

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
TRANSPORTATION SOLUTIONS AND MAINTENANCE AND OPERATIONS



PLANS AND SPECIFICATIONS FOR
Contract Number: T201901002
Federal Aid Project Number: ESTP-2019(04)
Median Barrier Installation, Statewide, Open End

CONTRACT PREPARED AND RECOMMENDED BY:

Mark L. Bucala
DelDOT Safety Manager

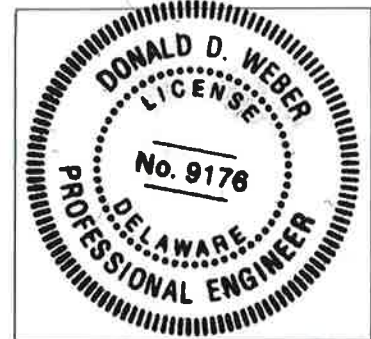
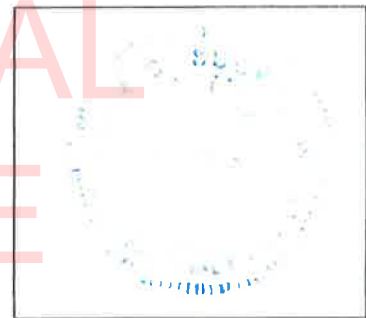
DATE: July 30, 2018

DATE RECOMMENDED: 7/31/18

R. Sauer
NORTH DISTRICT MAINTENANCE ENGINEER

DATE APPROVED: 7/31/18

Paul
Asst. Director – Traffic Operations and Management



CONTRACT DESCRIPTION

The purpose of this Contract is to install Guardrail, Guardrail End Treatments, High Tension Cable Barrier, and High Tension Cable Barrier End Treatments as required in the median Statewide. The work shall include but not be limited to Maintenance of Traffic, Excavation and Embankment, GABC, Type B, installation of asphalt maintenance strip, components, terminals, and anchor systems, erosion and sediment control, and topsoil, seeding and mulching as required or directed by the Engineer on the individual work orders.

The specific work sites are not listed herein, but will be assigned as available by DelDOT Traffic Safety. The locations of High Tension Cable Barrier and Guardrail installation will be principally along I-95 and SR 1 within Kent and New Castle Counties. Other locations may be assigned along other roads in all three Counties. Plans will be provided once locations are determined.

GENERAL NOTES

1. All work shall be performed in accordance with the Delaware Department of Transportation Standard Specifications dated August 2016 (as amended by the Supplemental Specifications), the DelDOT Special Provisions, the Standard Construction Details, the current Delaware MUTCD (including revisions up to the day of contract advertising), and these project notes.
2. This contract shall be for a period of two (2) years from the date of Initial Notice to Proceed, with the option to extend the contract for one (1) additional one-year period. The one-year extension must be approved by both parties in writing, at least 30 days prior to the expiration of the existing contract. The Performance Bond shall be submitted with the contract extension and shall be subject to any such agreed upon renewal for the extension period. Failure on the part of the Contractor to submit the Performance Bond for the extension period prior to the last working day before end of the previous period may result in the contract being cancelled. It shall be the contractor's responsibility to obtain the forms necessary to renew the Performance Bond each year the contract is in force.
3. An updated Performance Bond shall be submitted at the beginning of each fiscal year. Failure on the part of the Contractor to submit the Performance Bond shall result in the Contract being cancelled. Costs to be included in the price bid for Item 763000 (Initial Expense).
4. Whenever the word "Contractor" is used in this contract, it shall refer to the person or persons, company or corporation furnishing the services required.
5. Whenever the word "Department" or "Engineer" is used, it shall refer to the person or persons, representing the Delaware Department of Transportation (DelDOT).
6. Tasking of work for Fiscal Years relevant to this contract is contingent upon authorization of Federal and State funding.

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

7. Section 101.03 "Working Day" definition is amended. There will not be a winter shutdown from December 16th to March 15th. The Department reserves the right to issue work and charge time between these dates.
8. No utility relocation involvement is anticipated. Should any conflicts be encountered during construction requiring adjustment and/or relocation of the agencies' existing facilities, the necessary relocation work shall be accomplished by the respective agencies' forces, as directed by the Engineer. Any adjustments and/or relocations of municipally owned facilities shall be done by the State's contractor in accordance with the respective agencies' standard specifications as directed by the Engineer.
9. No environmental permits are anticipated for this work. Any questions related to environmental impacts should be directed to the DeIDOT Project Manager. The DeIDOT Project Manager will be responsible for coordinating with DeIDOT's Environmental Studies Section to determine if permits are needed.
10. It is anticipated that all work will occur within DeIDOT's existing right of way or easement areas. The Contractor shall not trespass on private property unless the District has acquired a "Temporary Trespass Agreement" from the property owner. If the work is within a permanent easement, the work shall not begin until the adjacent property owners have been notified. Prior to starting work on private property, the Contractor shall notify affected property owners of proposed work dates. Should the need occur to trespass onto private property; it will be the responsibility of the Contractor to coordinate with the DeIDOT Project Manager to secure such trespass needs.
11. The DeIDOT Project Manager is responsible for ensuring any required documents and analysis as part of the adopted Work Zone Safety and Mobility Procedures and Guidelines has been completed prior to any work starting on this contract.
12. Underground and aerial utilities may be present at all locations. Therefore, all standard practices and procedures regarding utilities shall be followed. The Contractor shall contact Miss Utility of Delaware prior to starting each work order. The Contractor is responsible for the support and protection of all utilities when excavating. The Contractor is responsible for ensuring proper clearances, including safety clearances, from overhead utilities for construction equipment. The Contractor is advised to check the site for access purposes for his equipment, and make arrangements directly with utility companies for field adjustments for adequate clearances if necessary.
13. Contractor shall comply with DeIDOT Standard Construction Details for all work performed in this Contract.

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

14. Work located within Municipalities requires a Town Agreement. Contact DeIDOT TEAM Support section at (302) 760-2251 to process a town agreement prior to commencing work within Municipalities.
15. Excavated material not needed on the project shall be removed from the site at the Contractor's expense.
16. The Contractor shall acquire all necessary materials and equipment prior to starting work at a specific location. The equipment and material shall remain accessible and on-site until completion of work at that particular location unless prior approval from the Engineer is given.
17. Grass and soil areas within State right-of-way that have been damaged by equipment during this Contract shall be restored with topsoil, seed and mulch at the Contractor's own expense to the satisfaction of the Engineer.
18. Delete Section 104.06 of the DeIDOT Standard Specifications, and replace with the following:

The Department reserves the right to, at any time prior to completion of the contract, issue plan revisions, make adjustments in Contract item quantities, or make such alterations considered necessary to satisfactorily complete the Contract.

The Department reserves the right to increase or decrease the quantities of Pay Items specified in the Contract. Such additions or deletions shall not be cause for an increase or decrease in Contract unit bid prices. The "Change" threshold of plus or minus 25%, as described in Subsection 104.06 of the DeIDOT Standard Specifications dated August 2016 shall not apply to this Contract. Quantity increases or decreases of plus or minus 25% or greater shall not be justification for adjustments to unit prices.

The plan revisions and quantity adjustments described above do not invalidate the Contract or release the Contract surety. Payment for these changes shall exclude any amount for loss of anticipated profits alleged to result from the change.

When payment for the Contract work cannot be agreed upon by the Contractor and the Department prior to starting such work ordered, the Department may direct the Contractor to perform the work under Force Account provisions of Subsection 109.04. The Contractor will proceed immediately with the work so ordered and such direction shall neither invalidate the Contract, nor release the surety.
19. All additional work shall be performed using Contract unit bid prices. When contract unit bid prices are not available, then prices will be negotiated or performed by Force Account procedures in accordance with Section 109.04 of the DeIDOT Standard Specifications.
20. Performance and Progress of Work:

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

The Contractor shall commence on work indicated on the work order no later than the fifth (5th) business day after issuance unless required materials are not available. Non-availability of materials shall be verified by at least three (3) different sources. Verification shall be formal and supplied by the Contractor in writing.

Issuance of each work order constitutes the notice to proceed with the work described on the work order.

If there is a verified non-availability of materials, time charges shall commence on the first (1st) working day following the delivery date of materials.

Failure to start assigned work orders in the allowed time constitutes "Failure to Pursue the Work" and subjects the Contractor to Liquidated damages as outlined in Section 108.08 of the Standard Specifications. If work on a specific work order is not completed within the allotted time, Liquidated Damages will be assessed in accordance with Subsection 108.09 and based on the total value of that work order.

Each work order shall be considered a separate unit of work. The Engineer will make payment monthly for the completed invoices as outlined in Section 109.07. Upon the substantial completion of the work at an individual location, the Engineer will stop time at that location and perform a semi-final inspection for the work order location in accordance with Subsection 105.16. The Engineer reserves the right to require the Contractor to add Work or make repairs to completed locations at the Engineer's expense until such a location has been accepted by the Department. The Contractor must repair all defects in the work caused by poor workmanship or materials at his/her own expense until the Department accepts the Contract after the Final Inspection.

A Semi-Final and Final Inspection will be completed on an annual basis for work orders completed in a calendar year. Upon satisfactory completion of the Final Punchlist, the Department will accept the location and release the Contractor from responsibility for the Work at that location. If a work order is sufficiently large and complex as determined by the Engineer, a Final Inspection may be held upon the individual completion of that work order.

21. The Contractor is reminded that Section 105.07 of the Standard Specifications requires the Contractor to maintain a competent Superintendent or Foreman on the job site at all times.
22. Payment will be monthly for the completed work as outlined in Section 109.07.
23. The Contractor will be responsible for any barrier repairs resulting from damage during construction and prior to completion of final inspection. These repairs include removing, resetting, or replacement of barrier elements, such as posts, blockouts, rail, cable, and end terminals; there will be no additional payment for barrier repairs during construction.

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

24. Backfill of holes created by post removal, in compacted lifts, providing and installing rail backup plates, bolts, nuts, and washers, providing and setting up traffic cones and/or patterns are incidental to the Bid Items. Cost for the placement of one-third (1/3) of a cubic yard of Portland Cement Concrete around the base of unstable posts, as directed by the Engineer, is incidental to the unit price bid for Item 720006, Galvanized Steel Post or Item 720549, Galvanized Steel Post, extra-length. Cost for excavating and disposing of up to one (1) cubic yard of material and/or grading (up to a 6" depth) to meet the manufacturer's slope requirements is incidental to the unit price bid for Items 721001, 721003, or 721004. If excavation in excess of one (1) cubic yard is required, then the entire excavation necessary to meet the grading requirements at the location in question will be measured and paid for under item 202000, Excavation and Embankment. If additional borrow is needed to construct the required grading zone, payment shall be made under Item 209006 (Borrow, Type F).

GENERAL MAINTENANCE OF TRAFFIC NOTES FOR OVERALL CONTRACT

1. All work shall be performed in a manner that will reasonably provide the least practicable obstruction to all road users, including vehicular, pedestrian, and bicycle traffic, and shall conform to the requirements of the Delaware Manual On Uniform Traffic Control Devices (MUTCD), Part 6, including all revisions up to the date of advertisement for bids.
2. All shoulder or travel lane closures along I-95, SR 1, and interstate ramps may be performed between the hours of 9:00 pm and 6:00 am. Any deviation from this time restriction must be approved by the North District Engineer and DelDOT Safety Officer prior to commencement of work.
3. The Contractor is reminded that no travel lane restrictions will be permitted during the Holiday periods listed in the Standard Specifications Subsection 801.03.5 updated on 6/15/18. Also, no lane closures will be permitted during the following events:
 - a. NASCAR Spring Race (Early May)
 - b. Firefly (Mid-June)
 - c. NASCAR Fall Race (End September/Early October)
 - d. The actual dates for these events are to be determined and must be coordinated with the Department.
4. The Contractor shall have an American Traffic Safety Services Association (ATSSA) Certified Supervisor assigned to this project.
5. Any existing signs that conflict with any construction signs shall be covered by the Contractor as needed, or as directed by the Engineer. The Contractor shall stake out locations of warning signs in the field and receive approval from the Engineer for the location and method of mounting prior to ordering the signs. The cost to lay out the location of warning signs shall be incidental to item 763501 – Construction Engineering. The Contractor, with the Engineer, shall inventory all existing signs within the Contract limits. Signs that must remain in place during

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

the project shall be maintained by the Contractor. Any other existing signs shall be removed and properly stored by the Contractor to prevent loss or damage. The cost to inventory, remove, store, and reinstall existing signs shall be incidental to item 801000 – Maintenance of Traffic.

6. The safety measures outlined within this Contract and the Delaware MUTCD are not necessarily sufficient in every instance to guarantee the protection of the traveling public or the persons working on the project. Therefore, the provisions of this Contract do not relieve the Contractor of the sole responsibility for the safety of all persons working within or traveling through the work zone throughout the duration of the project. The Contractor shall implement any additional safety measures that are not expressly required by the Contract and are necessary to ensure the safety of all persons. The Contractor shall submit to the Engineer justification for deviations from the Traffic Control Plan or Traffic Management Plan. Final approval of the deviations or additions shall rest with the Engineer. All costs for this work shall be incidental to Item 763000 (Initial Expense).
7. Any deficiencies related to temporary traffic control that are reported to the Contractor in writing shall be corrected within 24 hours or as directed by the Engineer. Corrective actions on severe deficiencies as determined by the Engineer shall be taken immediately unless otherwise directed by the Engineer. Failure to comply will result in non-payment for those devices that are found to be deficient for the duration of the deficiency. Severe deficiencies that are not corrected immediately could result in possible suspension of work until items identified are brought back into compliance and/or the holding of the pay estimate until the severe deficiencies are corrected.
8. The use of millings and GABC in the travel way, temporary travel way, high volume entrances, and access ramp for the purpose of providing a temporary roadway surface, pothole repair, tapered edge for utilities, butt joints, and longitudinal drop-offs (milling and paving operations) is prohibited unless it is otherwise designated to be used in the contract plans. Use cold patch, bituminous concrete, bituminous concrete wedge, or taper mill, as noted in the contract documents or approved by the Engineer. Payment for cold patch, bituminous concrete, or bituminous concrete wedge shall be paid as noted in the contract documents. Taper mill bituminous concrete shall be paid under bituminous concrete milling item. Millings or GABC shall be used at the following locations where access to a business, residence, or edge drop off needs to be maintained unless otherwise noted in the plans or directed by the Engineer to use bituminous concrete or cold patch. All millings and GABC will be rolled and compacted to help prevent the material from unravelling:
 - a. Driveways
 - b. Entrances
 - c. Low volume access ramps (identified in the contract documents)
 - d. Edge drop offs adjacent to live roadway (lane, shoulder, or turn lane) and the proposed road construction.

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

e. Edge of Roadway drop off.

9. If the Contractor does not complete the contract work within the contract completion time as listed on the Work Order (including approved time extensions), the Contractor shall be responsible for providing the necessary temporary traffic control devices that are required to complete any remaining work. The cost of such temporary traffic control shall be borne by the Contractor. No additional payment will be made to the Contractor to maintain traffic in accordance with the Delaware MUTCD, specifications, and these project notes. Temporary traffic control items shall include, but not be limited to, warning signs, barricades, plastic drums, P.C.C. safety barrier, traffic officers, arrow panels, message boards, portable light assemblies and portable impact attenuators.
10. All equipment shall be removed from the job sites on a daily basis, except when allowed by the Engineer.
11. All temporary traffic control devices used on all highways open to the public in this State shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350 and the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration Information: Crash Tested Work Zone Traffic Control Devices and/or Manual for Assessing Roadside Safety Hardware (MASH). It is the requirement of the Department that such certification be submitted for traffic control devices used on all projects, not just those involving the National Highway System.
12. The Department reserves the right to stop the Contractor's operations, if in the opinion of the Engineer, the Contractor's operations are not in compliance with the Delaware MUTCD, the specifications, or the Contract Documents. The Department also reserves the right to stop the Contractor's operations if the Engineer deems the operation unsafe.
13. The Department will not make payment to the Contractor for any and all temporary traffic control devices where the Contractor sets up temporary traffic control to perform work, but fails to perform any work.
14. The plans will note the "Typical Applications" from the Delaware MUTCD that apply to the individual locations of work. Any additional or alternate Maintenance of Traffic measures required at specific locations shall be submitted to the Engineer and approved by DeIDOT Safety Section prior to starting work at the location in question.
15. Whenever the Contractor closes a lane or road, they shall contact DeIDOT's TMC at (302) 659-4600 notifying them of the time the restriction is put into place and again when the restriction is lifted.
16. All work zones shall be secured with plastic drums having retroreflective fluorescent orange and white prismatic sheeting.

PROJECT SPECIFIC NOTES

1. Item 211002 (Removal of Structures and Obstructions – Guardrail) shall be utilized for, and payment shall include, the removal and disposal of existing guardrail and all appurtenances attached to these elements including the rails, posts, blocks, washers, reflectors, bolts turned down rail section, and any other incidentals within the length of material being removed. Measurement shall be made for the linear feet of rail actually removed from the site. Note that costs to remove any concrete anchors that are part of an existing end treatment shall be incidental to item 211002 – Removal of Structures and Obstructions, Guardrail.
2. At locations where 27 inch guardrail exists, a transition section shall be installed between the attenuator and existing guardrail. Standard Construction Detail sheet B-7 shows this transition. Payment for the transition will be made using Items 720021 and 720023. No additional payment, other than these unit prices will be made to construct the transitions unless otherwise approved by the engineer.
3. All runs of new guardrail shall utilize composite offset blocks. Payment for these blocks in new guardrail to be included in item 720021. Composite blocks shall conform to NCHRP Repost 350, Test Level 4 and/or applicable MASH requirements. Unless specifically directed otherwise by the Engineer, no steel or wood blocks are to be utilized in these runs.
4. The Contractor shall acquire all necessary materials and equipment prior to starting work at a specific location. The equipment and material shall remain accessible and on-site until completion of work at that particular location unless prior approval from the engineer is given.
5. Exposed soil must be stabilized with seed and mulch on this contract within seven (7) calendar days from the time that the excavation takes place.
6. All costs associated with construction layout for guardrail runs, end treatments, and approach grading areas shall be incidental to Item 763501, Construction Engineering.
7. The cost to fine grade, compact, and prepare existing acceptable base materials for GABC, Type B or Hot Mix shall be incidental their respective bid items.
8. Prior to the start of construction, the Contractor shall submit to the Engineer for review and approval, a Work Schedule in Bar Graph format showing the proposed sequence of the various work locations and the Calendar Day durations anticipated for each location. Work may be prosecuted on multiple sites concurrently, provided that no maintenance of Traffic conflicts as a result. Additionally, the Contractor shall notify the Engineer at least 10 days in advance to confirm the starting date of each location of work in order that necessary public notice can be made by the Engineer.

9. Whenever guardrail, attenuators, and/or high tension cable barrier are removed from a location of work, the Contractor shall perform the work continually until the replacement or new guardrail, attenuators, and/or high tension cable barrier have been installed. A sand drum array shall be used as end treatment for any sections left untreated at the end of a shift. The sand drum array shall also be configured for reverse directions impacts. Protection of these areas with only cones or drums is unacceptable.

763501 - CONSTRUCTION ENGINEERING

1) Description:

This work consists of construction lay out including; stakes, lines and grades as specified below. Subsection 105.10 Construction Stakes, Lines and Grades of the Standard Specifications is voided.

Based on contract plans and information provided by the Engineer, the Contractor shall provide all layout necessary to install the guardrail, high tension cable barrier, or end treatments at the locations and alignments provided in the plans.

2) Equipment. The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of [3mm+2ppmxD] and an angle accuracy of up to 2.0 arc seconds or 0.6 milligons. If the Contractor chooses to use GPS technology in construction stakeout, the Contractor shall provide the Engineer with a GPS rover and Automatic Level for the duration of the contract. The GPS rover shall be in good working condition and of similar make and model used by the Contractor. The Contractor shall provide up to 8 hours of formal training on the Contractor's GPS system to a maximum of four Engineer's appointees (DELDOT Construction Inspectors). At the end of the contract, the Engineer will return the GPS rover to the Contractor. If any of the equipment/instruments are found to be out of adjustment or inadequate to perform its function, such instrument or equipment shall be immediately replaced by the Contractor to the satisfaction of the Engineer. Choosing to use GPS technology does not give the contractor authority to use machine control.- Construction Engineering (GPS) Machine Control Grading shall only be used if noted in the General Notes in the plan set outlining the available files that will be provided to the Contractor and "the Release for delivery of documents in electronic form to a contractor" are signed by all parties prior to delivery of any electronic files. Only files designated in the General Notes shall be provided to the contractor. If machine control grading is allowed on the project see the "machine control" section of this specification. GPS technology and machine control technology shall not be used in the construction of bridges.

3) Engineering/Survey Staff. The Contractor shall provide and have available for the project an adequate engineering staff that is competent and experienced to set lines and grades needed to construct the project. The engineering personnel required to perform the work outlined herein shall have experience and ability compatible with the magnitude and scope of the project. Additionally, the Contractor shall employ an engineer or surveyor licensed in the State of Delaware to be responsible for

the quality and accuracy of the work done by the engineering staff. When individuals or firms other than the Contractor perform any professional services under this item, that work shall not be subject to the subcontracting requirements of Subsection 108.01 of the Standard Specifications. The Contractor shall assume full responsibility for any errors and/or omissions in the work of the engineering staff described herein. If construction errors are caused due to erroneous work done under Construction Engineering the Contractor accepts full responsibility, no matter when the error is discovered. Consideration will not be given for any extension of contract time or additional compensation due to delays, corrective work, or additional work that may result from faulty and erroneous construction stakeout, surveying, and engineering required by this specification.

Construction Methods:

4) Performance Requirements:

- (a) Construction Engineering shall include establishing the survey points and survey centerlines; finding, referencing, offsetting the project control points; running a horizontal and vertical circuit to verify the precision of given control points. Establishing plan coordinates and elevation marks for guardrail or high tension cable alignment, elevation, end treatment location, and any other stakes required for control lines and grades; and setting vertical control elevations, to complete the contract work. The Contractor shall be responsible for the preservation of the Department's project control points and benchmarks. The Contractor shall establish and preserve any temporary control points (traverse points or benchmarks) needed for construction. Any project control points (traverse points) or benchmarks conflicting with construction of the project shall be relocated by the Contractor. The Contractor as directed by the Engineer must replace any or all stakes that are destroyed at any time during the life of the contract. The Contractor shall re-establish centerline points and stationing prior to final cross-sections by the Engineer. The Vertical Control error of closure shall not exceed $0.035 \text{ ft} \times [\text{Square root of number of miles in the level run}]$ ($0.01 \text{ m} \times [\text{square root of number of kilometers}]$). The Horizontal Control precision ratio shall have a minimum precision of 1:20,000 feet (1 meter per 20,000 meters or 1:20,000) of distance traversed prior to adjustment.
- (b) The Contractor shall perform construction centerline layout of all roadways, ramps and connections, etc. from project control points set by the Engineer. The Contractor using the typical sections provided in the plans shall calculate proposed grades at the edge of pavement.
- (c) The Contractor shall advise the Engineer of any horizontal or vertical alignment revisions needed to establish smooth transitions to existing facilities. The Contractor must immediately bring to the attention of the Engineer any potential drainage problem within the project limits. The Engineer must approve any proposed variation in profile, width or cross slope.
- (e) The Contractor, using contract plans, shall investigate proposed construction for possible conflicts with existing and proposed utilities. The Contractor shall then report such conflicts to the Engineer for resolution.
- (g) If wetland areas are involved and specifically defined on the Plans the following shall apply:

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

- i. It is the intent of these provisions to alert the Contractor, that he/she shall not damage or destroy wetland areas, which exist beyond the construction limits. These provisions will be strictly enforced and the Contractor shall advise his/her personnel and those of any Subcontractor of the importance of these provisions.
 - ii. All clearing operations and delineation of wetlands areas shall be performed in accordance with these Special Provisions. Before any clearing operation commences the Contractor shall demarcate wetlands at the Limits of Construction throughout the entire project as shown on the Plans labeled as Limits of Construction or Wetland Delineation to the satisfaction of the Engineer.
 - iii. The material to be used for flagging the limits of construction shall be orange vinyl material with the wording "Wetland Boundary" printed thereon. In wooded areas, the flagging shall be tied on the trees, at approximate 20-foot (6.1 meter) intervals through wetland areas. In open field and yard areas that have been identified as wetlands, 3 foot (one meter) wooden grade stakes shall be driven into the ground at approximate 20 foot (6.1 meter) intervals and tied with the flagging.
 - iv. If the flagging has been destroyed and the Engineer determines that its use is still required, the Contractor shall reflag the area at no cost to the Department. If the Contractor, after notification by the Engineer that replacement flagging is needed, does not replace the destroyed flagging within 48 hours, the Engineer may proceed to have the area reflagged. The cost of the reflagging by the Engineer will be charged to the Contractor and deducted from any monies due under the Contract.
 - v. At the completion of construction, the Contractor shall remove all stakes and flagging.
 - vi. The Contractor shall be responsible for any damages to wetlands located beyond the construction limits, which occurs from his/her operations during the life of the Contract. The Contractor shall restore all temporarily disturbed wetland areas to their preconstruction conditions. This includes restoring bank elevations, streambed and wetland surface contours and wetlands vegetation disturbed or destroyed. The expense for this restoration shall be borne solely by the Contractor.
- (h) Whenever the Engineer will be recording data for establishment of pay limits, the Contractor will be invited to obtain the data jointly with the Engineer's Survey Crew(s) in order to agree with the information. If the Contractor's representative is not able to obtain the same data, then the information obtained by the Engineer shall be considered the information to be used in computing the quantities in question.
- 5) Submittals.** All computations necessary to establish the exact position of all work from the control points shall be made and preserved by the Contractor. All computations, survey notes, electronic files, and other records necessary to accomplish the work shall be made available to the Department in a neat and organized manner at any time as directed by the Engineer. The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor and any necessary correction to the work shall be made as soon as possible. The Contractor shall furnish the Engineer with such assistance as may be required for checking all lines, grades, and measurements established by the Contractor and necessary for the execution of the work. Such checking by the Engineer shall not relieve the Contractor of his/her responsibility for the accuracy or completeness of the work. Copies of all notes must be furnished to the engineer at the completion of the project.

The Contractor shall submit any of the following at the Engineer's request:

- (a) Proposed method of recording information in field books to ensure clarity and adequacy.
- (b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.
- (c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.
- (d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control - traverse closure report.
- (e) Description of newly established benchmarks with location, elevation and closed loop survey field notes - bench closure report
- (f) All updated electronic and manuscript survey records.
- (g) Stakeout plan for each structure and culvert.
- (h) Computations for buildups over beams, screed grades and overhang form elevations.
- (i) A report showing differences between supplied baseline coordinates and field obtained coordinates, including a list of preliminary input data.
- (j) Any proposed plan alteration to rectify a construction stakeout error, including design calculations, narrative and sealed drawings.
- (k) Baseline for each borrows pit location.
- (l) Detailed sketch of proposed overhead ground mounted signs or signals showing obstructions that may interfere with their installation.
- (m) Copies of cut sheets.

Machine Control Grading

This Section of the specification shall only be used if machine control is authorized for use on the project.

Description:

This specification contains the requirements for grading operations utilizing Global Positioning Systems (GPS).

Use of this procedure and equipment is intended for grading the subgrade surface; it is not intended for the use in constructing final surface grades.

The Contractor may use any manufacturer's GPS machine control equipment and system that results in achieving the grading requirements outlined in section 202 of the standard specifications. The Contractor shall convert the electronic data provided by the Department into the format required by their system. The Department will only provide the information outlined in this document and no additional electronic data will be provided.

The Contractor shall perform at least one 500 foot test section with the selected GPS system to demonstrate that the Contractor has the capabilities, knowledge, equipment, and experience to properly

operate the system and meet acceptable tolerances. The engineer will evaluate and make the determination as to whether additional 500 foot test sections are required. If the Contractor fails to demonstrate this ability to the satisfaction of the Department, the Contractor shall construct the project using conventional surveying and staking methods.

Materials:

All equipment required to perform GPS machine control grading, including equipment needed by DelDOT to verify the work, shall be provided by the Contractor and shall be able to generate end results that are in accordance with the requirements of Division 200 - EARTHWORK of the Standard Specifications.

Construction:

A.DelDOT Responsibilities:

1. The Department will provide the project specific localized coordinate system.
2. The Department will provide data in an electronic format to the Contractor as indicated in the General Notes.
 - i. The information provided shall not be considered a representation of actual conditions to be encountered during construction. Furnishing this information does not relieve the Contractor from the responsibility of making an investigation of conditions to be encountered including, but not limited to site visits, and basing the bid on information obtained from these investigations, and the professional interpretations and judgments of the Contractor. The Contractor shall assume the risk of error if the information is used for any purpose for which the information is not intended.
 - ii. Any assumption the Contractor makes from this electronic information shall be at their risk. If the Contractor chooses to develop their own digital terrain model the Contractor shall be fully responsible for all cost, liability, accuracy and delays.
 - iii. The Department will develop and provide electronic data to the Contractor for their use as part of the contract documents in a format as indicated in the General Notes. The Contractor shall independently ensure that the electronic data will function in their machine control grading system.
3. The Engineer shall perform spot checks of the Contractor's machine control grading results, surveying calculations, records, field procedures, and actual staking. If the Engineer determines that the work is not being performed in a manner that will assure accurate results, the Engineer may order the Contractor to redo such work to the requirements of the contract documents, and in addition, may require the Contractor to use conventional surveying and staking, both at no additional cost to the Department.

B. Contractor's Responsibilities

1. The Contractor shall provide the Engineer with a GPS rover and Automatic Level, for use during the duration of the contract. At the end of the contract, the GPS rover and Automatic Level will be returned to the Contractor. The Contractor shall provide a total of 8 hours of formal training on the Contractor's GPS machine control system to the Engineer and up to three additional Department appointees per rover.
2. The Contractor shall review and apply the data provided by the Department to perform GPS machine control grading.
3. The Contractor shall bear all costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to application of GPS machine control grading techniques. Grade elevation errors and associated corrections including quantity adjustments resulting from the contractor's use of GPS machine control shall be at no cost to the Department.
4. The Contractor shall convert the electronic data provided by the Department into a format compatible with their system.
5. The Contractor's manipulation of the electronic data provided by the Department shall be performed at their own risk.
6. The Contractor shall check and if necessary, recalibrate their GPS machine control system at the beginning of each workday in accordance with the manufacturer's recommendations, or more frequently as needed to meet the requirements of the project.
7. The Contractor shall meet the accuracy requirements as detailed in the Standard Specifications.
8. The Contractor shall establish secondary control points at appropriate intervals and at locations along the length of the project. These points shall be outside the project limits and/or where work is performed. These points shall be at intervals not to exceed 1000 feet. The horizontal position of these points shall be determined by conventional survey traverse and adjustments from the original baseline control points. The conventional traverse shall meet or exceed the Department's Standards. The elevation of these control points shall be established using differential leveling from the project benchmarks, forming a closed loop. A copy of all new control point information including closure report shall be provided and approved by the Engineer prior to construction activities. The Contractor shall be responsible for all errors resulting from their efforts and shall correct deficiencies to the satisfaction of the Engineer and at no additional cost to the Department.
9. The Contractor shall provide stakes at all alignment control points, at every 500 foot stationing, and where required for coordination activities involving environmental agencies and utility companies at the Contractor's expense.

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

10. The Contractor shall at a minimum set hubs at the top of finished grade at all hinge points on the cross section at 500 foot intervals on the main line and at least 4 cross sections on side roads and ramps as directed by the engineer or as shown on the plans. Placement of a minimum of 4 control points outside the limits of disturbance for the excavation of borrow pits, Stormwater Management Ponds, wetland mitigation sites etc. These control points shall be established using conventional survey methods for use by the Engineer to check the accuracy of the construction.
11. The Contractor shall preserve all reference points and monuments that are identified and established by the Engineer for the project. If the Contractor fails to preserve these items the Contractor shall reestablish them at no additional cost to the Department.
12. The Contractor shall provide control points and conventional grades stakes at critical points such as, but not limited to, PC's, PT's, superelevation points, and other critical points required for the construction of drainage and roadway structures.
13. No less than 2 weeks before the scheduled preconstruction meeting, the Contractor shall submit to the Engineer for review a written machine control grading work plan which shall include the equipment type, control software manufacturer and version, and proposed location of the local GPS base station used for broadcasting differential correction data to rover units.
14. The Contractor shall follow the guidelines set forth in the "Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques" and follow a minimum of Second Order Class 1, (2-I) classification standards.

Automated equipment operations have a high reliance on accurate control networks from which to take measurements, establish positions, and verify locations and features. Therefore, a strong contract control network in the field which is the same or is strongly integrated with the project control used during the design of the contract is essential to the successful use of this technology with the proposed Digital Terrain Model (DTM). Consistent and well-designed site calibration for all machine control operations (as described below under *Contract Control Plan*) are required to ensure the quality of the contract deliverables. The Contract Control Plan is intended to document which horizontal and vertical control will be held for these operations. Continued incorporation of the Base Station(s) as identified in the Contract Control Plan is essential to maintaining the integrity of positional locations and elevations of features. The Contract Control Plan shall be submitted to the Department for review and approval by the Departments Survey Section 3 weeks prior to the start of any machine control work. The Contractor shall operate and maintain all elements of the Machine Grade Control continuously once the operations begin until otherwise approved by the Engineer.

Contract Control Plan:

The Contractor shall develop and submit a Contract Control Plan for all contracts which use Machine Control Grading. Contract control includes all primary and secondary horizontal and vertical control

DELAWARE DEPARTMENT OF TRANSPORTATION
CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

which will be used for the construction contract. Upon the Contractor's completion of the initial survey reconnaissance and control verification, but prior to beginning primary field operations, the Contractor shall submit a Contract Control Plan document (signed and sealed by the Delaware licensed Land Surveyor or Delaware Professional Engineer who oversees its preparation) for acceptance by the Engineer, which shall include the following:

1. A control network diagram of all existing horizontal and vertical control recovered in the field as contract control.
2. Include a summary of the calculated closures of the existing control network, and which control has been determined to have been disturbed or out of tolerance from its original positioning.
3. An explanation of which horizontal and vertical control points will be held for construction purposes. If necessary include all adjustments which may have been made to achieve required closures.
4. An explanation of what horizontal and vertical control (including base stations) was set to accomplish the required stakeout or automated machine operation. Include how the position of these new control points was determined.
5. Describe the proposed method and technique (technology and quality control) for utilizing the control to establish the existing and/or proposed feature location and to verify the completed feature location and/or measured quantity.
6. A listing of the horizontal and vertical datums to be used and the combined factor to be used to account for ellipsoidal reduction factor and grid scale factor.
7. If the Contractor chooses to use machine control as a method of measuring and controlling excavation, fill, material placement or grading operations as a method of measuring and controlling excavation, fill, material placement or grading operations, the Contractor Control Plan shall include the method by which the automated machine guidance system will initially be site calibrated to both the horizontal and vertical contract control, and shall describe the method and frequency of the calibration to ensure consistent positional results.
8. Issues with equipment including inconsistent satellite reception of signals to operate the GPS machine control system will not result in adjustment to the "Basis of Payment" for any construction items or be justification for granting contract time extension.

Method of Measurement:

The quantity of Construction Engineering will not be measured.

Basis of Payment:

Payment will be made at the Lump Sum price bid for the item "Construction Engineering". The price bid shall include the cost of furnishing all labor, equipment, instruments, stakes and other material

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

necessary to satisfactorily complete the work as herein described under this item for all roads and structures that are a part of the contract. Adjustment in payment will be made for the deletion or addition of work not shown in the contract documents.

Monthly payment will be made under this item in proportion to the amount of work done as determined by the Engineer.

ITEM SUMMARY

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY
201000	Clearing and Grubbing	L.S.	1.00
202000	Excavation and Embankment	C.Y.	13430.00
204000	Test Hole	EACH	15.00
209006	Borrow, Type F	C.Y.	750.00
211002	Removal of Structures and Obstructions, Guardrail	LF	2500.00
301001	Graded Aggregate Base Course, Type B	C.Y.	6613.00
401014	Superpave, Type B, PG 64-22	TON	13844.00
602130	Adjusting and Repairing Existing Drainage Inlet	EACH	25.00
720021	Galvanized Steel Beam Guardrail, Type 1-31	L.F.	925.00
720023	Galvanized Steel Beam Guardrail, Type 3-31	L.F.	2750.00
721001	Guardrail End Treatment Attenuator, Type 1- 31, TL-3	EACH	1.00
721004	Galvanized Steel Beam Attenuator, Type 3-31	Each	3.00
721006	End Anchorage 31	EACH	1.00
721010	Guardrail to Barrier Connection, Approach Type 1-31	EACH	4.00
722001	High Tension Cable Barrier	L.F.	127180.00
722002	High Tension Cable Barrier End Treatment	EACH	86.00

DELAWARE DEPARTMENT OF TRANSPORTATION

CONTRACT No.: T201901002 Median Barrier Installation, Statewide, Open End

762000	Saw-cutting Bituminous Concrete	L.F.	3500.00
763000	Initial Expense	L.S.	1.00
763501	Construction Engineering	L.S.	1.00
801000	Maintenance of Traffic	L.S.	1.00
802003	Arrow Panels, Type C	EA-DY	1200.00
803001	Furnish and Maintain Portable Changeable Message Sign	EA-DY	150.00
804001	Furnish and Maintain Portable Light Assembly	EA-DY	1200.00
805001	Plastic Drums	EA-DY	32000.00
806001	Traffic Officers	HOUR	400.00
808002	Furnish and Maintain Truck Mounted Attenuator, Type II	EA-DY	1500.00
810001	Temporary Warning Signs and Plaques	EA-DY	12000.00
819018	Installation or Removal of Traffic Sign on Single Sign Post	EACH	15.00
905004	Inlet Sediment Control, Drainage Inlet	EACH	350.00
907017	Compost Filter Log	L.F.	2500.00
908004	Topsoil, 6" Depth	S.Y.	44450.00
908010	Topsoiling, 6" Depth	S.Y.	1950.00
908014	Permanent Grass Seeding, Dry Ground	S.Y.	63500.00