

# UAVLight: A Benchmark for Illumination-Robust 3D Reconstruction in Unmanned Aerial Vehicle (UAV) Scenes

## Supplementary Material

### Overview

This supplementary material provides additional qualitative and quantitative results complementing the UAVLight benchmark paper. It is organized into four parts, and we also provide a video file containing extended visualizations across time slots and viewpoints.

- **Part 1: Additional Dense Point Cloud Visualizations.**

We provide dense point cloud renderings for the remaining six scenes not shown in the main paper, illustrating large-scale geometry and illumination-sensitive regions (Fig. 2).

- **Part 2: Multi-Time-Slot Visualizations Across All Scenes.** Figs. 3 and 4 show 3–5 representative time slots per scene, demonstrating how natural sunlight variations affect appearance while geometry and viewpoints remain fixed.

- **Part 3: Additional Baseline Comparisons.** We provide qualitative comparisons of all evaluated baselines on the remaining six scenes, as shown in Figure 5. These examples extend the main paper’s analysis of explicit versus implicit illumination modeling.

- **Part 4: Extended Quantitative Results.** We report full PSNR, SSIM, and LPIPS results for the remaining six scenes, complementing Tables 4 and 5 in the main paper. The metrics are presented in two tables, each covering three scenes (Road2, Industrial, Roof in Table 1; City2, Industrial2, City in Table 2). These results complete the evaluation over all 18 UAVLight scenes and further demonstrate the benchmark’s illumination diversity and consistency across time.

These additions offer a complete view of UAVLight’s behavior across all 18 scenes and multi-time-of-day captures, further supporting its role as a controlled-yet-natural benchmark for illumination-robust reconstruction.

### Reproducibility Details

To ensure full reproducibility, we provide the following implementation and configuration details used across all experiments:

- **Hardware.** NVIDIA A800 GPUs, 80GB VRAM for all baseline methods.
- **Software.** PyTorch 2.4.1, CUDA 11.8, COLMAP 3.7.
- **Dataset Release.** We release camera poses, A/B split indices per time slot, undistorted images, sunlight vectors, dense pointcloud, and evaluation scripts.

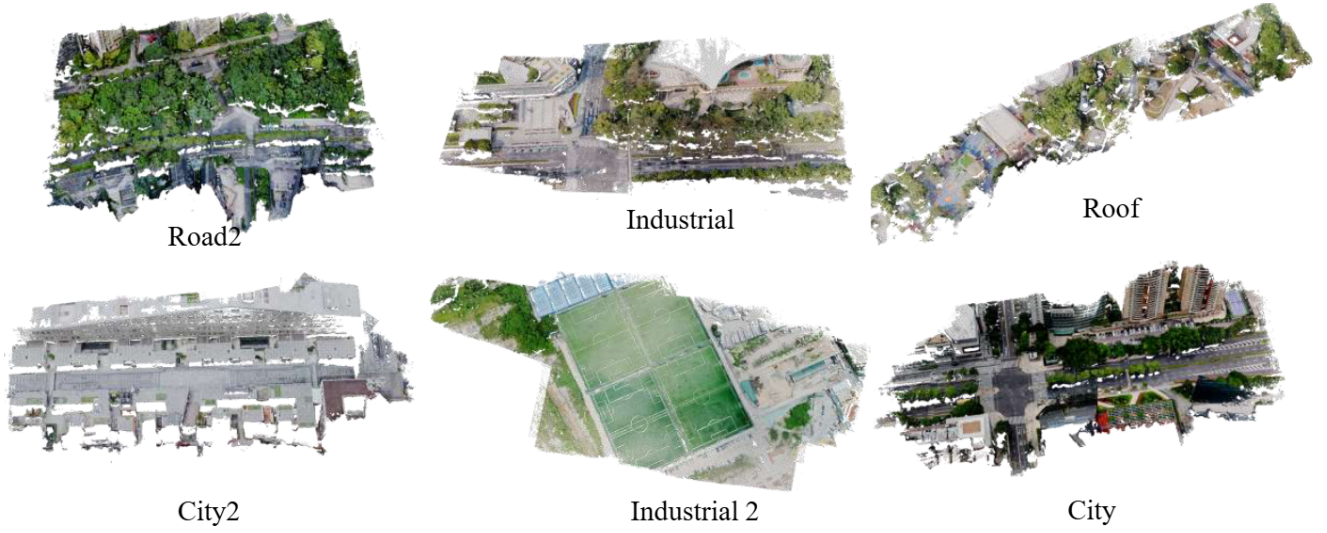


Figure 2. **Dense point cloud visualizations for the remaining six scenes in UAVLight.** These reconstructions exhibit diverse structural layouts, including vegetation, metallic structures, and transportation infrastructure, serving as ground-truth geometric references under changing natural illumination.

Method	Road2			Industrial			Roof		
	PSNR	SSIM	LPIPS	PSNR	SSIM	LPIPS	PSNR	SSIM	LPIPS
<b>LumiGauss</b>	22.24	0.750	0.163	17.42	0.676	0.223	19.79	0.654	0.288
<b>WildGaussians</b>	21.60	0.692	0.223	17.49	0.580	0.338	16.91	0.532	0.555
<b>GaussianWild</b>	21.34	0.721	0.170	18.13	0.622	0.285	19.29	0.587	0.394
<b>NeRF-OSR</b>	16.53	0.369	0.581	18.85	0.513	0.555	18.17	0.462	0.691
<b>NeRF-W</b>	16.93	0.431	0.493	16.45	0.534	0.481	18.18	0.516	0.504

Table 1. **Extended quantitative results (Part 1)** on Road2, Industrial, and Roof. Metrics are reported separately for PSNR, SSIM, and LPIPS (no slash).

Method	City2			Industrial2			City		
	PSNR	SSIM	LPIPS	PSNR	SSIM	LPIPS	PSNR	SSIM	LPIPS
<b>LumiGauss</b>	22.69	0.820	0.148	20.03	0.850	0.188	19.77	0.780	0.155
<b>WildGaussians</b>	21.21	0.759	0.215	24.80	0.909	0.121	20.82	0.749	0.180
<b>GaussianWild</b>	21.30	0.771	0.167	22.33	0.892	0.115	20.72	0.752	0.163
<b>NeRF-OSR</b>	19.38	0.552	0.535	21.47	0.789	0.378	19.71	0.595	0.413
<b>NeRF-W</b>	19.62	0.602	0.460	20.49	0.825	0.339	17.42	0.619	0.409

Table 2. **Extended quantitative results (Part 2)** on City2, Industrial2, and City. Metrics are reported separately for PSNR, SSIM, and LPIPS.



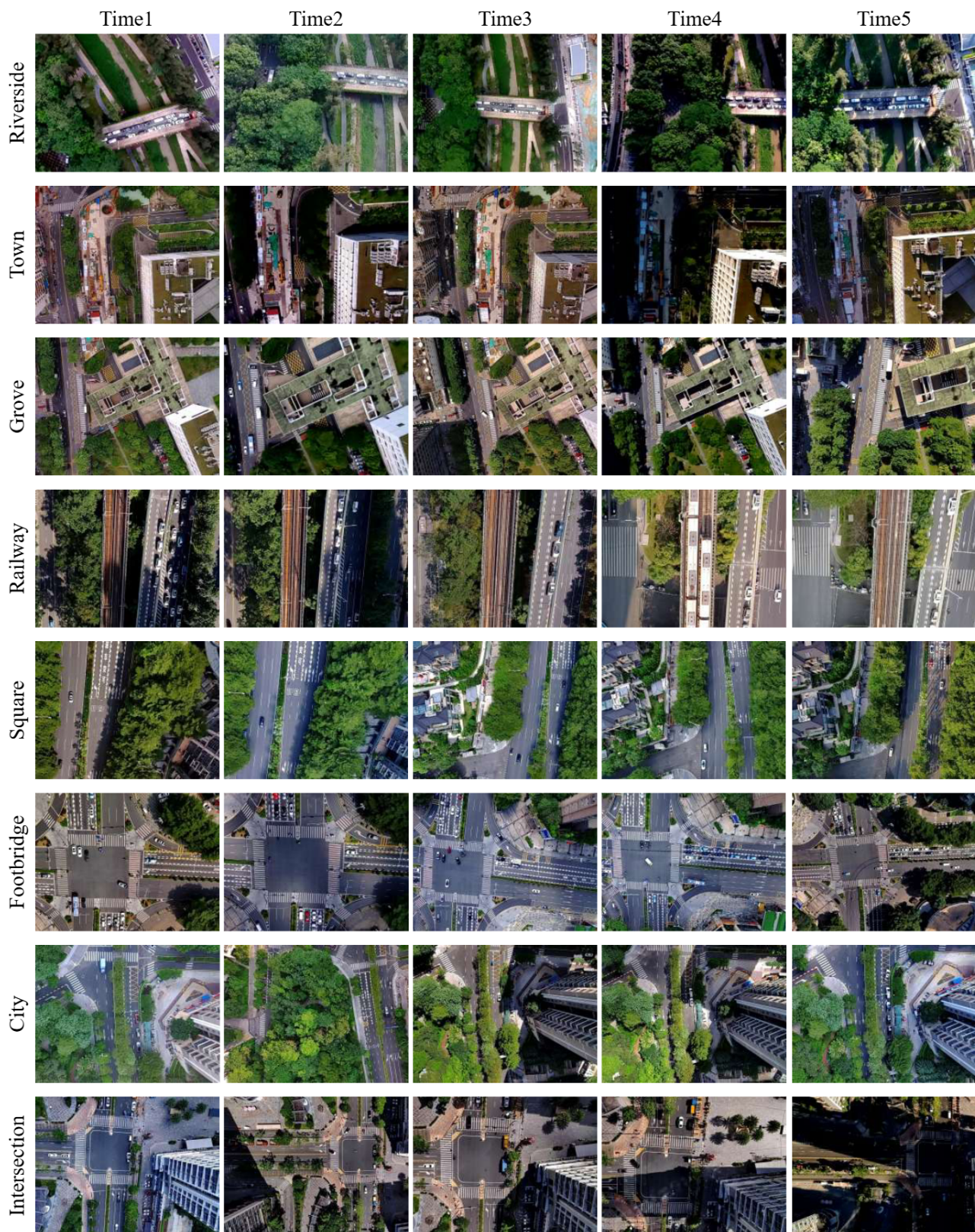


Figure 3. **Representative multi-time-slot visualizations (Part I).** Each scene is shown under 3–5 time slots captured along identical waypointed UAV trajectories. Shadow displacement, shading gradients, and ambient-light variations illustrate the natural illumination diversity captured by UAVLight.







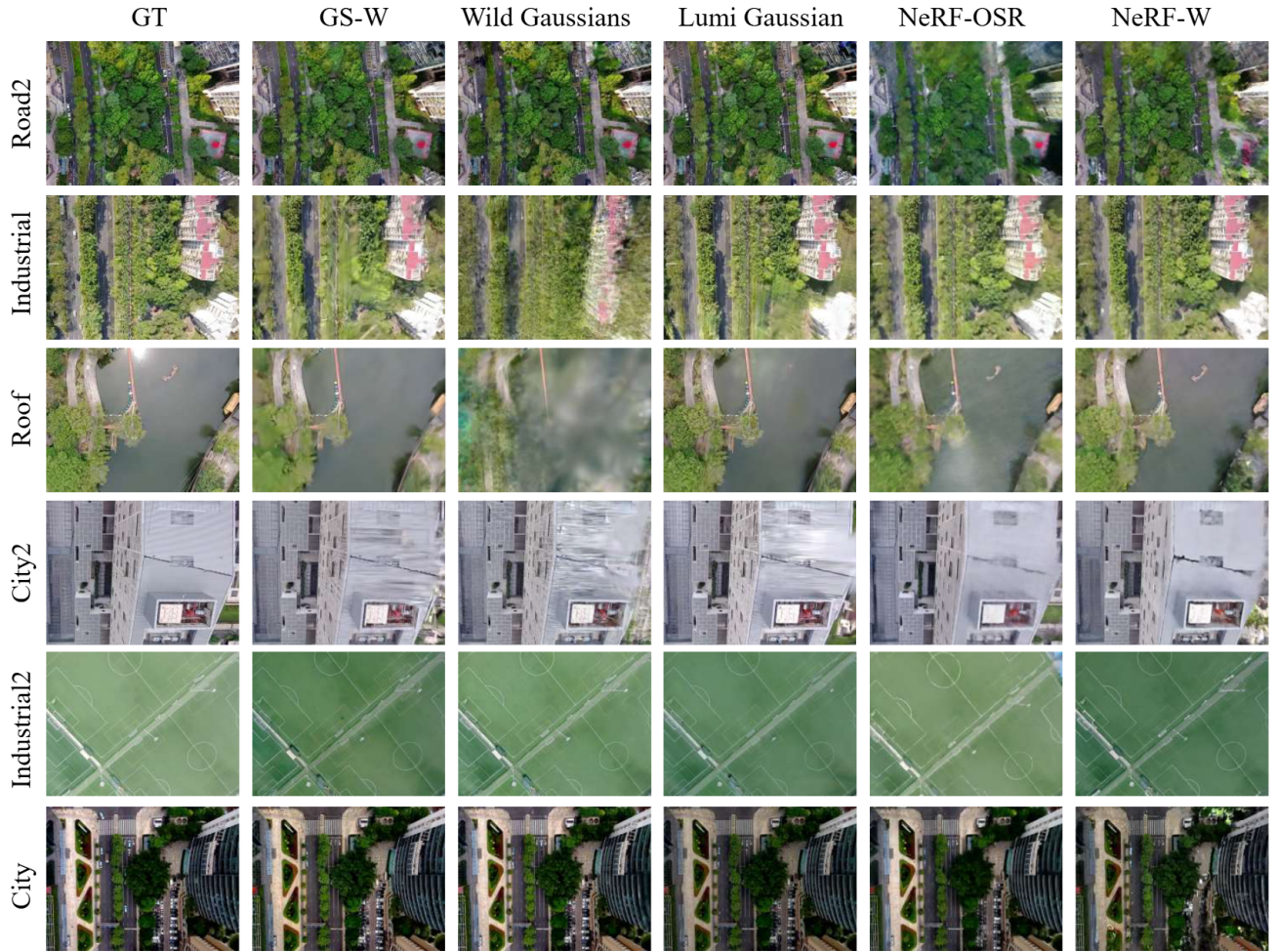


Figure 5. **Additional comparisons on the remaining six scenes.** We present the rendering results from all baselines, complementing the main paper and providing full-scene coverage of implicit and explicit illumination models across UAVLight.