

MIAMI-DADE COUNTY  
DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS (DTPW)

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ADDENDUM NO. 1  
April 28, 2023

PROJECT: Bear Cut Bridge No. 874544 Rehabilitation  
Project No. 20220176

BID DUE DATE: May 10, 2023; 02:00 P.M.

FROM: Miami-Dade County DTPW  
Capital Improvements Division  
111 NW First Street, 14<sup>th</sup> Floor  
Miami, FL 33128  
305.375.2930

TO: Prospective Bidders and Interested Parties

This Addendum forms part of the project solicitation documents and will be incorporated into the Contract Documents, as applicable. Insofar as the Original Contract Documents, Drawings and Specifications are inconsistent, this Addendum shall govern. Please acknowledge receipt of this Addendum, at the time of bid submittal to Miami-Dade County, in the space provided on the "Acknowledgement of Addenda Form" provided with the project solicitation documents. Failure to acknowledge receipt of all addenda may be cause for disqualification.

**CHANGES TO SPECIAL PROVISIONS:**

1. Delete Article 1.05, Time for Completion, from the Special Provisions, and replace as follows:  
**1.05 TIME FOR COMPLETION**
  - A. Work must be substantially completed within 305 calendar days after the date when the Contract Time commences to run as provided in Subarticle 1.06 N of the General Requirements (Division 1), and all requirements of the Contract Documents completed and ready for final payment within 365 days after the date when the Contract Time commences to run.
  
2. Delete the below requirement: Subarticle B 5 from Article 1.10, Additional Insurance to be Carried by the Contractor from the Supplementary Instructions to Bidders.  
  
- 5. Completed Value Builders' Risk Insurance on an "all risks" basis in an amount not less than one hundred (100%) percent of the insurable value of the building(s) or structure(s). The policy shall be in the name of Miami Dade County and the Contractor. (It does not apply)

3. Add Article 3, Field Office as follows:

**FIELD OFFICE**

A. Description:

1. This section specifies the furnishing, installing, and maintaining of a field office for the exclusive use of Miami Dade County employees and the Construction Engineering and Inspection (CEI) Consultant Team in the administration of the Contract. The office shall be separated from, but in close to the Contractor's office. The Contractor shall not use this office or its equipment, in particular the telephone.

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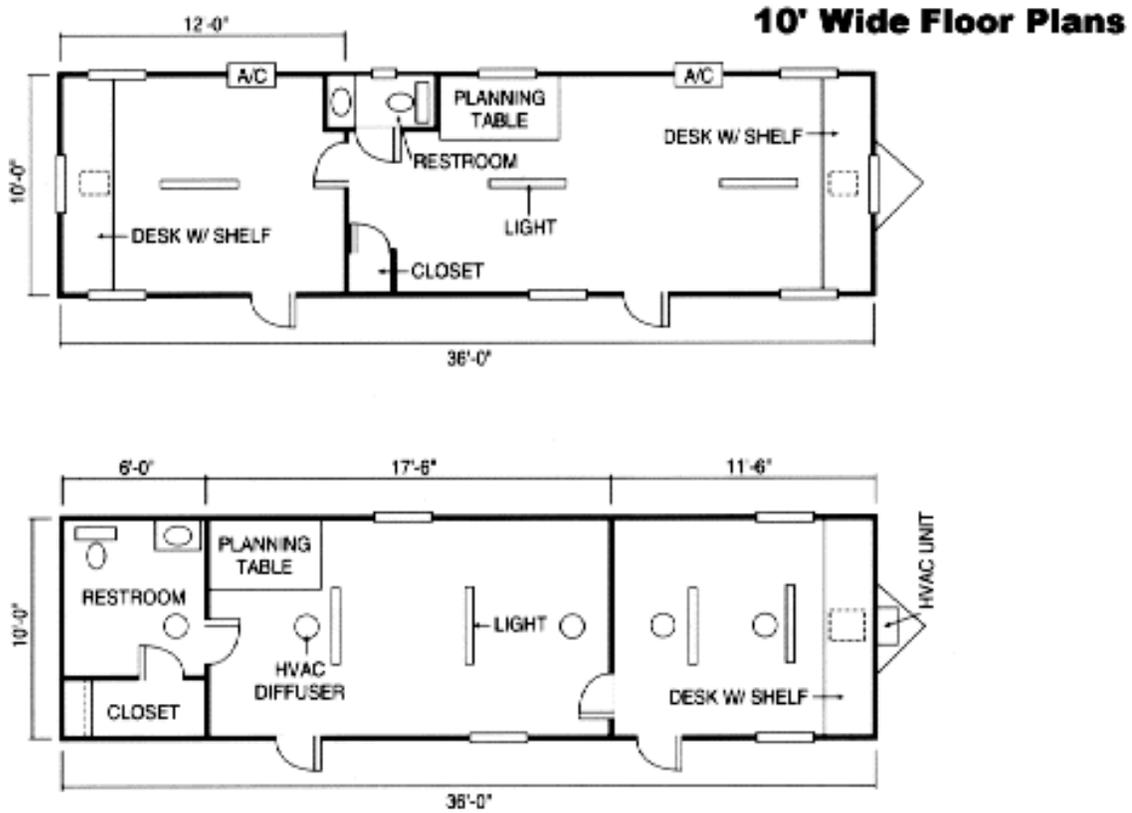
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2. In the event a mobile office unit cannot be used, the Engineer may direct the Contractor to forgo the aforementioned mobile office unit and instead provide a Field Office located in available commercial space within close proximity to the project site. It shall be the responsibility of the Contractor to identify said availability and to secure the required office space upon the Engineers written approval. All of the requirements and conditions, set forth herein regarding the Field Office Article, shall remain unless otherwise specifically provided in writing from the Engineer.
3. Contractor will provide a proposed field office layout and location to the Engineer for his review within 5 days of the issuance of the "Notice to Proceed." The location of the field office shall be as directed by the Engineer. The Field Office shall be located within one (1) mile from the project site.
4. Utilities, potable water and telephone connection, use and service charges shall be paid by the Contractor during the term of the contract. Long distance calls, made by MDC personnel, will be the responsibility of MDC. (Telephone calls to Monroe, Broward and Palm Beach Counties will not be considered as long distance).
5. No work shall commence until the Field Office is completely set up. Including electricity, functioning telephone/internet and air conditioning along with the appropriate Certificate of Occupancy. No exception will be made unless specifically authorized by the Engineer.
6. In the event a mobile office unit cannot be used, the Engineer may direct the Contractor to forgo the mobile office unit and instead provide a Field Office located in available commercial space within proximity to the project site. It shall be the responsibility of the Contractor to identify said availability and to secure the required office space upon the Engineers written approval. All of the requirements and conditions set forth herein regarding the Field Office Article, shall remain unless otherwise specifically provided in writing from the Engineer.

B. Products

1. Field Office
  - a. Furnish and install one (1) new, factory manufactured, mobile field office unit not less than 2,000 Square feet. Floor space shall be divided and shall include no less than one restroom and one private office. The private office shall be approximately 120 square feet. The Mobile Unit layout shall be consistent with either of the diagrams below. The private office will be located at an end of the mobile unit.
  - b. Layout:

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- c. The following items, materials and services shall be included and/or provided:
- 1) The Field Office shall be weather tight and have a structurally sound foundation and superstructure;
  - 2) Exterior walls, floors, and ceilings shall be insulated;
  - 3) Interior walls and ceilings shall be refinished plywood paneling;
  - 4) Interior Floors shall have resilient flooring;
  - 5) Restroom furnishings shall include: Water closet, lavatory with hot and cold water supply, mirror, soap holder, toilet tissue dispenser, and paper towel dispenser;
  - 6) The interior lighting shall not be less than 100 foot candles at desk height except in the restroom. The restroom lighting shall be adequate. Exterior lighting shall be located over each entrance door;
  - 7) Electrical receptacles shall be of the duplex receptacle type, not more than 10 feet from center-to-center, on all interior walls except in the restroom;
  - 8) An electrical water cooler shall be provided with hot and cold taps, bottled water, and a supply of drinking cups and cup disposal as needed by the Engineer and Staff;
  - 9) An electrical refrigerator, with a capacity of no less than 1.7 c.f. and of energy efficient design shall be provided;
  - 10) The Field Office shall include a Hot Water Heater with no less than a 20-gallon capacity;

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- 11) The Field Office shall have a heating and air-conditioning, thermostatically controlled, system capable of maintaining office spaces at an ambient temperature between 68 and 78 degrees Fahrenheit.
- 12) The exterior doors to the private office and any interconnecting doors between offices shall be fitted with door locks and keyed alike. Three sets of keys shall be provided to the Engineer. Any door between the central space and the restroom shall have privacy locks;
- 13) Provide a dedicated phone line for a copier/printer/scanner; and one jack for Internet broadband access.
- 14) The private office within the Field Office shall be equipped with Broadband Internet service, no less than 1 GB of speed, including e-mail capabilities for the duration of the Contract;
- 15) Contractor will provide a laptop computer having the following minimum configuration or better:
  - a) Processor - Intel® Core i5-10210U CPU (or equivalent)
  - b) Graphics Processor - Intel HD Graphics 5500 GPU
  - c) Display - 15.4 inch 16:9 format, 1920 x 1080 Pixels, IPS, matte finish
  - d) Storage - 500 GB SSD
  - e) Memory - 8.0 GB RAM
  - f) USB 3.0 Ports (Minimum of 2)
  - g) LAN - Gigabit Ethernet Port
  - h) WLAN - Dual Band Wireless-AC (802.11 a/b/g/n/ac)
  - i) Backlit QWERTY Keyboard
  - j) Operating System - Windows 11 Enterprise (or newer)
  - k) Replaceable Battery (Not Built-in)
  - l) Kensington Lock/Security Locking Cable (Combination Lock)
  - m) Three years Manufacturer's Warranty (parts/labor/onsite)
  - n) Carrying case
- 16) Contractor will deliver laptop computer specified above to the County Project Manager no later than 5 days from their receipt of the Notice to Proceed. The Project Manager will submit the laptop to the information Technology Department (ITD) for certification that it meets the minimum specifications set forth herein. The Project Manager will provide a written confirmation to the Contractor upon certification by ITD;
- 17) Contractor will provide one color copier/printer/scanner, to be operational in conjunction with the laptop. The Contractor shall supply adequate paper, ink/toner , any supplies in connection to the printer and all cables, power cords, surge protector and software, as required by the Engineer in connection to the project;
- 18) The laptop computer, and color Copier/printer/scanner and all accessories shall remain the property of Miami-Dade County upon completion of the contract. Said equipment shall be delivered to the Department as instructed by the Engineer.

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- 19) The Field Office shall have an operational burglar alarm system, maintained and monitored by a qualified monitoring service for the duration of the contract or until such time the Engineer approves its termination. In the event the monitoring service receives an alert from the alarm, the Engineer shall be notified immediately;
- 20) The Field Office shall be equipped and secured with hurricane tie-downs, complying with current Miami-Dade County Ordinances;
- 21) The Field Office shall have ADA compatible steps, landings, and a handicap ramp with handrails. The steps, landings, decks, and ramps shall all be constructed utilizing pressure treated lumber and hot dipped galvanized nails and bolts. A sketch design and layout of the aforementioned items shall be provided along with the proposed location and layout described in subarticle B above and will be subject to the approval of the Engineer;
- 22) Furnishings for the Field Office shall be supplied by the Contractor and shall include the following:
  - a) Two desks, having a surface area of 3x5 feet.
  - b) Two desk chairs
  - c) One lockable wooden or metal locker of a size suitable for storing field testing and surveying equipment.

C. Execution

1. Access and Parking

- a. Field Office shall be located as to provide clear access from public streets including parking spaces for not less than five vehicles immediately adjacent to the field office. Signs shall be posted indicating that these spaces are reserved for the Engineer and/or Miami-Dade County personnel only. The parking area will be graded for drainage and surfaced with gravel, asphalt paving, or concrete paving.

2. Restroom Sewer Connection

- a. Restroom in the Field Office shall be connected to two 700-gallon chemical holding tanks. The holding tanks shall be serviced as often as necessary to prevent accumulation of wastes and unsanitary conditions, but no less than two times per week.

3. Maintenance

- a. Contractor must clean and service the Field Office and parking area three times per week during normal working hours. Cleaning and servicing include complete janitorial services, soap, paper towels, and toilet tissue. Contractor will be responsible for any maintenance issue to the office and equipment at no additional compensation.

D. Measurement and Payment

1. Measurement

- a. The work under this Section will not be measured separately for payment. No separate payment will be made for the Engineer's Field Office, and it is to be included by the Contractor in prices bid for the various items of the work.

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4. Add attached Appendix "C" to the Special Provisions, "Technical Specification for Carbon Fiber Reinforced Polymer Field Testing Requirements."
5. Add attached Appendix "D" to the Special Provisions, "Technical Specification for Shallow Subsurface Polyurethane Injection."

**END OF ADDENDUM NO. 1**



Alfredo E. Muñoz, P.E.

Chief Capital Improvements Division

Department of Transportation and Public Works (DTPW)

AM:lh

c: Laura Hernandez, DTPW    Katherine Fernandez, DTPW

Jacqueline Alcina, P.E. DTPW    Laurie Johnson, ISD

Jhonnatan Escalante, ISD    Clerk of the Board

Project File

Ryan Fisher, P.E. DTPW

Marcia Martin, ISD

APPENDIX "C" TO SPECIAL PROVISIONS  
TECHNICAL SPECIFICATIONS

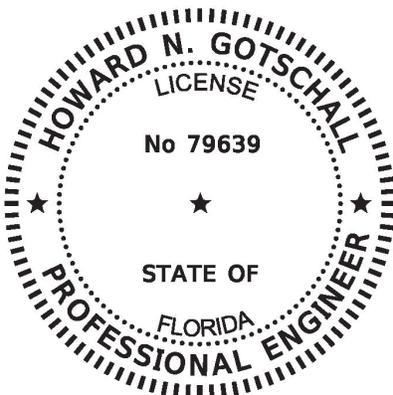
TECHNICAL SPECIAL PROVISION FOR  
CARBON FIBER REINFORCED POLYMER FIELD TESTING  
REQUIREMENTS

PROJECT NO.: EDP-MT-20210010

This item has been digitally signed and sealed by Howard Gotschall, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed signature must be verified on any electronic copies.

Prepared by: Howard Gotschall, P.E.  
Date: February 10, 2023  
Fla. License No.: 79639  
Firm Name: Hanson Professional Services Inc.  
Firm Address: 6303 Blue Lagoon Drive, Suite 280  
City, State, Zip code: Miami, FL, 33126

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## **CARBON FIBER REINFORCED POLYMER FIELD TESTING REQUIREMENTS**

### **1.0 General.**

The Engineer shall observe all aspects of on-site field testing.

### **2.0 Quality Assurance.**

Include the work under this Technical Special Provision in the Contractor Quality Control General requirements set forth in Section 105 of the FDOT Standard Specifications

All tests shall comply with requirements of ASTM D7522, ASTM E329, ASTM E543, ASTM E548, ASTM E699, and ACI 440.2R-17.

Calibrate testing equipment before proceeding with each set of tests using devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

### **3.0 Contractor Submittals.**

Prior to starting work, submit to the Engineer for approval, a proposed Quality Assurance and Testing plan and work schedule.

### **4.0 Carbon Wrap Testing Requirements.**

#### **4.1 Inspection for voids/delamination.**

After allowing at least 24 hours for initial resin cure to occur, perform a visual and acoustic tap test of the layered surface, in accordance with ACI 440.2R-17 (Part 3, Chapter 7 (7.2.3)). The acoustic tap test coverage will be, at a minimum, one sounding tool strike per square foot of area coated with the CFRP. Additional testing shall be performed if an area is deemed to be suspect.

Other methods for detecting voids must be submitted and approved by the Engineer prior to proceeding.

#### **4.2 Bond Testing (CFRP System).**

All testing under this section are to be performed in the presence of the Engineer. Conduct direct pull-off testing per ASTM D7522 or approved equal. Documentation of ASTM, ACI, logbooks, and Manufacturer's data should be readily available. Conduct direct pull-off tests under the following test conditions:

(1) Prior to the first CFRP installation, conduct two pull-off tests on installed samples of the CFRP (12-inch x 12-inch) to verify the tensile bond between the CFRP and the existing concrete substrate. This sample shall conform to the number of CFRP layers to be used in the repair. The location of the pull-off tests shall be representative of the general conditions and performed on a flat surface. Allow the CFRP system to cure a minimum of 24 hours before execution of the direct pull-off test. After testing, inspect the failure surface of the coupon specimen. Failure at the bond line at tensile stresses below 200 psi is unacceptable. If the results are unacceptable, consult the Manufacturer, make necessary modifications, and repeat the test until acceptable results are obtained. If the results from the repeated tests prove unacceptable, the Engineer has the discretion to order the Contractor to substitute a different carbon wrap system.

(2) During CFRP installation, conduct pull-off tests to verify the tensile bond between the CFRP and the existing concrete substrate. Test location(s) to be prescribed by the Engineer. Allow the CFRP system to cure a minimum of 24 hours and a maximum of 48 hours before execution of the direct pull-off test. After testing, inspect the failure surface of the coupon specimen. Failure at the bond line at tensile stresses below 200 psi is unacceptable. The Engineer has the discretion to order the Contractor to remove the unacceptable materials and repeat the process.

#### **4.3 Testing Frequency**

Conduct direct pull-off testing at the follow frequency:

- (1) Two initial CFRP pull-off samples (12-inch x 12-inch) are required. The Engineer will select the location where this initial testing will be performed.
- (2) Test the installed CFRP prior to the application of the protective coating.

- (3) Test the installed CFRP prior to the application of the protective coating.
- (4) Perform a minimum of one direct pull-off test at each structure where less than 500 square feet of CFRP is installed. For structures where more than 500 square feet of CFRP is installed, perform one additional direct pull-off test for each 500 square foot increment. Allow the CFRP system to cure a minimum of 24 hours (maximum 48 hours) before execution of the direct pull-off test. The Engineer will select the locations where the testing will be performed. Patch all test areas with an equivalent CFRP material prior to the application of the protective coating.

#### **4.4 Conditions of Acceptance (CFRP system)**

- (1) The failure mode must be cohesive failure within the concrete for tests on the CFRP system.
- (2) The tensile bond strength must be in excess of 200 psi.
- (3) If required, repair the tested area in accordance with the Technical Special Provision for Girder Strengthening using CFRP Wrap.

Verify compliance of materials and mixes with requirements of Contract Documents. Promptly notify the Engineer of observed irregularities or non-conformance work or products.

Perform additional tests required by the Engineer. If re-testing is required due to nonconformance to specified Contract requirements, including the requirements incorporated into this Technical Special Provision, perform the required repair, as well as the new testing, at no additional cost to the Department.

Take a minimum of five samples for quality control testing of each of the following: epoxy injection material, carbon fiber fabric, primer and saturating (matrix) resins, and surface finishing products. Provide these same at no additional cost to the Department.

#### **5.0 Test Report**

After each test, promptly submit one copy of the test report to the Engineer. Include with each test report: Date issued, Project title, Name of inspector, Date and time of inspection and testing, Identification of product and specifications section (included batch numbers), Location of tests within the Project, Type of inspection or test, Results of tests, Conformance with Contract Documents and Specifications.

#### **6.0 Method of Measurement**

In accordance with Technical Special Provision for Girder Strengthening using CFRP Wrap.

#### **7.0 Basis of Payment**

In accordance with Technical Special Provision for Girder Strengthening using CFRP Wrap.

APPENDIX "D" TO SPECIAL PROVISIONS  
TECHNICAL SPECIFICATIONS

## SHALLOW SUBSURFACE POLYURETHANE INJECTION

### 1. General.

Furnish and inject polyurethane grout to fill voids and lift slope panels at the locations shown in the Plans or as directed by the Engineer. Furnish all labor, equipment and materials required to inject expansive one or two-part polyurethane.

Work may be performed at night or on weekends as deemed necessary by the Engineer. Review the available subsurface information and visit the site to assess the severity of issue to be corrected, the site geometry, equipment access conditions, and location of existing structures and above ground facilities. Any damage resulting from the injection operation is the sole responsibility of the contractor.

Field locate and verify the location of all utilities in the vicinity of the project site prior to starting the work. Maintain uninterrupted service for all existing utilities throughout the work.

### 2. Personnel Requirements.

The on-site superintendent supervising the work described in this Section must have at least three years of verifiable experience in polyurethane injection. Provide documentation of each project successfully completed, listing the project name and location, name of contracting party with current contact number, a brief description of the work, and dates of completion.

Prior to the start of the work, submit the Contractor and superintendent qualifications to the Engineer for approval.

### 3. Materials.

**3.1 One Component Polyurethane:** Use a one component high density polyurethane grout, meeting the following requirements, that upon injection reacts with moisture for rapid expansion and curing to create a watertight mass.

**3.1.1 Viscosity:** The material must have a viscosity of 110 to 130 centipoise (cP) at 20°C to 25°C.

**3.1.2 Compressive and Tensile Strength:** The material must have a minimum cured compressive strength of 600 psi in accordance with ASTM C39 (with fine sand and without conditioning), a minimum cured tensile strength of 40 psi in accordance with ASTM D1623 or ASTM D3574, and no shrinkage in accordance with ASTM D1042 or ASTM D756.

**3.1.3 Cure Time:** The material must achieve a minimum compressive strength of 400 psi within 30 minutes. If work is performed within the travel lane, traffic must be safely restored within 30 minutes after the last injection of material.

**3.1.4 Performance in Water:** Ensure the cured material is not affected by the presence of excess water.

**3.1.5 Certification:** Submit a manufacturer's certification that the material meets the requirements of this Specification to the Engineer.

**3.1.6 Alternate Formulations:** Certain situations may necessitate the use of

polyurethane formulations that provide physical characteristics exceeding the requirements above. Submit the manufacturer's certification for the alternate formulation to the Engineer for approval.

**3.2 Two Component Polyurethane:** Use a two-component closed cell, hydro- insensitive, high density polyurethane system that upon injection results in rapid expansion and curing.

**3.2.1 Apparent Density:** The material must have an apparent overall density of 4.7 pounds per cubic foot to 6.5 pounds per cubic foot, tested in accordance with ASTM D1622 (without conditioning).

**3.2.2 Compressive Strength:** The material must have a minimum cured compressive strength of 75 psi tested in accordance ASTM D1621 (without conditioning).

**3.2.3 Cure Time:** The material must achieve a minimum compressive strength of 60 psi within 30 minutes. Traffic, if work is performed within the travel lane, must be safely restored within 30 minutes after the last injection of material.

**3.2.4 Performance in Water:** Ensure the injected material is not affected by the presence of excess water.

**3.2.5 Certification:** Submit a manufacturer's certification that the material meets the requirements of this Developmental Specification to the Engineer.

**3.2.6 Alternate Formulations:** Certain situations may necessitate the use of polyurethane formulations that provide physical characteristics exceeding the requirements above. Submit the manufacturer's certification for the alternate formulation to the Engineer for approval.

#### **4. Equipment.**

Provide mobile injection equipment, including, but not limited to, a pumping unit capable of injecting material to the locations and depths required with electric generating capabilities necessary to support the injection operations. The equipment must be capable of controlling the rate of flow of material to achieve the desired results while minimizing blowback and blowouts. Use equipment with a certified flow meter or volumetric measurement device having a visual readout to measure the amount of material injected at each location. Provide a certification for the metering device to the Engineer.

Use equipment with pressure and temperature control devices capable of maintaining proper temperature and proportionate mixing of the polyurethane materials. Ensure the equipment properly mixes two component materials when two component polyurethane materials are injected.

Use drilling equipment capable of drilling the required diameter injection holes through concrete, pavement or other masonry materials as shown in the Plans without damaging the integrity of the existing structure.

Use laser levels and target readers, zip levels and other measuring devices capable of monitoring movement at the surface of the pavement or structure to verify that the necessary void filling and improvement has occurred without adversely affecting the existing profile.

Provide all necessary equipment such as light towers, electric generators, compressors, heaters, hoses, containers, valves and gauges to efficiently conduct and control the work.

## **5. Construction Requirements.**

**5.1 Pre-Construction Submittals:** Upon approval of the Contractor's qualifications, submit the following information to the Engineer for review and approval prior to performing any work:

- i. The proposed start date and duration of the project sequence.
- ii. The type and size of all equipment to be used. Describe the methods to be used to achieve the requirements of this Specification.
- iii. The materials to be used and anticipated injection rate.
- iv. A description of construction methods to be used for site preparation, including the methods for measurement concerning slab lifting requirements, clearing of debris and a pre-construction survey documenting existing cracks/damage to concrete curb and gutters or adjacent structures.
- v. A description of construction methods to be used to perform the injection of the polyurethane with a detailed sequence of injection operations.
- vi. Manufacturer's technical data sheet verifying that the polyurethane materials meet all requirements this Specification, including the densities (in pounds per gallon) of each individual component (resin and activator) of any two part polyurethane materials.
- vii. Certification for the metering device or the Contractor's plan for measuring the material.
- viii. Proposed plan to monitor inside subsurface drainage structures during injection and to prevent excessive polyurethane migration into any existing drainage structures.

**5.2 Pavement Profile:** Prepare a profile of the slope panels from laser level measurements of each area to document pre-existing conditions to ensure movement does not exceed 1/16 inch of the final planned elevation during the injection operations. Prior to beginning any work, submit a report documenting this inspection and the recorded elevations to the Engineer for approval. Include photographs of the area documenting the location and length of existing cracks.

**5.3 Quality Control:** For polyurethane solutions which require mixing or blending of multiple components, perform a daily quality check in the presence of the Engineer, using the flow meters and/or measurement devices, on the ratio of the parts provided by the injection system. Perform a test shot of material from one component source at a time with a minimum of 5 gallons of each material, comparing the output in gallons of resin to the gallons of activator, if applicable (resin material only for one component foam system). Determine the injection ratio for two component systems. If this ratio differs from the approved solution ratio used at the test point locations, check the system for problems, make any necessary adjustments until a proper ratio is achieved. Following these checks and adjustments, and prior to performing the work each day, reset the measurement devices on the pumping units to zero. The Engineer reserves the right to perform compressive strength testing on polyurethane samples.

## **5.4 Testing.**

**5.4.1 Pre-Production:** When pre-production test injection points are shown in the Plans, complete a pre-production polyurethane injection performance testing program. Prior to the injection at production point locations indicated in the Plans, determine the rate and amount to be injected to obtain the required improvement.

Assess the cure rate for the proposed process by the initial completion of pre-production polyurethane injection performance testing at pre-production test injection points shown in the Plans. Inject at the pre-production test point locations using the proposed materials, injection rates, and processes anticipated for production.

To verify adequate subsurface improvement has been achieved, perform a minimum of two standard penetration test (SPT) soil borings in accordance with ASTM D1586, using safety or automatic hammer) or dynamic cone penetrometer (DCP) soundings in accordance with ASTM D6951, at locations approved by the Engineer. After injection of the test points, locate at least one SPT boring or DCP sounding just outside the injected area and at least one SPT boring or DCP sounding centrally within the test point grid, unless shown otherwise in the Plans. Use the same equipment for all tests. Submit the results of the SPT borings and DCP soundings, the recommended injection rate and injection cut-off criteria to the Engineer for review and approval prior to proceeding with the production point locations. The Engineer may require additional SPT borings or DCP soundings. Do not adjust the polyurethane components, ratios or injection processes during production point injection without the approval of the Engineer.

**5.4.2 Post-Production:** Additional subsurface testing, performed using SPT soil borings or DCP soundings, may be required as directed by the Engineer on each project lane to confirm existing subgrade soil conditions based upon available subsurface information. The Engineer may require access holes to be drilled to allow the insertion of video equipment to assess the size of existing voids.

**5.5 Injection Placement:** Inject the polyurethane to the depth shown in the Plans. If not shown in the Plans, select the exact location, spacing, hole size and depth of the injection tubes with the approval of the Engineer. All one component polyurethane material must be injected to the greater of the elevation shown on the plans or one foot below the existing water table. When direct access to voids is available, provide a means to confine the placement and inject the polyurethane directly into the void.

When direct access to voids is not available, drill a series of holes sized no larger than required for the injection tube placement, at approximately 3 to 4 foot intervals or as determined by the Engineer. When drilling through reinforced concrete, determine the location of existing reinforcing prior to drilling injection holes. Do not drill into or cut existing reinforcing. If existing reinforcing is encountered during drilling, shift the hole to clear reinforcing.

Install and operate a level control system during the injection operation. Monitor the elevation of the pavement or structure profile to detect any movement within a 10 to 15 foot radius from the point of injection during injection operations, or as directed by the Engineer.

Continuously monitor laser level or dial indicator micrometer readings during injection operations to determine sufficient material usage as indicated by pavement movement of 1/16 inch or less. Additionally, monitor all directly adjoining structures, such as adjacent bridge spans, bulkheads, road surfaces, curb and gutter to detect and prevent unintended movement.

Inject the material gradually to avoid excessive force build up. If the movements exceed 1/16 inch beyond the desired profile, take corrective actions to stop the movement and

perform repairs. Immediately notify the Engineer if signs of damage are observed, such as new cracks in the pavement, increased size of existing cracks, or separation of joints in paved and unpaved surfaces. Repair any damage to the concrete slab/pavement, adjacent structures, bulkheads, gutters, and shoulders resulting from the injection operations to the satisfaction of the Engineer, and at no cost to the Department.

Remove any excess polyurethane material extruding from cracks or the drilled holes. Seal the drilled holes to the full depth of the slab section with cement grout.

**5.6 Faulted Joints.** For undersealing and leveling of faulted joints of concrete pavement, inject to fill any void in the sub-base. When the void is filled and the area is stabilized, begin lifting and realigning panels to proper grade.

**5.7 Lifting:** In some situations, for lifting, the subgrade will need to be stabilized. When stabilization is required, an injection depth will be determined by the Contractor and approved by the Engineer but will not be at a depth greater than 3 feet below the pavement base. Inject the material until the dip in the pavement is removed and the pavement or structure is brought to the desired grade. If stabilization is not necessary, the injection depth will be 12 or more inches below the pavement base to fill the void and lift the pavement or structure to the desired grade.

**5.8 Edgedrains:** If edgedrains are present, keep all injections within 4 feet of the edgedrain and at least 18 inches below the bottom of the edgedrain.

**5.9 Punch Outs:** Prior to replacement of short sections of concrete (punch-outs) where base and subbase are suspected as contributing to the failure, perform injections to stabilize the base and subbase to avoid cutout and removal of base and subbase. Ensure removal of the existing slab does not disturb the tubes or the newly stabilized base and subbase. After removal of the slab, cut the tubes off at the top of the base material.

**5.10 Blowouts:** Take responsibility for any blowouts, excessive slab lifting, slab or bulkhead damage or exacerbation of misalignment that may occur as a result of the work. If movement exceeds 1/16 inch beyond the desired movement, take corrective actions to stop the movement. Repair the area to the satisfaction of the Engineer and at no cost to the Department.

**5.14 Water Control Structures:** For void filling and sealing of water control structures, culverts, bulkheads and sea walls, submit a plan of action to the Engineer for approval. Base the plan of action on the specific situation and propose the injection spacing, elevations, quantities and desired result.

## 6. Report.

Submit a report to the Engineer documenting the polyurethane material injection and instrumentation. Provide before and after photos of the project, a diagram of injection ports, injection volumes per port, problems encountered during construction, resolutions made, and certification testing results in the report. Include profiles before and after injection, document whether the transition at joints are smooth, and whether there are additional cracks in the concrete or surrounding structures. Submit the report prior to final acceptance of the project. In addition, supply as-built injection drawings and grade readings within 5 days of completing the project.

**7. Method of Measurement.**

For single component polyurethane, the quantity to be paid will be the volume (in gallons) of material authorized, injected, and accepted. For two component polyurethane mixes, the quantity to be paid will be the weight, in pounds, of material authorized, injected, and accepted. Multiply the volume (in gallons) of resin by the resin density to determine the weight of resin. Multiply the volume (in gallons) of activator by the activator density to determine the weight of activator. Add the weights of resin and activator to determine the total weight. For pre-production testing, do not include the cost of polyurethane material. Include the quantity of material used for pre-production testing in the quantity of single component or two component polyurethane injection, as appropriate.

**8. Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section including furnishing all labor, materials, tools, equipment, testing, and incidentals necessary to complete the work.

Payment for pre-production testing will not be made until all injection placements are completed and accepted.

Payment will be made under: Item No. 906-173- Polyurethane Injection