## Section 152. — Construction Survey and Staking

11/05/15–FP14

WFL Specification 11/05/15

Include the following on all projects requiring work in this Section.

Note: Edit to make survey requirements project specific. If necessary, identify requirements by project segment or station.

Construction Requirements

### 152.02 Qualifications.

Add the following:

Conform to the following:

**(a) Personnel.** Provide a crew supervisor on the project whenever surveying and staking is in progress.

**(b) Equipment.** Furnish survey instruments and supporting equipment capable of achieving the specified tolerances.

Construction equipment controlled with a Global Positioning System (GPS) and Robotic Total Station (RTS) machine guidance system may be used in the construction of subgrade, subbase, and base aggregate courses, or other construction operations when approved.

**(c) Material.** Furnish acceptable tools and supplies of the type and quality suitable for highway survey work. Furnish stakes and hubs of sufficient length to provide a solid set in the ground with sufficient surface area above ground for necessary legible and durable markings.

### 152.04 General.

 Delete the text of this Subsection and substitute the following:

Include staking activities in the construction schedule submitted according to Section 155. Include the dates and sequence of each staking activity.

At the preconstruction conference, submit a cost breakdown of the work included in the lump sum item for the purpose of making progress payments.

WFL Specification 11/22/04)

Include the following when the Government has set only control points.

**(a)** Government set reference lines and points. The Government has set horizontal and vertical control points for the project. The location and identity of each control point are shown on the plans.

Before beginning construction, notify the CO of any missing control points or stakes. The Government will reestablish control points and stakes missing before the beginning of construction.

WFL Specification 01/01/04

Include the following if the Government has set a stake only at the beginning of the project (such as for a station survey).

1. Government set reference lines and points. The Government will set a stake to identify the beginning of the project. No other control will be furnished.

WFL Specification 08/17/10

Include the following when the Government furnishes data. Edit as required.

**(b) Government furnished information.** The Government will furnish the following data relating to horizontal and vertical alignment and theoretical slope stake catch points, and other design data:

**(1)** Computer listings containing horizontal alignment, vertical profile, superelevation, excavation and embankment slope ratios, and earthwork quantities;

**(2)** Printed and digital (.CSV format) construction staking notes showing theoretical slope stake catch points;

**(3)** Printed clearing notes (based on theoretical catch points);

**(4)** X, Y, Z coordinates (horizontal and vertical control points);

**(5)** Printed and digital (.CSV format) X, Y, Z coordinates (subgrade and base layers at centerline and shoulders); and

**(6)** Plotted cross sections (earthwork).

**( )** [INSERT OTHER AVAILABLE INFORMATION].

Perform additional conversions and calculations as necessary for convenient use of Government-furnished data. The Contractor is responsible for the accuracy of all staking information converted from the Government-furnished data. Provide immediate notification of apparent errors in the initial staking or in the furnished data.

WFL Specification 11/05/15

Include the following on all projects requiring work in this Section.

**(c)** Pre-survey meeting. Before surveying or staking, discuss and coordinate the following with the CO:

**(1)** Surveying and staking methods;

**(2)** Stake marking;

**(3)** Grade control for courses of material;

**(4)** Referencing;

**(5)** Structure control;

**(6)** Field staking data;

**(7)** Localization of the GPS systems to the Government-established control points; and

**(8)** Other procedures and controls necessary for the work.

Do not start work until staking or three-dimensional (3D) verification data for the affected work has been approved.

Preserve initial reference and control points. Notify the CO of missing control points or stakes at least 10 days before beginning construction. The Government will reestablish control points missing before the beginning of construction.

Acceptance of the construction staking does not relieve the Contractor of responsibility for correcting errors discovered during the work and for bearing additional costs associated with the error.

Maintain legibility of stake markings for the duration of the project or until notified in writing the stakes are no longer needed. Replace stakes if necessary to ensure markings are maintained.

Record survey and measurement field data in an approved format. Sample note formats are available as listed in Subsection 106.01. Submit as-staked data and corrections made to the Government-furnished survey data. Submit survey and measurement data at least weekly.

The construction survey and staking work may be spot-checked for accuracy, and unacceptable portions of work may be rejected. Resurvey rejected work, and correct work that is not within the tolerances specified in Table 152-1.

Remove and dispose of flagging, paint, lath, stakes, and other staking material after the project is complete.

Compute and furnish calculations supporting pay quantities. Measure quantities within the tolerances established by the CO according to Subsection 109.01.

WFL Specification 05/14/13

Include the following when roadway excavation work is paid for by ‘design’ quantity. Do not use if:

• Roadway excavation is measured by Contract Quantity

• Confidence in roadway excavation quantity is low (i.e., limited survey)

Coordinate with 152.05(c) and 204.16(a)(1)(a)

Adjust roadway prism excavation quantities for volume changes resulting from slope stake variations. See Subsections 152.05(d) and 204.16(a)(1)(a).

### 152.05 Survey and Staking Requirements.

 Amend as follows

WFL Specification 05/14/13

Include the following when roadway excavation work is paid for by ‘design’ quantity. Do not use if:

• Roadway excavation is measured by Contract Quantity

• Confidence in roadway excavation quantity is low (i.e., limited survey)

Coordinate with 152.04 and 204.16(a)(1)(a)

Add the following to paragraph (c):

Do not take roadway cross-sections unless required for volume adjustments. See Subsections 152.03(d) and 204.16(a)(1)(a).

WFL Specification 11/05/15

Include the following in all projects when direct payment for survey work is required (if you have lump sum survey pay items.

Payment

### 152.08

 Delete the second paragraph and substitute the following:

Payment for lump sum items will be prorated based on the submitted cost breakdown for the work completed under this Section.