NCDOT

AUTOMATED MACHINE GUIDANCE (6-17-08) General

This Special Provision contains requirements that shall be followed if the Design-Build Team elects to use Global Positioning System (GPS) machine control grading and shall be used in conjunction with Section 801 of the 2006 Standard Specifications for Roads and Structures. The use of this technology is referenced as Automated Machine Guidance (AMG).

All equipment using AMG shall be able to generate end results that adhere to the 2006 Standard Specifications for Roads and Structures. The Design-Build Team shall perform test sections for each type of work to be completed with AMG to demonstrate that the system has the capability to achieve acceptable results. If acceptable results cannot be achieved, the Design-Build Team shall conform to the requirements for conventional stakeout.

The Design-Build Team shall be responsible for all errors resulting from the use of AMG and shall correct deficiencies to the satisfaction of the Engineer at no cost to the Department.

Submittals If the Design-Build Team elects to use AMG, a Digital Terrain Model (DTM) of the design surface and all intermediate surfaces shall be developed in conjunction with plan development. The Engineer of Record shall certify that the model used for AMG is representative of the approved "Released for Construction" sealed plans. The certification and DTM files in TIN format shall be provided to the Engineer for review.

At least 90 days prior to beginning grading operations, the Design-Build Team shall submit to the Engineer an AMG Work Plan to include, but not be limited to, proposed equipment, control software manufacturer and version, types of work to be completed using AMG, project site calibration report, repetitive calibration methods for construction equipment and rover units to be used for the duration of the project, and local GPS base station to be used for broadcasting differential correction data to rover units. This may include the NC Network RTK. All surveys shall be tied to existing project control as established by the Department.

Inspection

The Engineer will perform quality assurance checks of all work associated with AMG. If it is determined that work is not being performed in a manner that will assure accurate results, the Engineer may require corrective action at no cost to the Department.

The Design-Build Team shall provide the Engineer with a GPS rover unit for use during the duration of the contract. The rover shall be loaded with the same model that is used with the AMG and shall have the same capability as rover units used by the Design-Build Team. The rover will be kept in the possession of the Engineer and will be returned to the Design-Build Team upon completion of the

contract. Any maintenance or repairs required for the rover shall be the responsibility of the Design-Build Team. Formal training of at least 8 hours on the use of the proposed AMG system shall be provided to the Engineer by the Design-Build Team and the equipment manufacturer. Training shall include, but not be limited to, hardware, software, and operation of the rover unit.

Subgrade and Base Controls

If the Design-Build Team elects to use AMG for fine grading and placement of base or other roadway materials, the GPS shall be supplemented with a laser or robotic total station. Include details of the proposed system in the AMG Work Plan. In addition, the following requirements apply for the use of AMG for subgrade and base construction.

(A) Provide control points at intervals along the project not to exceed 1000 feet. The horizontal position of these points shall be determined by static GPS sessions or by traverse connection from the original base line control points. The elevation of these control points shall be established using differential leveling from project benchmarks, forming closed loops where practical. A copy of all new control point information shall be provided to the Engineer prior to construction activities.

(B) Provide fine grade hubs referencing the top of finish grade along the cross section at 500- foot intervals. These hubs shall be established using conventional survey methods for use by the Engineer to check the accuracy of fine grading and pavement construction and shall remain in place until completion of all pavement layers unless otherwise allowed by the Engineer.

(C) Provide conventional survey grade stakes at other critical points such as TSs, SCs, CSs, STs, PCs, PTs, and super elevation transition points as requested by the Engineer.