



Standard Operating Procedure: Survey Control

General Information

Table 1 General Information

Property	Value
Document owner	Eduardo Garcia IV
Approved by	Ronney Lackey
Revision	3
Revision date	4/21/2026
Last review date (must be reviewed annually)	4/21/2026

Printed documents are considered uncontrolled

Purpose

1. The purpose of this procedure is to standardize the setting of survey control points and to ensure that the needs of our projects are met. These needs include accuracy to establish consistency across the department, precise so that projects can be designed correctly, and long-lasting to be utilized on later projects. This will reduce errors in material quantity estimations, redesigns, and will allow data to be used for multiple projects.

References

2. References
 - 2.1. [TxDOT Surveyors' Toolkit](#)
 - 2.2. [Monument Specifications](#)
 - 2.3. [TxDOT Levels of Accuracy](#)

Acronyms and Definitions

3. Acronyms and Definitions
 - 3.1. Acronyms**
 - 3.1.1. **NGS** – National Geodetic Survey
 - 3.1.2. **PM** – Project Manager
 - 3.1.3. **PPCP** – Primary Project Control Point
 - 3.1.4. **PS&E** – Plan Specifications and Estimates

3.1.5. **RRP** - Regional Reference Point

3.2. Definitions

- 3.2.1. **Missing Control Point**– Any control point monument that can no longer be found. A missing control point should be reset according to the standards of the funding entity under a new unique control point name. Use the naming convention agreed upon by the District Survey Coordinator.
- 3.2.2. **Recovered Control Point**– A found control point monument that has been previously sealed by a surveyor and/or engineer, for example, control originally set by a different entity (whether county or city or other department of the State or Feds, etc.). Recovered control point monuments shall be checked in the field for condition, position and/or elevation. Any recovered control point found to be out of compliance shall be re-surveyed or reset using the processes in this document, the [TxDOT Monument Specifications](#) document, [TxDOT Levels of Accuracy](#) document and according to the standards of the [TxDOT Survey Manual](#).
- 3.2.3. **Set Control Point**– A control point monument set under TxDOT funding shall be installed according to the processes described in this document and in the TxDOT Survey Manual. New primary control points shall always be installed following current TxDOT standards.
- 3.2.4. **Legacy Mapping Plane**– Control Point coordinates of record shall follow the original datum and not be modernized. A table of the primary control points is required to include the following: control coordinates of record, current TxDOT RRP control coordinates, and the differential between two mapping planes at primary control points, if applicable. All metadata shall be reported as required.
- 3.2.5. **New Mapping Plane**– Current TxDOT RRP Data

3.2.6. **Survey Level One**– RRP Network Stations, Cooperative CORS sites; See [TxDOT Levels of Accuracy](#) for precision tolerances

3.2.7. **Survey Level Two**–

3.2.7.1. 2A-Primary Project Control (GNSS); See [TxDOT Levels of Accuracy](#) for precision tolerances.

3.2.7.2. 2B- Local Project Control; See [TxDOT Levels of Accuracy](#) for precision tolerances.

3.2.8. **Survey Level Three**– Ground Control Points, boundary corners, Right-of-Way Markers; See [TxDOT Levels of Accuracy](#) for precision tolerances.

Responsibilities

4. Responsibilities

4.1. **District Survey Coordinator**– The District Survey Coordinator is responsible for determining when and if any deviation from control standards are needed for a project, including to supply control monument caps.

4.2. **Surveyor**– The Surveyor is responsible for setting control monuments according to TxDOT standards and shall certify all applicable deliverables.

4.3. **TxDOT Survey Project Manager (PM)**– The TxDOT designated survey PM is responsible for communication and enforcement of these standards.

Flowchart

5. Flowchart – N/A

Procedure

6. Procedure

6.1. The Surveyor shall contact the TxDOT Survey Project Manager and request TxDOT RRP accounts. Accounts are granted for 1 (one) data collector per account request. Accounts must be used to ensure control monuments are tied to a TxDOT RRP.

- 6.2. The Surveyor shall determine the control layout, with the District Survey Coordinator's guidance. The Surveyor shall provide the layout to the TxDOT Survey PM for approval before implementation. It is understood that a layout may be field adjusted, for example, to avoid utilities, obtain a clear horizon, and to maintain intervisibility. It is the responsibility of the Surveyor to provide an updated layout when a previously approved layout is modified.
- 6.3. The Surveyor shall confirm with the TxDOT Survey PM the number of primary control points to set and to which CSJs and/or Project IDs they pertain. The TxDOT Survey PM will request control point numbers/names for the primary control from the District Survey Coordinator. This request shall include the CSJ and/or Project ID, the number of primary control points to be set, and control sheets for nearby existing control points that are to be checked and referenced, all at the District Survey Coordinator's direction. TxDOT will provide the point numbers/names, the control sheets for existing monuments, and the appropriate control caps to the Surveyor.
- 6.4. The Surveyor **shall** submit a [Texas811](https://www.texas811.org/) ticket at <https://www.texas811.org/> as an **excavator** for all primary control points to be set and only hand dig in areas of dense utilities. TxDOT is not responsible for damage to utilities caused by the Surveyor. The District Survey Coordinator may request a copy of the Texas811 ticket at any time.
- 6.5. The Surveyor shall set primary control following the methods provided in the [Monument Specifications](#) document for monument types and application details.
- 6.5.1. Stamp the TxDOT cap with the control point number/name prior to setting, as applicable.
- 6.5.2. Control Monument Construction *Method 1* for areas with soil.

- 6.5.2.1. Use earth auger or post hole digger to create a 3-foot deep by 18-inch diameter circular hole and insert a form or as directed by the District Survey Coordinator. Fill form with wet concrete mix. Proceed using a 5/8-inch-diameter iron rebar 3 feet in length (unless obstructed) with cap and set into wet concrete form. Use wire or twine to anchor rebar to nearby lathes. The edge of the convex cap shall be set to just slightly below wet concrete. This minimizes exposure of the edge of the cap. Once concrete is set, clip twine/wire.
- 6.5.3. Control Monument Construction *Method 2* for areas with exposed bedrock or existing concrete slab.
 - 6.5.3.1. Drill a hole into exposed rock or concrete slab wide enough to accommodate the stem of the control cap. Grind out a countersink depression wide enough for the top of the cap to limit exposure of the bottom edge of the cap. Epoxy control cap into the hole. Use appropriate epoxy type for application and follow epoxy manufactures instructions for use. Allow epoxy to cure according to epoxy manufacturer's specifications.
- 6.5.4. Control Construction *Method 3* for areas with sandy soil.
 - 6.5.4.1. Start by digging a hole with an auger or shovel, 1-foot deep by 18-inch diameter circular hole. Use a specialized sectional rod. See [Monument Specifications](#) for Datum Point Rod. Drive the first section of rod in the center of the hole with the driving point tip on the first rod. Make sure it remains plumb while driving.
 - 6.5.4.2. Couple another section of rod with lock washers tightly to the first and continue to drive the assembly. To obtain tight joints, hand-tighten the sections and then apply another one-quarter turn with a wrench or wrenches. Repeat this procedure until the driving rate is near refusal. The last rod

section is driven such that its top is up to 3 inches below the surface. If necessary, use a grinder or comparable tool to cut any access rod. Leave the top of rod smooth to have a good surface to add a "Dimple" in the center.

6.5.4.3. Stamp aluminum lid with the control point name and year of installation. Install a minimum of 1 foot of the required size #5 PVC sleeve. Epoxy the aluminum lid of the Datum Point Rod to the PVC sleeve, which will isolate the rod from soil movements that may occur. Ensure that the top of the monument is at least 3-inches from the closed lid. Backfill around the outside of the sleeve with sand or surrounding material.

6.5.5. For all 3 methods above (6.5.2, 6.5.3, or 6.5.4), the use of delineator/witness posts shall be determined by the TxDOT District Survey Coordinator. When used, the post should be 6 feet in length and be set to a minimum of 3 feet above the ground surface. The post should have the standard witness post sign attached or painted. Leave the area as nearly to undisturbed as possible. Clean up any trash or unused material in the area. See the [Monument Specifications](#) document for details of delineator/witness posts usage.

6.5.6. The Surveyor shall consult the [TxDOT Levels of Accuracy](#) document for requirements. The District Survey Coordinator will determine the level precision requirements.

6.5.6.1. Level between all primary control points to develop an adjustment for balanced elevations. The District Survey Coordinator will determine the precision requirements.

6.5.6.2. Perform least-squares adjustment or an equivalent available software to create a unified control network.

6.6. The Surveyor shall tie in any nearby control (TxDOT, NGS, city, county and/or Flood Control District Control or any other) into

primary project control as directed by District Survey Coordinator. Surveying methods shall be consistent with TxDOT standards when tying in to nearby control.

- 6.7. The Surveyor shall create a Control Index Sheet suitable for the PS&E utilizing the [Primary Survey Control Checklist \(Form ROW-S-2462Check\)](#) as approved by the District Survey Coordinator.
- 6.8. The Surveyor shall create a Horizontal & Vertical Control Sketch Sheet suitable for the PS&E utilizing the [Primary Survey Control Checklist \(Form ROW-S-2462Check\)](#) as approved by the District Survey Coordinator.
- 6.9. The Surveyor shall create [Primary Survey Control \(Form ROW-S-2462\)](#) suitable for Public Information Requests.
- 6.10. The Surveyor shall complete a [Primary Survey Control Checklist](#) on all control point deliverables.
- 6.11. The Surveyor shall submit the Control Index Sheet (Section 6.7), Horizontal & Vertical Control Sketch Sheet (Section 6.8), [Primary Survey Control](#) form (Section 6.9), and [Primary Survey Control Checklist](#) (Section 6.10) to TxDOT for review prior to certification by seal and signature. TxDOT will return redlined copy or approval in writing to the Surveyor for revision or acceptance.
- 6.12. After redline corrections are addressed by the Surveyor, the Surveyor shall sign and seal the Control Index Sheet (Section 6.7), Horizontal & Vertical Control Sketch Sheet (Section 6.8), and [Primary Survey Control](#) form (Section 6.9).
- 6.13. The Surveyor shall submit signed & sealed copies to the TxDOT Survey PM. The TxDOT Survey PM will provide them to the District Survey Coordinator for archiving and public information requests.

The TxDOT Survey PM shall maintain copies within the project records.

6.14. In the absence of clear understanding of the procedures outside this document, it is the responsibility of the TxDOT Survey PM and/or District Survey Coordinator to provide a practical example to the Surveyor.

Forms/Records

7. Forms/Records

Table 2 Forms and Records

Form number	Form name	Record administrator	Storage location	Retention period
ROW-S-2462	Primary Survey Control		Blank	Blank
ROW-S-2462Check	Primary Survey Control Checklist		Blank	Blank

Revision History

8. Revision History

Table 3 Revisions

Revision	Originator	Revision date	Description of change
1	Ronney Lackey	3/29/2023	New SOP
2	Eduardo Garcia IV	2/25/2025	Revised throughout as part of annual adequacy review
3	Eduardo Garcia IV	4/21/2026	Revised throughout, deleted steps 6.6.1 – 6.6.5, placed in new SOP template

Training

9. Training

Table 4 Training

Training date	Trainer	Training location (insert link)
Blank	Blank	Blank