

**OKLAHOMA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS
FOR
GENERAL PROVISIONS FOR USE OF ELECTRONIC DATA**

These Special Provisions revise, amend, and where in conflict, supersede applicable Sections of the 2009 Standard Specifications for Highway Construction, English and Metric.

(Add the following:)

110.01 ELECTRONIC DATA

The Department will provide access to electronic data for the purposes of bidding ODOT work and performing highway construction using automated machine guidance systems. The Contractor will be responsible for manipulating the provided file formats to make them compatible with the respective equipment and systems being used.

Electronic data for ODOT highway construction projects may be downloaded from the Department's website: <http://www.okladot.state.ok.us/contracts/index.htm> Files will be available for download in either dgn, LandXML, or ASCII format.

Table 110:1 Available Electronic Data		
File Type and Description	Description	File Format
Cross Sections	Includes superelevation data and special ditch information	dgn
Design Drainage	Includes drainage structure and channel change information)	dgn
Design Horizontal and Vertical Alignment w/ 3D Design Line Work	Includes design features such as edge of pavement, shoulders, drives, street returns, and plan and profile sheet information)	dgn
Existing Topographic Data	Contains topographic data of the project site without data points	dgn
Original Ground Surface	Contains original survey	LandXML
Survey Project Control	Contains centerline, edge of pavement, toe of slope, and other relevant design features	ASCII and LandXML

Although the Department has established a standardized format for electronic data and the transmission

of such, it is possible that the electronic data provided was not originally created or transmitted in an approved format and has been consequently converted. Therefore, the Department does not assume responsibility for inaccuracies or omissions contained within the data, or for any losses caused by such errors.

The plans indicate the areas of the project where the Department is providing electronic surface models within the project right-of-way. Areas outside of this may be constructed using conventional construction survey techniques. The additional surface models may be generated to facilitate automated machine guidance in those areas at no additional cost to the Department.

110.02 USE OF ELECTRONIC DATA FOR BIDDING

As a service to bidders, prior to letting the Department may supply electronic files containing point station, offset, and elevations for the data shown in the cross sections. The files depict the original ground, subgrade, and final grade. No representation is made that the electronic information provided is complete or accurate. All bids should be prepared from the plans. If any discrepancies are noted between the plans and this electronic information, the information in the plans supersedes the electronic file(s). The Department will not consider claims related to the use of the electronic information.

110.03 USE OF ELECTRONIC DATA FOR CONSTRUCTION

As a service to the Contractor, the Department may supply electronic files containing point station, offset, and elevations for the data shown in the Plans. The electronic data may be used to perform highway construction using automated machine guidance systems. Automated machine guidance (AMG) is defined as the utilization of positioning technologies such as global positioning systems (GPS), Robotic Total Stations, laser systems, etc. to automatically guide and adjust construction equipment according to the intended design requirements.

Automated machine guidance is not a mandatory requirement. Automated machine guidance, conventional staking, or a combination of both may be used at the Contractor's option for staking on this project.

The Department believes the electronic data provided to be accurate, but provides no guarantee. The documents originally provided in the contract remain the basis of the contract, and the electronic data provided is intended for informational purposes in order to assist the Contractor with the use of survey and automated machine control. Therefore, no compensation will be considered for expenses incurred by the Contractor due to the use of the electronic data.

The electronic information is not to be considered a representation of actual conditions to be encountered during construction. The Contractor assumes full responsibility for any assumptions made from the electronic information. The Contractor is expected to perform an investigation of conditions to be encountered, including but not limited to site visits.

A. Equipment

The Contractor may use any type of AMG system(s) that results in compliance with the Contract documents and applicable Standard Specifications. Provide sufficient equipment, systems, and software to achieve a degree of automated machine control which will produce results meeting or exceeding the quality requirements of the plans and specifications.

B. Construction Methods

(1) Department Responsibilities

For new construction the Department will establish the initial horizontal and vertical control points in the field for the project as indicated in the contract documents. For reconstruction or overlays the Department will furnish information on existing horizontal and vertical control points. The control points provided by the Department will be in the Oklahoma state plane coordinate system as shown in the plans.

The Department may perform random checks of the machine controlled grading results, surveying calculations, records, field procedures, and actual staking. If it is determined that the work is not being performed in a manner that will ensure results meeting the requirements of the plans and specifications, such work will be required to be redone at no additional cost to the Department.

(2) Contractor Responsibilities

At least one week prior to the preconstruction conference, submit a written machine control grading work plan to the Engineer for review. As a minimum, include the following information in the work plan:

- A description of the manufacturer, model, and software version of the AMG equipment.
- Information which documents the level of experience in the use of automated machine guidance systems (or related technologies) to be used on the project, including formal training and field experience of project staff.
- Contact information for a single onsite staff person as the primary contact, and up to one alternate contact person for automated machine guidance technology issues.
- A definition of the project boundaries and scope of work to be accomplished with the automated machine guidance system.
- A description of how the project proposed secondary control(s) is to be established. Include a list and map detailing control points covering the project site.
- A description of site calibration procedures including, but not limited to, equipment calibration and the frequency of calibration, as well as how the equipment calibration and information will be documented to the Engineer. Include a complete record of when and where the tests were performed, and the status of each equipment item tested within or out of the ranges of required tolerances.
- A description of the quality control procedures used for checking mechanical calibration and maintenance of equipment. Include the frequency and type of checks to be performed.
- A description of the method and frequency of field verification checks, and the submission schedule of results to the Engineer.

- A description of the contingency plan in the event of failure/outage of the AMG system.
- A schedule of digital terrain models (dtm) intended for use on the project.
- A description of how the AMG technology will be integrated into other technologies used on the project.

Furthermore, prior to the start of construction, make available to the Engineer a GPS rover for use during earthwork operations. Ensure the rover is in good, working condition, and has a documented history of routine maintenance. Maintenance of the rover while being used by the Department will be the responsibility of the Contractor.

Provide a maximum of eight (8) hours training on the use of the rover and the AMG system to allow the Engineer to make random checks of subgrade and surface elevations. At the completion of the project the rover will remain property of the Contractor.

(a) Subgrade and Base Construction

Establish secondary control points located at appropriate intervals along the length of the project, and outside the project limits as necessary, at intervals not to exceed 1,000 feet [300 m]. Determine the horizontal position of these points using static GPS sessions, or by traverse connection from the original baseline control points. Establish the elevation of these control points using differential leveling from the project benchmarks, forming closed loops. Provide a copy of all new control point information to the Engineer prior to beginning construction activities. Correct all deficiencies and discrepancies to the satisfaction of the Engineer at no additional cost to the Department.

Preserve or reestablish all reference points and monuments that are established by the Department within the project limits.

Using pins, stakes, or other approved methods, mark the finished subgrade and/or base at all hinge points on the cross section at 1,000 ft [300 m] intervals on mainline, and at least two cross sections on the side roads and ramps. Establish these marks using conventional survey methods (e.g. total station or transit/spirit level) for use by the Engineer to check the accuracy of the construction.

Provide control points and conventional grade stakes at critical points such as, but not limited to, PC's, PT's, super elevation transition points, and other critical points required for the construction of drainage and roadway structures.

(b) Surfacing

When lasers or robotic total stations are used for the AMG system, set additional control points at maximum 250 ft [75 m] intervals on alternating sides of the pavement.

Set paving hubs with cut/fill to finish pavement elevations along superelevated curve transitions points (see ODOT Roadway Standard SUEL-3), and at station equation locations. Additional paving hubs will not be required for mainline pavement.

C. Payment

Include the costs of using automated machine guidance in the unit cost bid for the relevant pay item(s) established in the contract. Payment is considered full compensation for equipment, preparation and conversion of electronic files, survey, training, production and delivery of reports and other electronic media, and all other items required for using automated machine guidance.

No consideration for compensation will be considered for:

- Delays due to late submittal of electronic files,
- Placement of paving hubs and stringline due to failure of the automated machine guidance system,
- Rework resulting from failure or errors in using automated machine guidance, or
- Additional quantities placed resulting from using automated machine guidance.

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