



SYRACUSE DIVISION BUNDLED BRIDGES

TAS 17-37B, Contract D800001

DB CONTRACT DOCUMENTS PART 8

SPECIAL SPECIFICATIONS

Final, October 5, 2017

This *Part 8 – Special Specifications* provides access to, and details the Project-specific requirements for the use of, the following documents:

1. NYSDOT/Authority Standard Specifications and Construction Materials
2. NYSDOT/Authority Engineering Information Issuances
3. NYSDOT/Authority Special Specifications.

NYSDOT Standard Specifications and Construction Materials

The Design-Builder shall use the NYSDOT Standard Specifications Construction Materials in coordination with *Part 5 – Special Provisions*.

The NYSDOT Standard Specifications Construction Materials can be accessed at the following internet link:

<https://www.dot.ny.gov/main/business-center/engineering/specifications/busi-e-standards-usc>.

NYSDOT/Authority Engineering Information Issuances

The Design-Builder shall use the relevant NYSDOT/Authority engineering information issuances, which include:

1. Engineering Instructions (EI);
2. Engineering Bulletins (EB);
3. Engineering Directives (ED).

The above listed engineering information issuances can be accessed at the following internet link:

<https://www.dot.ny.gov/main/business-center/consultants/forms-publications-and-instructions/engineering-information-issuance-system>

NYSDOT Special Specifications

The Design-Builder *may* submit to use NYSDOT/Authority Special Specifications which are listed in the Electronic Pay Item Catalog (e-PIC) (requires Authority acceptance) and which have received General Approval, and **shall** use any NYSDOT/Authority Special Specifications which are referenced in this Part 8 or elsewhere in the Contract Documents. Delete and ignore sections in the NYSDOT/Authority Special Specifications titled *Method of Measurement* and *Basis of Payment* from the NYSDOT/Authority Special Specifications.

NYSDOT Special Specifications can be accessed at the following internet link:

<https://www.dot.ny.gov/main/business-center/engineering/specifications/special-specifications-us>.

The NYSTA Special Specifications may be accessed

Via a written request provided at the One on One meetings with names of firm's personnel needing access.

The following Special Specifications are attached herein:

ITEM 206.03120025 – CONDUIT INSTALLATION ON ABOVE GRADE STRUCTURES

ITEM 557.2101XX09 – INTERNAL CURING HIGH PERFORMANCE CONCRETE WITH CORROSION INHIBITOR – TYPE XX FRICTION

ITEM 557.21020016 – FIELD CAST JOINTS BETWEEN PRECAST CONCRETE UNITS

ITEM 557.51090018 – INTERNAL CURING CONCRETE FOR SUPERSTRUCTURE SLABS WITH INTEGRAL WEARING SURFACE – BOTTOM FORMWORK REQUIRED – TYPE 09 FRICTION

ITEM 557.54090018 – INTERNAL CURING CONCRETE FOR STRUCTURAL APPROACH SLAB WITH INTEGRAL WEARING SURFACE – TYPE 09 FRICTION

ITEM 611.19010024 – POST-PLANTING CARE WITH REPLACEMENT

ITEM 634.99020017 – VIBRATION MONITORING (NONBLASTING)

ITEM 680.7751--25 – TRANSMIT COAXIAL CABLE – TYPE A

ITEM 680.7752--25 – TRANSMIT COAXIAL CABLE – TYPE B

ITEM 683.3010--25 – TRANSMIT TAG READER

ITEM 683.3011--25 – TRANSMIT ANTENNA

ITEM 683.5000--25 – NEMA 4x STAINLESS STEEL ENCLOSURE

ITEM 800.01000015 – DESIGN BUILD – DESIGN SERVICES

ITEM 800.02000015 – DESIGN BUILD – CONSTRUCTION INSPECTION SERVICES

ITEM 800.03000015 – DESIGN BUILD – QUALITY CONTROL SERVICES

ITEM 800.04000015 – DESIGN BUILD – FORCE ACCOUNT WORK

ITEM 800.05000015 – DESIGN BUILD – SITE MOBILIZATION

ITEM 800.0600NN15 – DESIGN BUILD – CONSTRUCTION WORK

In the event of a discrepancy between the version of any Special Specification attached herein and the version available from the NYSDOT/Authority web site listed above, the version included in these Contract Documents shall apply.

ITEM 206.0312--25 - CONDUIT INSTALLATION ON ABOVE GRADE STRUCTURES

1. DESCRIPTION:

1.01 The Contractor shall attach conduit to structures as shown on the plans and as directed by the Engineer including: overpasses, underpasses, retaining walls, bridge railings, and concrete barriers. The work shall include excavation and restoration in kind, as required and as shown by the Contract Documents and as directed by the Engineer.

2. MATERIALS:

2.01 Galvanized steel clamps, U-bolts, and backplates shall be in accordance with subsection 723-20. PVC coating shall be in accordance with Subsection 723-23. Stainless steel bolts shall be in accordance with Subsection 715-16.

3. CONSTRUCTION DETAILS:

3.01 The Contractor shall install conduit, at locations shown on the Contract Documents, utilizing one or more of the following attachment methods:

- Conduit clamps with expansion anchors and bolts
- Conduit clamps with bolts
- U-bolts with backplates
- Details shown on the plans.

3.02 Excavation and restoration of disturbed areas shall be performed in accordance with the details shown on the plans and as ordered by the Engineer.

4. METHOD OF MEASUREMENT:

4.01 The work shall be measured by the number of linear feet of conduit actually installed in accordance with the Contract Documents and as directed by the Engineer.

5. BASIS OF PAYMENT:

5.01 The unit price bid per foot shall include the cost of furnishing all labor, materials, and equipment necessary to complete the work, as specified, including but not limited to: clamps, bolts, expansion anchors, U-bolts, excavation and restoration at conduit terminations.

**ITEM 557.2101XX09 – INTERNAL CURING HIGH PERFORMANCE CONCRETE
WITH CORROSION INHIBITOR - TYPE XX FRICTION**

DESCRIPTION

This specification covers internal curing high performance concrete with corrosion inhibitor, including batching, transportation, casting and curing.

MATERIALS

Internal Curing High Performance Concrete

Manufacture HP concrete according to §501, and the following modifications:

1. The slump range is 4-7 inches. High Range Water-Reducing Admixtures (§711-08, ASTM Type F), are permitted.
2. The maximum w/c ratio is reduced to 0.35.
3. Substitute lightweight fine aggregate, meeting the requirements of AASHTO M 195, for 30% (by volume) of standard fine aggregate.
4. Construct lightweight fine aggregate stockpile(s) at the production facility so as to maintain uniform moisture throughout the pile. Using a sprinkler system approved by the Materials Engineer, continuously and uniformly sprinkle the stockpile(s) with water for a minimum of 48 hours, or until the “Absorbed Moisture content” of the aggregate in the stockpile is at least 15% by weight (as determined by Test Method NY 703-19E). If a steady rain of comparable intensity occurs, turn off the sprinkler system at the direction of the Materials Engineer, until the rain ceases. At the end of the wetting period, or after the rain ceases, allow stockpiles to drain for 12 to 15 hours immediately prior to use, unless otherwise directed by the Materials Engineer.
5. The moisture content of the lightweight fine aggregate must be determined immediately prior to batching, using Materials Procedure 703-19E. If the supplied mix design is based on “oven dry” weight of lightweight fine aggregate, a corresponding adjusted weight must be supplied to account for the actual absorbed moisture content, so that the mix design entered in to the automated batching system is based on SSD weight. After the adjusted mix design is entered into batching system, additional adjustments must be made to the fine aggregate and water quantities to account for the “surface” moisture of the fine aggregates.
6. Use Calcium Nitrate Based Corrosion Inhibitor (CNBCI) in the mix at a rate of 5.4 gallons per cubic yard. Account for the water contained within the CNBCI when determining the amount of water used in the mix.

The Materials Engineer, or his representative, will approve the batch weights prior to use. Use these values to manufacture all high performance concrete with corrosion inhibitor for this project, and periodically correct the batch weights to account for changes in the fine aggregate fineness modulus and aggregate moisture contents.

High Weight Methyl Methacrylate

The high molecular weight methacrylate (HMWM) resin shall be low viscosity and non-fuming. Acceptance is based on the manufacturer certifying that it conforms to the following, and the contractor forwarding the certification to the DCES:

**ITEM 557.2101XX09 – INTERNAL CURING HIGH PERFORMANCE CONCRETE
WITH CORROSION INHIBITOR - TYPE XX FRICTION**

Viscosity	Less than 25 cps when measured according to ASTM D2849
Density	Greater than 8.4 lb/gal. @ 77° F.
Flash Point	Greater than 200° F.
Vapor Pressure	Less than 1.0 mm Hg @ 77° F. (ASTM D 323)
TG (DSC)	Greater than 136° F (ASTM D3418)
Gel Time	Greater than 40 minutes for a 100 gram mass
Percent Solids	Greater than 90 % by weight
Bond Strength	Greater than 1522.3 psi (ASTM C882)

Sand for coating HMWM shall be commercial quality dry blast sand. 95% of the sand shall pass the #8 sieve, and 95% shall be retained on the #30 sieve. The container shall include the following information: The name of the manufacturer, the brand name of the product, the date of manufacture.

Water shall meet the requirements of §712-01.

Curing Compound shall meet the requirements of §711-05.

CONSTRUCTION DETAILS

Form Work, Batching and Curing

The design and fabrication of forms shall follow approved installation drawings and shall be constructed from plywood or approved equal. The forms shall be removable and shall not absorb water.

Add the following to §557-3.01, Concrete Manufacturing and Transporting:

The lightweight fine aggregate, at the time of batching must be at least 15% absorbed moisture content . Batch the lightweight fine aggregate first, then routinely batch the fine aggregate, coarse aggregate, admixtures, cement, pozzolan, Microsilica, and remaining mixing water and mix completely.

Place the concrete when the ambient temperature is at least 60 F and no more than 85 F. Curing shall be as per §502-3.11.

Quality Control

The contractor shall take four sets of compressive strength test samples for each day of placement. Each set consists of 2 cylinders 6 inches X 12 inches. All sets shall be cured in an environment similar to the material they represent. The contractor's concrete cylinder curing procedure shall be included on the installation drawings. Cylinders shall be provided to the Engineer at least 12 hours prior to the proposed testing.

The following tests shall be performed:

Compressive strengths shall be according to ASTM C 39. The timing of the testing shall be as needed to open to traffic and as ordered by the Engineer, except that one set shall be tested at 28 days. The cylinders will be broken by the Department.

**ITEM 557.2101XX09 – INTERNAL CURING HIGH PERFORMANCE CONCRETE
WITH CORROSION INHIBITOR - TYPE XX FRICTION**

Application of HMWM

Abrasive blast clean the area to be treated, removing all contaminants from the surface. Clean adjacent surfaces of the area to be treated using compressed air which is free of oil and moisture.

Do not apply HMWM if rain is expected within 12 hours of completion. Apply HMWM to clean, dry surfaces when the surface temperature is at least 50° F, and if near 50° F, rising. The HMWM shall be mixed and applied according to the manufacturer's instructions and no more than 5 gallons at a time. Apply the HMWM as shown in the plans and to all cracks as directed by the Engineer.

When the HMWM surface will be used as a driving surface, sand must be applied to provide friction. After the HMWM has been applied, at least 20 minutes shall elapse before applying the sand. The sand shall be broadcast at a rate of approximately two pounds per square yard, completely covering the HMWM.

Opening to traffic

The HMWM must be tack-free before construction traffic is permitted to resume. The concrete must have a minimum compressive strength of 3000 psi, unless a different strength is shown in the Plans. If the concrete does not achieve the proper strength, contact the Deputy Chief Engineer of Structures.

METHOD OF MEASUREMENT

Measurement will be by volume of concrete placed in cubic feet. The volume of in-place concrete shall be calculated to the nearest cubic foot.

BASIS OF PAYMENT

Payment at the contract price for the above item shall be full compensation for all labor, equipment, and material to do the work.

XX = Friction Type

01 - Type 1 Friction

02 - Type 2 Friction

03 - Type 3 Friction

09 - Type 9 Friction

ITEM 557.21020016 - FIELD CAST JOINTS BETWEEN PRECAST CONCRETE UNITS

SCOPE

This specification covers field casting of joints for precast concrete units, including batching, transportation, casting and curing.

MATERIAL

High Weight Methyl Methacrylate (used as repair for leaking joint)

The high molecular weight methacrylate (HMWM) resin shall be low viscosity and non-fuming. Acceptance is based on the manufacturer certifying that it conforms to the following, and the contractor forwarding the certification to the DCES:

Viscosity	Less than 25 cps when measured according to ASTM D2849
Density	Greater than 8.4 lb/gal. @ 77° F.
Flash Point	Greater than 200° F.
Vapor Pressure	Less than 1.0 mm Hg @ 77° F. (ASTM D 323)
TG (DSC)	Greater than 136° F (ASTM D3418)
Gel Time	Greater than 40 minutes for a 100 gram mass
Percent Solids	Greater than 90 % by weight
Bond Strength	Greater than 1522.3 psi (ASTM C882)

Sand The sand shall be commercial quality dry blast sand. 95% of the sand shall pass the #8 sieve, and 95% shall be retained on the #30 sieve.

The container shall include the following information: The name of the manufacturer, the brand name of the product, the date of manufacture.

Water shall meet the requirements of §712-01.

UHPC material shall meet the following, 28 days unless otherwise noted:

Minimum Compressive Strength (ASTM C39)	
Heat-Treated*	≥ 25 ksi
Not Heat-Treated**	≥ 20 ksi
Not Heat-Treated 3 day**	≥ 12 ksi
Prism Flexural Tensile toughness (ASTM C1018; 10 in. span)	I ₃₀ ≥ 48
Long-Term Shrinkage (ASTM C157; initial reading after set)	≤ 766 microstrain
Chloride Ion Penetrability (ASTM C1202)	≤ 250 coulombs
Chloride Ion Penetrability (AASHTO T259; 1/5 in. depth)	< 0.07 oz/ft ³
Scaling Resistance (ASTM C672)	y < 3
Abrasion Resistance (ASTM C944 2x weight; ground surface)	< 0.025 oz. lost
Freeze-Thaw Resistance (ASTM C666A; 600 cycles)	RDM > 96%
Alkali-Silica Reaction (ASTM C1260; tested for 28 days)	Innocuous
* Heat-Treated - According to manufacturer's recommendation, temperature not to exceed 250°F.	
** Not Heat-Treated - Cured at a temperature of 50° F ± 3°.	

Casting and testing must include the following (The DCES may waive tests if these tests have been previously performed for material supplied by the manufacturer):

A minimum of 12 cylinders 3 in. X 6 in. shall be cast.

ITEM 557.21020016 - FIELD CAST JOINTS BETWEEN PRECAST CONCRETE UNITS

All cylinders shall be cured using the same method of curing proposed to be used in the field. The temperature during curing shall be within 18°F of the low end of the proposed temperature range for curing in the field. 2 cylinders shall be tested each testing day. Testing times are at 4 days, 7 days, 14 days, and 28 days. The compressive strength shall be measured by ASTM C39 and shall meet 12 ksi minimum at 4 days and 21 ksi minimum at 28 days. Only a UHPC mix design that passes these tests may be used to form the joint.

Cast 6 additional cylinders 12 in. diameter and 7 ½ in. deep. Each cylinder shall have one 32 in. long epoxy-coated reinforcing bar cast in the center of the circular face. The axis of the bar shall be perpendicular to the formed surface. 3 of the bars shall be #6 bars embedded 5 inches deep and 3 of the bars shall be #4 bars embedded 3 inches deep. These cylinders will be kept wet for four days then delivered to the Materials Bureau for testing according to Test Method No. NY 701-14 E. Contact the Materials Bureau prior to casting for specific instructions on preparing the test specimens. The test will be performed as soon as practical after the corresponding samples reach 12 ksi.

This test is a pullout test. The samples pass if the bars yield without the UHPC failing and without the bars pulling out of the UHPC.

Results of all the tests above, conducted by an AASHTO accredited testing lab shall be submitted to the DCES for review and approval a minimum of 60 days prior to the use of UHPC in the field. Provide to the DCES a list of bridge projects in which the proposed UHPC material has been used as joint fill between precast concrete elements (within or outside the USA). The DCES reserves the right to reject a proposed UHPC material which lacks a proven track record in precast concrete joint filling in bridge applications.

CONSTRUCTION

Pre-Pour Meeting: Prior to the initial placement of the UHPC, the contractor shall arrange for an on site meeting with the UHPC representative. The contractor's staff and the NYSDOT Engineer and Inspectors shall attend the site meeting. The objective of the meeting will be to clearly outline the procedures for mixing, transporting, finishing and curing of the UHPC material.

The contractor shall arrange for a representative of the UHPC supplier to be on site during the placement of the joints. The representative shall be knowledgeable in the supply, mixing, delivery, placement, and curing of the UHPC material.

Storage: The contractor shall assure the proper storage of premix, fibers and additives as required by the supplier's specifications in order to protect materials against loss of physical and mechanical properties.

Form Work, Batching and Curing

The design and fabrication of forms shall follow approved installation drawings and shall follow the recommendations of the manufacturer. All the forms for UHPC shall be constructed from plywood. The forms shall be coated to prevent absorption of water.

The contractor shall follow the batching sequence as specified by the supplier and approved by the DCES. The surface of the UHPC field joints shall be filled to plus 1/8 inch above the surface of the precast panels.

ITEM 557.21020016 - FIELD CAST JOINTS BETWEEN PRECAST CONCRETE UNITS

The UHPC in the form shall be cured according to Manufacturer's recommendations to attain the required strength shown on the contract documents. A continuous curing temperature of a minimum of 60°F is recommended.

Quality Control

The contractor shall measure the slump flow on each batch of UHPC. The slump flow will be conducted using a mini-slump cone. The flow for each batch shall be between 7 in. and 10in. The slump flow for each batch shall be recorded in the QA/QC log. A copy of the log shall be given to the Engineer.

The contractor shall take four sets of compressive strength test samples for each day of placement. Each set consists of 3 cylinders 3in. X 6in. All sets shall be cured in an environment similar to the material they represent.

The following tests shall be performed:

Compressive strengths shall be according to ASTM C 39. The timing of the testing shall be as required by the contract documents. The second set shall be tested at 28 days. The third set will be sent to the Materials Bureau between the 4th day and the 14th day. The fourth set shall be treated as a reserve set.

Watertight Integrity Test

After the joint has reached the required strength, a watertight integrity test shall be performed in accordance with §567-3.01.H. If leakage occurs the Contractor must seal the entire length of the leaking joint using High Weight Methyl Methacrylate at no extra cost to the State.

Repair

Abrasive blast clean the area to be treated, removing all contaminants from the surface. Clean adjacent surfaces of the leaking joints using compressed air which is free of oil and moisture.

Do not apply sealers if rain is expected within 12 hours of completion. Apply sealers to clean, dry surfaces when the surface temperature is at least 50° F, and if near 50° F, rising. The sealer shall be mixed and applied according to the manufacturer's instructions and no more than 5 gallons at a time. Pour the sealer over the joints.

When the methacrylate surface will be used as a driving surface, sand must be applied to provide friction. After the resin has been applied, at least 20 minutes shall elapse before applying the sand. The sand shall be broadcast at a rate of approximately two pounds per square yard, completely covering the sealer.

The sealer must be tack-free before construction traffic is permitted to resume.

MEASUREMENT FOR PAYMENT

Measurement will be by volume of UHPC joints placed in cubic feet. The volume of in-place UHPC shall be calculated to the nearest cubic foot.

BASIS OF PAYMENT

Payment at the contract price for the above item shall be full compensation for all labor, equipment, and material to do the work.

- ITEM 557.51XX0018 - INTERNAL CURING CONCRETE FOR SUPERSTRUCTURE SLABS WITH INTEGRAL WEARING SURFACE - BOTTOM FORMWORK REQUIRED - TYPE XX FRICTION**
- ITEM 557.52XX0018 - INTERNAL CURING CONCRETE FOR SUPERSTRUCTURE SLABS WITH INTEGRAL WEARING SURFACE - BOTTOM FORMWORK NOT REQUIRED - TYPE XX FRICTION**
- ITEM 557.54XX0018 - INTERNAL CURING CONCRETE FOR STRUCTURAL APPROACH SLAB WITH INTEGRAL WEARING SURFACE - TYPE XX FRICTION**
- ITEM 557.55000018 - INTERNAL CURING CONCRETE FOR SIDEWALKS AND SAFETY WALKS**

DESCRIPTION

Furnish and place reinforcing steel and Internal Curing (IC) concrete to construct superstructure slabs as shown in the contract plans. Internal Curing concrete is a modified Class HP concrete with lightweight fine aggregate substituted for a portion of the standard fine aggregate to aid the curing process internally.

MATERIALS

Manufacture Class HP concrete modified for internal curing according to §501, and the following modifications:

1. The slump range is 4-7 inches. High Range Water-Reducing Admixtures (§711-08, ASTM Type F), are permitted.
2. The maximum w/c ratio is 0.40. Do not include absorbed moisture of the light weight fine aggregate as part of the w/c ratio calculation.
3. Substitute lightweight fine aggregate, meeting the requirements of AASHTO M 195, for 30% (by volume) of standard fine aggregate.

The Regional Materials Engineer, or his representative, will approve the batch weights prior to use. Use these values to manufacture all internally cured high performance concrete and periodically correct the batch weights to account for changes in the fine aggregate fineness modulus and aggregate moisture contents.

CONSTRUCTION DETAILS

Apply the provisions of §557-3 and the following modifications:

1. Add the following to §557-3.01, Concrete Manufacturing and Transporting:
 - a. Construct lightweight fine aggregate stockpile(s) at the production facility so as to maintain uniform moisture throughout the pile. Using a sprinkler system approved by the Materials Engineer. Continuously and uniformly sprinkle the stockpile(s) with water for a minimum of 48 hours, or until the “Absorbed Moisture content” of the aggregate in the stockpile is at least 15% by weight as determined by Test Method NY 703-19E (<https://www.dot.ny.gov/divisions/engineering/technical-services/materials-bureau/forms-manuals>). If a steady rain of comparable intensity occurs, turn off the sprinkler system at the direction of the Materials Engineer, until the rain ceases. At the end of the wetting period, or after the rain ceases, allow stockpiles to drain for 12 to 15 hours immediately prior to use, unless otherwise directed by the Materials Engineer.
 - b. The moisture content of the lightweight fine aggregate must be determined immediately prior to batching, using Test Method NY 703-19E. If the supplied mix design is based on “oven dry” weight of lightweight fine aggregate, a

corresponding adjusted weight must be supplied to account for the actual absorbed moisture content, so that the mix design entered in to the automated batching system is based on SSD weight. After the adjusted mix design is entered into batching system, additional adjustments must be made to the fine aggregate and water quantities to account for the “surface” moisture of the fine aggregates.

- c. The lightweight fine aggregate, at the time of batching must be at least 15% absorbed moisture content. Batch the lightweight fine aggregate first, then routinely batch the fine aggregate, coarse aggregate, admixtures, cement, pozzolan, Microsilica, and remaining mixing water and mix completely.
 - d. Have the lightweight aggregate manufacturer supply a service representative at the site for the first two days of concrete placement operations to assist in the control of IC concrete mixing and placement operations.
2. Make any repairs as per the provisions of §557-3.16, Damaged or Defective Concrete.
 3. The loading limitations of §557-3.14 apply.

METHOD OF MEASUREMENT

Apply all the provisions of §557-4.

BASIS OF PAYMENT

Apply all the provisions of §557-5.

XX = Friction Type

01 - Type 1 Friction

02 - Type 2 Friction

03 - Type 3 Friction

09 - Type 9 Friction

ITEM 611.19010024 - POST-PLANTING CARE WITH REPLACEMENT - MAJOR DECIDUOUS TREES

ITEM 611.19020024 - POST-PLANTING CARE WITH REPLACEMENT - MINOR DECIDUOUS TREES

ITEM 611.19030024 - POST-PLANTING CARE WITH REPLACEMENT - CONIFEROUS TREES

ITEM 611.19040024 - POST-PLANTING CARE WITH REPLACEMENT - DECIDUOUS SHRUBS

ITEM 611.19050024 - POST-PLANTING CARE WITH REPLACEMENT - EVERGREEN SHRUBS

ITEM 611.19060024 - POST-PLANTING CARE WITH REPLACEMENT - VINES, GROUNDCOVERS

ITEM 611.19070024 - POST-PLANTING CARE WITH REPLACEMENT - HERBACEOUS PLANTS

DESCRIPTION

This work consists of the care of newly planted and transplanted trees, shrubs, vines, groundcovers and other plants and replacement of plants in kind and as necessary, in accordance with the contract documents and as directed by the Engineer.

MATERIALS

Materials shall meet the requirements of the following subsections of Section 700 *Materials and Manufacturing*.

Water	712-01
Topsoil	713-01
Mulch for Landscape Bedding	713-05
Trees, Shrubs and Vines	713-06
Materials for the Protection of Plants	713-08
Pesticides	
713-13	

CONSTRUCTION

Post-Planting Care. The Contractor shall perform all work as specified under Standard Specification section **611-3.05 Post-Planting Care**.

Replacement Planting. Plants that die, become diseased or badly impaired during Post-Planting Care shall be removed and replaced in kind once with new, healthy plant material, in the same location as the initial planting. Replacement planting shall occur within the planting seasons shown in Standard Specification **Table 611-1**. For any plants replaced during the Post-Planting Care period, Post-Planting Care shall continue to the end of the period.

Replacement plants shall be planted, maintained and accepted per Standard Specification **Section 611-3.01**. Planting soil used in the initial planting shall be reused for replacement plants and shall be supplemented with topsoil at no additional cost if additional material is needed to meet grade and surface finish. Watering shall accompany backfilling, at no additional cost. No replacement tree shall be staked, guyed or anchored.

ITEM 611.19010024 - POST-PLANTING CARE WITH REPLACEMENT - MAJOR DECIDUOUS TREES

ITEM 611.19020024 - POST-PLANTING CARE WITH REPLACEMENT - MINOR DECIDUOUS TREES

ITEM 611.19030024 - POST-PLANTING CARE WITH REPLACEMENT - CONIFEROUS TREES

ITEM 611.19040024 - POST-PLANTING CARE WITH REPLACEMENT - DECIDUOUS SHRUBS

ITEM 611.19050024 - POST-PLANTING CARE WITH REPLACEMENT - EVERGREEN SHRUBS

ITEM 611.19060024 - POST-PLANTING CARE WITH REPLACEMENT - VINES, GROUNDCOVERS

ITEM 611.19070024 - POST-PLANTING CARE WITH REPLACEMENT - HERBACEOUS PLANTS

METHOD OF MEASUREMENT.

The quantity to be measured for payment will be the number of plants of each type cared for and, if necessary, replaced in kind.

BASIS OF PAYMENT.

The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete the work.

Payment will be made under:

Item No.	Item	Pay Unit
611.19010024	Post Planting Care with Replacement - Major Deciduous Trees	Each
611.19020024	Post Planting Care with Replacement - Minor Deciduous Trees	Each
611.19030024	Post Planting Care with Replacement - Coniferous Trees	Each
611.19040024	Post Planting Care with Replacement - Deciduous Shrubs	Each
611.19050024	Post Planting Care with Replacement - Evergreen Shrubs	Each
611.19060024	Post Planting Care with Replacement - Vines, Groundcovers	Each
611.19070024	Post Planting Care with Replacement - Herbaceous Plants	Each

ITEM 634.99010017 - BUILDING CONDITION SURVEY

ITEM 634.99020017 - VIBRATION MONITORING (NONBLASTING)

DESCRIPTION

A. Building Condition Survey. This work shall consist of performing a building condition survey(s) and preparing permanent records as indicated in the contract documents prior to the commencement of work, after completion of work, and at locations and times during construction as directed by the Engineer.

B. Vibration Monitoring (Nonblasting). This work shall consist of performing vibration monitoring of background and construction activities and preparing daily and summary report(s) of vibration readings.

MATERIALS

A. Building Condition Survey. Provide general photography and video equipment, analog or digital, capable of superimposing the date and time on all images.

B. Vibration Monitoring (Nonblasting). Provide a 3-component seismograph, capable of measuring particle velocity data in three mutually perpendicular directions. Annual factory calibration is required throughout the duration of the work.

CONSTRUCTION DETAILS

A. General. The Contractor shall engage the services of a firm capable of furnishing a New York State licensed Professional Engineer to conduct a condition survey of the existing building(s) indicated in the contract documents in the Special Note entitled Vibration Criteria and an experienced vibration monitoring Consultant to measure peak particle velocities prior to, and during, construction operations. Submit as proof to the Deputy Chief Engineer Technical Services (DCETS) the experience and qualifications of the firm's personnel conducting the work.

B. Building Condition Survey. Provide, as a minimum, the following information:

1. Photographic and videotape documentation of the interior and exterior condition of the building(s).
2. Extent and location of existing signs of building distress such as cracks, spalling, signs of settlement, flooding, leaking, etc.

The Engineer may accompany the Contractor on each building condition survey for verification of the data recorded. Provide two copies of all documentation of each building condition survey to the Engineer.

C. Vibration Monitoring (Nonblasting). The DCETS may waive the requirements of vibration monitoring based on the results of the building condition survey.

Perform continuous vibration monitoring during construction operations when adjacent construction activities make monitoring prudent. The Contractor shall perform contract work in

ITEM 634.99010017 - BUILDING CONDITION SURVEY

ITEM 634.99020017 - VIBRATION MONITORING (NONBLASTING)

a manner that will limit construction vibration at the specified locations to within the limits set within the contract documents.

1. Submittal of Written Vibration Monitoring Plan. Prior to performing work adjacent to specified locations, a written Vibration Monitoring Plan prepared by the Contractor shall be submitted to the Engineer a minimum of 10 work days in advance for approval. The Engineer will send a copy of the Vibration Monitoring Plan to the Geotechnical Engineering Bureau, Engineering Geology Section, for review and written comment. The vibration monitoring plan may be returned to the Contractor for revision or clarification.

The vibration monitoring plan shall include the necessary information to outline the recording collection. The vibration monitoring plan shall include, but not be limited to, the following items:

a. Contract Designations

- The name of vibration monitoring specialist(s).
- The scheduled start date and length of construction operations which require vibration monitoring.
- The limits of vibration monitoring work, including sites on or off State-owned right-of-way.
- The location of all structures to be monitored in proximity to the construction operation.
- The location of any underground utilities in proximity to the construction operation.

b. Experience and Equipment

- Submit proof and details, as references, of two projects in the past five years where the vibration monitoring consultant performing the work has satisfactorily monitored construction operations by recording maximum peak particle velocities (PPVs). Include contact information for each reference.
- Submit information on the required 3-component seismograph, capable of measuring particle velocity data in three mutually perpendicular directions, including: the manufacturer's name, model number, and documentation of factory calibration performed within the last 12 months.

c. Methods and Procedures

- The location of adjacent structures to be monitored and maximum allowable PPVs as indicated in the contract documents. If not otherwise specified, a maximum allowable PPV in accordance with the United States Bureau of Mines (USBM) Vibration Criteria (Figure 1) shall be observed at all structures.
- The location of seismograph(s) placements, as directed by the Contractor's Professional Engineer. Recording seismographs may be installed on selected structures.
- Appropriate details for anchoring the geophone(s).

- The procedure for tracking PPV throughout construction operations (e.g., Pile Driving Operations: pile tip vs. vibrations may be correlated through time of day. A record of the time of day at each depth interval, included on the pile driving records, would be required to correlate to a time-based readout of PPV).

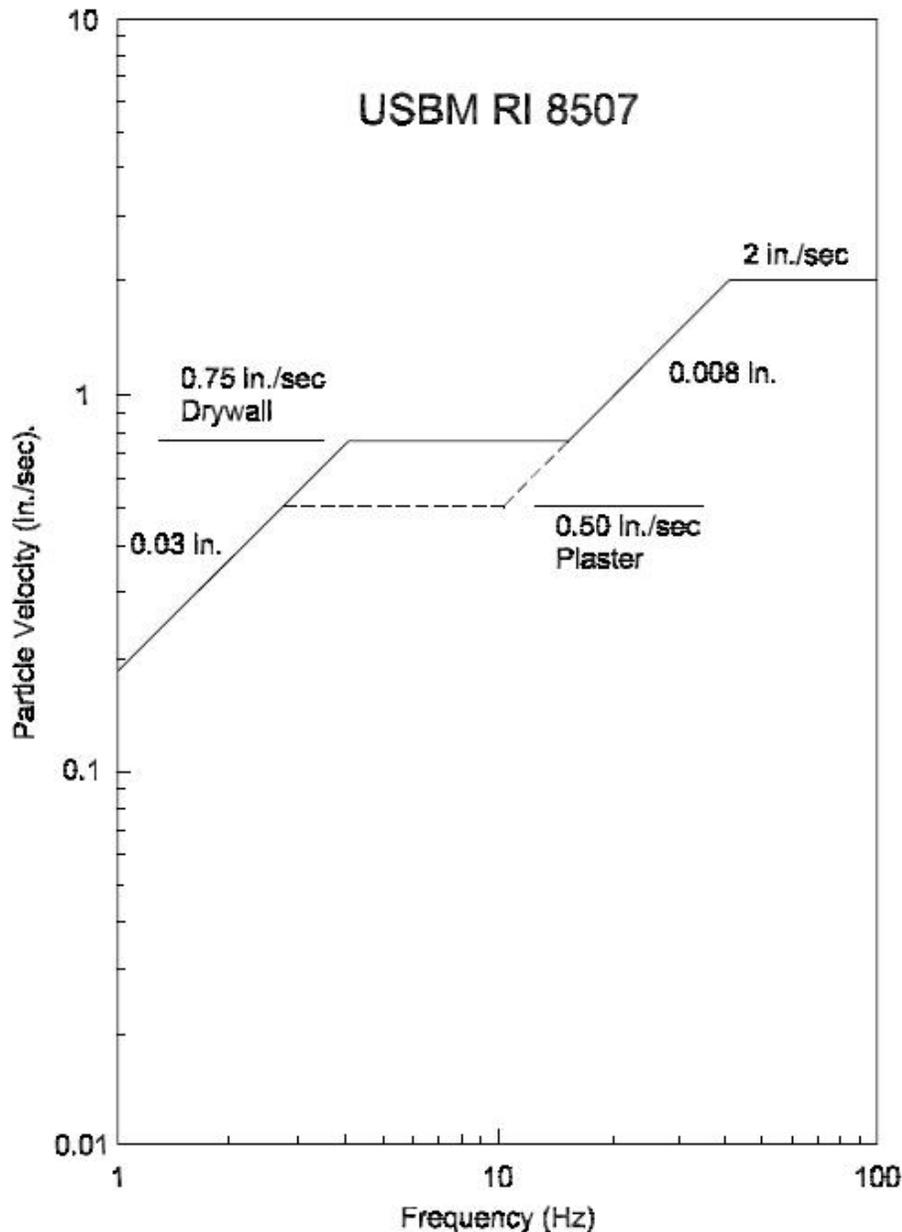


Figure 1—Safe Vibration Limit Recommendations for Residential Structures

Figure 1 – USBM Vibration Criteria (after Siskind et al, 1980)

The figure provides a “threshold damage” limit, defined as cosmetic damage (e.g., cracking) within the structure, categorized by both frequency ranges and particle velocity

ITEM 634.99010017 - BUILDING CONDITION SURVEY

ITEM 634.99020017 - VIBRATION MONITORING (NONBLASTING)

2. Measuring Vibrations. The Contractor shall inform the Engineer immediately each time measured particle velocities exceed 85% of the allowable peak particle velocity. The Contractor shall make equipment or procedural modifications as required to avoid exceeding the allowable vibration intensity.

If the measured velocities exceed the maximum allowable PPVs, the Contractor shall stop operations immediately and revise equipment and procedures to reduce vibrations to allowable levels.

The Contractor shall be in communication with his monitoring firm's personnel during vibration monitoring at all locations to verify the data recorded.

The Contractor shall provide the Engineer with the results of daily vibration monitoring, one work day after the readings are taken. Upon completion of the construction operations for those locations requiring vibration monitoring, the daily submittals shall be synthesized into a final report.

If the seismographs show any indication of damage or vandalism, the seismographs shall be immediately recalibrated or replaced.

METHOD OF MEASUREMENT

A. Building Condition Survey. This work will be measured on a lump sum basis.

B. Vibration Monitoring (Nonblasting). This work will be measured on a lump sum basis.

BASIS OF PAYMENT

The unit price bid for building condition survey(s) and vibration monitoring shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work.

Vibration Monitoring (Nonblasting). Progress payments will be made for this item paid proportionally in accordance with the amount of work completed, measured on a workday basis.

Payment will be made under:

Item No.	Item	Pay Unit
634.99010017	Building Condition Survey	Lump Sum
634.99020017	Vibration Monitoring (Nonblasting)	Lump Sum

ITEM 680.7751--25 - TRANSMIT COAXIAL CABLE – TYPE A

1. DESCRIPTION:

1.01 Under this item, the Contractor shall furnish and install coaxial cables and connectors where shown on the plans in accordance with the Contract Documents, and as ordered by the Engineer. Coaxial cable and connectors shall be for outdoor use and shall be provided with lightning surge protection and electrical noise filtering. For use in TRANSMIT sites where the distance from the antenna to the reader is up to 150 feet.

2. MATERIALS:

2.01 The coaxial cable shall be Cushcraft TL 93605 or approved equal with the following characteristics:

A. Physical:

1.	Diameter over jacket	-	0.4 inch, maximum
2.	Diameter over outer conductor	-	0.32 inch
3.	Cable Weight	-	0.069 lb/ft
4.	Center Conductor	-	Copper
5.	Outdoor Conductor	-	Tin/Copper Braid, 90%

B. Mechanical:

1.	Cable Tensile Strength	-	150 pounds
2.	Minimum Bending Radius	-	5 inches

C. Electrical:

1.	Impedance	-	50 ohms ± 2 ohms
2.	Velocity of Propagation	-	85%
3.	Capacitance	-	24 Picofarads per foot
4.	Max. Attenuation at 1000 MHz. and 75°F:	-	4.22 dB / 328 feet
5.	Center conductor DC Resistance at 68°F:	-	1.32 ohms per 3,281 feet

D. Temperature:

1. Installation & Operating Temperature Range: -40°C to 80°C.

E. Coaxial Connectors: The Contractor shall install weatherproof coaxial connectors at each end of the coaxial cable with the following specifications:

At the reader antenna:

Type -	N connector male
Size	½ inch
Impedance	50 ohms
Plating Coat	Silver plated body and gold plated pin

At Field Cabinet:

Type	N connector male
Size	Compatible with surge protector
Impedance	50 ohms
Plating Coat	Silver plated body and gold plated pin.

Attach a surge suppressor at the end of each coaxial cable in the field controller cabinet. Refer to Transmit Cabinet Specification for Surge Suppressor requirement.

ITEM 680.7751--25 - TRANSMIT COAXIAL CABLE – TYPE A

3. CONSTRUCTION DETAILS:

- 3.01 **Installation:** The Contractor shall install coaxial cable as shown on the plans or as directed by the Engineer. The coaxial cable shall be installed in the conduit or attached directly to an overhead sign structure.

The installation techniques and procedures of the coaxial cable shall not degrade the electrical and mechanical characteristics of the coaxial cable in any manner. The Contractor shall use appropriate cable hoisting grips, lubricant, and entry guide chutes, winch and corner rollers as specified by the cable manufacturer. The Contractor shall submit coaxial cable installation techniques and procedures for approval by the Engineer prior to any cable installation.

All coaxial cable runs shall be continuous from reader antennas to the field cabinets without any intermediate connectors or splices. A cable slack of one meter shall be supplied in the field cabinet for each coaxial cable run. A weatherproof and permanent label shall be attached to each coaxial cable end at the field cabinet so that each coaxial cable can be identified to a reader antenna. The Contractor shall submit a label sample and labeling procedure for approval by the Engineer prior to the installation of any coaxial cable or reader antenna installation.

The cable shall be handled with care. It shall not be pulled along the ground and shall be taken from the reel only as it is placed. Bends of small radii and twists shall be avoided and shall not exceed the Manufacturer’s recommended bending radius.

All observed damage to the cable, whether prior to its installation, during construction or by testing subsequent to installation shall be immediately called to the attention of the Engineer. The method of repair or correction of such damage shall be approved by the Engineer. The Contractor shall promptly repair such damage or make such correction in accordance with the approved method.

Cable attached directly to an overhead sign structure shall be secured with heavy duty, weather resistant cable ties every four (4) feet or less.

- 3.02 **Cable Moisture Sealing:** Each end of the cable shall be protected from water entry at all times. Immediately after installation and after the Interconnection Test, the cable shall be fitted with a water sealant consisting, as a minimum, of a heat shrinkable end cap. The shrinkable end cap shall have a specified recovered inside diameter less than the cable diameter. The length of the end cap shall be a minimum of three (3) inches. The materials used and the installation procedure shall be demonstrated successfully to the Engineer.

- 3.03 **Testing:** The Contractor shall perform the following tests as a minimum to ensure that the reader antenna and coaxial cable are ready for communications:

A. **Reel Test:** At the Contractor’s shop, each coaxial cable reel shall be inspected for any physical damage and a DC resistance test, a megger test and a TDR tests shall be performed. A frequency sweep shall also be performed for the 850 to 950 MHz. bandwidth. This test shall be included in the Factory Acceptance Test.

B. **Stand Alone Test:** Prior to connecting the reader antenna and coaxial cable at the location, the Contractor shall successfully test each item separately. The Contractor shall submit a test procedure for approval by the Engineer that includes the following as a minimum:

ITEM 680.7751--25 - TRANSMIT COAXIAL CABLE – TYPE A

3. CONSTRUCTION DETAILS: (cont'd)

3.03 **Testing:** (cont'd)

1. Coaxial cable and reader antenna physical inspection for any damage during transport and installation.
 2. Coaxial Cable Time Domain Reflectory (TDR) Test, DC ohm test and megger test as recommended by the coaxial cable manufacturer.
 3. Reader Antenna Impedance Measurement.
- C. **Connection Test:** After installation of the coaxial cable and providing end connectors and the connection to reader antenna, inspect coaxial cable for any damage and complete a frequency sweep for the 850 to 950 MHz. bandwidth and a TDR test from the cabinet. This test shall be included in the Site Acceptance Test.

Test Procedures and expected test results shall comply with the manufacturers' specifications and General Provisions. The Contractor shall inform the Engineer three (3) days prior to performing any tests so that the Engineer may witness tests and approve the coaxial cable for installation and payment.

4. METHOD OF MEASUREMENT:

- 4.01 The coaxial cable will be measured for payment as per the number of feet installed, made fully operational and tested.

5. BASIS OF PAYMENT:

- 5.01 The unit price bid per linear foot shall include all costs for furnishing and installing the coaxial cables including connectors to connect each reader antenna, testing and all materials, labor, equipment and tools necessary to complete the work.

- 5.02 Progress payments will be made as follows:

- Seventy Five percent (75%) of the bid price for the item will be paid when the cable is installed and the Stand Alone Test has been successfully completed.
- Twenty-Five percent (25%) of the bid price for the item will be paid when the Connection Test has been successfully completed.

No payment will be made for repair or replacement of damaged material, which was made necessary due to the contractor's operations.

ITEM 680.7752--25 - TRANSMIT COAXIAL CABLE – TYPE B

1. DESCRIPTION:

1.01 Under this item, the Contractor shall furnish and install coaxial cables and connectors where shown on the plans in accordance with the Contract Documents, and as ordered by the Engineer. Coaxial cable and connectors shall be for outdoor use and shall be provided with lightning surge protection and electrical noise filtering. For use in TRANSMIT sites where the distance from the antenna to the reader is between 150 and 350 feet.

2. MATERIALS:

2.01 The coaxial cable shall be Andrew LDF4-50A or approved equal with the following characteristics:

A. Physical:

- | | | | |
|----|-------------------------------|---|----------------------|
| 1. | Diameter over jacket | - | 0.63 inch, maximum |
| 2. | Diameter over outer conductor | - | 0.55 inch |
| 3. | Cable Weight | - | 0.15 lb/ft |
| 4. | Center Conductor | - | Copper Clad Aluminum |
| 5. | Outdoor Conductor | - | Copper |

B. Mechanical:

- | | | | |
|----|------------------------|---|------------|
| 1. | Cable Tensile Strength | - | 250 pounds |
| 2. | Minimum Bending Radius | - | 5 inches |

C. Electrical:

- | | | | |
|----|---|---|---------------------------|
| 1. | Impedance | - | 50 ohms ± 1 ohm |
| 2. | Velocity of Propagation | - | 88% |
| 3. | Capacitance | - | 23 Picofarads per foot |
| 4. | Max. Attenuation at 1000 MHz. and 68°F: | | 2.22 dB / 100 feet |
| 5. | Center conductor DC Resistance at 68°F: | | 0.57 ohms per 1,000 feet. |

D. Temperature:

- | | | | |
|----|---|--|-----------------|
| 1. | Installation & Operating Temperature Range: | | -40°F to 176°F. |
|----|---|--|-----------------|

E. Coaxial Connectors: The Contractor shall install weatherproof coaxial connectors at each end of the coaxial cable with the following specifications:

At the reader antenna:

- | | |
|--------------|--|
| Type - | N connector male |
| Size | ½ inch |
| Impedance | 50 ohms |
| Plating Coat | Silver plated body and gold plated pin |

At Field Cabinet:

- | | |
|--------------|---|
| Type | N connector male |
| Size | Compatible with surge protector |
| Impedance | 50 ohms |
| Plating Coat | Silver plated body and gold plated pin. |

Attach a surge suppressor at the end of each coaxial cable in the field controller cabinet. Refer to Transmit Cabinet Specification for Surge Suppressor requirement.

ITEM 680.7752--25 - TRANSMIT COAXIAL CABLE – TYPE B

3. CONSTRUCTION DETAILS:

- 3.01 **Installation:** The Contractor shall install coaxial cable as shown on the plans or as directed by the Engineer. The coaxial cable shall be installed in the conduit or attached directly to an overhead sign structure.

The installation techniques and procedures of the coaxial cable shall not degrade the electrical and mechanical characteristics of the coaxial cable in any manner. The Contractor shall use appropriate cable hoisting grips, lubricant, and entry guide chutes, winch and corner rollers as specified by the cable manufacturer. The Contractor shall submit coaxial cable installation techniques and procedures for approval by the Engineer prior to any cable installation.

All coaxial cable runs shall be continuous from reader antennas to the field cabinets without any intermediate connectors or splices. A cable slack of one meter shall be supplied in the field cabinet for each coaxial cable run. A weatherproof and permanent label shall be attached to each coaxial cable end at the field cabinet so that each coaxial cable can be identified to a reader antenna. The Contractor shall submit a label sample and labeling procedure for approval by the Engineer prior to the installation of any coaxial cable or reader antenna installation.

The cable shall be handled with care. It shall not be pulled along the ground and shall be taken from the reel only as it is placed. Bends of small radii and twists shall be avoided and shall not exceed the Manufacturer's recommended bending radius.

All observed damage to the cable, whether prior to its installation, during construction or by testing subsequent to installation shall be immediately called to the attention of the Engineer. The method of repair or correction of such damage shall be approved by the Engineer. The Contractor shall promptly repair such damage or make such correction in accordance with the approved method.

Cable attached directly to an overhead sign structure shall be secured with heavy duty, weather resistant cable ties every four (4) feet or less.

- 3.02 **Cable Moisture Sealing:** Each end of the cable shall be protected from water entry at all times. Immediately after installation and after the Interconnection Test, the cable shall be fitted with a water sealant consisting, as a minimum, of a heat shrinkable end cap. The shrinkable end cap shall have a specified recovered inside diameter less than the cable diameter. The length of the end cap shall be a minimum of three (3) inches. The materials used and the installation procedure shall be demonstrated successfully to the Engineer.

- 3.03 **Testing:** The Contractor shall perform the following tests as a minimum to ensure that the reader antenna and coaxial cable are ready for communications:

A. **Reel Test:** At the Contractor's shop, each coaxial cable reel shall be inspected for any physical damage and a DC resistance test, a megger test and a TDR tests shall be performed. A frequency sweep shall also be performed for the 850 to 950 MHz. bandwidth. This test shall be included in the Factory Acceptance Test.

B. **Stand Alone Test:** Prior to connecting the reader antenna and coaxial cable at the location, the Contractor shall successfully test each item separately. The Contractor shall submit a test procedure for approval by the Engineer that includes the following as a minimum:

ITEM 680.7752--25 - TRANSMIT COAXIAL CABLE – TYPE B

3. CONSTRUCTION DETAILS: (cont'd)

3.03 **Testing:** (cont'd)

1. Coaxial cable and reader antenna physical inspection for any damage during transport and installation.
 2. Coaxial Cable Time Domain Reflectory (TDR) Test, DC ohm test and megger test as recommended by the coaxial cable manufacturer.
 3. Reader Antenna Impedance Measurement.
- C. **Connection Test:** After installation of the coaxial cable and providing end connectors and the connection to reader antenna, inspect coaxial cable for any damage and complete a frequency sweep for the 850 to 950 MHz. bandwidth and a TDR test from the cabinet. This test shall be included in the Site Acceptance Test.

Test Procedures and expected test results shall comply with the manufacturers' specifications and General Provisions. The Contractor shall inform the Engineer three (3) days prior to performing any tests so that the Engineer may witness tests and approve the coaxial cable for installation and payment.

4. METHOD OF MEASUREMENT:

- 4.01 The coaxial cable will be measured for payment as per the number of feet installed, made fully operational and tested.

5. BASIS OF PAYMENT:

- 5.01 The unit price bid per linear foot shall include all costs for furnishing and installing the coaxial cables including connectors to connect each reader antenna, testing and all materials, labor, equipment and tools necessary to complete the work.
- 5.02 Progress payments will be made as follows:
- Seventy Five percent (75%) of the bid price for the item will be paid when the cable is installed and the Stand Alone Test has been successfully completed.
 - Twenty-Five percent (25%) of the bid price for the item will be paid when the Connection Test has been successfully completed.

No payment will be made for repair or replacement of damaged material, which was made necessary due to the contractor's operations.

ITEM 683.3010--25 - TRANSMIT TAG READER
ITEM 683.3011--25 - TRANSMIT ANTENNA

1. DESCRIPTION:

1.01 This work shall consist of furnishing and installing TRANSMIT Tag Readers and TRANSMIT Antennas in accordance with the Contract Documents.

2. MATERIALS:

2.01 The Contractor shall furnish TRANSMIT Tag Readers (field processors) with associated software and any miscellaneous cables and mounting hardware required at each TRANSMIT processor cabinet location indicated in the Contract Drawings.

2.02 Equipment cabinets for the TRANSMIT readers will be furnished and installed under other contract items.

2.03 To insure compatibility with the TRANSMIT system, the equipment shall be as follows:

A. Each TRANSMIT site that uses fiber optics for communication shall have the following equipment installed and tested:

1. Phazor VRC Antennas shall be mounted as shown in the plans. Quantity per site shall be as shown in the plans.
2. Janus readers (Single RS-232) shall be installed in the field cabinets. One (1) reader per eight (8) antennas.
3. IFS Media Converters shall be installed in the field cabinets and Ethernet locations (NYSTA Toll Utility Buildings, Fiber Regen Facility, Maintenance Buildings, etc.). One (1) per field site, one (1) per Ethernet location; Model DE7230M-C.
4. Lantronix Access Server (Model #UDS-2100) shall be installed in the field cabinets. One (1) access server per field site. Server connected to reader dataport by a 5 foot female to female 9 pin cable and to the diagnostic port by a 5 foot DB9 female to DB25 female cable.

B. Each transmit site that uses cellular communication shall have the following installed and tested:

1. Phazor VRC Antennas shall be mounted as shown in the plans. Quantity per site shall be as shown in the plans.
2. Janus readers (Single RS-232) shall be installed in the field cabinets. One (1) reader per eight (8) antennas.
3. Digi Connect Port WR 44 VPN, Model WR44-U800-WE1-RH (Verizon) with Conformal Coating. The modem must be given to the Engineer for programming by Networks Group. This modem requires an antenna affixed to the outside of the sign housing. The antenna shall be a Cell Antenna – Model CAF822. There shall be no substitution for the modem or antenna.

ITEM 683.3010--25 - TRANSMIT TAG READER
ITEM 683.3011--25 - TRANSMIT ANTENNA

2. MATERIALS: (cont'd)

2.03 (cont'd)

4. Black Box RJ45 Surge Suppressors (Model #SP527A) shall be installed in the field cabinets. One (1) suppressor per field site.

TRANSMIT Tag Reader – Kapsch Janus Reader, PN 801965-002 non-redundant with traffic management firmware, RS-232, no sync) with VRC Lane Kit, PN 800750-303, one per antenna.
TRANSMIT Antenna – Overhead Lane Kit Flat Panel Antenna manufactured by:
Kapsch TrafficCom IVHS
6020 Ambler Drive, Mississauga, Ontario, Canada L4W 2P1
Phone: (905) 624-3020

2.04 **TRANSMIT Tag Reader:** The Tag Reader shall meet the following requirements:

- Protocol:** For interrogation of tags – Interagency Group (IAG). The Engineer will furnish protocol for communication between the Operations Center and the tag reader.
- Reading Speed:** Up to eight (8) lanes of traffic with vehicles traveling at up to 100 mph.
- Frequency:** 915.75 Mhz.
- Data Interface:** RS-232 at up to 19.2 kbps.
- FCC Licensing:** Contractor shall be responsible for obtaining all licenses required by the Federal Communications Commission. The license shall be in the name of the New York State Thruway Authority.
- Distance from Antenna:** Operate up to 100 ft. from the Transmit Antenna.
- Electrical:** 115±20VAC, 60 Hz, 120 W
- RF Modules:** One (1) module for each antenna specified in the Contract Documents. The module shall be compatible with the Transmit Antenna.
- Mechanical:**
- Configured for mounting in EIA-19 rack.
 - Maximum Dimensions: 15.75” (H) x 19” (W) x 10.75” (D)
 - Blank plates shall cover unused module slots.
- Environmental:**
- Temperature: -4°F to +158°F
 - Humidity: 5% to 90% noncondensing.

2.05 **TRANSMIT Antenna:** The antenna shall be suitable for overhead mounting and shall meet the following requirements:

- Electrical:**
- Frequency Range: 902 MHz to 928 MHz.
 - Gain: 7.5 ±1 dB.
 - VSWR: 1.3:1 maximum.
 - Impedance: 50 ohms.
 - Beam width- horizontal: 60 ± 5 degrees
 - Beam width – vertical: 45 ± degrees

ITEM 683.3010--25 - TRANSMIT TAG READER
ITEM 683.3011--25 - TRANSMIT ANTENNA

2. MATERIALS: (cont'd)

2.05 **TRANSMIT Antenna:** (cont'd)

Electrical: (cont'd)

- Polarization: horizontal.
- Cross polarization: less than 15 dB.
- Side Lobe Suppression: less than 17 dB.

Mechanical:

- Dimensions: 22" (H) x 11" (W) x 6" (D) maximum.
- Weight: 5.7 lb. maximum.
- Rated Wind Velocity: 124 mi./hr.
- Moment at 160 km/hr: 11 ft-lb
- Reflector Material: Aluminum.

Connector: A Type N Coaxial connector shall be used to attach the coaxial cable to the antenna.

Surge Protector: A surge protector shall be provided in the equipment cabinet for each antenna. The surge protectors shall be in accordance with the tag reader manufacturer's recommendations.

All cables to interconnect equipment shall be new materials meeting the specifications of the equipment manufacturer.

2.06 **New Equipment:** All components, parts, interconnecting cable and other items used in the manufacture and installation of equipment under this specification shall be new and unused. All parts and components shall be the latest, proven model in current production.

2.07 **Quality of Materials:** All parts, equipment and materials supplied under this specification shall be of the best quality and shall be controlled and incorporated into the system in such a manner as to produce a complete product which is acceptable and properly functional in every detail. All external screws, nuts, and locking washers shall be stainless steel unless otherwise noted in the Contract Drawings. Self-tapping screws shall not be used.

2.08 **Unspecified Parts:** All parts, even if not specified, which are necessary for the TRANSMIT equipment to be complete and ready for operation, or which are normally included as standard equipment, shall be furnished and installed by the Contractor. All unspecified parts supplied shall conform to the requirements of these specifications and to the accepted standards of the industry.

2.09 **Electrical Materials:** Electrical materials and fittings shall conform to the requirements of the current National Electrical Code. Electrical fittings shall be watertight and weatherproof. An inert dielectric material shall separate dissimilar metals.

3. CONSTRUCTION DETAILS:

3.01 The Contractor shall install the tag reader into the cabinet designated in the Contract Documents and the antenna(s) as specified in the Contract Documents. Mounting shall be as shown in the Contract Documents. The Contractor shall connect the tag reader to the antenna lead-in cable through the surge protector(s) and connect the tag reader to the 120 VAC power bus in the cabinet. The RS-232 output from the tag reader shall be connected to the Fiber Optic Data Transceiver Point to Point furnished as part of another item.

ITEM 683.3010--25 - TRANSMIT TAG READER
ITEM 683.3011--25 - TRANSMIT ANTENNA

3. CONSTRUCTION DETAILS: (cont'd)

3.02 Surge protectors shall be installed in the equipment cabinet between the antennas and the tag reader. The surge protectors shall be grounded in accordance with the manufacturer's recommendations.

3.03 The coaxial cable shall be continuous from antenna to the surge protector located in the reader cabinet without any intermediate splices or connectors. Cable slack of 3 ft. shall be left in the reader cabinet for each coaxial cable. A weatherproof and permanent label shall be attached to the coaxial cable end in the reader cabinet end so that each cable can be identified as to antenna. The Contractor shall submit a label sample and labeling procedure to the Engineer for approval prior to installation of any coaxial cable or reader.

3.04 **Documentation Requirements:** Ten (10) complete sets of operation and maintenance manuals shall be provided. The manuals shall, as a minimum, include the following:

- A. Equipment operation.
- B. Complete installation procedures.
- C. Complete performance specifications (functional, electrical, mechanical and environmental).
- D. Complete and accurate troubleshooting, diagnostic and maintenance procedures.

3.05 **Testing Requirements:**

A. **Reader Antenna:** The Contractor shall test each reader antenna and interconnection to ensure that the reader antenna and coaxial cable has not been damaged during installation. Prior to connecting the reader antenna and coaxial cable at the site, the Contractor shall test each item separately. The following tests shall be performed:

- 1. Each reel of coaxial cable shall be inspected at the Contractor's shop to insure no physical damage. A DC resistance, megger and a TDR shall be performed on each reel. Each reel shall be frequency swept from 850 to 950 Mhz.
- 2. Prior to installing the antenna the Contractor shall physically inspect the antenna for damage, perform a VSWR test on the antenna and measure the antenna's impedance.
- 3. After installation of the antenna and coaxial cable at the site, the Contractor shall perform a physical inspection of each item to verify that it has not been damaged during installation, perform a TDR test, DC ohm test and megger test on the installed coaxial cable as recommended by the cable manufacturer and perform an impedance measurement on the antenna.
- 4. After connection of the coaxial cable to the antenna and all connectors, the Contractor shall do a frequency sweep of 850 to 950 MHz and a TDR test from the cabinet.

B. **Operational Test:** The Contractor shall perform an Operation Test for each TRANSMIT Site after the antenna(s) have been connected to the Tag Reader. Using a test set provided by the Contractor, the Contractor shall verify that vehicles with tags are correctly interrogated by the tag reader. Ninety-five percent (95%) of all tagged vehicles passing within the antenna's field shall be correctly interrogated. This test shall be performed locally from the reader cabinet and remotely from the operations center.

ITEM 683.3010--25 - TRANSMIT TAG READER
ITEM 683.3011--25 - TRANSMIT ANTENNA

4. METHOD OF MEASUREMENT:

4.01 The TRANSMIT Tag Reader and TRANSMIT Antenna will be measured for payment as the number of units furnished, installed, made fully operational and tested.

5. BASIS OF PAYMENT:

5.01 The unit price bid shall include the cost of all required labor and equipment to furnish, install (TRANSMIT readers), integrate, and test the TRANSMIT equipment. Payment for the TRANSMIT reader cabinet shall be included under separate contract items.

5.02 Payment will be as follows for the TRANSMIT Antenna:

- Sixty percent (60%) of the bid price for the TRANSMIT antenna will be paid after proof that the reader order has been successfully received by the vendor and tentative shipment date has been set by the vendor
- Fifteen percent (15%) of the bid price for the TRANSMIT Antenna will be paid after completion of the operations tests.
- Twenty-five percent (25%) of the bid price for the TRANSMIT Antenna will be paid upon system acceptance.

Payment will be as follows for the TRANSMIT Tag Reader:

- Sixty percent (60%) of the bid price for the TRANSMIT Tag Reader will be paid after proof that the reader order has been successfully received by the vendor and tentative shipment date has been set by the vendor.
- Fifteen percent (15%) of the bid price for the TRANSMIT Tag Reader will be paid after completion of the remote operations test.
- Twenty-five percent (25%) of the bid price for the TRANSMIT Tag Reader will be paid after system acceptance.

ITEM 683.5000--25 - NEMA 4X STAINLESS STEEL ENCLOSURE

1. DESCRIPTION:

1.01 This work shall consist of furnishing and installing a stainless steel NEMA 4X enclosure in accordance with the plans and specifications.

2. MATERIALS:

2.01 Enclosure shall be 14 gauge, Type 316 stainless steel meeting NEMA 4X specifications. Enclosure shall be manufactured by Hoffman, Wiegmann, Milbank or Adalet.

2.02 Back panel to be painted, 12 gauge steel manufactured by the Enclosure manufacturer.

2.03 Door stop to be manufactured by enclosure manufacturer.

2.04 Shelving to be 0.125" (3.175 mm) thick aluminum.

2.05 Strut channel for shelf support shall be galvanized.

3. CONSTRUCTION DETAILS:

3.01 Enclosure size to be as noted in the plans.

3.02 One full shelf and one half shelf shall be installed in each enclosure as detailed in the Plans.

3.03 Enclosure to be installed as detailed in the plans w/external mounting feet. Thru bolting shall be prohibited.

3.04 Enclosures to be installed with hinges on the left side when facing the door unless otherwise noted on the plans.

4. METHOD OF MEASUREMENT:

4.01 This work shall be measured as the number of enclosures installed in accordance with the plans, specifications and/or as ordered by the Engineer.

5. BASIS OF PAYMENT:

5.01 The unit price bid for each enclosure shall include the cost of all labor, materials and equipment, including back panel, doorstop and shelving, to complete the work to the satisfaction of the Engineer.

ITEM 800.01000015 – DESIGN BUILD – DESIGN SERVICES

DESCRIPTION. This work shall consist of providing design services in accordance with the contract documents.

MATERIALS. None Specified.

CONSTRUCTION DETAILS. The Design Builder shall provide Design Services by the appropriately qualified and licensed personnel in accordance with the requirements in the contract documents.

METHOD OF MEASUREMENT. Design Build - Design Services will be measured for payment on a lump sum basis.

BASIS OF PAYMENT. The lump sum price bid for Design Build - Design Services shall include the cost of furnishing all labor, equipment and incidentals to satisfactorily complete the work. Progress payments will be made in accordance with the contract documents.

ITEM 800.02000015 – DESIGN BUILD – CONSTRUCTION INSPECTION SERVICES

DESCRIPTION. This work shall consist of providing Construction Inspection Services in accordance with the contract documents.

MATERIALS. None Specified.

CONSTRUCTION DETAILS. The Design Builder shall provide Construction Inspection Services by the appropriately qualified and licensed personnel in accordance with the requirements in the contract documents.

METHOD OF MEASUREMENT. Design Build - Construction Inspection Services will be measured for payment on a lump sum basis.

BASIS OF PAYMENT. The lump sum price bid for Design Build - Construction Inspection Services shall include the cost of furnishing all labor, equipment and incidentals to satisfactorily complete the work. Progress payments will be made in accordance with the contract documents.

ITEM 800.03000015 – DESIGN BUILD – QUALITY CONTROL SERVICES

DESCRIPTION. This work shall consist of providing Quality Control Services in accordance with the contract documents.

MATERIALS. None Specified.

CONSTRUCTION DETAILS. The Design Builder shall provide Quality Control Services by the appropriately qualified and licensed personnel in accordance with the requirements in the contract documents.

METHOD OF MEASUREMENT. Design Build - Quality Control Services will be measured for payment on a lump sum basis.

BASIS OF PAYMENT. The lump sum price bid for Design Build - Quality Control Services shall include the cost of furnishing all labor, equipment and incidentals to satisfactorily complete the work. Progress payments will be made in accordance with the contract documents.

ITEM 800.04000015 – DESIGN BUILD – FORCE ACCOUNT WORK

DESCRIPTION. This work shall consist of performing construction work in accordance with the contract documents and as directed by the Engineer.

MATERIALS. None Specified.

CONSTRUCTION DETAILS. The Design Builder shall perform construction work in accordance with the contract documents as directed by the Engineer. The Design Builder will maintain and provide agreed price or force account records to document the costs in accordance with DB section 109-9.

METHOD OF MEASUREMENT. Design Build – Force Account Work will be measured for payment on a Dollar Cents basis.

BASIS OF PAYMENT. The price shown for Design Build - Force Account Work shall include the cost of furnishing all labor, materials, equipment and incidentals to satisfactorily complete the work. The total cost shown in the itemized proposal will be considered the price bid even though payment will be made only for actual work performed. The unit price amount is not to be altered in any manner by the bidder. Should the bidder alter the amount shown, the altered figure will be disregarded, and the original price will be used to determine the total amount bid for the contract.

Progress payments will be made in accordance with the contract documents.

ITEM 800.05000015 – DESIGN BUILD – SITE MOBILIZATION

DESCRIPTION. This work shall consist of providing necessary bonds, insurance, prefinancing and set up of necessary general plant, including shops, storage areas, office and such sanitary and other facilities as are required by local or state law or regulation.

MATERIALS. None Specified.

CONSTRUCTION DETAILS. The Design Builder shall provide the above facilities and service for mobilization in a safe and workmanlike manner in conformance with any pertinent local or State Law, regulation or code to the extent and at the time the Contractor deems them necessary for its operations. Good housekeeping shall be maintained.

METHOD OF MEASUREMENT. Design Build – Site Mobilization will be measured for payment on a lump sum basis.

BASIS OF PAYMENT. The lump sum price bid for Design Build – Site Mobilization shall not exceed four percent (4%) of the total contract bid price for all Construction Work items. Should the bidder exceed the foregoing four percent (4%), the Department will make the necessary adjustment to determine the total amount bid based on the arithmetically correct proposal.

Progress payments in the amount of 4% of the construction work items will be made to the Contractor with the first contract payment made for other contract work at the individual itemized work site.

ITEM 800.0600NN15 – DESIGN BUILD – CONSTRUCTION WORK

DESCRIPTION. This work shall consist of construction work in accordance with the contract documents.

MATERIALS. None Specified.

CONSTRUCTION DETAILS. The Design Builder shall perform all construction work in accordance with the requirements in the contract documents.

METHOD OF MEASUREMENT. Design Build – Construction Work will be measured for payment on a lump sum basis for each location. The individual locations are identified in the contract documents.

BASIS OF PAYMENT. The lump sum price bid for Design Build – Construction Work shall include the cost of furnishing all labor, materials, equipment, management and supervision to satisfactorily complete the work. Progress payments will be made for each construction work location in accordance with the contract documents.

Note: NN in pay item number denotes serialization by location.