the Root Filter Set (RFS), Max Response 8 (MR8), Fisher Vectors from dense SIFT (FV), (FV) with CNN features, and Vector of Locally Aggregated Descriptors (VLAD). Each column shows the features with and without joint normal (-N) modeling; i.e. (without (-N) / with (-N)). From left to right, each column adds more features to the original feature set.

Features	-	+HSV	+N_{3D}	+HSV+N_{3D}
(RFS / RFS-N)	(33.24 / 37.76)	(45.03 / 47.89)	(49.68 / 49.55)	(51.24 / 52.29)
(MR8 / MR8-N)	(32.47 / 41.34)	(45.32 / 47.84)	(49.74 / 50.63)	(53.03 / 53.37)
(FV / FV-N)	(60.97 / 66.95)	(62.92 / 68.76)	(65.87 / 68.16)	(66.37 / 69.05)
(FV+CNN / FV-N+CNN)	(68.92 / 73.80)	(67.82 / 72.05)	(72.08 / **73.84**)	(70.79 / 72.13)
(VLAD / VLAD-N)	(51.82 / 53.66)	(56.71 / 58.95)	(60.50 / 62.00)	(60.68 / 61.37)

Table 1: Comparing RFS, MR8, FV, FV+CNN, and VLAD Features.

Table 2 presents rectification used with the same set of features as Table 1. Each row shows the results with and without rectification: (without rectification / with rectification). Note that in the case of FV+CNN, either or both features can use rectified images. We use boldface to denote which feature type is using rectification (e.g. **FV**+CNN means that FV used rectified images).

Features	-	+HSV	+N_{3D}	+HSV+N_{3D}
RFS	(33.24 / 34.42)	(45.03 / 44.13)	(49.68 / 50.18)	(51.24 / 53.50)
RFS-N	(37.76 / 39.82)	(47.89 / 49.50)	(49.55 / 50.00)	(52.29 / 53.11)
MR8	(32.47 / 35.03)	(45.32 / 45.29)	(49.74 / 52.08)	(53.03 / 52.24)
MR8-N	(41.34 / 42.05)	(47.84 / 48.42)	(50.63 / 51.63)	(53.37 / 54.32)
FV	(60.97 / 60.26)	(62.92 / 63.32)	(65.87 / 65.70)	(66.37 / 66.29)
FV-N	(66.95 / 66.82)	(68.76 / 68.08)	(68.16 / 67.11)	(69.05 / 68.82)
FV+CNN	(68.92 / 70.13)	(67.82 / 68.50)	(72.08 / 72.47)	(70.79 / 70.74)
FV-N+CNN	(73.80 / 72.97)	(72.05 / 71.79)	(73.84 / 73.68)	(72.13 / 71.87)
FV+**CNN**	(68.92 / 68.95)	(67.82 / 67.55)	(72.08 / 72.05)	(70.79 / 70.58)
FV-N+**CNN**	(73.80 / 73.71)	(72.05 / 72.13)	(73.84 / 73.82)	(72.13 / 72.21)
FV+**CNN**	(68.92 / 70.13)	(67.82 / 68.47)	(72.08 / 72.53)	(70.79 / 70.92)
FV-N+**CNN**	(73.80 / 72.92)	(72.05 / 71.84)	(73.84 / 73.50)	(72.13 / 71.95)
VLAD	(51.82 / 50.89)	(56.71 / 56.74)	(60.50 / 60.63)	(60.68 / 61.11)
VLAD-N	(53.66 / 52.58)	(58.95 / 57.82)	(62.00 / 60.82)	(61.37 / 60.84)

Table 2: Comparing Rectification with RFS, MR8, FV, FV+CNN, and VLAD Features.

3. Additional GeoMat Scene Scale Samples

Figure 3 shows 40 of the 160 images of our scene scale dataset of a construction site.
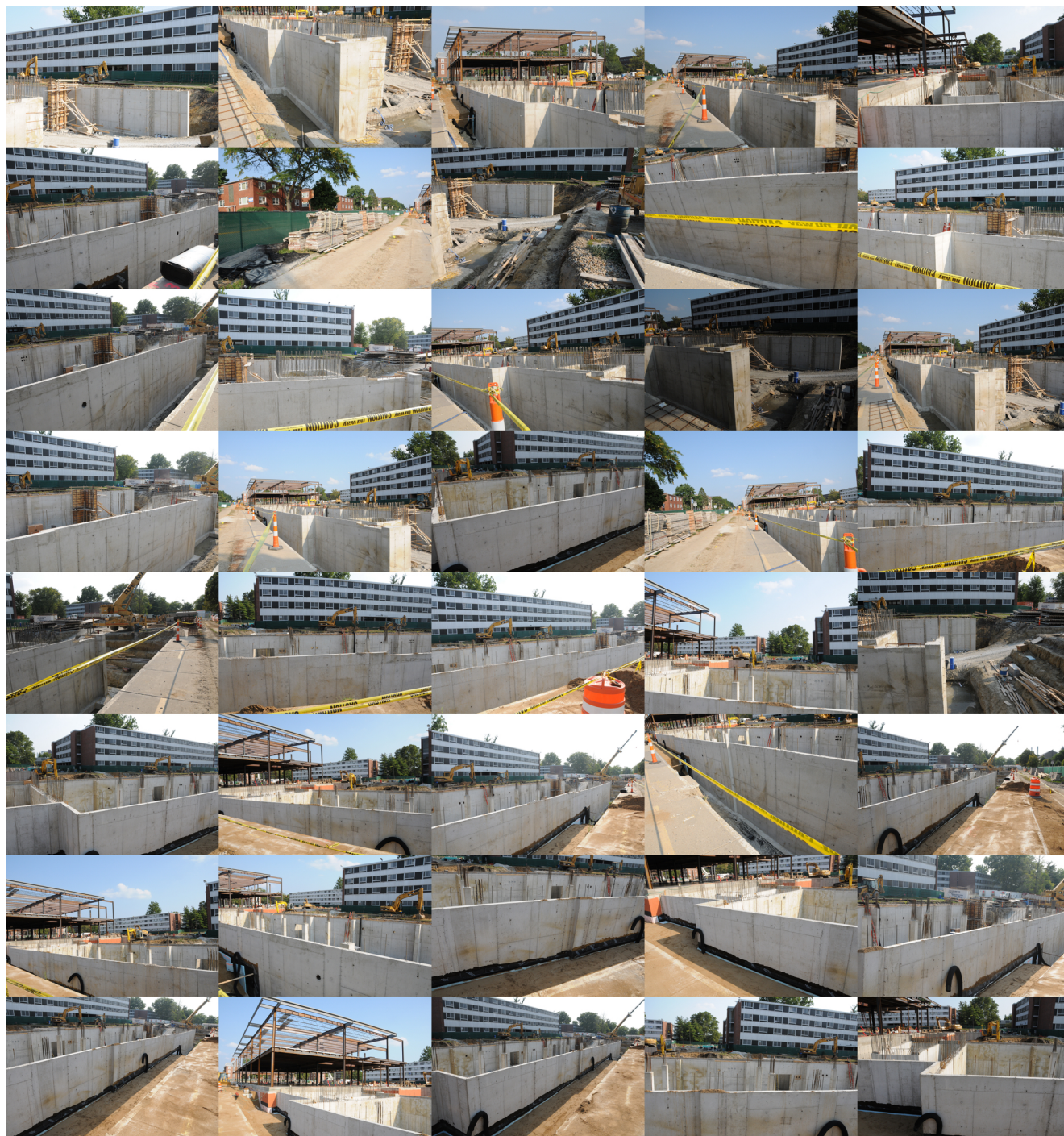

Figure 3: 40 of the 160 images of the construction site for the scene scale dataset.