

# CHAPTER 1

## GENERAL

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*Sec. 1.01 Legal Status of the Survey*

The State Highway Commissioner is authorized by the Revised Code of Virginia §33.2-1011. (Effective October 1, 2014) (see [Figure 1-A](#)) to make surveys for highway purposes. The code states, "The State Highway Commissioner, through his duly authorized officers, agents, or servants, may enter upon any land in the Commonwealth for the purposes of making examination and survey thereof, with a view to ascertainment of its suitability for highway purposes, or for any other purpose incidental thereto. Such officers, agents, or servants shall exercise care to protect any improvements, growing crops, or timber in making such examination or survey."

This authority should never be used arbitrarily, but should be thoroughly tempered with proper respect for private property and for the rights and feelings of the individual.

*Sec. 1.02 Authorization and Assignment of Surveys*

*Sec. 1.02.1 Authorization*

All surveys for highways on all systems, including closed surveys for determination of ownership or for purchase, are to be authorized by the State Location and Design Engineer or his representative. This authorization will be in the form of a memorandum in which the scope of the project, length, type of survey required and any other pertinent data will be outlined. Supplemental data, made available to assist in performing the survey, will be furnished also.

Supplemental survey data, or information, shall include but is not limited to: National Geodetic Survey (NGS) field survey control, both horizontal and vertical, U.S. Geological Survey topographic maps, photographs of the area, existing road plans, and prints of adjacent projects in the planning stage. As schedules permit, the Global Positioning System, as initiated by the District Survey Engineer, shall be used to provide field survey control to the project based upon published government control.

After the location approval by the Commonwealth Transportation Board and the Federal Highway Administration, survey authorization for Interstates will be made in accordance with tentative construction schedules. Survey authorization for Principal-Minor Arterial System projects will be made in accordance with established construction or planning schedules. Prior approval must be given by the Federal Highway Administration on projects where Federal-Aid for preliminary engineering is requested.

Survey authorization for the Secondary System (Arterial-Collector-Local Roads) will be made when requested by the Secondary Roads Division, in accordance with planning schedules and the Secondary System Contract Advertisement Schedule.

Deleted Information \*

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\* Rev. 3/19

VDOT employees will use a variety of programs to manage their projects. Project development information stored in POOL. Project schedules are stored and managed in Project Web Application (PWA). Project estimates are stored in Project Cost Estimating System (PCES). Project documents are currently stored in IPM Documents; however, this will be transitioning to ProjectWise. Most project information can be viewed in Integrated Project Manager (IPM). All of these systems are administered by Central Office, and utilized across all nine Districts and their Residencies.

Projects Schedules are initially determined by the PWA template type that is selected for the project at time of project initiation. Project Managers then have the flexibility to adjust the PWA schedules to more accurately reflect project specific circumstances and expectations. All project tasks are defined in the VDOT PMO Project Tasks and Scheduling Guide. Individual project tasks are assigned to a team member who is responsible to ensure the task is completed. Actual task start and finish dates should be promptly entered into PWA by the Project Manager.\*

Please refer to [Figure 1-B](#) for all current survey-related codes and their descriptions.

The Department's policy is not to re-establish right-of-way lines for adjacent property owners or anyone else unless it is to serve the Department's needs. The Department will, however, assist others, such as property owners, engineers or surveyors in establishing right-of-way by providing plans and other available information. The surveying necessary to re-establish the lines is the responsibility of the one having the need for such information.

**Section §33.2-236(see [Figure 1-C](#)) Maps or plats prepared at request and expense of local governing bodies and other groups; Department of Mines, Minerals and Energy to seek other existing sources.**

**The Commissioner of Highways may prepare photogrammetric maps or plats of specific sites or areas at the request of the governing bodies of localities of the Commonwealth, local nonprofit industrial development agencies, planning district commissions, soil and water conservation districts, metropolitan planning organizations, public service authorities, and local chambers of commerce. The Department of Mines, Minerals and Energy shall first review the request to determine whether suitable or alternate maps or plats are currently available, and the local governing body, agency, or chamber shall agree to reimburse the Department of Transportation for the cost of producing the maps or plats.**

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### Sec. 1.02.2 Survey Assignments

Upon receipt of a survey authorization, the Survey Manager will assign the project to a Survey Supervisor (Land Surveyor) in the district or Consultant staff. During the progress of the survey, the Survey Manager will review the work for conformance with current instructions and ascertain that the survey data is complete and covers the proposed project.

### Sec. 1.02.3 Consultant Assignments

**Survey Managers, State Photogrammetry Manager, and the Geospatial Program Manager shall be informed by email of ANY photogrammetric, survey, or SUE work being performed by all primes and/or sub-consultants under any VDOT contract in each respective district prior to commencement of the survey. All photogrammetric, survey, or SUE deliverables shall be submitted to the District and Central office as work is completed via ProjectWise regardless of the contract that it was performed under.\***

VDOT has Survey and SUE primes consultants available for obtaining services in the surveying and subsurface utility engineering fields. These services are requested through task assignments. Each consultant is responsible for obtaining ProjectWise Access for each task assignment. The task assignment process is outlined below.

**[Represents communication protocol to be used]**

- Use the UPC first in the subject line of the email.

1. Assignments are initiated at the district or CO level by the Project Manager or other personnel and sent to the Survey Manager or Geospatial Program Manager (CO). **[LD forms and email]**
2. The Survey Manager will contact the Geospatial Program Manager with the project information so a prime can be assigned. Information includes: scope of work, UPC#, activity code, Agency One Use code, PM name and contact number, due date, and notice if any consultants have already been on the job. If aerial photography is necessary, the State Photogrammetrist will be contacted prior to assignment to a consultant. **[email]**
3. The Geospatial Program Manager will assign a prime to the task based on the information provided by the district that best fits the Departments business needs. Consultants that have prior involvement on the job will be reassigned to the job when available. **[email ]** {Time to return:} <=1 business day in general.
4. The Survey Manager will contact the Prime assigned for an estimate based on the scope information. **[email ]**

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5. The Prime will complete an estimate based on the information provided. The following items should be included in the final estimate: {Time to return:} 5 days by contract.
  - a. Narrative letter – includes a detailed scope, VDOT responsibilities (if any), contract MOA date with term, schedule, and deliverables.
  - b. Distribution of Man-hours in spreadsheet format –
  - c. Fee Calculation work sheet – Limit to 1 page.
  - d. Project limits provided by the Department –Sketches, maps, written documentation
  - e. Attachments – Should be used for sub consultant’s services.
  - f. Any additional documentation if relevant to the task.
  - g. PDF Name should include: UPC-Route-Desc example: 4632-630-Location survey.pdf\*
6. Prime submits copy of estimate to the Survey Manager. The Geospatial Program Manager and Geodetic Survey Supervisor will be cc’d with all correspondence. **[email]** Do not send color files unless Department requests.
7. Survey Manager is responsible for reviewing, negotiating hours, and obtaining the Project Managers notice to proceed (NTP) which includes invoicing UPC/Cost Center and activities. NTP will be forwarded to the Geospatial Program Manager and Geodetic Survey Supervisor. Project Managers will provide an open activity for the task assignment and must keep it open for the duration of the work. **[email]**
8. Geospatial Program Manager is responsible for reviewing and giving final NTP to the Consultant.
  - a. NTP will be given by email first. **[email]**
  - b. A formal letter will be provided by US mail service to the Consultant. **[letter]**
9. Consultant will track each districts task requests and provide reports to the Department as requested. Bi-weekly reports will be inclusive of assigned and unassigned tasks. Report shall include: District, UPC, Route, Project Number, Description, NTP Date, Due Date, Project Percent Complete, Notes in Excel format. **[email]**
10. If NTP is not received by the Consultant within 2 weeks of submittal, the Consultant will email CO and the District requesting the status of the assignment. **[email]**
11. Survey Managers will review the work for conformance with task request and meets the requirements outlined in the Survey Manual. Survey Manager will notify the consultant and CC the Geospatial Program Manager that the task has been completed, reviewed, and submitted per Sec. 1.08 so the task assignment can be closed.**[email]**

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12. Survey Managers will fill out consultant evaluation forms.

#### **Sec. 1.02.4 Consultant Assignments --- Structure Monitoring\***

VDOT has a prime consultant available for obtaining services in the field of monitoring deformation of structures. These services are requested through task assignments. Each consultant is responsible for obtaining ProjectWise Access for each task assignment. The task assignment process is outlined below.

[Represents communication protocol to be used]

- Use the UPC first in the subject line of the email.

1. Assignments are initiated at the district or CO level by the Project Manager or other personnel and sent to the Geodetic Survey Supervisor or Geospatial Program Manager (CO). [LD forms and email]
2. The Project Manager will contact the Geodetic Survey Supervisor with the project information. Information includes: scope of work, UPC#, activity code, Agency One Use code, PM name and contact number, due date, and notice if any consultants have already been on the job.
3. The Geodetic Survey Supervisor will assign the task based on the information provided by the district that best fits the Departments business needs.
4. The Geodetic Survey Supervisor will contact the Prime for an estimate based on the scope information. [email ]
5. The Prime will complete an estimate based on the information provided. The following items should be included in the final estimate: {Time to return:} 5 days by contract
  - a. Narrative letter – includes a detailed scope, VDOT responsibilities (if any), contract MOA date with term, schedule, and deliverables.
  - b. Distribution of Man-hours in spreadsheet format –
  - c. Fee Calculation work sheet – Limit to 1 page.
  - d. Project limits provided by the Department –Sketches, maps, written documentation
  - e. Attachments – Should be used for sub consultant’s services.
  - f. Any additional documentation if relevant to the task.
  - g. PDF Name should include: UPC-Route-Desc example: 4632-630-Location survey.pdf\*
6. Prime submits copy of estimate to the Geodetic Survey Supervisor. The Geospatial Program Manager will be cc’d with all correspondence. [email] Do not send color files unless Department requests.

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\* Added 3/19

7. Geodetic Survey Supervisor is responsible for reviewing and obtaining the Project Managers notice to proceed (NTP). NTP will be forwarded to the Geospatial Program Manager. Project Managers will provide an open activity for the task assignment and must keep it open for the duration of the work. [email] \*
8. Geospatial Program Manager is responsible for reviewing and giving final NTP to the Consultant.
  - c. NTP will be given by email first. [email]
  - d. A formal letter will be provided by US mail service to the Consultant. [letter]
9. Consultant will track each task request and provide reports to the Department as requested. [email]
10. If NTP is not received by the Consultant within 2 weeks of submittal, the Consultant will email CO and the District requesting the status of the assignment. [email]
11. Project/Task Manager will review the work for conformance with task request and meets the requirements outlined in the Survey Manual. Geodetic Survey Supervisor will notify the consultant and CC the Geospatial Program Manager that the task has been completed ,reviewed, and submitted per Sec. 1.08 so the task assignment can be closed.[email]
12. Task Managers will fill out consultant evaluation forms when requested.

#### *Sec. 1.02.4* **Consultant Invoices/Vouchers**

All district invoices shall be reviewed by the Survey Managers and/or with the Project Managers within 5 days of receipt by email or mail. If Central Office does not receive notification from the District of an invoice discrepancy or charge code correction within five (5) business days of the email, Central Office will process the invoice, as submitted, under the UPC/Activity code on file. Identification of invoice discrepancy or charge code correction after the five (5) business days will be the responsibility of the District to correct. Please make sure all UPC/CSC's are open to charges for at least 60 days to allow the processing and payment of invoice.

#### *Sec. 1.03* **Working Hours**

VDOT survey personnel working hours are set by the Department. These working hours may vary and be dependent upon extenuating circumstances in certain areas of the state. An example might be that survey personnel may be forbidden to work within the interstate right-of-way during rush hour traffic according to District policy for safety considerations.

The Land Surveyor Supervisor shall notify the Survey Manager by email or phone where he and the survey party will be working each day.

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\* Rev. 3/19

#### *Sec. 1.04* **Daily Diary/Field Notes**

A complete diary, also known as Field Notes,\* which shall be kept by the Survey Supervisor (Land Surveyor), should indicate the activities of all members of the party and the type and amount of work accomplished by the party. The diary will be checked frequently by the Survey Manager to insure completeness and accuracy. [See Figure 1-A](#)

#### *Sec. 1.05* **Refuse Disposal**

It is the responsibility of the person in charge of the party to see that the grounds are cleaned up after lunch and all refuse is disposed of, whether on private property or on the State's right-of-way. Under no circumstances shall the survey personnel leave waste paper or any miscellaneous debris on any job.

#### *Sec. 1.06* **Specifications and Standards**

Each party will be furnished, according to its needs, one or more copies of the Road and Bridge Specifications, Road Designs and Standards, the Construction Manual, and Post Construction Operations Manual, and revisions or errata for same as they are issued. These will be charged to the Survey Supervisor (Land Surveyor) and every member of the party must become familiar with the contents. Of particular importance should be the specifications covering the type of road for which the survey is being performed. Other standard plans, such as minor drainage structures and revisions thereto, will be issued from time to time as deemed necessary.

#### *Sec. 1.07* **Accuracy of Surveys**

All Survey topographic information must comply with the [Model Virginia Map Accuracy Standards and the National Map Standards](#) for the scale of mapping. These standards are hyperlinked. Control and Right of Way surveying is to comply with all applicable requirements of the latest edition of the Virginia Board for Architects, Professional Engineers, Land Surveyors, Certified Interior Designers and Landscape Architects regulations.

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\* Rev. 3/19



*Sec. 1.08 Submission of Completed of Surveys*

ProjectWise shall be used for all survey documentation and file storage. Once created all files shall be stored in the ProjectWise environment for the life of the project. Hyperlinks to the information shall be included in the all correspondence. Survey Folders have been created for storage and organizational purposes.\*

All GPS control “subject data” for VDOT surveys (either primary control or photogrammetric control) shall be delivered to VDOT’s Geodetic Surveys Engineer for a quality control check and evaluation. This information will be delivered to the Geodetic Surveys Engineer immediately after completion of the primary control (deliverables are in Section 10.06).

After all field work has been completed as outlined in Chapter 4.00 and the processing and final quality control checking have been completed, a copy of all survey, utility, DTM, contour, and all updated files are to be stored on the appropriate ProjectWise Document Management server.

The Survey Manager shall update activity 31S in the IPM system for all projects surveyed by VDOT staff.

A transmittal letter or an e-mail shall be sent to the individuals listed below and CC’d to Geospatial Program Manager and Assistant State Location and Design Engineer’s offices notifying them of the completion of the survey and location of the files:

**Projects designed in District:** Transmittal or email to designer and project manager.

**Projects designed in Central Office or by Consultants:** Transmittal or email to project manager and designer.

**Bridge projects designed in Central Office or by Consultants:** Transmittal or email to State Bridge Engineer’s office.

**Bridge projects designed in District:** Transmittal or email to the bridge engineer in charge of the project, and if applicable, the L&D designer.

For surveys in which all data has been secured except the utility designation, the survey shall not be shown complete nor shall the element for the Human Resources Planning System be closed out until the utility designation is complete.

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\* Rev. 3/19

### *Sec. 1.09* **Safety**

All survey activities shall be governed by guidelines and instructions as issued by the State Traffic Engineer and the State Safety and Health Engineer. All survey personnel should be very familiar with and aware of the guidelines as specified in VDOT's "Virginia Work Area Protection Manual" and VDOT's "Work Zone Safety Guidelines for Temporary Traffic Control". All survey personnel, who will be in the roadway and are responsible for directing traffic in the work zone, shall have successfully completed and shall be certified as a flagman through VDOT's Flagging Certification Program. All survey personnel who are required to enter confined spaces (i.e. manholes, utility vaults, etc.) shall be certified through VDOT's Confined Space Certification Program. Any questions or information requests regarding VDOT's Certification Programs should be directed to the State Safety and Health Engineer.

### *Sec. 1.10* **Outside Requests for Information**

As time permits, the District or Central Office staff may provide approved roadway or right of way plans for land surveying professionals outside VDOT when requested by phone, mail, or email at their discretion. If the information is on an approved plan sheet(s), it will be satisfactory to sell him a print of the plan sheet. This will apply to horizontal control, vertical control and other survey information. If a person would like to come to the appropriate office and copy the data himself, this would be satisfactory.

National Geodetic Survey (formerly U.S.C.& G.S.) data can be acquired from: The Director, National Geodetic Survey, 1315 East-West Highway, Silver Spring, Maryland 20910, or by visiting the NGS web site and using the searchable database for datasheet retrieval at <http://www.ngs.noaa.gov/>.

Please refer to [Figure 1-C](#) in this chapter for requests from government agencies.

### **Sec. 1.11 Location Survey Report**

Unless specified otherwise by the Geospatial Program Manager, a Location Survey Report shall be submitted at the initial completion of all location survey projects performed internally or by consultant staff. The Location Survey Report shall be uploaded to ProjectWise and an email submitted with a hyperlink\* to the Survey Manager, the appropriate quality control person and cc'd to the Geospatial Program Manager. The report shall accompany all necessary digital files that contain all requested survey data.

The Location Survey Report shall be in a separate WORD document (\*.doc) file format and shall consist of two parts, a heading (or informational block) and a body.

The heading shall contain the following:

- Route number,      - 911 name                      - Project number      - UPC #County/City
- District                      - Project Length                      - Work Begin/End Date
- Horizontal & Vertical Datum Basis                      - Survey Personnel Involved.

The body of the narrative will be a brief description of the project and shall include, but not be limited to, the following:

- the purpose of the assignment
- all traverse and level loop raw and adjusted closures
- a description of survey control and which points constrained the network
- utility owners and addresses
- possible locations of hazardous materials or contaminated soils
- conflicts with dissatisfied property owners
- general description of conflicts with record and field property data
- a list and description of each survey file and supporting data that is sent to the Geospatial Program Manager's office
- general observations or recommendations regarding the field survey and completed survey files

The Location Survey Report shall be archived with all project data for future reference and will be used and chronicled as an informational source for the life of the survey.

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\* Rev. 3/19

*Sec. 1.12* **Human Resources Planning System**

The Human Resources Planning System was established in 1972 to enable the Department to determine personnel costs and manpower requirements related to the development of highway projects. This system records the hours expended for each element and provides a record for the project of the hours expended. From these records, "norms" are developed in order that manpower can be projected for new projects.

The Land Surveyor Supervisor shall become familiar with the system and properly educate his personnel regarding it. Time sheets should be reviewed carefully to assure that the element code is correct for the type of work performed and that the element is closed out when that element is completed.

The Survey Manager shall have the responsibility of submitting budgets for projects and revising the budgets when necessary. [VDOT] Budgets compiled by the Survey Manager will be submitted to the Project Manager for inclusion into the "Project Cost Estimating System" (PCES) and the "Integrated Project Manager" (IPM) system. The [VDOT] activities listed in the current edition of the "Project Tasks and Scheduling Guide" should be used when making a budget for a project. Any project changes, such as alignment miles and/or any other changes made due to additional data or change in the scope of the project are input directly into the "Project Cost Estimating System" (PCES) and the "Integrated Project Manager" (IPM) system after changes are approved[VDOT] by the Project Manager. The Survey Manager should review all changes before they are submitted to ensure the completeness and accuracy. Any questions regarding the work elements or project numbers, which are being charged to, should be directed to the Survey Manager.\*

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\* Rev. 3/14

## Figure 1-A

### Surveying Daily Diary or Field Notes\*

The surveyor's field notes are the permanent written records of the survey taken at the time the work was done in the field. Keep in mind that others may be required to read the field notes and, therefore, care should be taken to ensure that the notes are clear and in a form others can readily interpret.

Proper Field Notes should include:

- Only one book should be used per project unless it has been filled. All project field information shall be placed in this book.
- First few pages of book remain blank to use as an index
- Update index as completed
- A double sheet is considered one sheet
- Place the number of each page in the extreme upper right-hand side of the page
- Type of survey
- Record the name and assignment of each member of the surveying party.
- List of equipment used.
- The date and weather conditions should be recorded at the top right-hand side.
- The note taker should use a 3H or 4H pencil. 2H or ink will smear.
- If an error is made, line through the error. Write in the correct data above the error. Do not erase.
- Data should reflect the degree of accuracy (7.40 is NOT written as 7.4). The decimal point should NOT be omitted.
- If you need to void a page, this is NOT done by tearing it out. The word VOID is written diagonally across the page (or 1/2 page).
- Explanatory notes about a particular reading should be written on the same horizontal line as the reading.
- If calculations on paper are necessary, these should be contained to the back pages of the field book.

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\* Added 3/19

**Figure 1-B**

**Program/Project Management System (IPM) Activity Codes**

12	AUTHORIZE PE
22S	PHOTOGRAMMETRY/AERIAL PHOTO/IMAGE PROCESSING
31S	CONDUCT LOCATION SURVEY
37S	MAJOR STRUC/BRIDGE SURVEY
50	SURVEY/SUE DATA VERIFICATION*
56S	SURVEY COMPENSATORY MITIGATION
57S	RIGHT OF WAY STAKEOUT SURVEY
58	SURVEAY RIGHT OF WAY PLAN SHEETS
70S	UTILITY STAKEOUT – SURVEY
77S	CONSTRUCTION SURVEY
88	SURVEY MONUMENTATION

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\* Rev. 3/19

## Figure 1-C

**§ 33.2-236. (Effective October 1, 2014) Maps or plats prepared at request and expense of local governing bodies and other groups; Department of Mines, Minerals and Energy to seek other existing sources.**

**The Commissioner of Highways may prepare photogrammetric maps or plats of specific sites or areas at the request of the governing bodies of localities of the Commonwealth, local nonprofit industrial development agencies, planning district commissions, soil and water conservation districts, metropolitan planning organizations, public service authorities, and local chambers of commerce. The Department of Mines, Minerals and Energy shall first review the request to determine whether suitable or alternate maps or plats are currently available, and the local governing body, agency, or chamber shall agree to reimburse the Department of Transportation for the cost of producing the maps or plats. (Code 1950, § 33-136.2; 1962, c. 96; 1970, c. 322,; 1982, c. 184; 1984, c. 590; 2014, c. [805](#).)**

**Figure 1-D**

SURVEYING EQUIPMENT – EDM and SURVEY INSTRUMENT EVALUATION												
YEAR 2004												
Part y	Type Instr.	Model	Serial No.	1 <sup>st</sup> Quarter		2 <sup>nd</sup> Quarter		3 <sup>rd</sup> Quarter		4 <sup>th</sup> Quarter		Remarks
				Date	Chkd. By	Date	Chkd. By	Date	Chkd. By	Date	Chkd. By	
99	TOPCON	601AF	F 30988	3-2		6-8		8-24		10-17		No Adj.
		Accessories	3 Tribrach	3-2		6-8		8-24		10-17		Needed
			2 RangePole	3-2		6-8		8-24		10-17		
99	TOPCON	501	P 70236	3-2		6-8		8-24		10-17		Dist. OK
		Accessories	1 Tribrach	3-2		6-8		8-24		10-17		Adj. Vent
			0 RangePole									Cross Hair
99	TOPCON	GTS 2	B 40525	3-2		6-8		8-24		10-17		
		Accessories	1 Tribrach	3-2		6-8		8-24		10-17		
			RangePole									
		Accessories										
		Accessories										