

VDOT Survey Manual

Revisions August 2021

Chapter 1

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 1.02.1 Added paragraph regarding USGS map availability
Deleted paragraphs related to programs used to manage projects including references to POOL, PWA, PCES and IPM
- Section 1.02.4/5 There were two sections 1.02.4; **consultant invoices changed to 1.02.5**
Deleted text of Virginia Code §33.2-236 (hyperlink provided)
- Section 1.13 Section added to provide reference to policy and procedure resources regarding operations that involve UAS, Laser Scanning and/or LiDAR

Chapter 2

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 2.02 Section for “Care and Adjustment of Instruments” has numerous revisions for both clarity and further inclusion; paragraphs added for GPS equipment and General Care and Cleaning; paragraph on Storage and Shipping has been expanded
- Section 2.03 Renamed from “Calculators and Computers” to “Field Controllers and/or Data Collectors” and text also revised accordingly
- Section 2.04 Section on EDM Reflector Constants, old verbiage partially deleted to allow for minor technical corrections; expanded for a more complete discussion of constants and differences to be applied per manufacturer and/or specific prism recommendations; updated for prism and non-prism modes of operation
- Section 2.07 Added section for “Routine Equipment Checks” which are performed more often than those discussed in Section 2.06
- Section 2.08 “GPS” was formerly Section 2.07

Chapter 3

No Significant Revisions

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting

Chapter 4

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 4.01.01 Deleted text of Virginia Code §33.2-1011 (hyperlink provided)
Added information to access railroad property
The entirety of the Right of Entry procedures has been revised and/or updated to reflect the current guidance given in Virginia Code §33.2-1011 which was last revised in March 2021; new references and/or hyperlinks to the current procedural documentation and current examples are provided
- Section 4.02 Paragraph added to stress the importance of showing all easements and right of way which was included on previous VDOT plan sheets
- Section 4.02.01 Paragraph(s) on easement research expanded for clarification
- Figures Included All Right of Entry figures have been revised and/or updated
Sample Right of Way Acquisition Plat has been revised and/or updated

Chapter 5

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Throughout “A Network Approach” Areas with additions and/or clarifications to stress the importance of, and thus promote, a network approach to performing GNSS surveys (*and the processing of said GNSS survey data*) runs through the entire chapter; this is done to foster better compliance with the GNSS guidelines as outlined in this revision as well as with prior versions of the VDOT Survey Manual
- Section 5.01 Expanded discussion of GNSS systems in general
- Section 5.03 Expanded for “A Network Approach”
- Section 5.04 Item (2c) Changed from NGS B-Order or higher to NGS 1st Order or higher; B, A, and AA monuments are typically CORS stations and are of a higher expected precision than 1st order marks, however allowing the use of 1st order marks gives the surveyor the option of setting up on and using local control points
- Section 5.04 Item (2e) Added maximum distance of 1450 feet between control points forming a sight or azimuth pair
- Section 5.04 Item (2f) Added explanation about the different Dop’s (Dilution of Precision) elements
- Section 5.04 Item (2k) Ellipsoid model changed from WGS84 to GRS80 to be consistent with the Code of Virginia requirement to use NAD83 based SPCS
- Section 5.04 Item (2n) Minimum observation time for rapid static changed from 15 minutes plus distance to 20 minutes plus distance

Chapter 5

Significant Revisions Itemized

- Section 5.04 Item (5) Revised to specifically mention **OPUS-Projects** to foster “A Network Approach” and to clear up any misconceptions about using OPUS singularly
- Section 5.08 Updated references to the Code of Virginia (old 5G, 5H and 5M)
- Section 5.13 Revised and/or clarified leveling standards for establishing benchmarks or controls and performing profile leveling; added standards for secondary and photogrammetric controls; provided equations on a mile and a station basis
- Figures Included Removed all figures reciting sections of the Code of Virginia
- Figure 5-D Added rebar monument diagram and a recommended control disc layout
- Figure 5-M (Old 5P) Revised GNSS Spec. Table to reflect changes mentioned herein

Chapter 6

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 6.03 Renamed to “Panels” and has been revised to include the traditional photo cross panel, a simplified cross panel, a tee panel and a chevron panel
- Figure 6-A Revised and/or additional panel dimensions; digital media camera panels added
- Figure 6-B Revised and/or additional panel configurations; digital media camera panels added

Note: All panel configurations can be used for traditional film; use dimensions provided for traditional film as needed and use panel dimension ratios for digital media cameras (DMC)

- Section 6.06 “Photogrammetric Control: Instructions to Surveyors” example sheet and control deliverables has been revised to include additional panel configurations
- Section 6.08 Additional target configuration/dimensions added to helicopter-photography
- Section 6.09 Form LD-392 updated; hyperlink provided
- Section 6.13 Flight Lines: added altitude variation tolerances
- Section 6.13 Overlap: variation tolerances expanded and clarified
- Section 6.13 Crab: variation tolerances expanded and clarified
- Section 6.13 Tip and Tilt: variation tolerances revised, expanded and clarified
- Section 6.16 Airborne LiDAR: significant revisions and additional guidance
- Section 6.17 Form LD-393 updated; hyperlink provided

Chapter 7

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 7.01 Added references to Right of Entry procedures in Chapter 4 and guidance for surveys requiring entry onto railroad property
- Section 7.03 Expanded to include additional technologies and photographs
- Section 7.04.1 “Surveys Near Airports” expanded with more detailed explanations

Chapter 8

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 8.02 Added references to Right of Entry procedures in Chapter 4
- Section 8.03.02 Added guidance for surveys requiring entry onto railroad property
- Figure 8-A Form LD-23 updated; hyperlink provided

Chapter 9

Laser Scanning and LiDAR Applications

This Chapter is entirely new; Chapter 9 was previously intentionally left blank for future subjects.

Chapter 10

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 10.01 Expanded references to the Post-Construction Manual and the Road and Bridge Specifications for clarification
- Section 10.10 Additional cross references and hyperlinks provided

Chapter 11

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 11.10 Right of Way stakes; additional guidance provided
- Section 11.12 No-Plan Projects; additional guidance provided

Chapter 12

Significant Revisions Itemized

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
- Section 11.02 Added references to Right of Entry procedures in Chapter 4 and guidance for surveys requiring entry onto railroad property
- Figure 12.1 Added S.U.E. Quality Level Chart for quick reference and clarity
- Figure 12.2 Added “Miss Utility 811” guidelines

Appendix A

No Significant Revisions

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting

Appendix B

No Significant Revisions

- Throughout Minor changes and/or updates to verbiage; added and/or updated hyperlinks; updates to contact information and job titles; general formatting
Added conversion factors for the International Foot