

1 **(January 13, 2021)**

2 **Contractor Surveying - Roadway**

3 The Contracting Agency has provided primary survey control in the Plans.

4
5 The Contractor shall be responsible for setting, maintaining, and resetting all alignment
6 stakes, slope stakes, and grades necessary for the construction of the roadbed,
7 drainage, surfacing, paving, channelization and pavement marking, illumination and
8 signals, guardrails and barriers, and signing. Except for the survey control data to be
9 furnished by the Contracting Agency, calculations, surveying, and measuring required
10 for setting and maintaining the necessary lines and grades shall be the Contractor's
11 responsibility.

12
13 The Contractor shall inform the Engineer when monuments are discovered that were
14 not identified in the Plans and construction activity may disturb or damage the
15 monuments. All monuments noted on the plans "DO NOT DISTURB" shall be protected
16 throughout the length of the project or be replaced at the Contractors expense.

17
18 Detailed survey records shall be maintained, including a description of the work
19 performed on each shift, the methods utilized, and the control points used. The record
20 shall be adequate to allow the survey to be reproduced. A copy of each day's record
21 shall be provided to the Engineer within three working days after the end of the shift.

22
23 The meaning of words and terms used in this provision shall be as listed in "Definitions
24 of Surveying and Associated Terms" current edition, published by the American
25 Congress on Surveying and Mapping and the American Society of Civil Engineers.

26
27 The survey work shall include but not be limited to the following:

- 28
29 1. Verify the primary horizontal and vertical control furnished by the Contracting
30 Agency, and expand into secondary control by adding stakes and hubs as well
31 as additional survey control needed for the project. Provide descriptions of
32 secondary control to the Contracting Agency. The description shall include
33 coordinates and elevations of all secondary control points.
34
35 2. Establish, the centerlines of all alignments, by placing hubs, stakes, or marks
36 on centerline or on offsets to centerline at all curve points (PCs, PTs, and PIs)
37 and at points on the alignments spaced no further than 50 feet.
38
39 3. Establish clearing limits, placing stakes at all angle points and at intermediate
40 points not more than 50 feet apart. The clearing and grubbing limits shall be 5
41 feet beyond the toe of a fill and 10 feet beyond the top of a cut unless
42 otherwise shown in the Plans.
43
44 4. Establish grading limits, placing slope stakes at centerline increments not more
45 than 50 feet apart. Establish offset reference to all slope stakes. If Global
46 Positioning Satellite (GPS) Machine Controls are used to provide grade
47 control, then slope stakes may be omitted at the discretion of the Contractor
48
49 5. Establish the horizontal and vertical location of all drainage features, placing
50 offset stakes to all drainage structures and to pipes at a horizontal interval not
51 greater than 25 feet.
52

- 1 6. Establish roadbed and surfacing elevations by placing stakes at the top of
2 subgrade and at the top of each course of surfacing. Subgrade and surfacing
3 stakes shall be set at horizontal intervals not greater than 50 feet in tangent
4 sections, 25 feet in curve sections with a radius less than 300 feet, and at 10-
5 foot intervals in intersection radii with a radius less than 10 feet. Transversely,
6 stakes shall be placed at all locations where the roadway slope changes and
7 at additional points such that the transverse spacing of stakes is not more than
8 12 feet. If GPS Machine Controls are used to provide grade control, then
9 roadbed and surfacing stakes may be omitted at the discretion of the
10 Contractor.
- 11
- 12 7. Establish intermediate elevation benchmarks as needed to check work
13 throughout the project.
- 14
- 15 8. Provide references for paving pins at 25-foot intervals or provide simultaneous
16 surveying to establish location and elevation of paving pins as they are being
17 placed.
- 18
- 19 9. For all other types of construction included in this provision, (including but not
20 limited to channelization and pavement marking, illumination and signals,
21 guardrails and barriers, and signing) provide staking and layout as necessary
22 to adequately locate, construct, and check the specific construction activity.
- 23
- 24 10. Contractor shall determine if changes are needed to the profiles or roadway
25 sections shown in the Contract Plans in order to achieve proper smoothness
26 and drainage where matching into existing features, such as a smooth
27 transition from new pavement to existing pavement. The Contractor shall
28 submit these changes to the Engineer for review and approval 10 days prior to
29 the beginning of work.
- 30

31 The Contractor shall provide the Contracting Agency copies of any calculations and
32 staking data when requested by the Engineer.

33

34 The Contractor shall ensure a surveying accuracy within the following tolerances:

	<u>Vertical</u>	<u>Horizontal</u>
36 Slope stakes	±0.10 feet	±0.10 feet
37 Subgrade grade stakes set		
38 0.04 feet below grade	±0.01 feet	±0.5 feet
39		(parallel to alignment)
40		±0.1 feet
41		(normal to alignment)
42		
43		
44 Stationing on roadway	N/A	±0.1 feet
45 Alignment on roadway	N/A	±0.04 feet
46 Surfacing grade stakes	±0.01 feet	±0.5 feet
47		(parallel to alignment)
48		±0.1 feet
49		(normal to alignment)
50		

1	Roadway paving pins for		
2	surfacing or paving	±0.01 feet	±0.2 feet
3			(parallel to alignment)
4			±0.1 feet
5			(normal to alignment)
6			

7 The Contracting Agency may spot-check the Contractor's surveying. These spot-
8 checks will not change the requirements for normal checking by the Contractor.

9
10 When staking roadway alignment and stationing, the Contractor shall perform
11 independent checks from different secondary control to ensure that the points staked
12 are within the specified survey accuracy tolerances.

13
14 The Contractor shall calculate coordinates for the alignment. The Contracting Agency
15 will verify these coordinates prior to issuing approval to the Contractor for commencing
16 with the work. The Contracting Agency will require up to seven calendar days from the
17 date the data is received.

18
19 Contract work to be performed using contractor-provided stakes shall not begin until the
20 stakes are approved by the Contracting Agency. Such approval shall not relieve the
21 Contractor of responsibility for the accuracy of the stakes.

22
23 Stakes shall be marked in accordance with Standard Plan A10.10. When stakes are
24 needed that are not described in the Plans, then those stakes shall be marked, at no
25 additional cost to the Contracting Agency as ordered by the Engineer.

26
27 ***Payment***

28 Payment will be made for the following bid item when included in the proposal:

29
30 "Roadway Surveying", lump sum.

31
32 The lump sum contract price for "Roadway Surveying" shall be full pay for all labor,
33 equipment, materials, and supervision utilized to perform the Work specified, including
34 any resurveying, checking, correction of errors, replacement of missing or damaged
35 stakes, and coordination efforts.