



■ CONSTRUCTION MONITORING · CASE STUDY

# PROGRESS INTELLIGENCE REPORT

RTK drone monitoring of a 22.55-acre construction site — orthomosaic, terrain model, and progress documentation captured on schedule.

● PLATFORM · DJI Matrice 4E

● RTK FIXED

● GSD · 1.0 CM/PX

● COVERAGE · 22.55 AC

RTK DRONE MAPPING &amp; GEOSPATIAL ANALYSIS · SOUTHERN CALIFORNIA

FILE / AA-CS-003

For planning and due diligence purposes only. Does not substitute for a licensed land survey, engineering assessment, or professional certification.



EXECUTIVE SUMMARY

# SITE INTELLIGENCE OVERVIEW

AI-assisted briefing based on mission data, quality metrics, and site observations.

EXECUTIVE SUMMARY

The aerial mapping mission conducted by Aerial Atomics LLC focused on assessing the construction progress of Lennar's 'TheRow' project in San Marcos. Utilizing the DJI Matrice 4E, the mission aimed to provide detailed insights into grading, structural developments, and site logistics, ensuring that project stakeholders have a clear understanding of the current status and any potential areas of concern. The data collected will support effective decision-making and enhance project management efficiency.

The aerial data captured during the mission achieved centimeter-grade accuracy due to the use of RTK Fixed positioning. With a Ground Sample Distance (GSD) of 1.0 cm/px and a total of 1454 images processed, the resulting point cloud consists of 85.3 million points, allowing for precise analysis of the site conditions. The GPS Root Mean Square (RMS) error was recorded at 0.017 m, ensuring high-quality data for further evaluation.

Aerial imagery reveals indicators of rough grading completion across the site, with active cut and fill zones visible. Visual analysis suggests that foundation work has progressed significantly, with framing activities underway and underground utilities being installed. Surface patterns indicate possible erosion control measures in place, while material staging areas and soil stockpiles are clearly defined in the imagery. Additionally, aerial observations highlight the condition of haul roads, which are crucial for site access and logistics.

KEY FINDINGS

1

Point cloud generated with 85.3 million points for detailed analysis.

2

GSD of 1.0 cm/px ensures high-resolution imagery.

3

Visual indicators suggest rough grading is largely complete.

4

Aerial imagery reveals potential issues with erosion control measures.

5

Surface patterns indicate active material staging and soil stockpiling.

MISSION AT A GLANCE

22.55 ac

SITE AREA

1.0 cm/px

RESOLUTION

1454.0

IMAGES

RTK Fixed

POSITIONING

85.3M

POINT CLOUD

SECTION 01 · MISSION BRIEF

# PROJECT BRIEF

A scheduled UAV mission documented site progress — grading advancement, structure framing, earthwork volume, and schedule compliance — as a georeferenced record for project teams and stakeholders.

PREPARED BY

## AERIAL ATOMICS

Curtis Emmanuel  
Director of Aerial Intelligence

RTK FIXED

ENGINEERING-GRADE GSD

MISSION SCOPE

LOCATION

San Marcos

DATE

2026-05-26

COVERAGE

22.55 acres

CLIENT

Lennar Construction

EQUIPMENT · HW

- DJI Matrice 4E
- RTK Fixed
- Mechanical-shutter camera

FLIGHT PARAMETERS · OPS

- Front overlap 85%
- Side overlap 85%
- Fixed altitude
- Altitude 122.0 ft AGL
- Speed 7.9 m/s

DELIVERABLES PRODUCED · OUT

- 1.0 cm/px orthomosaic
- Digital Surface Model (DSM)
- Dense point cloud (85.3M pts)
- Progress comparison mosaic
- Condition analysis report
- Drainage analysis layer
- Interactive GIS web map
- PDF assessment report



■ FIG. 01 · ORTHOMOSAIC

# SURVEY FOOTPRINT

The full property was reconstructed from 1454.0 images into a seamless 1.0 cm/pixel orthomosaic — one georeferenced base layer for every measurement and condition call.

TOTAL AREA

**22.55** ac

IMAGES

**1454.0** shots

AVG GSD

**1.0** cm/px

ELEV. RELIEF

**16.1** m

REPROJ. ERR

**1.07** px

POINT CLOUD

**85.3M** pts

SECTION 02 · QUALITY ASSURANCE

# DATA QUALITY & ACCURACY

The photogrammetric report confirms centimeter-grade RTK Fixed positional control and reliable image alignment — the basis for confident measurement and condition interpretation.

| RECONSTRUCTION READOUT     |                    | QA / GEOREF |
|----------------------------|--------------------|-------------|
| GPS RMS ERROR              | ✓ WITHIN TOLERANCE | 1.7 cm      |
| ABSOLUTE HORIZONTAL · CE90 | ✓ WITHIN TOLERANCE | 1.7 cm      |
| ABSOLUTE VERTICAL · LE90   | ✓ WITHIN TOLERANCE | 2.3 cm      |
| REPROJECTION ERROR         | ✓ WITHIN TOLERANCE | 1.07 px     |
| SPARSE RECONSTRUCTION RATE | ✓ WITHIN TOLERANCE | 98.6 %      |

| INTERPRETATION                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>Centimeter-grade RTK Fixed accuracy</li><li>Excellent image alignment</li><li>Reliable orthomosaic generation</li><li>High confidence in observations</li></ul> |

| RTK FIXED CLASS                         |
|-----------------------------------------|
| Sub-5 cm horizontal/vertical confidence |

| POSITIONAL ACCURACY REFERENCE · PLAIN LANGUAGE |                                  |              |                                   |
|------------------------------------------------|----------------------------------|--------------|-----------------------------------|
| METRIC                                         | WHAT IT MEASURES                 | THIS PROJECT | INTERPRETATION                    |
| GPS RMS Error                                  | Overall 3D position accuracy     | 1.7 cm       | Absolute position of each pixel   |
| CE90 Horizontal                                | 90% of points within X cm horiz. | 1.7 cm       | Horizontal measurement confidence |
| LE90 Vertical                                  | 90% of points within X cm vert.  | 2.3 cm       | Elevation surface reliability     |
| Reprojection Err                               | Image-to-model alignment quality | 1.07 px      | Lower is sharper orthomosaic      |

■ FIG. 02 · ELEVATION

# DIGITAL SURFACE MODEL

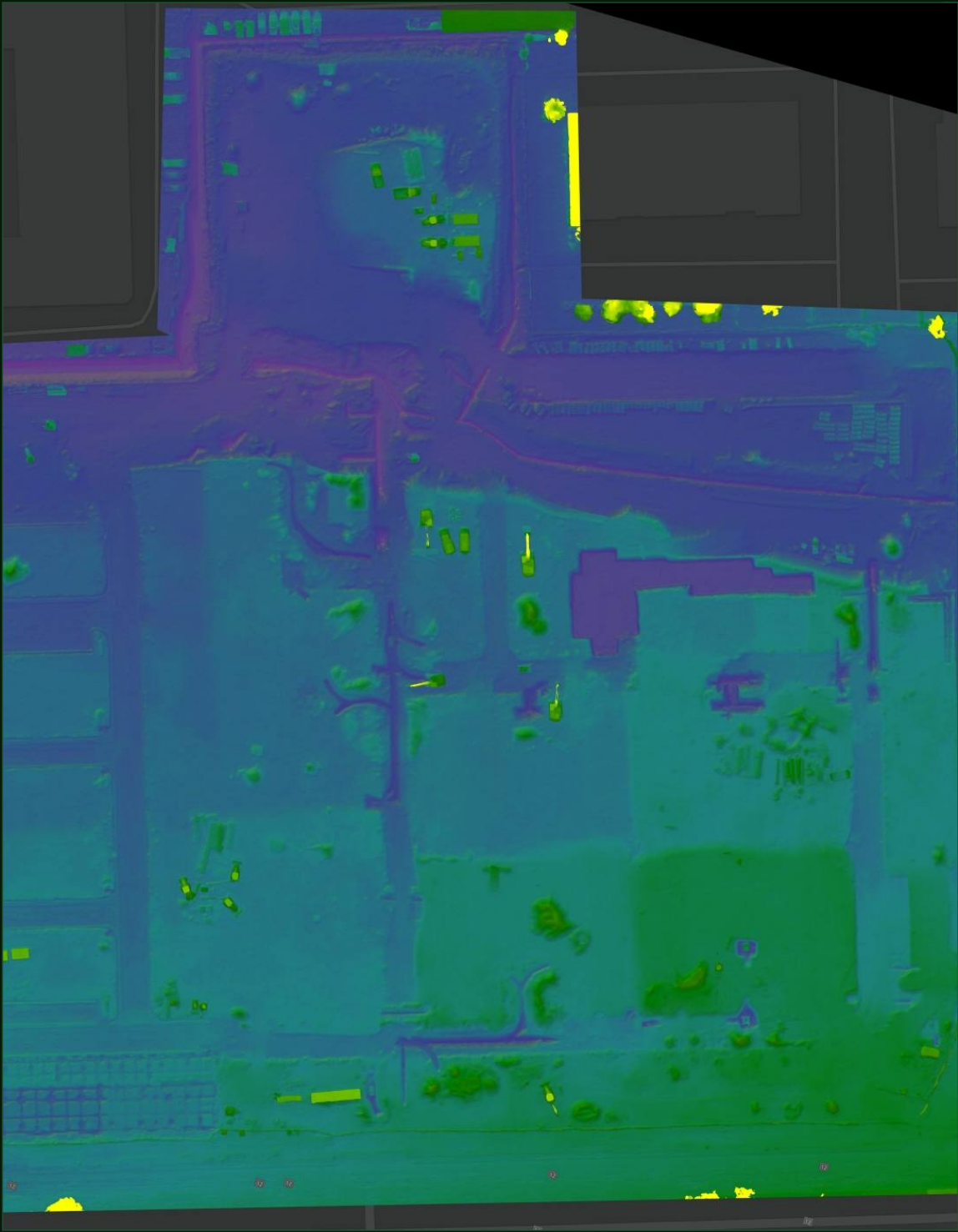
The DSM records the elevation of every feature — structures, vegetation, and terrain — across the 22.55-acre footprint.

RELATIVE ELEVATION



KEY INSIGHTS

- Identifies high and low points across the property
- Highlights drainage patterns and ponding-prone areas
- Visualizes structure and vegetation height
- Supports grading and stormwater analysis



SECTION 03 · PROGRESS DOCUMENTATION

# SITE PROGRESS ANALYSIS

At 1.0 cm/pixel, surface conditions, wear patterns, and drainage indicators are clearly resolved across the entire site footprint.

OBSERVED INDICATORS

- Rough grading complete areas
- Active cut / fill zones
- Compaction areas
- Erosion control measures

OWNER VALUE

- Prioritize areas needing attention
- Quantify area for contractor bids
- Track condition over time
- Document for insurance / records

STAKEHOLDER VALUE

- Build accurate proposals remotely
- Reduce on-site time & risk
- Support capital planning
- Improve documentation quality



FOUNDATION / GRADING PROGRESS

SCOPE NOTE — All observations are derived from aerial imagery and constitute visual indicators only. This report does not constitute a structural inspection, engineering assessment, or certified condition report.



## ■ SECTION 04 · EARTHWORK &amp; LOGISTICS

# SITE SURFACES & DRAINAGE

The DSM converts surface form into actionable drainage and condition analysis — pairing what the orthomosaic shows with where water actually moves.



EARTHWORK ADVANCEMENT

## SURFACE CONDITIONS

- Foundation poured
- Framing progress
- Underground utilities
- Retaining walls

## DRAINAGE VALUE

- Plan grading & swales
- Locate ponding areas
- Reduce flood risk
- Support permitting

## ADDITIONAL FINDINGS

- Material staging areas
- Soil stockpiles
- Equipment staging
- Haul road condition

## BENEFICIARIES

- Property owners
- Engineers & planners
- Maintenance teams
- Insurance / legal



SECTION 05 · OUTPUT PACKAGE

# DELIVERABLES & APPLICATIONS

Every engagement produces a GIS-ready dataset that drops directly into maintenance systems, engineering workflows, and budgeting models — no specialized software required to view it.

## CORE DELIVERABLES

- Orthomosaic (GeoTIFF)
- Digital Surface Model (DSM)
- Condition assessment report
- Site surface documentation
- Interactive GIS web map
- Area & distance measurements

## DELIVERY FORMATS

- Cloud-optimized GeoTIFF
- DSM raster (GeoTIFF)
- Point cloud LAS / LAZ
- Hosted ArcGIS Online map
- PDF condition report

## COMMON APPLICATIONS

- Condition inspections
- Capital planning & budgeting
- Drainage & grading evaluation
- Insurance condition records
- Monitoring & change detection

## STAKEHOLDER BENEFITS

- |                                           |                                           |                                               |
|-------------------------------------------|-------------------------------------------|-----------------------------------------------|
| ● Detect missing or damaged surface areas | ● Identify standing water / poor drainage | ● Measure area for contractor bids            |
| ● Document pre-existing conditions        | ● Reduce risky manual site access         | ● Integrate into existing GIS & CMMS          |
| ● Support capital planning & budgeting    | ● Enable repeatable change detection      | ● Build accurate proposals without site visit |
| ● Reduce manual inspection exposure       | ● Deliver reports within 48–72 hours      | ● Establish measurable condition baseline     |

## INTERACTIVE MAP



SCAN TO OPEN MAP

MAP URL

<https://arcg.is/1L1H12>

## PROFESSIONAL DISCLOSURE

This report is produced from aerial photogrammetric data and is intended for planning, due diligence, and asset management purposes only. It does not constitute or substitute for a licensed land survey, boundary determination, structural engineering assessment, environmental report, or any professional certification required by law. All measurements, elevations, and visual observations are derived from aerial imagery and are subject to the accuracy specifications stated in the Quality Assurance section of this report. Aerial Atomics LLC is not a licensed land surveyor or professional engineer. Consult a licensed professional for any regulatory, legal, or engineering application.

SECTION 06 · WHY IT WORKS

# OPERATIONAL ADVANTAGES

01

## CENTIMETER PRECISION

Centimeter-resolution data for confident condition calls.

02

## REPEATABLE MISSIONS

Future flights compare against the same baseline.

03

## FULL-SITE COVERAGE

One mission documents hundreds of acres in a single pass.

04

## SIMPLE DELIVERY

PDF reports and web maps — no special software needed.

TRADITIONAL INSPECTION VS AERIAL INTELLIGENCE

METHOD

DIMENSION

TRADITIONAL MANUAL INSPECTION

AERIAL ATOMICS MAPPING

FIELD TIME

Multi-day, crew on site

Single coordinated flight

COVERAGE

Sampled / spot checks

Continuous 22.55-acre dataset

RECORD

Notes & loose photos

Georeferenced, measurable layers

SAFETY

Ladder & roof exposure

No manual access required

RE-SURVEY

Restart from scratch

Repeat against same baseline

DELIVERABLES

Written report, loose photos

GIS dataset + interactive web map

TURNAROUND

Days to weeks for report

48–72 hour standard delivery



## AERIAL ATOMICS

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● FAA PART 107 CERTIFIED

● LICENSED & INSURED