Attachment “B”

Technical Specifications
City of North Miami

Technical Specifications

For the Tressler Street (NE 17th Avenue) Drainage Improvements from NE 16th Avenue to NE 135th Street

Prepared by:

R.J. Behar & Company, Inc.
Engineers • Planners

6861 S.W. 196th Avenue, Suite 302
Pembroke Pines, FL 33332
SPECIAL PROVISIONS
FOR

Tressler Street (NE 17th Avenue) Drainage Improvements
from NE 16th Avenue to NE 135th Street

1. GENERAL

The applicable portions of the 2018 Edition of the FLORIDA DEPARTMENT OF
TRANSPORTATION’S STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE
CONSTRUCTION and its supplements with changes pertaining thereto, as amended by the
general Specifications and the following Special Provisions; all are hereby made a part of this
Contract. All testing, as required, shall be the responsibility of the Contractor, who shall
submit test results to the City Inspector for his approval. Further, the applicable portions of
the SOUTH FLORIDA BUILDING CODE and the PUBLIC WORKS MANUAL OF
METROPOLITAN DADE COUNTY, shall apply to this project.

Unless otherwise noted, all page references in the Special Provisions refer to the Florida
Department of Transportation’s STANDARD SPECIFICATION FOR ROAD AND
BRIDGE CONSTRUCTION. All references to the Florida Department of Transportation
(Department) as it relates to the Owner shall refer to the City of North Miami.

2. LOCATION OF WORK

The area where the work is to be performed is Tressler Street (NE 17th Avenue) from NE
16th Avenue to NE 135th Street. The exact location and limits of construction are shown in
the plans accompanying the contract documents.

3. SECTION 2, PROPOSAL REQUIREMENTS AND CONDITIONS

This section is deleted. Refer to the City of North Miami bid documents and requirements.

In addition, the City assumes no responsibility for the accuracy of the test results shown in
the plans. They are included only as a general indication of the materials likely to be found
adjacent to the holes bored at the site of the proposed work. The Contractor shall examine
these data and interpret the subsoil investigation and other preliminary data, and the bid shall
be based on the contractor’s opinion of the conditions likely to be encountered. The proposal
the bidder submits, shall be considered “prima facie” evidence that the bidder has made an
examination of the information provided and the site conditions.

4. SECTION 3, AWARD AND EXECUTION OF CONTRACT

This section is deleted. Refer to the City of North Miami bid documents and requirements.

5. SECTION 4, SCOPE OF WORK
Page 20, Section 4-1, Intent of Contract shall read: The work proposed under this contract consists of furnishing all supervision, labor, materials, transportation equipment, tools and any incidentals necessary to perform all operations for roadway milling and resurfacing, pavement restoration, swale regrading and stabilization, driveway restoration, curb and gutter, curb valley gutter, sidewalk, exfiltration drainage system, storm sewers, drainage structures, sodding, signing and pavement markings.

6. SECTION 5, CONTROL OF THE WORK

Page 42, Section 5-1.2, Department’s Plans, add the following: plans accompanying these contracts documents are entitled Tressler Street (NE 17th Avenue) from NE 16th Avenue to NE 135th Street Drainage Improvements.

7. SECTION 7, LEGAL REQUIREMENTS AND RESPONSIBILITY TO THE PUBLIC

Page 61, Section 7-2.1 – General: This subarticle is amended to include the following:

Permits which are issued by CITY OF NORTH MIAMI for construction within the public right-of-way, will be issued at no cost to the Contractor.

Additional permits, which may be required by other municipalities or agencies, including those required for tree removal, will be the responsibility of the Contractor.

Page 67, Section 7-11 – Preservation of Property: This sub-article is expanded to include:

Property public or private damaged during construction or removed for the convenience of the work, shall be repaired or replaced at the expense of the Contractor in a manner acceptable to the City Inspector, prior to the final acceptance of the work. Such facilities shall include, but are not limited to: signalization equipment and miscellaneous hardware removed from the construction site, driveways, walkways, walls, fences, footings or underground utilities.

NOTE: All street name signs shall remain in place during the period of construction except those that are required to be relocated due to interference with the actual construction. All signs that are relocated or damaged by the Contractor during the course of the work shall be re-installed or replaced at the proper location, as soon as possible by the Contractor.

Prior to the removal of any traffic control signs that interfere with the construction, the Contractor shall provide temporary signing or other provisions to assure a continuous flow of traffic under at least the same conditions as previously existed.

All signs that found to be unserviceable shall be reported to the City of North Miami.
Page 69, Section 7-11.5 – Utilities: This sub-article is expanded to include:

The Contractor shall make all necessary arrangements with the utility companies concerned for maintenance of their lines during the construction period. The utility companies will provide the Contractor with updates of their schedules for completing any required relocation work. The Contractor shall incorporate these schedules into his/her sequence of construction.

NOTE: The Contractor shall contact the Sunshine 811 at least forty-eight (48) hours prior to commencing any trenching or excavation on this project.

8. SECTION 8, PROSECUTION AND PROGRESS

Page 84, Section 8-3.5 – Preconstruction Conference: This sub-article is expanded to include:

After the award of contract and prior to the issuance of the “Notice to Proceed,” a Preconstruction Conference will be held with the Contractors, members of the City of North Miami Departments, representatives of Utility Companies, and other contractors affected by the work. The time and place of this conference will be set by the City of North Miami.

At the Preconstruction Conference, the Contractor must provide two copies of a detailed construction schedule showing the proposed starting and completion dates for each work classification or bid item. The work classification should be sub-divided to the extent necessary to provide adequate detail and shall also include such items as mobilization, shop drawing review, etc.

Page 84 Section 8-4.1 – Night Work: Replace this article as follows:

No work shall be done at all on Sunday or any day between the hours of 7:00 p.m. and 7:00 a.m., except such work as is necessary for the proper care and protection of the work already performed, or, except that permission do such work may be secured from the City Inspector. See also SECTION 603.

9. PROJECT SIGN

The Contractor shall construct two project signs in accordance with the instructions of the City inspector. The signs shall be constructed of ¾-inch Marine Plywood, newly painted and lettered according to the instructions of the City inspector. The signs shall be painted and lettered in accordance with professional outdoor sign painting standards as to layout, symmetry, proportion, clarity, neatness and use of weather-resistant colors and materials. The Contractor shall place the signs, securely braced and mounted, as directed by the City Inspector. All materials, except for decals as applicable, shall be provided by the Contractor and the signs shall remain the property of the Contractor at the completion of the Contract. No work shall commence until the project signs are secured in place.

No separate payment will be made for the project signs.
10. FIELD OFFICE

Field office will not be needed.

11. PAYMENT ADJUSTMENT – BITUMINOUS MATERIAL

Page 96, Section 9-2.1.1 – Fuels: This sub-article is replaced as follows: No contract adjustment will be made for fuel requirements. Unit prices submitted at the time of bid will be used for payment purposes.

Page 97, Section 9-2.1.2 – Bituminous Material: This sub-article is replaced as follows: Contractor shall submit Certification of Quantities as required by the contract documents.

No contract adjustment will be made to bituminous material based on increases or decreases of Asphalt Price Index. Unit prices submitted at the time of bid will be used for payment purposes.

Page 102, Section 9-5.5. – Off Site Storage: This sub-article is replaced as follows: No partial payments will be allowed for materials stockpiled.

12. SECTION 101: MOBILIZATION

Page 108, Section 101-2.2 – Partial Payments: This sub-article is replaced as follows: This work shall be paid on a lump sum basis. Payments will be divided equally over the life of the contract and paid on a monthly basis.

13. SECTION 102: MAINTENANCE OF TRAFFIC

Page 109, Section 102-1 – Description: This sub-article is amended to include:

Temporary Traffic Control Details are included in the Plans for this project. No work shall commence on this project or any portion thereof without implementation of this Plan.

Excavated or other material stored adjacent to, or partially upon a roadway pavement, shall be adequately marked for traffic safety at all times.

The Contractor shall provide the necessary access to all adjacent property during construction. This may include temporary limerock base at driveways and/or closing only one driveway per property at a time. Cost should be included as part of the Lump Sum item for Maintenance of Traffic.

Special attention shall be given for directing the flow of pedestrian and vehicular traffic, especially in areas surrounding schools. At the discretion of the City Inspector, the City may require the Contractor to call for and hire off-duty police officers for directing the traffic and
maintaining safety if in any way the operations will curtail the use of the streets, roads and work areas specified herein.

Page 126, Section 102-13 – Basis of Payment: Partial payment for lump sum Maintenance of Traffic shall be made with each partial progress estimate. Partial payment shall be provided on progress estimates and shall be provided on a percentage equal to the percentage of contract time expired.

14. SECTION 105: CONTRACTOR QUALITY CONTROL GENERAL REQUIREMENTS

Section 105: This Section is replaced as follows:

105.01 CONTRACTOR QUALITY CONTROL: The Contractor shall provide and maintain an effective quality control program that will demonstrate compliance with the contract specifications.

A. Establish a quality control system to perform sufficient inspection of all items of Work, including that of Subcontractors, to insure conformance to the Specifications and Drawings with respect to the materials, workmanship, construction, equipment performance, and identification.

B. The Contractor's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance or special technicians to provide capability for the controls required by the Technical Specifications. The Contractor's quality control plan must clearly identify the quality control leader and personnel organizational system. The leader must have the authority to direct the removal and replacement of work.

C. After the Contract is awarded and before construction begins, the Contractor shall meet with the City or its representative to discuss quality control requirements. The meeting shall develop mutual understanding relative to details of the system, including the Contractors forms to be used for recording the quality control operations, inspections, administration of the system, and the interrelationship of Contractor and City inspection.

D. All compliance inspections shall be recorded on appropriate forms, including but not limited to the specific items required in each section of the Technical Specifications. Those forms, including record of corrective actions taken, shall be furnished to the City. The City's quality control representative shall maintain a check off list of all deficiencies which are not corrected the same day as they are discovered.

E. Should recurring deficiencies in an item or items indicate that the quality control system is not adequate, the Contractor shall take such corrective actions as may be directed by the City.
F. Contractor shall submit his written quality control plan for review, describing the activities and listing those inspection and testing activities that the Contractor will perform prior to beginning the Work. The Contractor's Quality Control Plan shall describe how he will communicate timely notification to allow for test and inspection activities performed by the City, or its representatives, for on and off-site construction activities.

G. Ensure that the equipment used in the production and testing of the materials provides accurate and precise measurements in accordance with the applicable Specifications. Maintain a record of all inspections, including but not limited to, date of inspection, results of inspection, and any subsequent corrective actions taken. Make available to the City the inspection records, when requested.

105.02 TESTING LABORATORY SERVICES: All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to City. The laboratory shall be staffed with experienced technicians, properly equipped, FDOT certified, and fully qualified to perform the tests in accordance with the specified standards. Submit certifications prior to placement of materials.

105.03 TESTING LABORATORY SERVICES FURNISHED BY CONTRACTOR: Testing that the City will coordinate and pay for is described in Section 1.04 below. All other testing laboratory services in connection with tests (which are identified as the Contractor's responsibility in the Contract Documents) shall be performed and paid for by the Contractor, and a certified copy of the results will be furnished to the CITY within 5 days of the test. The Contractor shall pay all charges for services on: cast-in-place concrete, moisture density (Proctor) and relative density tests on embankment, fill and backfill materials, in-place field density tests on embankments and fills, and paving construction.

The Contractor is also responsible for testing and inspection services required to achieve an effective quality control program, to assure that the work strictly complies with the contract requirements. Contractor shall pay all costs for such services. Contractor shall also pay for any tests performed by City which do not meet Specifications, as described below.

1.04 TESTING LABORATORY SERVICES FURNISHED BY CITY:

A. The City may secure the services of a material's testing company, for field and laboratory tests verification, for certain items of work. The City shall only pay for cost of verification tests. Verification sampling and testing will be performed in the general manner indicated in the Specifications, with minimum interference with construction operations.

While the Contractor may perform testing in order to proceed to a following construction stage, the City will determine the exact time and location of field sampling and testing, and may require additional sampling and/or testing as necessary to determine that materials and equipment conform with Contractor-submitted data and with the Contract Documents.
B. Arrangements for delivery of samples and test specimens to the testing laboratory under this paragraph will be made by the Contractor. The testing laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and shall furnish a written report of each test.

C. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary.

D. Testing Laboratory employed by the City will not be authorized to:
   1. Release, revoke, alter or enlarge on requirements of the Contract Documents.
   2. Approve or accept any portion of the Work.
   3. Perform any duties of the Contractor.

Costs for material testing shall be included within the applicable items of construction.

15. SECTION 110: CLEARING AND GRUBBING

Page 158, Section 110-1 – Description: This sub-article is amended to include:
The Contract Unit Price bid as indicated in the Bid Form of the proposal shall be full compensation for all work required for clearing and grubbing; removal and disposal of flexible pavement, curb and gutter, drainage structures and pipes, miscellaneous concrete, vegetation, trash and debris, and miscellaneous roadway items; and cleaning of existing drainage systems left in place within the Project. The bid price for this item shall include all costs of disposing of sediments removed from existing drainage structures.

Page 164, Section 110-12 – Basis of Payment: This sub-article is amended to include: Partial Payment for lump sum clearing and grubbing shall be made with each partial progress estimate. Partial payment shall be provided on progress estimates on a percentage equal to the percentage of clearing and grubbing work performed.

16. SECTION 120: EXCAVATION AND EMBANKMENT

Page 166, Section 120-1.2 – Unidentified Areas of Contamination: This article is amended as follows: Delete paragraphs 3-6. The City may hire an external contractor (CAR) to manage possible contamination materials or contract with the Prime Contractor to manage any possible contamination materials. Coordinate and cooperate with the CAR for completion of the work efforts.

Page 171, Section 120-12 – Construction: This article is amended to add the following:

The Contractor shall include the costs of all grading in the unit bid prices for the appropriate items. No separate payments will be made for any grading required on this project. The Contractor shall provide an As-built survey of profile grade prior to placing asphaltic concrete. The survey shall be taken at 50’ intervals, along finished limerock. The survey
shall include points along center line construction and lip of curb for roadway and edge of pavement for shoulder areas. The Contractor will refinish areas not conforming to specified tolerance in Article 120-12.1.

Page 172, Section 120-13 Method of Measurement Article 120-13.2 Roadway Excavation, is Modified as Follows:

The Contractor is advised that Roadway Excavation measurement for payment shall be made by the difference in volumes determined by elevations taken prior to excavation and elevations taken after excavation compacted and shaped in accordance with the plans and contract documents. The Contractor shall include these survey costs within the unit prices for excavation and embankment items.

17. **SECTION 200: ROCK BASE**

Page 216, Section 200-5 – Spreading Rock: This section is amended to include: At the option of the City Inspector, unless the use of forms is specifically called for in the plans, the base may be constructed six inches wider in lieu of using forms. These extra widths will not be measured for payment and shall be provided at no additional expense to the City.

Page 217, Section 200-6 – Compacting and Finishing Base: This section is amended to include: Prior to placing the base, the subgrade will be inspected by the City Inspector to ascertain whether or not the work satisfies the requirements to the specified density, lines, grades, and cross sections. It shall be the responsibility of the Contractor to maintain the required subgrade density until the base is placed in the subgrade.

Page 218, Section 200-7.2.1 – Density: This section is amended to include: The minimum density, which will be acceptable at any location outside the traveled roadway (such as intersections, crossovers, turnouts, etc.) shall be 95% of maximum density.

Page 221, Section 200-8– Priming and Maintaining: This section is amended to include: Upon the City Inspector’s approval of the limerock base, it shall be primed with a prime coat having a minimum curing period of 48 hours. Under no circumstances will the City Inspector allow the prepared base to remain unsurfaced pending completion of other work remaining on the project.

Page 221, Section 200-10 – Method of Measurement: This section is amended to include: The areas of base course to be measured for payment shall include the areas of extra base required at various intersections. The cost of replacing base materials removed only for the construction of underground items shall be included in the bid price for the various items.

Page 222, Section 200-11 – Basis of Payment: This section is revised to read: The quantity of limerock base, determined as provided in this section, shall be paid for at the unit price as indicated in the Bid Form of the proposal. Such price and payment shall be full compensation for all work specified for the complete construction of the base course as specified herein, including the necessary preparation and compaction of the subgrade, correcting all defective
surfaces of the subgrade removing all cracks and checks as provided in 200-6.4.2, and/or
deficient thickness and priming of the base course.

18. SECTION 300: PRIME AND TACK COATS FOR BASE COURSES

Page 255, Section 300-10 Basis of Payment: This article is modified to read:

A prime coat is required for all limerock base construction and the cost will be included in
the unit price bid for limerock base per square yard as noted in the Bid Form of the Proposal.
No separate payment shall be made for the prime coat or its application.

19. SECTION 334: SUPERPAVE ASPHALT CONCRETE

Page 284, Section 334-3.2.1 – General: This article is modified to add the following:

No work shall be started on this portion of the contract until the Contractor has conferred
with the City Inspector and has submitted the mix designs to be used and has obtained
approval prior to construction:

The verification of conformity to specification of a job mix formula, submitted by the
Contractor, could be granted if the plant has previously operated in conformity with the same
material specification as used in this contract. Provide documentation that the mix designs
has been granted approval on other jobs by the Florida Department of Transportation.

Page 296, Section 334-8 – Basis of Payment: This article is modified as follows:
Payment will full compensation for furnishing all new materials, for mixing, hauling,
compacting, and testing new pavement as directed and accepted by the City on a per TON
basis as noted in the Bid Form of the Proposal. Delete Section 334-8.2 and 334-8.3.

20. SECTION 425: INLETS, MANHOLES AND JUNCTION BOXES

Page 451, Section 425-8.2 – Adjusted Structures: This subarticle is expanded to include:

All structures such as manholes, valve boxes, or existing inlets shall be adjusted to the final
grades. If no item of payment is provided in the Bid Form, the cost shall be included in other
items of work. Upon completion of the work, and prior to acceptance and final payment, all
such structures will be inspected by the City Inspector to ensure that they are free of all
debris and thoroughly cleaned.

21. SECTION 430: PIPE CULVERT

Page 452, Section 430-1 Description: This section has been expanded to include:

Pipe culverts, installed under the terms of these contract documents shall consist of the same
material throughout the project – for example – all RCP, or all HDPE.
*Contractor’s option Bid for Storm Sewer Pipe can be different than option for Exfiltration Drain.

Page 445, Section 430-9.3 Installation Requirements Including Trenching, Foundation And Back Filling Operations. This section is amended to add:

Backfilling to the original ground surface or subgrade surface of openings made for the above structures is included in the work required under this Section. All material used for backfill shall be of a quality acceptable to the City Inspector. It shall consist of well graded limerock or limerock and sand fill, free of deleterious material. The structures shall be inspected by the City Inspector, in place, prior to the actual backfilling.

Page 446, Section 430-12.1 General. This section is modified to read:

Payment for the work under this Section shall be full compensation for furnishing of the pipe culvert, fittings (coupler bands, gaskets, etc.) and all materials required for the work specified, including excavation, backfilling, restoration of pavement, curb and gutter, sidewalks, etc., as shown on the Plans, disposal of surplus material, clean-out and all other items necessary to complete the work within the intent of these specifications. The Contractor shall not include any costs incurred for pavement, sidewalk, and curb and gutter restoration in the price for the Pipe Culvert if payment for these items are specifically provided for in separate bid items.

22. FRENCH DRAIN (EXFILTRATION TRENCH) (SECTIONS 443 AND 514)

Page 472, Section 443-3 Excavating Trench. This section is expanded to include:

The Contractor shall furnish, place and maintain sheet piling, underpinning or other approved bracing and shoring material, which may be required to support the sides of the excavation and prevent any failure of the trench walls, which in any way may delay construction, endanger personnel, damage public or private property or be determined to maintaining traffic. All such work shall be in accordance with the governing specifications and payment shall be considered incidental to the unit price bid for French Drain. No additional payment will be made.

Page 473, Section 443-5 Placing Coarse Aggregate and Backfilling. Add the following:

Areas where the filter is to be placed shall be reasonably smooth and free of projections which could damage the filter material.

The material shall be loosely laid (not stretched). Adjacent strips shall overlap by a minimum of one foot. The filter material shall be placed in such a manner that no bridging effects occur and in no place shall there be voids between the filter material and the surrounding trench.
When placing the ballast rock for bedding of the pipe as well as backfill, the ballast rock as well as the adjacent sides of the trench shall be thoroughly saturated to reduce the possibility of voids occurring after placement of the ballast rock. Any voids or pockets created should then be refilled with ballast rock.

Page 473, Section 443-6 Method of Measurement. This article is modified to read:

The quantity of French Drain to be paid for under this Section shall be the length in linear feet measured in place, completed and accepted, as indicated on the Plans.

Page 473, Section 443-7, Basis of Payment. This section is amended to add:

The quantity of French Drain to be paid for under this Section shall include the plastic filter blanket when the utilization of such is required, as indicated on the Plans.

**23. SECTION 522: CONCRETE SIDEWALK AND DRIVEWAYS**

Page 688, Section 522-1, Description: This article is expanded to include:

The work specified under the Section consists of the construction and replacement of sidewalks utilizing Class I Concrete having a minimum compressive strength of 3,000 p.s.i. at 28 days. The width, thickness and type shall be as shown and noted in the Plans. All work will be in accordance with this Section except as modified herein.

PAGE 711, SECTION 522-10, Basis of Payment: Delete this article and substitute the following:

The quantity, determined as provided above, shall be paid for at the contract unit price bid per square yard for each particular type of sidewalk construction as designed and noted in the plans. Such price and payment shall be full compensation for all work specified under this Section, including the necessary preparation and compaction of the subgrade in both cut and fill areas, as well as backfilling, grading and final dressing required as directed by the City Inspector.

Payment will be made under the following item(s) as applicable:

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONCRETE SIDEWALK (6” thick)</td>
<td>S.Y.</td>
</tr>
<tr>
<td>(Class I Concrete, 3000 p.s.i.)</td>
<td></td>
</tr>
<tr>
<td>CONCRETE PEDESTRIAN RAMPS (4” thick)</td>
<td>S.Y.</td>
</tr>
<tr>
<td>(Class I Concrete, 3000 p.s.i.)</td>
<td></td>
</tr>
</tbody>
</table>
24. SECTION 572: PERVIOUS PAVEMENT (SWALE STABILIZATION)

572-1 Description.
Furnish all materials, equipment, and labor and construct pervious pavements for swale stabilization as indicated in the contract documents.

572-2 Materials.
Meet the following requirements:
- **Stabilization** ..........................................................Section 160
- **Concrete** .............................................................Section 346
- **Sod** ..................................................................Section 570
- **Sand and gravel base** ..................................As required by the Manufacturer
- **Coarse Aggregate** .............................................As required by the Manufacturer
- **Grass Paving Units** - As manufactured by Invisible Structures, Inc., Golden Colorado
- **Concrete Swale Blocks** – As manufactured by Ideal Concrete Block Company of Westford, Massachusetts or approved equal.

Use sod in combination with Grass Paving Units (Grasspave 2).
Use sod plugs/grass seeding in combination with concrete swale blocks or pavers.

572-3 Construction Requirements.
Follow the manufacturer’s requirements for project conditions prior, during and following installation. Protect partially completed paving against damage from other construction traffic when work is in progress.

Notify the Engineer 48 hours in advance for review and examination of the subgrade and base course installed conditions. Do not start porous paving installation until unsatisfactory conditions are corrected. Prepare subgrade per Section 160 of the FDOT specifications. Excavate areas to allow the unit thickness and base. Protect areas and provide adequate drainage. Level and clear sub base of large objects, such as rocks and pieces of wood.

After subbase is accepted, proceed with base preparation. Verify subgrade in accordance with porous paving system manufacturer's instructions. After base is accepted, proceed with Grass Paving Units or concrete swale blocks. Follow manufacturer’s instructions.

Complete the installation with the installation of sod or sod plugs/grass seeding. Adequately water sod or grass seed to assure germination of seed and growth of root system.

Seeded areas must be protected from any traffic, other than emergency vehicles, for a period of 4 to 8 weeks, or until the grass is mature to handle traffic.

Sodded areas must be protected from any traffic, other than emergency vehicles, for a period of 3 to 4 weeks, or until the root system has penetrated below the Grass Paving units.

572-4 Acceptance Sampling and Testing.
Acceptance of the work will be visual inspection of each step as required by the Manufacturer’s.

**Shop Drawings:** Submit design detail showing proper cross-section.

**Samples:** Submit manufacturer's sample of Grasspave2 10” x 10” section of Grasspave2 material.

**Installation Instructions:** Manufacturer’s printed installation instructions. Include methods for maintaining installed products.

**Certificates:**
1. Manufacturer signed certificate stating the product is made in the USA.
2. Submit Material Certificates for base course and sand (or USGA mix) fill materials
3. Product certificates signed by the manufacturer certifying material compliance of polyethylene used to make Grasspave2 units.

**Warranties:** Provide manufacturer’s standard warranty documents that materials provided are free from defects in material and/or workmanship.

A qualified Manufacturer’s field representative shall be available for a pre-construction meeting via phone or in person and will provide installation videos, design details, installation instructions, and the technical specifications.

**572 -5 Method of Measurement.**
The quantity to be paid for under this Section will be at the Contract unit price for the completed installation including subbase preparation, base, swale paving system, and grass establishment as shown in the drawings and following manufacturer’s required procedures, completed and accepted.

**572 -6 Basis of Payment.**
Price and payment will be full compensation for all work, equipment, tools and labor, and all incidentals necessary for satisfactory completing the work.

Payment will be made under:
- Item No. 572-1, Pervious Pavement (Swale Stabilization) – per square yard.

**25. HIGHWAY SIGNING**

Page 970, Section 700 General Requirements. This section is modified to add the following:

The post shall be furnished in appropriate length to provide a minimum 7-ft clearance from the bottom of the sign to the ground with full length attachment to the sign blank. In the event that a street name sign is to be attached above the stop sign, additional length of post must be allowed for said attachment.
Page 973, Section 700-2.4 Basis of Payment. This article is amended to add the following:

The contractor shall be responsible for removal of all existing signs conflicting with the design. The existing signs, when removed, shall be dissembled and delivered to the City of North Miami location to be indicated. This is considered incidental to the project, with no direct payment for this work.
Juan Vazquez, PE, PH, BCEE  
Vice President  
RJ Behar & Company, Inc.  
6861 SWV 196th Street, Suite 302  
Pembroke Pines, FL 33332

Re: Geotechnical Engineering Investigation  
Tressler Street Drainage Improvements from NE 16th Avenue to NE 135th Street  
North Miami, Florida  
Langan Project No.: 300211701

Dear Juan:

This letter presents the results of our subsurface investigation and subsequent recommendations for the proposed Tressler Street drainage improvements ("the project") between NE 16th Avenue and NE 135th Street in North Miami, Florida. The purposes of the study were to determine the site-specific subsurface conditions and provide site preparation recommendations for the proposed drainage improvements. Our services have been performed in accordance with our proposal dated 31 October 2016.

Our understanding of the proposed construction and existing site conditions is based on our observations during our site visit and our field investigation, our review of your 14 November 2016 response to the City of North Miami’s Request for Proposals, and our review of the 10 February 2017 Specific Purpose Survey prepared by Munson Design and Consulting.

All elevations (el) presented in this report are in feet and referenced to the North American Vertical Datum of 1988 (NAVD 88).

SITE AND PROJECT DESCRIPTION  
The project is located along Tressler Street, between NE 16th Avenue and NE 135th Street in North Miami, Florida. It is our understanding that the proposed improvements will include installation of exfiltration trenches, installation of solid pipes, replacement of existing catch basins with new catch basins, and the regrading and retrofitting of swales.

SUBSURFACE INVESTIGATION  
Our subsurface investigation was performed on 11 March 2017 and consisted of four borings to a depth of 15 feet and exfiltration tests at two locations, to depths of 10 and 15 feet at each location, along the perimeter grass and dirt-covered areas along Tressler Street. The borings and exfiltration tests were performed by a specialty drilling subcontractor under our full-time engineering observation and monitoring. The locations of the borings and exfiltration tests are shown in Figure 1A and Figure 1B. The boring logs are presented in Appendix A.
The boreholes were advanced using mud rotary drilling techniques and were stabilized with drilling mud and casing. Standard Penetration Tests (SPT), which measure standard penetration resistances (N-values), and split-spoon sampling were performed continuously from the ground surface to a depth of 10 feet, and between 13 and 15 feet. All borings were done using an automatic hammer.

**SUBSURFACE CONDITIONS**

The following table provides a generalized summary of the subsurface conditions encountered. Detailed descriptions of the conditions encountered at each location are shown in Appendix A.

<table>
<thead>
<tr>
<th>Stratum Number</th>
<th>Stratum</th>
<th>Typical Top of Stratum Elevation (ft, NAVD)</th>
<th>Thickness (ft)</th>
<th>Field SPT N-values (blows/ft)</th>
<th>Corrected SPT N-values (blows/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fill</td>
<td>Ground Surface</td>
<td>1 to 2.5</td>
<td>9 to 17</td>
<td>11 to 21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Avg: 1.9)</td>
<td>(Avg: 13)</td>
<td>(Avg: 16)</td>
</tr>
<tr>
<td>2</td>
<td>Limestone</td>
<td>el +8.2 to el +9.5</td>
<td>12.5 to 14</td>
<td>8 to 33</td>
<td>10 to 41</td>
</tr>
</tbody>
</table>

Note 1: N-values provided above are the field N-values and have not been corrected for use of an automatic hammer.
Note 2: Corrected N-values include the FDOT recommended 1.24 correction for the use of an automatic SPT hammer.

The groundwater level was first encountered during the borings and exfiltration tests at an approximate depth of 10 feet below the ground surface, resulting in measured groundwater levels of approximately el +0.5 to el +1.2 ft, NAVD. Seasonal and tidal fluctuations should be expected beyond the previously mentioned range, with significant variations occurring during high precipitation periods.

According to the Flood Insurance Rate Map No. 12086C0143L of Miami-Dade County dated 11 September 2009, the site is located within a Flood Zone X designated as “areas determined to be outside the 0.2% annual chance floodplain.”

**Exfiltration Test Result**

Four open-hole constant head, exfiltration (percolation) tests were performed at the site in accordance with the test procedures outlined in “Test Method for Usual Condition, Open Hole Constant Head Exfiltration Tests – South Florida Water Management District, Permit Information Manual – Volume IV.” Two exfiltration tests were performed at each location to depths of 10 feet and 15 feet below existing grade. The exfiltration test locations are shown in Figure 1A and Figure 1B. The exfiltration tests results are presented in Appendix B.

**RECOMMENDATIONS**

The work is expected to include: (1) clearing in preparation for the proposed regrading and retrofitting of swale areas; (2) excavating and backfilling for the removal and installation of underground utilities; and subgrade and (3) base preparation as part of pavement restoration along Tessler Street. The following sections present the general recommendations for this work.
Site Clearing
The swale areas to be upgraded should be cleared of roots, existing asphalt, and other deleterious materials.

Engineered Fill
Engineered fill will be necessary to backfill all excavations after the removal and installation of underground utilities to the ground surface or bottom of pavement elevation. The backfill material should be compacted to field dry densities not less than 95% of the maximum dry density of the material, and within ±3% of the optimum moisture content as determined by the Modified Compaction Test (ASTM D-1557). The engineered fill should be placed in maximum lifts of 12 inches, with each lift compacted to the compaction criteria described above. In restricted areas where a small compactor must be used, the lift thickness should be 6 to 9 inches, depending on the equipment used in the field. The fill should consist of inorganic, granular soils free from deleterious materials with no more than 15% passing the No. 200 sieve. The moisture of the material must be adjusted before placement and compaction. The excavated Stratum 1 – Fill and Stratum 2 – Miami Limestone materials are expected to be acceptable for reuse as suitable fill. When backfilling below the groundwater level, crushed 3/4-inch filter stone (No. 57 stone, ASTM C33) should be used and placed to 6 inches above the water level. A separation geosynthetic filter fabric should be used to prevent migration of the fines from the fill material above into the underlying stone.

Backfilling over Utility Lines
All proposed utilities should be installed according to the requirements of the civil engineering drawings and specifications. When backfilling over utility lines and around other underground structures, fill should be placed in lifts and compacted to the requirements discussed for engineered fill. The loose lift thickness is expected to vary between 6 and 12 inches, based on the compaction equipment used for the work. Final lift thicknesses should be determined once the type of equipment to be used is known. The backfill material should meet the requirements for engineered fill presented in the previous section, as well as the requirements of the project civil engineer and pipe manufacturer.

Paved Areas
Pavement sections of the improvements should be designed to meet City of North Miami or Miami-Dade County requirements.

The pavement subgrade should consist of in-situ soil or imported engineered fill material and should be compacted to at least 95% of the material’s maximum dry density (ASTM D 1557), and within ±3% of the material’s optimum moisture content. If soft or unstable areas are observed during subgrade compaction, these materials should be removed and replaced with clean, engineered fill.

Limerock for use in the pavement base, or for subgrade stabilization (if necessary), should consist of approved Florida Department of Transportation (FDOT) crushed limerock with a minimum LBR of 100. Pavement base should be compacted to at least 98% of the material’s maximum dry density, and within ±3% of the material’s optimum moisture content.
Construction Excavations
All construction excavations shall be in accordance with the applicable Occupational Safety and Health Administration (OSHA) requirements.

CONSTRUCTION DOCUMENTS AND QUALITY CONTROL
Technical specifications and design drawings should incorporate our recommendations to ensure that subsurface conditions and other geotechnical issues at the site are adequately addressed in the construction documents. Langan should review all construction procedures related to the geotechnical work.

During construction, it is important that the work be performed under engineering observation to ensure that proper procedures are followed. Backfilling operations and pavement subgrade and base preparation should be performed under qualified engineering observation. All engineered fill should be tested.

LIMITATIONS
The information on subsurface strata and groundwater levels shown on the boring logs and percolation tests represent conditions encountered only at the locations indicated and at the time of investigation.

CLOSURE
Thank you for the opportunity to work with you on this project. Please call (786)-264-7200 if you have questions regarding this document.

Enclosure(s): Figure 1A – Test Location Plan
              Figure 1B – Test Location Plan
              Appendix A – Boring Logs
              Appendix B – Exfiltration Tests Results
FIGURES
1. BASE PLAN REPRODUCED FROM MUNSON AND CONSULTING, INC. PLAN ENTITLED "SPECIFIC PURPOSE SURVEY" WITH LATEST REVISION DATE OF 2 FEBRUARY 2017.

2. ALL BORING AND PERCOLATION TEST LOCATIONS SHOWN ARE APPROXIMATE.
1. BASE PLAN REPRODUCED FROM MUNSON AND CONSULTING, INC. PLAN ENTITLED "SPECIFIC PURPOSE SURVEY" WITH LATEST REVISION DATE OF 2 FEBRUARY 2017.

2. ALL BORING AND PERCOLATION TEST LOCATIONS SHOWN ARE APPROXIMATE.

LEGEND:

BORING APPROXIMATE LOCATION AND IDENTIFICATION NUMBER

PERCOLATION TEST APPROXIMATE LOCATION AND IDENTIFICATION NUMBER

NOTES:
APPENDIX A

BORING LOGS
<table>
<thead>
<tr>
<th>ELEV. (ft)</th>
<th>SAMPLE DESCRIPTION</th>
<th>SYMBOL LOG</th>
<th>DEPTH SCALE</th>
<th>NUMBER</th>
<th>RECOVERY [%]</th>
<th>TOOL/REMARKS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>+11.2</td>
<td>Gray to tan fine SAND, some limerock fragments [FILL]</td>
<td>S1</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+9.2</td>
<td>Light tan LIMESTONE, some sand</td>
<td>S2</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td></td>
<td>Advanced with tricone to 2' Good circulation</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, some sand</td>
<td>S2</td>
<td>3</td>
<td>9</td>
<td>9</td>
<td></td>
<td>Installed casing to 4'</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, some sand</td>
<td>S3</td>
<td>4</td>
<td>10</td>
<td>13</td>
<td></td>
<td>Advanced casing to 6'</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, some sand</td>
<td>S4</td>
<td>5</td>
<td>8</td>
<td>18</td>
<td></td>
<td>Advanced casing to 8'</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, little sand</td>
<td>S5</td>
<td>6</td>
<td>9</td>
<td>17</td>
<td></td>
<td>Advance casing to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>-3.8</td>
<td>Light tan LIMESTONE</td>
<td>S6</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boring terminated at 15'</td>
<td></td>
<td>15</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DRILLING EQUIPMENT**
CME-55 Truck Mounted

**SIZE AND TYPE OF BIT**
2" Tricone and Casing Bit

**DATE STARTED**
3/11/17

**DATE FINISHED**
3/11/17

**COMPLETION DEPTH**
15 ft.

**WEIGHT (lbs)**
6140

**DROP (in)**
30

**ELEVATION AND DATUM**
Approx. el + 11.2 (ft. NAVD)

**COMPLETION DEPTH**
15 ft.

**DATE FINISHED**
3/11/17

**DATE STARTED**
2/4/17

**REMARKS**
Installing casing to 4'
Advanced with tricone to 2'
Good circulation
Installed casing to 4'
Advance casing to 6'
Advance casing to 8'
Advance casing to 13'
Good circulation Easy drilling

**DRILLING FOREMAN**
Jaime Perez

**INSPECTING ENGINEER**
Yordany Rodriguez
Gray to tan fine SAND and LIMEROCK fragments [FILL]

Light tan LIMESTONE, some sand

Light tan LIMESTONE, some sand

Light tan LIMESTONE, some sand

Light tan LIMESTONE, little sand

Light tan LIMESTONE, little sand

Boring terminated at 15'

Advanced with tricone to 2'
Good circulation

Advanced with tricone to 4'

Advanced with tricone to 6'

Advanced with tricone to 8'

Advanced with tricone to 13'
Good circulation
Easy drilling
**LOG OF BORING**  

**PROJECT**  
Tressler Street Dainage Improvements

**LOCATION**  
North Miami, FL

**DATE**  
3/11/17 to 3/11/17

**COMPLETION DEPTH**  
15 ft.

**EQUIPMENT**  
CME-55 Truck Mounted

**CASING**  
2" Tricone

- **Casing Diameter (in):**
- **Casing Depth (ft):**

**WATER LEVEL**

- **Distance (ft):**
- **Dist.:**

**SAMPLER**  
Split-spoon 2" O.D.

- **Sampler Hammer:**
- **Weight (lbs):**
- **Drop (in):**

**NUMBER OF SAMPLES**

<table>
<thead>
<tr>
<th>DIST.</th>
<th>UNDIST.</th>
<th>CORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>10</td>
<td>24 HR.</td>
</tr>
</tbody>
</table>

**DATE FINISHED**

3/11/17

**DATE STARTED**

2/8/17

**ENGINEERING DATA**

- **Drilling Foreman:** Jaime Perez
- **Inspecting Engineer:** Yordany Rodriguez

**REMARKS**

- **Drilling Fluid:** Easy drilling
- **Fluid Loss:** Good circulation
- **Resistance:** Advanced with tricone to 2'
- **Casing Diameter:** 2.5 in.
- **Casing Depth:** 15 ft.

**SAMPLE DESCRIPTION**

- **ELEV. (ft):**
- **SAMPLE LOG:**
- **SYMBOL:**
- **LOG DEPTH:**
- **SAMPLE DATA:**

**DEPTH SCALE**

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>LOG DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>S2</td>
</tr>
<tr>
<td>S3</td>
<td>S4</td>
</tr>
<tr>
<td>S5</td>
<td>S6</td>
</tr>
</tbody>
</table>

**SAMPLE DATA**

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>TYPE</th>
<th>RECOVERY</th>
<th>PENETRATION RESISTANCE</th>
<th>PENETRATION BLOW</th>
<th>PENETRATION BLASP</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SS</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>17</td>
<td>Advanced with tricone to 2' Good circulation</td>
</tr>
<tr>
<td>2</td>
<td>SS</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>19</td>
<td>Advanced with tricone to 4'</td>
</tr>
<tr>
<td>3</td>
<td>SS</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>19</td>
<td>Advanced with tricone to 6'</td>
</tr>
<tr>
<td>4</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 8'</td>
</tr>
<tr>
<td>5</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>6</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>7</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>8</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>9</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>10</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>11</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>12</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>13</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>14</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
<tr>
<td>15</td>
<td>SS</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>Advanced with tricone to 13' Good circulation Easy drilling</td>
</tr>
</tbody>
</table>

**PROJECT OF**

North Miami, FL

**ELEVATION AND DATUM**

**Approx. el + 10.5 (ft. NAVD)**

**REMARKS**

- **Fluid Loss:**
- **Drilling Resistance:**
- **Drilling Fluid:**
- **Depth of Casing:**
- **ETC.:**

**COMPLETION DEPTH**

15 ft.
# Boring Log

**Project:** Tressler Street Dainage Improvements  
**Location:** North Miami, FL  
**Elevation and Datum:** Approx. el + 10.7 (ft. NAVD)  
**Drilling Equipment:** CME-55 Truck Mounted

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Sample Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>+10.7</td>
<td>Black and gray fine SAND and LIMEROCK, some roots, trace silt [FILL]</td>
<td>Advanced with tricone to 2' Good circulation</td>
</tr>
<tr>
<td>+8.2</td>
<td>Light tan LIMESTONE, little sand</td>
<td>Advanced with tricone to 4'</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, some sand</td>
<td>Advanced with tricone to 6'</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, some sand</td>
<td>Advanced with tricone to 8'</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE, some sand</td>
<td>Advanced with tricone to 10' Easy drilling</td>
</tr>
<tr>
<td></td>
<td>Light tan LIMESTONE</td>
<td></td>
</tr>
<tr>
<td>-4.3</td>
<td>Boring terminated at 15'</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

EXFILTRATION TEST RESULTS
**SOUTH FLORIDA WATER MANAGEMENT DISTRICT**

"USUAL CONDITION OPEN-HOLE TEST"

**EXFILTRATION TEST**

![Diagram of water table and hole dimensions](image)

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Date</th>
<th>Test Depth</th>
<th>Test Location</th>
<th>Ground Surface Elevation</th>
<th>Witnessed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-1</td>
<td>3/11/2017</td>
<td>10 ft</td>
<td>SHOWN ON SKETCH</td>
<td>+10.6 ft NAVD</td>
<td>Y. Rodriguez</td>
</tr>
</tbody>
</table>

**TEST DATA**

- \( d = \text{Diameter of hole (cased)} = 5.0 \text{ inches} \)
- \( D_W = \text{Depth to Water Table} = 10.0 \text{ feet} \)
- \( H_2 = \text{Head on Water Table} = 10.0 \text{ feet} \)
- \( D_s = \text{Saturated Hole Depth} = \text{NOT APPLICABLE} \)
- \( Q = \text{Average Stabilized Flow Rate} = 0.8 \text{ GPM} \)

**HYDRAULIC CONDUCTIVITY**

\[
K = \frac{4Q}{\pi d (2H_2^2 + 4H_2D_s + H_2d)}
\]

\[
2.6 \times 10^{-5} \text{CFS/FT}^2 \text{-FT HEAD}
\]

**SOIL PROFILE**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1'</td>
<td>Gray to tan SAND and LIMEROCK [FILL]</td>
</tr>
<tr>
<td>1'-10'</td>
<td>Light tan LIMESTONE, some sand</td>
</tr>
</tbody>
</table>

**Project:** TRESSELLER STREET DRAINAGE IMPROVEMENTS

**Drawing Title:** PERCOLATION TEST

**Date:** APRIL 2017

**Score:** N.T.S.

**Drawn By:** RF

**Checked By:** CO

**Sheet 1 of 1**

© 2016 Langan
## TEST DATA

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Date</th>
<th>Test Depth</th>
<th>Test Location</th>
<th>Ground Surface Elevation</th>
<th>Witnessed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-1</td>
<td>3/11/2017</td>
<td>15 ft</td>
<td>Shown on Sketch</td>
<td>+10.6 ft NAVD</td>
<td>Y. Rodriguez</td>
</tr>
</tbody>
</table>

### HYDRAULIC CONDUCTIVITY

\[
K = \frac{4Q}{\pi d (2H_w^2 + 4H_w D_s + H_w d)}
\]

1.6 x 10⁻⁵ CFS/FT² FT HEAD

### SOIL PROFILE

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1'</td>
<td>Gray to tan SAND and LIMEROCK [FILL]</td>
</tr>
<tr>
<td>1'-15'</td>
<td>Light tan LIMESTONE, some sand</td>
</tr>
</tbody>
</table>

---

P-1

**TRESSELLER STREET DRAINAGE IMPROVEMENTS**

NE 17TH AVENUE

NORTH MIAMI

MIAMI-DADE COUNTY  FLORIDA

**PERCOLATION TEST**

Project No. 300211701

Date: APRIL 2017

Score: N.T.S.

Drawn By: RF

Checked By: CO

Sheet 1 of 1

© 2016 Langan
### TEST DATA

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Date</th>
<th>Test Depth</th>
<th>Test Location</th>
<th>Ground Surface Elevation</th>
<th>Witnessed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-2</td>
<td>3/11/2017</td>
<td>10 ft</td>
<td>SHOWN ON SKETCH</td>
<td>+10.5 ft NAVD</td>
<td>Y. Rodriguez</td>
</tr>
</tbody>
</table>

#### Diameter of hole (cased) =

\[ d = \text{Diameter of hole (cased)} = 5.0 \text{ inches} \]

#### Depth to Water Table =

\[ D_w = \text{Depth to Water Table} = 10.0 \text{ feet} \]

#### Head on Water Table =

\[ H_2 = \text{Head on Water Table} = 10.0 \text{ feet} \]

#### Saturated Hole Depth =

\[ D_s = \text{Saturated Hole Depth} = \text{NOT APPLICABLE} \]

#### Average Stabilized Flow Rate =

\[ Q = \text{Average Stabilized Flow Rate} = 1.0 \text{ GPM} \]

#### HYDRAULIC CONDUCTIVITY

\[ K = \frac{4Q}{\pi d (2H_2 + 4H_2 D_s + H_2 d)} \]

\[ 3.3 \times 10^{-5} \text{ CFS/FT}^2 \cdot \text{FT HEAD} \]

#### SOIL PROFILE

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1’</td>
<td>Gray and black SAND and LIMEROCK [FILL]</td>
</tr>
<tr>
<td>1’-10’</td>
<td>Light tan LIMESTONE, some sand</td>
</tr>
</tbody>
</table>

---

**Project:** TRESSLER STREET DRAINAGE IMPROVEMENTS  
**Drawing Title:** PERCOLATION TEST  
**NO 17TH AVENUE**  
**NORTH MIAMI**  
**MIAMI-DADE COUNTY**  
**FLORIDA**
SOUTH FLORIDA WATER MANAGEMENT DISTRICT
"USUAL CONDITION OPEN-HOLE TEST"
EXFILTRATION TEST

Water Table

\[ d = \text{Diameter of hole (cased)} = 5.0 \text{ inches} \]
\[ D = \text{Depth to Water Table} = 10.0 \text{ feet} \]
\[ H_2 = \text{Head on Water Table} = 10.0 \text{ feet} \]
\[ D_s = \text{Saturated Hole Depth} = 5.0 \text{ feet} \]
\[ Q = \text{Average Stabilized Flow Rate} = 1.0 \text{ GPM} \]

TEST DATA

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Test Date</th>
<th>Test Depth</th>
<th>Test Location</th>
<th>Ground Surface Elevation</th>
<th>Witnessed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-2</td>
<td>3/11/2017</td>
<td>15 ft</td>
<td>SHOWN ON SKETCH</td>
<td>+10.5 ft NAVD</td>
<td>Y. Rodriguez</td>
</tr>
</tbody>
</table>

HYDRAULIC CONDUCTIVITY

\[ K = \text{Hydraulic Conductivity} = \frac{4Q}{\pi d (2H_2 + 4H_2 D_s + H_2 d)} \]
\[ 1.7 \times 10^{-5} \text{ CFS/FT}^2 \text{ FT HEAD} \]

SOIL PROFILE

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1'</td>
<td>Gray and black SAND and LIMEROCK [FILL]</td>
</tr>
<tr>
<td>1'-15'</td>
<td>Light tan LIMESTONE, some sand</td>
</tr>
</tbody>
</table>

---

Project: TRESSLER STREET DRAINAGE IMPROVEMENTS
Drawing Title: PERCOLATION TEST

Project No. 300211701
Drawing No. P-2 (15 ft)

TREESIDE STREET
NE 17TH AVENUE
NORTH MIAMI
MIA-DADE COUNTY FLORIDA

© 2016 LANGAN
Parkside Corporate Ctr, 19150 NW 79th Court, Suite 200
Miami Lakes, FL 33016
T: 786.264.7200 F: 786.264.7201 www.langan.com

FL CERTIFICATE OF AUTHORIZATION No. 00006601

Filename: langan.com\langan.com\data\MIA\data7\300211701\Engineering Data\Geotechnical\GintLogs\DataDrives.dwg
Date: 4/6/2017
Time: 10:57
User: yrodriguez
Style Table: Langan.stb
Layout: P2-15'