



# **Standard Operating Procedure (SOP): Survey Standards, Accuracy & Quality Control**

**Effective Date:** January 1, 2020

**Approved By:** Jay C. Hipp, PLS

**Reviewed By:** Corporate Office – Greenville, SC

## **1. PURPOSE**

This SOP establishes company-wide technical standards, accuracy tolerances, and quality control measures to ensure that all land surveying projects are conducted with consistency, precision, and accountability.

## **2. SCOPE**

This policy applies to all H&M Surveying field crews, CAD staff, project managers, and licensed PLS personnel across every office and project type, including boundary surveys, topographic mapping, construction staking, UAV mapping, and GIS services.

## **3. RESPONSIBILITIES**

- **Licensed Professional Land Surveyor (PLS) – Office Level**
  - Ensures fieldwork and deliverables meet corporate accuracy and quality standards.
  - Reviews and signs off on completed surveys and plats.
  - Coordinates with HQ for peer reviews or audits as needed.
- **Project Manager**
  - Oversees project workflow from scheduling to delivery.
  - Reviews data and plats for client-specific requirements.
  - Communicates project status and quality issues with clients.
- **Field Crew Chief**
  - Executes fieldwork according to project scope and standards.
  - Establishes site control and validates positional accuracy.
  - Ensures daily data backups and proper file naming.
- **CAD Technician**
  - Drafts surveys according to H&M Surveying's CAD standards.
  - Flags anomalies or inconsistencies in field data.
  - Prepares files for review by the PLS and Project Manager.



## **4. SURVEY ACCURACY STANDARDS**

### **Control Points (GPS):**

- **Horizontal Accuracy:**  $\pm 0.04$  feet
- **Vertical Accuracy:**  $\pm 0.05$  feet
- **Coordinate System:** NAD83 (2011), NAVD88
- Minimum of 2 site control points required for each job.

### **Robotic/Manual Total Station Work:**

- **Horizontal Accuracy:**  $\pm 0.03$  feet
- **Vertical Accuracy:**  $\pm 0.05$  feet
- Instrument must be checked against known benchmarks weekly.

### **UAV/LiDAR Mapping:**

- **GNSS Accuracy (RTK/PPK):**  $\pm 0.06$  feet horizontal,  $\pm 0.10$  feet vertical
- Ground Control Points (GCPs) must be placed and validated
- LiDAR and photogrammetric products undergo ground-truthing against check shots.

## **5. FIELD DATA MANAGEMENT**

- All crews must:
  - Export and name raw data files daily as: jobnumber\_date\_initials.txt (e.g., 2304\_0409\_JD.txt)
  - Upload files to ShareFile by end-of-day
  - Note discrepancies, environmental challenges, or control issues in the **Daily Field Report**
- Each project folder must include:
  - Field notes
  - Control point sketches
  - Equipment used (serial numbers)
  - Backup of raw and processed data



## **6. DRAFTING & DELIVERABLE STANDARDS**

- **File Types:** DWG (AutoCAD Civil 3D), PDF Plats, Excel Tables (if applicable)
- **Naming Convention:** jobnumber\_projectname.dwg
- **Standard Layers, Linetypes, and Symbols:** Per H&M CAD Template
- **Plats must include:**
  - Surveyor's certificate and seal
  - North arrow, scale, legend, basis of bearings
  - Control points and references
  - Title block (with corporate contact info)

## **7. QUALITY CONTROL (QC) & QUALITY ASSURANCE (QA)**

### **QC Checks (Performed by PM or CAD Manager):**

- Verify that field data matches CAD draft
- Ensure GCPs and benchmarks are correctly tied in
- Confirm client scope and deliverables are fulfilled
- Review layer management, labeling, and annotation

### **QA Review (PLS):**

- Final check before sealing plats or submitting deliverables
- Confirm that tolerances are within project and industry standards
- Sign off on project and complete internal QA Form

## **8. PEER REVIEW & CORPORATE AUDIT**

- Corporate office may conduct spot audits of:
  - Completed surveys
  - Equipment calibration logs
  - Project timelines and communication records
- Peer reviews may be requested for:
  - High-profile or public-sector jobs
  - Plats involving legal disputes
  - UAV deliverables with tight tolerances



## **9. DEFICIENCY PROTOCOL**

If an error is discovered:

- Immediate notification to PM and office PLS
- Client must be informed if deliverables are affected
- Corrected data or plats must be clearly marked as "REVISED"
- Root cause analysis should be completed and logged

## **10. REFERENCES**

SC LLR Standards of Practice Manual for Surveying

[https://llr.sc.gov/eng/PDF\\_Files/STANDARDS%20OF%20PRACTICE%20MANUAL.pdf](https://llr.sc.gov/eng/PDF_Files/STANDARDS%20OF%20PRACTICE%20MANUAL.pdf)

SC LLR Guidelines on Spatial Data Collection for Surveys

[https://llr.sc.gov/eng/PDF\\_Files/Guidelines%20on%20Data%20Collection%20for%20Surveys\\_2019.pdf](https://llr.sc.gov/eng/PDF_Files/Guidelines%20on%20Data%20Collection%20for%20Surveys_2019.pdf)

Guidelines on Engineering Surveys

[https://llr.sc.gov/eng/PDF\\_Files/Guidelines-on-Engineering-Surveys.pdf](https://llr.sc.gov/eng/PDF_Files/Guidelines-on-Engineering-Surveys.pdf)