



## **ENGINEERING DESIGN STANDARDS**

### **LEHIGH LAKE (LAKE LOWELL) SHORELINE REPAIR TOWN OF MEDLEY, FLORIDA**

**PROJECT ID: CIP #LS-0304**

**TECHNICAL SPECIFICATIONS**

**TABLE OF CONTENTS**

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**DIVISION 1: GENERAL REQUIREMENTS**

01010	Summary of Work	5
01015	Definitions and Standards	2
01045	Cutting and Patching	4
01050	Field Engineering and Surveying	3
01065	Permits and Fees	1
01071	Standard References	9
01200	Project Meetings and Reports	3
01300	Submittals	8
01320	Construction Videos and Photographs	3
01410	Testing and Quality Control	2
01530	Temporary Barriers and Controls	4
01570	Traffic Control	2
01580	Project Identification and Informational Signs	2
01600	Equipment and Materials	5
01630	Product Options and Substitutions	2
01700	Contract Closeout	4

**DIVISION 2: SITE WORK**

02050	Demolition	3
02100	Site Preparation	2
02110	Clearing & Land Preparation	2
02200	Earthwork	5
02215	Protection of Existing Structures - Refer to FDOT Standard Specifications for Road and Bridge Construction – Latest Edition, Section 108 and 455-1.1	1
02220	Excavation and Backfilling	3
02221	Trenching, Backfilling and Compacting	3
02435	Turbidity Control & Monitoring	3
02436	Environmental Protection	12
02820	Fence - Refer to FDOT Design Standards Index 550-002 and Referenced FDOT Standard Specifications for Road and Bridge Construction – Latest Edition	1
02920	Sodding	3

**DIVISION 3: CONCRETE**

03100	Concrete Formwork and Accessories	9
03200	Concrete Reinforcement	4
03300	Cast-In-Place Concrete	22
03410	Precast Concrete Below-Grade	11
03600	Grout	8

**DIVISION 4: MASONRY**

[NOT USED]

**DIVISION 5: METALS**

05070	Bolted Fasteners	4
05521	Pedestrian/Bicycle Bullet Railing Details - Refer to FDOT Design Standards Index 515-022 and Referenced FDOT Standard Specifications for Road and Bridge Construction – Latest Edition	1
05600	Miscellaneous Metals	2

**DIVISION 6: WOODS**

[NOT USED]

**DIVISION 7: THERMAL AND MOISTURE PROTECTION**

07920 Sealants and Caulking's 3

**DIVISION 8: DOORS AND WINDOWS**

[NOT USED]

**DIVISION 9: FINISHES**

[NOT USED]

**DIVISION 10: SPECIALTIES**

[NOT USED]

**DIVISION 11: EQUIPMENT**

[NOT USED]

**DIVISION 12: FURNISHINGS**

[NOT USED]

**DIVISION 13: BUILDING**

[NOT USED]

**DIVISION 14: CONVEYING SYSTEMS**

[NOT USED]

**DIVISION 15: MECHANICAL**

[NOT USED]

**DIVISION 16: ELECTRICAL**

[NOT USED]

**APPENDICES**

Appendix A Report of Geotechnical Exploration

Appendix B Topographic Survey

**END OF DIRECTORY**

SECTION 01010 SUMMARY OF WORK

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: This SECTION summarizes the WORK of the Project as covered in detail in the complete Contract Documents. This is a general summary and is not intended to be complete and all inclusive of the required WORK items.

1.02 SUBMITTALS:

- A. Submittals shall be in accordance with SECTION 01300.

1.03 PROJECT DESCRIPTION:

Description of Project: The scope of this project includes, but is not limited, to the construction of a concrete retaining wall part precast and part cast in place at the Town's Medley Lakeside Retirement Park located along NW 105<sup>th</sup> Way. The concrete wall is approximately 360 ft. in length along Lehigh lake shoreline.

1. The new concrete wall will consist of a precast concrete L-section and a cast in place part. The precast section part is instead to be use in the bottom (underwater) part of the wall and the cast in place above the water level.
2. There is an existing gabion wall that is going to remain in place.
3. A suggested method of placement of the precast section is included in the drawings, however the CONTRACTOR may propose alternative methods for approval by the Engineer.
4. The CONTRACTOR must provide a minimum of 3 feet excavation into the natural limestone conditions per the Geotechnical Report dated July 24, 2018.

1.04 RELATED CONTRACT ACTIVITIES:

The normal water elevations ranging from 2.7 to 3.8 feet, NGVD '29. The seasonal high groundwater elevation is 4.0 feet, NGVD '29.

1.05 WORK PERFORMED BY OTHERS:

- A. N/A

1.06 CONTRACTOR'S USE OF PREMISES:

- A. See General Terms & Conditions.
- B. During construction activities, the CONTRACTOR shall be responsible for maintaining all access roads in good condition, including grading and drainage. See General Terms & Conditions.

1.07 TOWN'S USE OF PREMISES:

- A. Partial TOWN Occupancy: The TOWN reserves the right to occupy and to place and install equipment in areas of the Project, prior to Substantial Completion provided that such occupancy does not interfere with completion of the WORK. Such placing of equipment and partial occupancy shall not constitute acceptance of the WORK.

1.08 WORK SEQUENCE, COORDINATION ACTIVITIES AND SCHEDULED DATES:

- A. General: The CONTRACTOR shall coordinate its WORK with other adjacent contractors, landowners and TOWN activities, with specific attention to access and staging areas. Construction sequence shall be determined by CONTRACTOR.
- B. Scheduled Events: Schedule the WORK to provide for coordination with the WORK performed by others.



1. See operational constraints above in Section 1.03.

1.09 COPIES OF DOCUMENTS:

- A. See General Terms & Conditions.

1.10 LIST OF DRAWINGS:

A. Drawings:

1. Contract Drawings: Lehigh Lake (Lake Lowell) Shoreline Repairs– Bulkhead Wall, 10601 NW 105<sup>th</sup> Way, Medley, FL 33178, Sheets 1-27.

B. Reference Materials:

1. The following reference materials are available for inspection at the offices of the TOWN: These materials are for reference only, are provided as-is, are not contractual documents, and do not replace the CONTRACTOR's due diligence in bid preparation.
  - a. Topographic Survey of Lakeside Retirement Community for Town of Medley. By Hadonne, Sheets 1-10, June 20, 2018.
  - b. Report of Geotechnical Exploration: Lakeside Retirement Community – Seawall Repair for Town of Medley. By H.R. Engineering Services, Inc. July 24, 2018.

END OF SECTION

SECTION 01015 DEFINITIONS AND STANDARDS

**PART 1 - GENERAL**

1.01 SCOPE:

A. Definitions:

1. A substantial amount of the Technical Specification (specification) language constitutes definitions for terms found in other areas of the Contract Documents including the Drawings, which must be recognized as diagrammatic in nature and not completely descriptive of all requirements necessary.
2. Certain terms used in the Contract Documents are defined in the General Terms & Conditions. Definitions and explanations are not necessarily either complete or exclusive but are general for the WORK.
3. The term "TOWN", as defined in the General Terms & Conditions and used in these specifications, is further defined as the Town or Town of Medley authorized representative, which may include, but is not limited to, the Design Engineer, Project Manager or Construction Manager.

B. General Requirements: General requirements are the provisions or requirements of Division 1 SECTIONS which apply to the entire WORK of the Contract.

1.02 FORMAT AND SPECIFICATION EXPLANATIONS:

A. Format Explanation: The format of principal portions of these specifications can be described as follows, although other portions may not fully comply, and no particular significance will be attached to such compliance or noncompliance.

1. SECTIONS and DIVISIONS: For convenience, the basic unit of the specification text is a "SECTION", each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into "DIVISIONS", which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The SECTION title is not intended to limit meaning or content of SECTION, nor to be fully descriptive of requirements specified therein, nor to be an integral part of the text.
2. SECTION Numbering: Used for identification and to facilitate cross-references in the Contract Documents. SECTIONS are placed in numeric sequence; however, the numbering is not sequential, and listing of SECTIONS in Table of Contents at the beginning of the Technical Specifications must be consulted to determine numbers and names of specification SECTIONS in these Contract Documents.
3. Page Numbering: Numbered independently for each SECTION. The SECTION number is shown with the page number at bottom of each page to facilitate location of the text.
4. Parts: Each SECTION of these specifications generally has been subdivided into three (3) basic parts for uniformity and convenience (Part 1 "General", Part 2 "Products", and Part 3 "Execution"). These parts do not limit the meaning of the text within. Some SECTIONS may not contain all three parts when not applicable or may contain more than three parts to add clarity to organization of the SECTION.
5. Imperative Language: Used generally in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the CONTRACTOR. For clarity of reading, at certain locations contrasting subjective language is used to describe responsibilities which must be fulfilled by the CONTRACTOR or, when so noted, by others.

6. Specialists Assignments: In certain instances, specification text requires that specific work be assigned to specialists or expert entities who must be engaged for performance of those units of work. These must be recognized as special requirements over which the CONTRACTOR has no choice or option. These assignments must not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. Nevertheless, final responsibility for fulfillment of the entire set of requirements remains with the CONTRACTOR.
  7. Trades: Except as otherwise specified or indicated, the use of titles such as "carpentry" in specification text, implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"), nor that the specified requirements apply exclusively to work by tradespersons of that corresponding generic name.
- B. Specification Content: Because of methods by which this Project specification has been produced, certain general characteristics of contents and conventions in use of language are explained as follows:
1. Specifying Methods: The techniques or methods of specifying requirements varies throughout the text, and may include "prescriptive", "compliance with standards", "performance", "proprietary", or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
  2. Overlapping and Conflicting Requirements: Where compliance with two (2) or more industry standards or sets of requirements is specified and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, notify the TOWN for a decision, as specified in the General Terms & Conditions.
  3. Abbreviations: Throughout the Contract Documents are abbreviations implying words and meanings which will be appropriately interpreted. Specific abbreviations have been established, principally for lengthy technical terminology, and in conjunction with coordination of specification requirements, with notations on the Drawings and in schedules. These are normally defined at first instance of use. Organizational and association names and titles of general standards are also abbreviated.

#### 1.03 DRAWING SYMBOLS:

- A. Except as otherwise indicated, graphic symbols used on the Drawings are those symbols generally recognized in the construction industry for the purposes indicated. Refer instances of uncertainty to the TOWN for clarification.

#### 1.04 INDUSTRY STANDARDS - APPLICABILITY:

- A. Applicable standards of the construction industry have the same force and effect and are made a part of the Contract Documents by reference, as if copied directly into the Contract Documents, or as if published copies were bound herewith. Referenced standards referenced directly in the Contract Documents or by governing regulations have precedence over non-referenced standards which are recognized in industry for applicability to work.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION (Not Applicable)**

END OF SECTION

SECTION 01045 CUTTING AND PATCHING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and all subsequent fitting and patching required to restore surfaces to their original condition.
  - 1. Cutting and patching is performed for coordination of the WORK, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
  - 2. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this SECTION. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
- B. Refer to other SECTIONS of these specifications and the Drawings for specific cutting and patching requirements and limitations applicable to individual units of WORK.
  - 1. Unless otherwise specified, requirements of this SECTION also apply to mechanical and electrical work.
  - 2. Refer to Division 15 and Division 16 SECTIONS for additional requirements and limitations on cutting and patching of mechanical and electrical work.
- C. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals

1.02 SUBMITTALS:

- A. Submittals shall be in accordance with SECTION 01300.
- B. Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this WORK well in advance of the time the WORK will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:
  - 1. Describe nature of the cutting and patching and how it is to be performed, indicating why cutting and patching cannot be avoided.
  - 2. Describe the anticipated results of the cutting and patching in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.
  - 3. List products to be used and firms that will perform the cutting and patching.
  - 4. Give dates when the cutting and patching is expected to be performed.
  - 5. List utilities that will be disturbed or otherwise be affected by the cutting and patching, including those that will be relocated and those that will be out-of-service temporarily.
    - a. Indicate how long utility service will be disrupted.
  - 6. Where cutting and patching of structural work involves the addition of reinforcement, submit details and calculations, prepared by a Professional Engineer licensed in the State of Florida, to show how that reinforcement is integrated with the original structure to satisfy all applicable requirements.

- C. Approval by the TOWN to proceed with cutting and patching work does not waive the TOWN's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

1.03 QUALITY ASSURANCE:

- A. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of the load-carrying capacity or load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.
- C. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the TOWN's opinion, result in lessening the building's aesthetic qualities.
  - 1. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work.
  - 2. Remove and replace work judged by the TOWN to be cut and patched in a visually unsatisfactory manner.
  - 3. Retain the original installer or fabricator if possible, or another recognized experienced and specialized firm for cutting and patching.

**PART 2 - PRODUCTS**

2.01 MATERIALS:

- A. General: Except as otherwise indicated, or as directed by the TOWN, use materials for cutting and patching that are identical to the existing materials.
- B. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect.
- C. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

**PART 3 - EXECUTION**

3.01 INSPECTION:

- A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the cutting and patching is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the cutting and patching.
- B. Coordinate layout of the cutting and patching and resolve potential conflicts before proceeding with the cutting and patching.

3.02 PREPARATION:

- A. Temporary Support: To prevent failure, provide temporary support of work to be cut.
- B. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the Project that may be exposed during cutting and patching operations.

1. Avoid interference with use of adjacent facilities or interruption of free passage to adjacent facilities.
2. Take precautions not to cut existing pipes, conduits or ducts currently in service, but scheduled to be relocated until provisions have been made to by-pass them. Coordinate with the TOWN.

3.03 PERFORMANCE:

- A. General: Employ skilled workmen to perform cutting and patching work.
- B. Cutting: Perform the cutting using methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
  1. General: Use hand or small power tools designed for sawing or grinding, not hammering and chopping, where cutting is required. Use of gasoline-powered tools will not be permitted in enclosed spaces.
  2. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole.
  3. Cut holes and slots neatly to size required with minimum disturbance of adjacent work.
  4. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  5. Temporarily cover openings when not in use.
- C. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned.
- D. Cut off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight the remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.
- E. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the WORK.
  1. Inspect and test patched areas to demonstrate the integrity of the WORK.
  2. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
  3. Patch and repair floor and wall surfaces to provide an even surface of uniform color and appearance where removal of walls or partitions extends from one finished area into another finished area.
  4. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.
  5. Extend the final paint coat over the entire unbroken surface containing the patch, after the patched area has received prime and base coats where the patch occurs in a smooth painted surface.
  6. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.04 CLEANING:

- A. Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely all excess paint, mortar, oils, putty and items of similar nature.
- B. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied.
- C. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01050 FIELD ENGINEERING AND SURVEYING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work:
  - 1. The CONTRACTOR shall engage a Professional Engineer of the discipline required, registered in the State of Florida, to perform engineering services for temporary facilities including the design of shoring systems, shores, earth and water retaining systems, forms, temporary erection supports, and similar items provided by the CONTRACTOR as part of its means and methods of construction.
  - 2. The CONTRACTOR shall engage a Professional Surveyor and Mapper licensed in the State of Florida to perform all necessary construction layout surveys, horizontal and vertical control, As-Built (Record) Surveys, and Topographic Surveys in accordance with Chapter 472.027 of the Florida Statutes and Chapter 5J-17 Florida Administrative Code (FAC) and these specifications.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 - Submittals
  - 2. SECTION 01700 – Contract Closeout
  - 3. SECTION 02200 – Earthwork

1.02 SUBMITTALS:

- A. Submit in accordance with SECTION 01300.

**PART 2 - CONTRACTOR CONSTRUCTION LAYOUT SURVEY**

2.01 DESCRIPTION: In connection with this WORK, the CONTRACTOR shall be responsible for:

- A. Performing all construction layout survey tasks as necessary for construction and satisfactory completion of the WORK.
- B. Verifying benchmark elevations by running a level loop between a minimum of two (2) Project vertical control points prior to the construction layout survey or establishing Project elevation data and/or new benchmarks where necessary.
- C. Completing all leveling under the supervision of a Florida licensed Professional Surveyor and Mapper. The level run shall close to within 0.03 feet  $\sqrt{\text{miles}}$  (0.03 feet times the square root of the distance in miles).
- D. Performing at a minimum two (2) daily check measurements with RTK Global Positioning System (GPS) on a minimum of two (2) different Project control monuments in two (2) different satellite geometric layouts.
- E. Performing a peg test as necessary on all level equipment with needed adjustments to maintain the accuracy of the instruments.
- F. Keeping a record of all survey work in a survey field book in a clear, orderly, and neat manner consistent with standard surveying practices.

2.02 CONSTRUCTION REQUIREMENTS:

- A. The CONTRACTOR's personnel performing the construction layout survey shall work under the direct supervision of a Florida licensed Professional Surveyor and Mapper. Submit the name(s) and address(s) of the survey firms(s) responsible for the Project surveying requirements to the TOWN prior to start of survey activities.
- B. The CONTRACTOR shall be solely and completely responsible for the accuracy of the line and grade of all features of the WORK. Any errors or apparent discrepancies found in previous surveys,



Drawings, or specifications shall be called to the attention of the TOWN by the CONTRACTOR for correction or interpretation prior to proceeding with the WORK.

- C. The CONTRACTOR shall be responsible for the placement, referencing, and preservation of all survey control points, whether set or found on the Project. All boundary corners (i.e. section corners, fractional section corners, similar Project survey monumentation) that may be lost, destroyed or disturbed during construction shall be carefully replaced and referenced by a Florida licensed Professional Surveyor and Mapper.
- D. The supervision of the CONTRACTOR's construction surveying personnel shall be the responsibility of the CONTRACTOR; any deficient surveying layout or construction WORK which may be the result of inaccuracies in construction layout survey operations or failure to report inaccuracies found in WORK shall be corrected at the expense of the CONTRACTOR.
- E. Station Identification: On linear elements of construction (such as levees, canals, and similar items) the CONTRACTOR shall place temporary identifying signs at intervals no greater than 500 feet using four (4) foot sections of one (1) inch by four (4) inches lumber driven into the ground. The signs shall identify the station at that location.
- F. In order to expedite the commencement of construction operations, the construction layout survey operation may commence prior to the issuance of the Notice to Proceed. The CONTRACTOR shall obtain written approval of the TOWN prior to commencing construction layout survey.

2.03 SURVEY STANDARDS: If the vertical and horizontal data needs to be established at the Project Site, the CONTRACTOR shall follow the following standards:

- A. Vertical Data:
  - 1. All vertical data shall be collected and displayed in National Geodetic Vertical Datum 29 (NGVD 29). All Vertical elevation control level runs shall start and end on National Geodetic Survey (NGS) Second Order or higher TOWN approved vertical control monuments. The CONTRACTOR shall use a minimum of two (2) different NGS Second Order or TOWN approved published benchmarks that are a minimum of one-half mile apart. The level run(s) between monuments must close on each other. If the monuments do not close on each other the surveyor shall re-do the level runs or use another NGS monument until the two (2) monuments used in the level run close. The level run shall close to within 0.03 feet  $\sqrt{\text{miles}}$  (0.03 feet times the square root of the distance in miles).
- B. All Vertical elevation control level runs shall start and end on National Geodetic Survey (NGS) Second Order or higher TOWN approved vertical control monuments.
  - 1. All new Water Control Structures shall require at a minimum one (1) new Site benchmark to be set if one does not exist. A survey disk (supplied by the TOWN) stamped with the Site designation or TOWN approved alternative shall be permanently grouted into the water control structure provided it is on a portion of the structure that does not have an expansion joint. The marker for the benchmark can be obtained from the TOWN Project Manager (PM). The CONTRACTOR shall only stamp or engrave the benchmark identification and not the elevation. If a NGS Class "B" mark is set, the survey disk is not required and the designation shall be stamped on the benchmark cap.
- C. A TOWN benchmark description sheet shall be completed for each benchmark established (set) for use in the Project. A TOWN benchmark description sheet shall be requested; if applicable, from the TOWN PM at the pre-construction meeting.
- D. Horizontal Data (State Plane Coordinates):
  - 1. All horizontal data shall be collected in and based on the North American Datum (NAD 1983/2007) adjustment or higher. Horizontal coordinate control shall be established from existing NGS or TOWN approved Second Order control or higher in the area by using a minimum of conventional NGS Third Order field observation procedures. All horizontal work shall be done in the same horizontal adjustment (no mixing of the adjustments). Once the horizontal datum has been established it shall not change for the life of the project.

- E. Cross-Sections: Provide a certified copy, in accordance with 2.04 below, of field measured cross-sections of the final embankments, prepared by a Professional Surveyor and Mapper licensed in the State of Florida for payment and record purposes, measured at the same stations as the detailed cross-sections shown on the Drawings. A tolerance of  $0.1\pm$  foot on the top of the canal and  $0.1\pm$  foot on the sides of the canal is permitted. The top of the canal shall be graded as shown on the Drawings, or as specified by the TOWN.

2.04 RECORDS AND SUBMITTALS:

- A. Submittals shall be in accordance with SECTION 01300.
- B. Provide TOWN a copy of the designs described in Paragraph 1.01 signed and sealed by the Florida registered Professional Engineer in charge of the Project.
- C. Provide TOWN one (1) copy of the Preliminary Surveyor's Report (MS Word 2007), and two (2) copies of the final signed, sealed and certified Surveyor's Report to the TOWN.
  - 1. At a minimum, the report shall include: an overall Project description, location sketches, field notes, equipment used, photographs and a horizontal data (NAD 1983/2007 state plane coordinate (RTK)) on each new bench mark (if applicable).
  - 2. A CD containing: Surveyor's firm name and logo, Surveyor's Report, digital photographs, benchmark description sheets and any other associated data.
- D. Records/As-builts:
  - 1. The CONTRACTOR shall provide one (1) set of conventional certified As-Built Survey overlaid on the Drawings.
  - 2. The CONTRACTOR shall provide a single PDF file with all data attached to that file and bookmark the As-Built.
  - 3. The CONTRACTOR shall provide single AutoCAD (version 2010 or later) digital files for each of the certified hard copies.

END OF SECTION

SECTION 01065 PERMITS AND FEES

**PART 1 - GENERAL**

1.01 SCOPE:

A. Summary of Work:

1. Unless otherwise specified, the CONTRACTOR shall obtain and pay for all permits and licenses related to the WORK as provided for in the General Terms & Conditions.

Permits obtained by the TOWN:

- Department of Regulatory and economic Resources Miami-Dade County Permit.
2. The CONTRACTOR will be issued copies of all permits obtained by the TOWN at the pre-construction conference. A copy of the permits shall be posted at the Site at all times during construction. The CONTRACTOR shall be responsible for familiarizing himself with the permits and shall abide by the permit conditions at all times. Refer to Article 6.08 of the Supplemental Conditions for the list of permits that TOWN has obtained or is in the process of obtaining.
  3. The WORK shall be conducted and shall result in construction of the improvements of the Project, in full accordance with the conditions of the permits granted for the Project.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

END OF SECTION

SECTION 01071 STANDARD REFERENCES

Wherever used in the project manual, the following abbreviations will have the meanings listed:

AA	Aluminum Association Incorporated 818 Connecticut Avenue, NW Washington, DC 20006
AABC	Associated Air Balance Council 1518 K Street NW Washington, DC 20005
AAMA	American Architectural Manufacturers Association 2700 River Road, Suite 118 Des Plaines, IL 60018
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW, Suite 225 Washington, DC 20001
ABMA	American Bearing Manufacturers Association 2025 M Street, NW Suite 800 Washington, DC 20036
ACI	American Concrete Institute 38800 Country Club Drive Farmington Hills, MI, 48331
AEIC	Association of Edison Illuminating Companies 600 18 <sup>th</sup> Street N Birmingham, Al 35203
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association 400 N. Capital Street, NW Suite 450 Washington, DC 20001
AGMA	American Gear Manufacturer's Association 500 Montgomery Street, Suite 350 Alexandria, VA 22314
AHA	American Hardboard Association 1210 West Northwest Hwy Palatine, IL 60067
AISC	American Institute of Steel Construction One East Wacker Drive, suite 700 Chicago, IL 60601
AISI	American Iron and Steel Institute 1000 16th Street, NW Washington, DC 20036

AITC	American Institute of Timber Construction 333 West Hampden Avenue Englewood, CO 80110
ALSC	American Lumber Standards Committee P. O. Box 210 Germantown, MD 20874
AMCA	Air Movement and Control Association, Inc. 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute, Inc. 25 West 43 <sup>rd</sup> Street New York NY 10036
APA	American Plywood Association P.O. Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, NW Washington, DC 20005
AHRI	Air-Conditioning Heating and Refrigeration Institute 1814 North Fort Myer Drive Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 10 East 40th Street New York, NY 10016
ASE	American Standard Safety Code for Elevators, Dumbwaiter and Escalators American National Standards Institute/ASME A17.1/CSA B44 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers United Engineering Center 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103

AWPA	American Wood Preservers Association P.O. Box 361784 Birmingham, AL 35236
AWPB	American Wood Preservers Bureau 7962 Conell Court P. O. Box 5283 Lorton, VA 22079
AWPI	American Wood Preservers Institute 1945 Old Gallows Road, Suite 150 Vienna, VA 22182
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165
AWS	American Welding Society 550 NW Lejune Road Miami, FL 33126
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 17 <sup>th</sup> Floor New York, NY 10017
BOCA	Building Officials and Code Administrators 17926 Halstead Homewood, IL 60430
CBMA	Certified Ballast Manufacturers Association 2120 Keith Building Cleveland, OH 44115
CMAA	Crane Manufacturers Association of America (Formerly called: Overhead Electrical Crane Institute) (OECI) 8720 Reds Oak Boulevard, Suite 201 Charlotte, NC 28217
CRSI	Concrete Reinforcing Steel Institute 933 North Plum Grove Road Schaumburg, IL 60173
CSA	Canadian Standards Association 155 Queen Street, Suite 1300 Ottawa, Ontario, CA K1P6L1
DEMA	Diesel Engine Manufacturer's Association 122 East 42nd Street New York, NY 10017

DHI	Door Hardware Institute 14150 Newbrook Drive, Suite 200 Chantilly, VA 20151
DIS	Division of Industrial Safety California Department of Industrial Relations 2422 Arden Way Sacramento, CA 95825
EI	Edison Electric Institute 701 Pennsylvania Avenue, NW Washington, DC 20004
EIA	Electronic Industries Alliance 2001 Eye Street, NW Washington, DC 20006
EJMA	Expansion Joint Manufacturer's Association 25 North Broadway Tarrytown, NY 10591
EPA	Environmental Protection Agency Region 4 Sam Nunn Atlanta Federal Center 61 Forsyth Street, SW Atlanta, GA 30303-3104
ESO	Electrical Safety Order, California Administrative Code, Title 8, Chap. 4, Subarticle 5 Office of Procurement, Publications Section P. O. Box 20191 8141 Elder Creek Road Sacramento, CA 95820
FAC	Florida Administrative Code
FEDSPEC	Federal Specifications General Services Administration Specification and Consumer Information Distribution Branch Washington Navy Yard, Bldg. 197 Washington, DC 20407
FEDSTDS	Federal Standards (see FEDSPECS)
FM	Factory Mutual Research 1151 Boston-Providence Turnpike Norwood, MA 02062
GAN	Glass Association of North America 800 SW Jackson Street, Suite 1500 Topeka, Kansas 66612
HEI	Heat Exchange Institute 1300 Summer Avenue Cleveland, OH 44115

HI	Hydraulic Institute 1230 Keith Building Cleveland, OH 44115
HPVA	Hardwood Plywood and Veneer Association 1825 Michael Faraday Drive Reston, VA 20190
IAPMO	International Association of Plumbing and Mechanical Officials 5001 E. Philadelphia Street Ontario, CA 91761
ICBO	International Conference of Building Officials 5360 South Workman Mill Road Whittier, CA 90601
ICEA	Insulated Cable Engineers Association P. O. Box P South Yarmouth, MA 02664
ICRI	International Concrete Repair Institute 10600 West Higgins Road, Suite 607 Rosemont, IL 60018
IEEE	Institute of Electrical and Electronics Engineers, Inc. 3 Park Avenue, 17 <sup>th</sup> Floor New York, NY 10016-5997
IES	Illuminating Engineering Society c/o United Engineering Center 120 Wall Street Floor 17 New York, NY 10005
ISA	Instrument Society of America 67 Alexander Drive Research triangle Park, NC 27709
ISO	International Organization for Standardization 1, ru de Varembe, Case Postale 56 CH-1211 Genna 20, Switzerland
JIC	Joint Industrial Council 7901 Westpark Drive McLean, VA 22101
MFMA	Metal Framing Manufacturers Association 401 Michigan Avenue Chicago, IL 60611
MILSPEC	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120



MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Avenue, N.E. Vienna, VA 22180
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt rd bldg C, Suite 312 Glen Ellyn, IL 60137
NACE	National Association of Corrosion Engineers P. O. Box 986 Katy, TX 77450
NEC	National Electrical Code National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814
NELMA	Northeastern Lumber Manufacturers Association, Inc. 272 Turtle Road P. O. Box 87A Cumberland Center, ME 04021
NEMA	National Electrical Manufacturer's Association 1300 N. 17 <sup>th</sup> Street, Suite 1752 Rosslyn, VA 22209
NESC	National Electric Safety Code American National Standards Institute 1430 Broadway New York, NY 10018
NETA	InterNational Electrical Testing Association 3050 Old Centre Avenue, Suite 102 Portage, MI 49024
NFP	National Forest Products Association (Formerly National Lumber Manufacturer's Association) 1619 Massachusetts Avenue Washington, DC 20036
NFPA	National Fire Protection Association Batterymarch Park Quincy, MA 02269
NHLA	National Hardwood Lumber Association P. O. Box 34518 Memphis, TN 38184-0518
NIST	National Institute of Standards and Technology 100 Bureau Drive, Suite 1070 Gaithersburg, MD 20899-1070

NSF	National Sanitation Foundation P.O. Box 130140 789 N. Dixoboro Road Ann Arbor, MI 48113
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational and Health Administration San Francisco Regional Office 200 Constitution Avenue Washington, DC 20210
PCI	Prestressed Concrete Institute 200 W. Adams Street, Suite 2100 Chicago, IL 60606
PPIC	The Plumbing & Piping Industry Council, Inc. 135 Calle Catalina Place Houston, TX 77007
RIS	Redwood Inspection Service California Redwood Association 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523
RLM	Reflector and Lamp Manufacturers Standard Institute
RMA	Rubber Manufacturers Association 1400 K Street Washington, DC 20005
SAE	Society of Automotive Engineers 400 Commonwealth Drive Warrendale, PA 15096
SBC	Standard Building Code Published by SBCCI
SMC	Standard Mechanical Code Published by SBCCI
SBCCI	Southern Building Code Congress International 1116 Brown-Marx Building Birmingham, AL 35203
SCMA	Southern Cypress Manufacturers Association 805 Sterick Bldg. Memphis, TN 38103

SDI	Steel Door Institute 30200 Detroit road Westlake, OH 44145
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. 4201 Lafayette Center Drive Chantilly, VA 20151
SPC	Society for Protective Coatings 40 24 <sup>th</sup> Street, 6 <sup>th</sup> Floor Pittsburgh, PA 15222
SPI	Society of the Plastics Industry, Inc. 1667 K Street, NW Suite 1000 Washington, DC 20006
SPIB	Southern Pine Inspection Bureau P.O. Box 10915 Pensacola, FL 32524
SSPC	The Society for Protective Coatings (formerly called: Steel Structures Painting Council) 40 24 <sup>th</sup> Street, 6 <sup>th</sup> Floor Pittsburgh, PA 15222-4656
SSPWC	Standard Specifications for Public Works Construction Building News, Inc. 3055 Overland Avenue Los Angeles, CA 90034
TEMA	Tubular Exchanger Manufacturer's Association 3251 Corte Malpaso, Suite 507 Camarillo, CA 93012
UL	Underwriters Laboratories Inc. 2600 NW Lake Road Camas, WA 98607
USBR	Bureau of Reclamation U.S. Department of Interior Engineering and Research Center Denver Federal Center, Building 67 Denver, CO 80225
USACE	United States Army Corps of Engineers Jacksonville District P. O. Box 4970 Jacksonville, FL 32232-0019
WCLIB	West Coast Lumber Inspection Bureau 6980 SW Varns Street P. O. Box 23145 Tigard, OR 97223

WWPA

Western Wood Products Association  
(Formerly called: West Coast Lumbermen's Association (WCLA))  
522 SW 5<sup>th</sup> Avenue, Suite 500  
Portland, OR 97204

END OF SECTION

SECTION 01200 PROJECT MEETINGS AND REPORTS

**PART 1 - GENERAL**

1.01 SCOPE

- A. Summary of Work: This SECTION includes the following administrative and procedural requirements:
1. Project Meetings:
    - a. Preconstruction conference
    - b. Progress meetings
  2. Schedules and Reports:
    - a. Initial coordination submittals
    - b. Construction Schedules
    - c. Special reports
- B. Related Work Specified Elsewhere:
1. SECTION 01300 – Submittals

1.02 SUBMITTALS:

- A. All submittals shall be made in accordance with SECTION 01300.

1.03 PROJECT MEETINGS:

- A. Pre-construction Conference
1. The TOWN will administer a pre-construction conference within ten (10) days after the Effective Date of the Agreement, to review items stated in the following agenda and to establish a working understanding between the parties as to their relationships during conduct of the WORK.
  2. The Preconstruction conference shall be attended by:
    - a. The CONTRACTOR and his Project Superintendent
    - b. Representatives of principal Subcontractors and Suppliers
    - c. Engineer and his Resident Project Representative if any
    - d. The TOWN or its representative
    - e. Other affected parties determined by the TOWN.
  3. Agenda:
    - a. Projected Construction Schedules
    - b. Critical Work sequencing
    - c. Designation of responsible personnel
    - d. Project coordination
    - e. Procedures and Processing of:
      - i. Field decisions
      - ii. Substitutions

- iii. Submittals
    - iv. Change Orders
    - v. Applications for payment
  - f. Procedures for testing
  - g. Procedures for maintaining record documents
  - h. Use of Premises:
    - i. Office, work and storage areas
    - ii. The TOWN's requirements
  - i. Construction facilities, controls, and construction aids
  - j. Temporary utilities
  - k. Management of Transit
  - l. Safety and first aid
  - m. Security
  - n. Requirements of any permits obtained by the TOWN and/or the CONTRACTOR
- 4. Location of Meeting: To be determined by the TOWN Construction Manager.

B. Progress Meetings:

- 1. The TOWN will administer a progress meeting a minimum of twice each month (every two (2) weeks) and at other times requested by the TOWN. The CONTRACTOR, Engineer and all Subcontractors active on the Site shall be represented at each meeting. The CONTRACTOR may request attendance by representatives of his Suppliers and other Subcontractors, or other entities concerned with the Project or involved with the planning, coordination or performance of future Project activities. All participants in the meeting shall be familiar with the Project and authorized to conclude matters relating to the WORK.
- 2. The CONTRACTOR and each Subcontractor shall be prepared to report on and discuss the current construction progress, any anticipated future changes to the Construction Schedule, and advise if their current progress, and anticipated future schedules are compatible with the WORK.
- 3. If one Subcontractor is delaying another, the CONTRACTOR shall direct such changes as are necessary for those involved to mutually agree on the Construction Schedule changes in the best interest of construction progress.
- 4. Agenda
  - a. Review of construction progress since previous meeting
  - b. Field observations, interface requirements, conflicts
  - c. Issues which may impede the Construction Schedule
  - d. Off-site fabrication
  - e. Delivery schedules
  - f. Submittal schedules and status
  - g. Site utilization
  - h. Temporary facilities and services
  - i. Hours of Work

- j. Hazards and risks
  - k. Housekeeping
  - l. Quality and Work standards
  - m. Change orders
  - n. Documentation of information for payment request
  - o. Corrective measures and procedures to regain projected schedule, if necessary
  - p. Revisions to the Construction Schedule
  - q. Progress and schedule during the succeeding WORK period
  - r. Review proposed changes for:
    - i. Effect on the Construction Schedule and on the Completion Date
    - ii. Effect on the other contracts of the Project
  - s. Other business
5. Location of Meetings: To be determined by the TOWN Construction Manager.
6. Reporting: After each meeting, minutes of the meeting will be distributed by the TOWN to each party present and to parties who should have been present.
- C. Special Reports:
- 1. When an event of an unusual and/or significant nature occurs at the Site, a special report shall be prepared and submitted by the CONTRACTOR to the TOWN. List the chain of events, persons participating, the response by CONTRACTOR's personnel, an evaluation of the results or effects, and similar pertinent information.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable)**

END OF SECTION

SECTION 01300 SUBMITTALS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. This SECTION includes definitions, descriptions, transmittal, and review of "Compliance" and "Miscellaneous" Submittals.

1.02 GENERAL INFORMATION:

A. Definitions:

1. Compliance Submittals include Shop Drawings, product data, and samples which are prepared by the CONTRACTOR, Subcontractor, MANUFACTURER, or Supplier and submitted by the CONTRACTOR to the TOWN as a basis for approval of the use of Equipment and Materials proposed for incorporation in the WORK or needed to describe installation, operation, maintenance, or technical properties.
  - a. Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
  - b. Product data includes standard printed information on materials, products and systems not custom-prepared for this Project, other than the designation of selections from available choices.
  - c. Samples include both fabricated and unfabricated physical examples of materials, products, and WORK; both as complete units and as smaller portions of units of WORK; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mock-ups are a special form of samples which are too large to be handled in the specified manner for transmittal of sample Submittals.
2. Miscellaneous Submittals are those technical reports, administrative Submittals, certificates, and warranties not defined as Shop Drawings, product data, or samples.
  - a. Technical reports include laboratory reports, tests, technical procedures, technical records, CONTRACTOR's design analysis and CONTRACTOR's survey field notes for construction staking, before cross-sections and after cross-sections, and similar type Submittals.
  - b. Administrative Submittals are those nontechnical Submittals required by the Contract Documents or deemed necessary for administrative records. These Submittals include maintenance agreements, workmanship bonds, Project photographs, physical work records, statements of applicability, copies of industry standards, as-constructed data, security/protection/safety data, and similar type Submittals.
  - c. Certificates and warranties are those Submittals on Equipment and Materials where a written certificate or guarantee from the MANUFACTURER or Supplier is called for in the Specifications.
  - d. Reports as required by Contract describing CONTRACTOR's means and methods for items such as dewatering, earth and water retaining, erosion/turbidity control, safety plans, and similar type Submittals.
3. Refer to ARTICLE 1.03 and 1.04 of this Part for detailed lists of documents and specific requirements.

B. Quality Requirements:



1. Submittals such as Shop Drawings and product data shall be of the quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings such as reproductions shall be useable for further reproduction to yield legible hard copy.
  2. Documents submitted to the TOWN that do not conform to these requirements shall be subject to rejection by the TOWN, and upon request by TOWN, CONTRACTOR shall resubmit conforming documents. If conforming Submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. CONTRACTOR's (or his Subcontractor's) failure to initially satisfy the legibility quality requirements will not relieve CONTRACTOR (or his Subcontractors) from meeting the required schedule for Submittal of Shop Drawings and product data.
- C. Language and Dimensions:
1. All words and dimensional units shall be in the English language.
  2. Metric dimensional unit equivalents may be stated in addition to the English units.
- D. Submittal Completeness:
1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable the TOWN to review the information effectively.
  2. Where standard drawings are furnished which cover a number of variations of the general class of equipment, each such drawing shall be individually annotated to describe exactly which parts of the drawing apply to the equipment being furnished. Use hatch marks to indicate variations that do not apply to the Submittal. The use of "highlighting" is not an acceptable means of annotating Submittals. Such annotation shall also include proper identification of the Submittal permanently attached to the drawing.
  3. Reproduction or copies of Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. The CONTRACTOR may use a reproduction of the TOWN-prepared Drawings for erection drawings such as to indicate information on erection or to identify detail drawing references. Where the Drawings are revised to show this additional CONTRACTOR information, the TOWN's title block shall be replaced with a CONTRACTOR's title block and the TOWN's professional seal shall be removed from the Drawing. The CONTRACTOR shall revise these erection drawings for subsequent TOWN revisions to the Drawings.

### 1.03 COMPLIANCE SUBMITTALS:

- A. Items shall include, but not be limited to, the following:
1. MANUFACTURER's specifications
  2. Catalogs, or parts thereof, of manufactured equipment
  3. Shop fabrication and erection drawings
  4. General outline drawings of equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates
  5. Detailed equipment installation drawings, showing foundation details, anchor bolt sizes and locations, baseplate sizes, location of TOWN's connections, and all clearances required for erection, operation, and disassembly for maintenance
  6. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams, and one-line diagrams
  7. Bills of material and spare parts list
  8. Instruction books and operating manuals
  9. Material lists or schedules

10. Performance tests on equipment by MANUFACTURERS
11. Concrete mix design information
12. Samples and color charts
13. All drawings, calculations, catalogs or parts thereof, MANUFACTURER's specifications and data, samples, instructions, and other information specified or necessary:
  - a. For TOWN to determine that the Equipment and Materials conform with the design concept and comply with the intent of the Contract Documents.
  - b. For the proper erection, installation, operation and maintenance of the Equipment and Materials which the TOWN will review for general content but not for substance.
  - c. For the TOWN to determine what supports, anchorages, structural details, connections, and services are required for the Equipment and Materials, and the effects on contiguous or related structures and Equipment and Materials.

B. Compliance Submittal Action Stamps:

1. The TOWN's review action stamp or designation, appropriately completed, will appear on all Compliance Submittals of CONTRACTOR when returned by the TOWN. Review status designations listed on TOWN's action stamp are defined as follows:
  - a. "ACCEPTED AS SUBMITTED": Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the WORK. CONTRACTOR is to proceed with fabrication or procurement of the items and with related WORK.
  - b. "ACCEPTED AS NOTED": Signifies Equipment and Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the WORK subject to the condition that as constructed it shall be in accordance with all notations and/or corrections indicated. CONTRACTOR is to proceed with fabrication or procurement of the items and with related WORK in accordance with TOWN's notations.
  - c. "RETURNED FOR REVISION": Means that deviations from the requirements of the Contract Documents exist in the Submittal. CONTRACTOR is to resubmit revised information responsive to TOWN's annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related WORK is not to proceed until the Submittal is approved.
  - d. "NOT ACCEPTABLE (SUBMIT ANEW)": Signifies Equipment and Material represented by the Submittal does not conform with the design concept or comply with the intent of the Contract Documents and is disapproved for use in the WORK. CONTRACTOR is to resubmit Compliance Submittals responsive to the Contract Documents.
  - e. "FOR REFERENCE ONLY": Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to the TOWN in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. The TOWN reviews such Submittals for general content but not for substance.
  - f. "DISTRIBUTION COPY (PREVIOUSLY ACCEPTED)": Signifies Submittals which have been previously accepted and are being distributed to CONTRACTOR, TOWN, Resident Project Representative, and others for coordination and construction purposes.

C. Schedule and Log of Compliance Submittals:

1. Prepare for the TOWN, a schedule and log for submission of all Compliance Submittals specified or necessary for TOWN's review of the use of Equipment and Materials proposed for

incorporation in the WORK or needed for proper installation, operation or maintenance. Submit the schedule and log with the procurement schedule and WORK progress schedule. Schedule submission of all Compliance Submittals to permit review, fabrication and delivery in time so as to not cause a delay in the WORK of CONTRACTOR or his Subcontractors or any other contractors as described herein.

2. In establishing schedule for Compliance Submittals, allow fifteen (15) working days in TOWN's office for reviewing original Submittals and ten (10) working days for reviewing resubmittals.
3. The schedule shall indicate the anticipated dates of original submission.
4. Schedule all Compliance Submittals required prior to fabrication or manufacture for submission within 60 days of the Notice to Proceed. Schedule Compliance Submittals pertaining to storage, installation and operation at the Site for TOWN's acceptance prior to delivery of the Equipment and Materials.
5. Resubmit Compliance Submittals the number of times required for TOWN's "ACCEPTED AS SUBMITTED." However, any need for resubmittals in excess of the number set forth in the accepted schedule, or any other delay in obtaining acceptance of Submittals, will not be grounds for extension of the Contract Time, provided the TOWN completes its reviews within the times stated above.

D. Transmittal of Compliance Submittals:

1. All Compliance Submittals of Equipment and Materials furnished by Subcontractors, MANUFACTURERS, and Suppliers shall be submitted to the TOWN by CONTRACTOR in electronic PDF format as indicated below.
2. After checking and verifying all field measurements, transmit all Compliance Submittals to the TOWN for acceptance as follows:
  - a. Identify each Compliance Submittal by Submittal Number, Project name and number, Contract title and number, and the Specification SECTION and article number marked thereon or in the letter of transmittal. Unidentifiable Submittals will be returned for proper identification.
  - b. Check and stamp Compliance Submittals of Subcontractors, Suppliers, and MANUFACTURERS with CONTRACTOR's approval prior to transmitting them to the TOWN. CONTRACTOR's stamp of approval shall constitute a representation to the TOWN that CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or he assumes full responsibility for doing so, and that he has coordinated each Compliance Submittal with the requirements of the WORK and the Contract Documents.
  - c. At the time of each submission, call to the attention of TOWN in the letter of transmittal any deviations from the requirements of the Contract Documents.
  - d. Provide all Submittals in electronic format, compatible with Adobe Professional, Version 8 (or Latest, and submitted as a single file, using PDF bookmarks and/or chapters to identify divisions within the Submittal package.
  - e. Submittals with file sizes greater than ten (10) megabyte (MB) shall be transferred to an existing TOWN OneDrive or other TOWN approved file sharing system, coupled with an electronic notification to the TOWN of the transfer. The OneDrive address, and associated password information, will be provided by the TOWN Project Manager.
  - f. Make all modifications noted or indicated by TOWN and return revised copies, or samples until accepted. Revised Submittals must be complete and conformed, including all pages/sheets with the required revisions and any additional or replacement pages/sheets. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by the TOWN on previous Submittals. Subsequent review cycles for

returned or revised Submittals shall replicate the process described in items d. through e. above.

- g. If the TOWN's review action is "ACCEPTED AS NOTED", the Submittal will be stamped as such, and electronically transmitted back to the CONTRACTOR. Upon receipt of this notification from the TOWN, The CONTRACTOR shall resubmit one (1) conformed electronic copy in PDF file format to the TOWN for final distribution. If the Submittal is required to be signed and sealed by a Professional Engineer registered in the State of Florida, it shall be signed and sealed at this time. Submittal will not be considered final until all copies have been received by the TOWN. Submittal will be stamped "DISTRIBUTION COPY (PREVIOUSLY ACCEPTED)" by the TOWN. Accepted Submittals transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the Submittal and resubmit for review.
  - h. Following completion of the WORK and prior to final payment, furnish those drawings necessary to indicate "AS CONSTRUCTED" conditions, including field modifications. Furnish additional copies for insertion in equipment instruction books as required. All such copies shall be clearly marked "AS BUILT DRAWING."
  - i. WORK requiring a Compliance Submittal shall not be commenced or shipped until the Submittal has been stamped "ACCEPTED AS SUBMITTED" or "ACCEPTED AS NOTED" by the TOWN.
  - j. Keep a legible copy or sample of each Compliance Submittal at the Site.
3. Copies of the equipment CONTRACTOR's erection drawings and other Compliance Submittals required for the installation of equipment furnished by others under separate Contract for installation under this Contract will be transmitted to CONTRACTOR by the TOWN in the final distribution of such Submittals.
  4. Information to MANUFACTURER's Office: MANUFACTURERS and Suppliers of Equipment and Materials shall furnish copies of all agreements, drawings, specifications, operating instructions, correspondence, and other matters associated with this Contract to the MANUFACTURER's office servicing the TOWN. Insofar as practicable, all business matters relative to Equipment and Materials included in this Contract shall be conducted through such local offices.

E. TOWN's Review:

1. The TOWN will review and return Compliance Submittals to CONTRACTOR with appropriate notations. Instruction books and similar Submittals will be reviewed by the TOWN for general content but not for substance.
2. The TOWN's acceptance of Compliance Submittals will not relieve CONTRACTOR from his responsibility as stated in the General Terms and Conditions.

F. Instruction Books / Operation & Maintenance Manuals:

1. Equipment instruction books and manuals shall be prepared by the MANUFACTURER and shall include the following:
  - a. Index and tabs
  - b. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and data sheets showing model numbers
  - c. Applicable drawings
  - d. Name of contact person, phone number, and address of the nearest authorized service facility
  - e. Attached to the above shall be a notice of the exact warranty effective dates, beginning and ending.

- f. All additional data specified
- 2. Information listed above shall be submitted electronically in a PDF file format.
  - a. Instruction Books/Operation & Maintenance Manuals shall contain the following:
    - i. Equipment name
    - ii. MANUFACTURER's name
    - iii. Project name
    - iv. Contract number
    - v. Reference to applicable Drawing No. & Technical Specifications Section
  - b. Format: The overall manual should be constructed around certain types of structures or equipment in the Project, and not merely assembled by technical specification section, so that all pertinent data needed by personnel to operate or maintain the equipment or structure is in one (1) manual (as far as is practical). The CONTRACTOR shall coordinate with the TOWN as to how the manuals are to be assembled (Bookmarked).

G. Samples:

- 1. Office samples shall be of sufficient size and quantity to clearly illustrate the following:
  - a. Functional characteristics of the product, with integrally related parts and attachment devices
  - b. Full range of color, texture, and pattern

1.04 MISCELLANEOUS SUBMITTALS:

- A. Miscellaneous Submittals are comprised of technical reports, administrative Submittals, and warranties which relate to the WORK, but do not require TOWN's approval prior to proceeding with the WORK. Miscellaneous Submittals may include but are not limited to (at TOWN's discretion):
  - 1. Welder qualification tests
  - 2. Welding procedure qualification tests
  - 3. X-ray and radiographic reports
  - 4. Field test reports
  - 5. Concrete cylinder test reports
  - 6. Certification on Materials:
    - a. Steel mill tests
    - b. Paint lab tests
    - c. Cement tests
  - 7. Soil test reports
  - 8. Temperature records
  - 9. Shipping or packing lists
  - 10. Job progress schedules
  - 11. Equipment and Material delivery schedules
  - 12. Progress photographs
  - 13. Warranties
  - 14. Fire protection and hydraulic calculations

15. Surveying field notes, preliminary and final Surveyor's Reports
16. Pump tests
17. Traffic control plan
18. Technical Reports
19. Written Certificates and Warranties

B. Transmittal of Miscellaneous Submittals:

1. All Miscellaneous Submittals furnished by Subcontractors, MANUFACTURERS, and Suppliers shall be submitted to TOWN by CONTRACTOR in an electronic PDF file format, unless otherwise specified.
  - a. Identify each miscellaneous Submittal by Project name and number, Contract title and number, and the specification section and article number marked thereon or in the letter of transmittal. Unidentifiable Submittals will be returned for proper identification.
  - b. Check and stamp Miscellaneous Submittals of Subcontractors, Suppliers, and MANUFACTURERS with CONTRACTOR's approval prior to transmitting them to the TOWN. CONTRACTOR's stamp of approval shall constitute a representation to the TOWN that CONTRACTOR has either determined and verified all information, or he assumes full responsibility for doing so, and that he has coordinated Miscellaneous Submittal with the requirements of the WORK and the Contract Documents.
  - c. At the time of each submission, call to the attention of the TOWN in the letter of transmittal any deviations from the requirements of the Contract Documents.
  - d. Make all modifications noted or indicated by TOWN and return revised copies until accepted. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by the TOWN on previous Submittals. After Submittals have been accepted, submit copies thereof for final distribution.
2. Test Reports:
  - a. Responsibilities of CONTRACTOR and TOWN regarding tests and inspections of Equipment and Materials and completed WORK are set forth elsewhere in these Contract Documents.
  - b. The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports in an electronic PDF file format to the following parties, unless otherwise specified:
    - i. TOWN
    - ii. Resident Project Representative
    - iii. CONTRACTOR
    - iv. MANUFACTURER or supplier

C. TOWN'S Review:

1. TOWN will review Miscellaneous Submittals for indications of WORK or material deficiencies within fifteen (15) working days in TOWN's office for original Submittals and ten (10) working days for reviewing resubmittals.
2. TOWN will respond to CONTRACTOR on those Miscellaneous Submittals which indicate WORK or material deficiency.

**PART 2 - PRODUCTS (Not applicable)**

**PART 3 - EXECUTION**

- 3.01 SUBMITTAL LOG: CONTRACTOR shall maintain an accurate Submittal Log and a Distribution List for the duration of the WORK, showing current status of all Submittals and Distributees at all times in a form acceptable to the TOWN. CONTRACTOR shall make the Submittal Log available to the TOWN for its review on request and shall bring a copy of the Submittal Log to all Progress Meetings.

END OF SECTION

SECTION 01320 CONSTRUCTION VIDEO AND PHOTOGRAPHS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: This SECTION specifies administrative and procedural requirements for construction photographs.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 - Submittals

1.02 SUBMITTALS:

- A. Submit photographs electronically as specified in SECTION 01300 and in PART 3, this SECTION.

1.03 QUALITY ASSURANCE:

- A. Photographs and video shall be clear and sufficient to show significant detail, not blurred, or taken in shadow, nor too distant. The TOWN may require that the photographs or video be retaken should the quality be insufficient. Costs for such re-takes are the CONTRACTOR's responsibility at no extra cost to the TOWN.

**PART 2 - PRODUCTS**

2.01 PHOTOGRAPHIC REQUIREMENTS:

- A. Specified in PART 3, this SECTION.

**PART 3 - EXECUTION**

3.01 COLOR AUDIO VIDEO TAPING OF CONSTRUCTION AREA:

- A. Prior to beginning any construction, the CONTRACTOR shall prepare a digital color audio video recording of all the areas to be affected by construction.
- B. The audio video recording shall be done within the two-week period prior to placement of materials or equipment on the construction area and furnished one week prior to the start of construction. The audio video recording shall be done with a TOWN Representative present.
- C. To preclude the possibility of tampering or editing in any manner, all video recordings shall, by electronic means, generate and display continuously and simultaneously on the screen digital information to include the date and time of recording. The time information shall consist of hours, minutes and seconds, separated by colons (i.e., 10:35:18).
- D. The audio video recording shall consist of one video and one audio track which shall be recorded simultaneously. All tracks shall consist of original live recordings and thus shall not be copies of other audio and video recordings. The audio track shall contain the narrative commentary.
- E. The rate of speed in the general direction of travel of the conveyance used during recording shall be controlled to provide a usable image. Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that playback will produce clarity of the object viewed.
- F. All recording shall be done during times of good visibility. No recording shall be done during periods of visible precipitation, unless otherwise authorized by the TOWN.



- G. The TOWN shall have the authority to designate what areas may be omitted or added for audio video coverage.
- H. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be less than eight feet to insure perspective.
- I. In some instances, audio video coverage will be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance by the TOWN.
- J. Areas covered shall include offsite roadways that will be subjected to heavy usage such as for haul routes or delivery of heavy components or equipment.

3.02 PROGRESS SITE PHOTOGRAPHS:

- A. The CONTRACTOR shall be responsible for photographs of the Site to show the existing and general progress of the WORK. The TOWN will advise as to which views are of interest. Photographs shall be taken of the following areas and at the following times.
  - 1. Existing Site conditions before Site WORK is started. Number of views shall be adequate to cover the Site.
  - 2. Progress of the WORK from beginning and throughout construction shall be documented in photographs with views from the ground level and below. Photographs must also be taken from an aerial perspective at least monthly. Progress photos must be provided with each pay request. Pay requests will not be considered acceptable until photographs are provided. Number of views shall be adequate to cover the Site.
  - 3. Finished Project after completion of WORK. Number of views shall be adequate to show the finished WORK.
  - 4. If Project is not completed during the Contract Time, or authorized extensions, photographs shall continue to be taken at no increase in Contract Price.
- B. Photographs shall be taken with sixteen (16) megapixel minimum resolution.
- C. Provide a CD containing all photographic images in JPG format. Label CD with the name and Contract number of Project, name of CONTRACTOR, description of view, and date photograph was taken.
- D. Deliver CD to TOWN with pay applications.

3.03 ADDITIONAL PHOTOGRAPHS:

- A. From time to time the TOWN may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order, and are not included in the Contract Price or an Allowance.
  - 1. The TOWN will give the photographer three (3) days' advance notice, where feasible.
  - 2. In emergency situations, the photographer shall take additional photographs within 24 hours of the TOWN's request.
  - 3. Circumstances that could require additional photographs include, but are not limited to:
    - a. Substantial Completion of a major phase or component of WORK.
    - b. TOWN's request for special publicity photographs.
    - c. Special events planned at Project Site.
    - d. Immediate follow-up when on-site events result in construction damage or losses.
    - e. Photographs to be taken at fabrication locations away from Project Site.

- f. Extra record photographs at time of final acceptance.

END OF SECTION

SECTION 01410 TESTING AND QUALITY CONTROL

**PART 1 - GENERAL**

1.01 SCOPE:

A. Summary of Work:

1. The CONTRACTOR shall provide and maintain an effective Quality Control Program that fulfills the requirements of the GENERAL TERMS & CONDITIONS.
2. The CONTRACTOR shall establish and implement a Quality Control Plan to perform sufficient inspection of all items of the WORK, including that of Subcontractors, to insure conformance to the Technical Specifications and the Drawings with respect to the materials, workmanship, construction, equipment performance, and identification.
3. 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 defective work.
4. After the Contract is awarded and before the construction begins, the CONTRACTOR shall meet with the TOWN or its representative to discuss quality control requirements. The meeting shall develop mutual understanding relative to the details of the Quality Control Plan, including the appropriate forms to be used for recording the quality control operations, inspections, administration of the Quality Control Plan, and the interrelationship of the CONTRACTOR and the TOWN inspection.
5. The 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 testing and inspection activities for on and off-site construction activities.
6. All compliance inspections shall be recorded on the appropriate forms, including but not limited to the specific items required in each SECTION of the Technical Specifications. The completed forms, including record of corrective actions taken, shall be furnished to the TOWN. The TOWN's quality control representative will maintain a list of all deficiencies which are not corrected the same day as they are discovered.
7. Should recurring deficiencies in an item or items indicate that the Quality Control Plan is not adequate, the CONTRACTOR shall take corrective actions as directed by the TOWN to update the Quality Control Plan, to satisfactorily address and resolve any reoccurring deficiencies.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

1.02 TESTING LABORATORY SERVICES:

- A. 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 the TOWN. The laboratory shall be staffed with experienced technicians, and shall be properly equipped, ACI certified, and fully qualified to perform the tests in accordance with the specified standards.

1.03 TESTING LABORATORY SERVICES FURNISHED BY CONTRACTOR:

- A. All testing required in connection with the performance of the WORK as described in paragraph C below and identified as the CONTRACTOR's responsibility elsewhere 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 TOWN within five (5) days of the test.
- B. The CONTRACTOR is also responsible for all testing and inspection services required to achieve an effective Quality Control Program, to assure that the WORK strictly complies with the Contract requirements. The CONTRACTOR shall pay all costs for such services. The CONTRACTOR shall also pay for any tests performed by the TOWN which do not meet the requirements of the Technical Specifications.
- C. The CONTRACTOR will secure the services of a materials testing company and pay all charges, for field and laboratory tests, for the following items of the WORK: 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 the tests required for the Grouting Beneath Structures. The field sampling and testing will be performed in the general manner indicated in the Technical Specifications, with minimal interference to the construction operations.

While the CONTRACTOR may request testing in order to proceed to a following construction stage, the TOWN will determine the exact time and location of the field sampling and testing and may require additional sampling and/or testing as necessary to determine that the materials and equipment conform with the CONTRACTOR-submitted data and with the Contract Documents.

- D. Arrangements for the delivery of samples and test specimens to the testing laboratory 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.
- E. The CONTRACTOR shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the WORK when necessary.
- F. When sampling or testing activities are performed in the field by testing laboratory personnel, the CONTRACTOR shall furnish personnel and facilities to assist in the activities.
- G. The Testing Laboratory contracted by the CONTRACTOR 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.
  - 4. The CONTRACTOR shall provide at least 48 hours advance notice of any work for which he may desire required testing for compliance.

#### 1.04 TRANSMITTAL OF TEST REPORTS:

- A. Written reports of test and engineering data furnished by the CONTRACTOR shall be submitted as specified in SECTION 01300.

END OF SECTION

SECTION 01530 TEMPORARY BARRIERS AND CONTROLS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: This SECTION includes General Requirements for:
  - 1. Protection of the WORK
  - 2. Protection of existing property
  - 3. Barriers
  - 4. Security
  - 5. Environmental controls
  - 6. Access roads and parking areas
  - 7. Traffic control and use of roadways
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals
  - 2. SECTION 02435 - Turbidity Control and Monitoring
  - 3. SECTION 02215 – Protection of Existing Structures
  - 4. SECTION 02436 – Environmental Protection

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.
  - 1. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

3.01 SAFETY AND PROTECTION OF WORK AND PROPERTY:

- A. General:
  - 1. The CONTRACTOR shall provide for the protection of the WORK as set forth in the GENERAL TERMS & CONDITIONS. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all WORK and Equipment and Materials free from injury or damage. At the end of each day all new WORK likely to be damaged shall be appropriately protected.
  - 2. The CONTRACTOR shall notify the TOWN immediately if at any time, operations are stopped due to conditions which make it impossible to continue or to obtain proper results.
  - 3. The CONTRACTOR shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, pits, and trenches dewatered sufficiently to permit continuous construction.

4. The CONTRACTOR shall protect floors from damage by proper covering and care when handling heavy equipment, painting, or handling mortar or other such materials. Use proper cribbing and shoring to prevent overloading of floors while moving heavy equipment. Provide metal pans under pipe-threading machines and other machines that may leak oil and clean such pans daily, keeping oil off the floors. Restore floors to former condition where damaged or stained.
  5. The CONTRACTOR shall not load concrete floors less than 28-days old without the written permission from the TOWN.
  6. The CONTRACTOR shall restrict access to roofs except as required by the WORK. Where access is required, provide protection with plywood, boards, or other suitable materials.
- B. Property Other than TOWN's:
1. The CONTRACTOR shall provide for the protection of property as set forth in the GENERAL TERMS & CONDITIONS. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.
  2. Names and telephone numbers of representatives of the power company having jurisdiction over power lines in the WORK area can be obtained from the TOWN. The CONTRACTOR shall contact the power company a minimum of seven (7) calendar days prior to performing WORK within 500' of power transmission line property, right-of-way or easement lines.
  3. The applicable requirements specified for protection of the WORK shall also apply to the protection of existing property of others.
  4. The CONTRACTOR shall restore all property affected by the CONTRACTOR's operations to the original or better condition, to the satisfaction of the TOWN.

### 3.02 BARRIERS:

A. General:

1. The CONTRACTOR shall furnish, install, and maintain suitable barriers as required to prevent public entry, protect the public, and to protect the WORK, existing facilities, trees, and plants from construction operations. Remove the barriers when no longer needed or at completion of the WORK.
2. The CONTRACTOR may use new or used materials, suitable for the intended purpose, but must not violate requirements of applicable codes and standards or of regulatory agencies.
3. Barriers shall be of a neat and reasonably uniform appearance, structurally adequate for the required purposes.
4. The CONTRACTOR shall maintain barriers in good repair and a clean condition for adequate visibility.
5. The CONTRACTOR shall relocate barriers as required by progress of the WORK.
6. The CONTRACTOR shall repair damage caused by the installation of barriers and restore damaged areas to original or better condition, to the satisfaction of the TOWN.

### 3.03 ENVIRONMENTAL CONTROLS:

A. Dust Control:

1. If appropriate and at the discretion of the TOWN, the CONTRACTOR shall provide and apply methods of positive dust control to minimize raising dust from construction operations.
2. The CONTRACTOR shall clean interior spaces and surfaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

3. The CONTRACTOR shall schedule operations so that dust and other contaminants will not fall on wet or newly-coated surfaces.
  4. The CONTRACTOR shall cover materials transported to and from Site as necessary to prevent depositing material on offsite roadways or creating dust.
- B. Water and Erosion Control:
1. The CONTRACTOR shall provide methods necessary to control surface water to prevent damage to the WORK, the Site, or adjoining properties as specified in SECTION 02435.
  2. The CONTRACTOR shall control fill, grading, and ditching to direct surface water away from excavations and other construction areas, and to direct surface water to proper storage and/or conveyance facilities.
  3. The CONTRACTOR shall control surface water and ground water as necessary to prevent flooding, erosion, or other damage to any portion of the Site and/or to adjoining areas.
- C. Debris Control and Clean-Up:
1. The CONTRACTOR shall keep the premises free at all times from accumulations of debris, waste materials, and rubbish. The CONTRACTOR's responsibilities shall include, but not be limited to the following:
    - a. Adequate trash receptacles at the Site, emptied promptly when filled.
    - b. Periodic cleanup to avoid hazards or interference with operations at the Site and to maintain the Site in a reasonably neat condition.
    - c. The keeping of construction materials such as forms and scaffolding neatly stacked.
    - d. Immediate cleanup to protect the WORK by removing splattered concrete, oil, paint, corrosive liquids, and cleaning solutions from walls, floors, and other surfaces before the surfaces are marred.
  2. The CONTRACTOR shall prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.
  3. Final cleanup is specified in SECTION 01700.
- D. Pollution Control:
1. The CONTRACTOR shall provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.
  2. The CONTRACTOR shall provide equipment and personnel and perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in approved locations and replace with suitable compacted fill and topsoil.
  3. The CONTRACTOR shall take special measures to prevent harmful substances from entering public waters, sanitary sewers, or storm sewers.
  4. If hazardous materials are discharged, report to authorities as required by applicable law or regulations and notify the TOWN, immediately.

### 3.04 TRAFFIC CONTROL AND USE OF ROADWAYS:

- A. Traffic Control:
1. The CONTRACTOR shall provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite safe vehicular traffic flow on haul routes, at Site entrances, onsite access roads, and parking areas. This includes barricades

and other devices or personnel as necessary to adequately protect the public. Prepare and submit a Traffic Control Plan to TOWN for review.

2. The CONTRACTOR shall remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified conditions.
  3. The CONTRACTOR shall provide and maintain suitable detours or other temporary expedients if necessary.
  4. Bridge over open trenches where necessary to maintain traffic.
  5. The CONTRACTOR shall consult with applicable governing authorities to establish public thoroughfares which will be used for Site access. All operations shall meet the approval of owners or agencies having jurisdiction.
- B. Maintenance of Roadways:
1. The CONTRACTOR shall repair roads, off-site roads, water control and TOWN structures damaged by operations. Keep traffic areas as free as possible of excavated materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.
  2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

### 3.05 SECURITY:

- A. The CONTRACTOR is solely responsible for initiating and maintaining security at the construction Site. CONTRACTOR shall take all necessary precautions for the security of, and shall provide the necessary protection to:
1. Materials and equipment incorporated into the WORK or stored on-site prior to incorporation into the WORK.
  2. Temporary field offices and sheds, and their contents if any and applicable.
  3. Plant and equipment including any equipment furnished for use by the TOWN.
- B. The CONTRACTOR shall replace, in kind, any materials or equipment lost, damaged or destroyed at no cost to the TOWN.

END OF SECTION



SECTION 01570 TRAFFIC CONTROL

**PART 1 - GENERAL**

1.01 SCOPE:

A. Summary of Work:

1. The WORK of this SECTION shall consist of furnishing all labor, material, and equipment and performing all operations in connection with traffic control in accordance with the Drawings and applicable codes and as specified herein.
2. The CONTRACTOR shall provide Maintenance of Traffic in accordance with the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction Section 102 and FDOT Standard Index No. 102.

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. The Florida Department of Transportation, "Standard Specifications for Road and Bridge Construction" (FDOT)
2. American Association of State Highway and Transportation Officials (AASHTO)
3. American Society for Testing and Materials (ASTM)
4. County Codes
5. U. S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices" (FHWA)

**PART 2 - PRODUCTS**

2.01 GENERAL:

- A. Coordinate with the Drawings to verify which of the following products is used in the WORK.

2.02 HIGHWAY SIGNING:

- A. Erecting aluminum or steel roadway signs with supporting posts, at the locations shown on the plans. The roadway signs and material shall conform to the requirements on FDOT Standard Specifications: Section 700, Articles 700-1 through 700-6.3.

2.03 REFLECTIVE PAVEMENT MARKERS:

- A. Installing reflectorized pavement markers and removing pavement markers within the Project limits as designated in the plans. The reflectorized pavement markers and materials shall conform to the requirements of FDOT Standard Specifications: Section 706, Articles 706-1 through 706-2.

2.04 PAINTING TRAFFIC STRIPES:

- A. Painting reflectorized traffic stripes, including edge stripes and traffic guide. The painting and materials shall conform to the requirements of FDOT Standard Specifications: Section 710, Article 710-1 through 710-2.

2.05 THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS:

- A. Placing and materials shall conform to the requirements of FDOT Standard Specifications: Section 711, Articles 711-1 through 711-2.

**PART 3 - EXECUTION**

3.01 SIGNS, MARKERS, PAINTING:

- A. Erection of signs and sign supports shall be in accordance with Section 700-6.3 of the FDOT Specifications.
- B. Placement of the markers shall be in accordance with Sections 710-3 through 710-8 of the FDOT Specifications.
- C. Painting shall be in accordance with Sections 710-3 through 710-8 of the FDOT Specifications.
- D. Thermoplastic markings shall be in accordance with Sections 711-3 through 711-8 of the FDOT Specifications.

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION AND INFORMATIONAL SIGNS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: This SECTION includes basic requirements for temporary Project Identification and Informational signs required during construction.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 1300 Submittals

1.02 SUBMITTALS:

- A. Submit as specified in SECTION 01300.
- B. Includes, but not limited to, the following:
  - 1. Shop Drawings, sign materials, sign proofs and product data as applicable.
  - 2. Show content, layout, lettering, colors, and structure.

**PART 2 - PRODUCTS**

2.01 DESIGN REQUIREMENTS:

- A. The CONTRACTOR shall design sign(s) and structure(s) to withstand wind and environmental conditions in accordance with all applicable laws and regulations. Provide with a finish adequate to withstand weathering, fading, chipping, and peeling for duration of construction.

2.02 IDENTIFICATION SIGNS:

- A. Project Identification:
  - 1. The CONTRACTOR shall construct sign mounting structure(s) and framing of wood or metal, structurally adequate to meet the requirements of Paragraph 2.01 above and/or as shown on the Contract Documents.
  - 2. The Project Identification sign panel shall be constructed of minimum 3/4-inch thickness B/C exterior grade plywood. Panels shall be one sheet with an overall size of 48 inches by 96 inches. Fonts shall be 3 inches high.
  - 3. Rough hardware shall be galvanized steel or aluminum.
  - 4. Coating: Paint shall be suitable for outdoor applications and shall be resistant to weathering, peeling, chipping and fading. Sign colors shall be approved by the TOWN.
  - 5. Information Content:
    - a. Project title/name, location, TOWN logo and name as shown on the Contract Documents
    - b. Names and titles of authorities (i.e. Governing Board Members, etc.)
    - c. Name of prime CONTRACTOR and major Subcontractors
- B. CONTRACTOR Identification: If not a part of the Project identification sign, provide and install the CONTRACTOR's standard sign.
- C. Design Engineer Identification: Design Engineer will provide, install and maintain his own signs.

2.03 INFORMATIONAL SIGNS:

A. Construction:

1. This includes signs for traffic, construction workers, and general public in regard to directions, warnings, hazards, locations of areas, facilities, equipment, and others of a similar nature.
2. The CONTRACTOR shall provide signs of design, size, color, and lettering as required by regulatory agencies and/or as shown on the Contract Documents. Signs shall be painted metal, plastic, or fiberglass. Materials shall be suitable for the conditions in which signs are to be placed, such as weathering and fading.
3. The CONTRACTOR shall construct sign mounting structure(s) and framing of wood or metal, structurally adequate to meet the requirements of Paragraph 2.01 above and/or as shown on the Contract Documents.

**PART 3 - EXECUTION**

3.01 INSTALLATION:

A. Project and Contractor Identification Signs: The CONTRACTOR shall

1. Install all required signs in locations acceptable to the TOWN. Install so as not to obstruct traffic or construction operations.
2. Erect on framing or foundation, and rigidly brace.
3. Maintain signs in good repair, in a neat, clean and readable condition.
4. Remove all signs, framing, supports, and foundations upon completion of the Project.

B. Informational Signs: The CONTRACTOR shall

1. Install at appropriate locations and in sufficient quantities to assure visibility. Relocate as required by progress of the WORK.
2. Maintain signs in good repair, in a neat, clean, and readable condition.
3. Remove all signs, framing, supports, and foundations upon completion of the Project.

END OF SECTION

SECTION 01600 EQUIPMENT AND MATERIALS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: This SECTION includes general requirements for transportation, handling, delivery, storage, and protection of CONTRACTOR and TOWN - furnished Equipment and Materials.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals
  - 2. SECTION 01630 - Product Options and Substitutions

1.02 DEFINITIONS: Definitions used in this Paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.

- A. Products: Items purchased for incorporation in the WORK, regardless of whether they were specifically purchased for the Project or taken from the previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and other terms of similar intent.
- B. Equipment: A product with operational or non-operational parts, regardless of whether motorized, manually operated, or fixed. Equipment may require service connections such as wiring or piping.
- C. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of the WORK.

1.03 QUALITY CONTROL:

- A. Equipment and Material Incorporated into the WORK: Provide products that comply with the requirements of the Contract Documents, are undamaged, and unless otherwise indicated, are unused at the time of installation. The CONTRACTOR shall provide products that are complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.
- B. Standard Products: Where they are available and comply with the Technical Specifications, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- C. Continued Availability: Where, because of the nature of its application, the TOWN is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the MANUFACTURER has published assurances that the products and its parts are likely to be available to the TOWN at a later date.
  - 1. Conform to applicable Technical Specifications, codes, standards, and regulatory agency requirements.
  - 2. Comply with size, make, type, and quality specified, or as specifically approved in writing by the TOWN.
  - 3. Manufactured and Fabricated Products:
    - a. Design, fabricate, and assemble in accordance with the best engineering and shop practices.
    - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

- c. Equipment and Materials shall be suitable for service conditions intended.
  - d. Equipment capacities, sizes, and dimensions indicated or specified shall be adhered to unless variations are specifically approved in writing.
  - e. Provide labels and nameplates where required by regulatory agencies or to state identification and essential operating data.
  - f. Two (2) or more items of the same kind shall be identical, supplied by the same MANUFACTURER.
4. Do not use equipment and material for any purpose other than that for which it is designed or is specified.
- D. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
- E. Identification: Each item of equipment shall have permanently affixed to it a label or tag with its equipment number designated in this Contract. The label or tag shall be stainless steel and shall be located so as to be easily visible.

1.04 TRANSPORTATION AND SHIPMENT:

- A. Shipment Preparation: The CONTRACTOR shall require MANUFACTURERS and suppliers to prepare Equipment and Materials for shipment in a manner to facilitate unloading and handling, and to protect against damage or unnecessary exposure in transit and storage, for CONTRACTOR supplied equipment. Provisions for protection shall include the following:
- 1. Crates or other suitable packaging materials
  - 2. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and accumulation of dirt in motors, electrical equipment, and machinery
  - 3. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel
  - 4. Grease packing or oil lubrication in all bearings and similar items
  - 5. Precast concrete components shall be transported, lifted and stored as specified by the precast supplier. Precast supplier shall provide written instructions to the CONTRACTOR as to the above. The CONTRACTOR shall provide a copy to the TOWN.
- B. Marking: Each item of Equipment and Material shall be tagged or marked as identified in the delivery schedule or on Submittals, submitted in accordance with SECTION 01300. Complete packing lists and bills of material shall be included with each shipment. Each piece of every item need not be marked separately, provided that all pieces of each item are packed or bundled together and the packages or bundles are properly tagged or marked.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Delivery – The CONTRACTOR shall:
- 1. Arrange deliveries of Equipment and Materials in accordance with cost loaded construction schedules, in ample time to facilitate inspection prior to installation, and to avoid delay of the WORK.
  - 2. Deliver, store, and handle Equipment and Materials in accordance with the MANUFACTURER's recommendations using means and methods that will prevent damage, deterioration, and loss, including theft.
  - 3. Control delivery schedules to minimize long term storage at the Site and to prevent overcrowding of construction areas. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

4. Avoid conflict with Work of TOWN or other contractors.
  5. Deliver Equipment and Materials to the Site in MANUFACTURER's sealed containers or other packaging system with identifying labels and instructions for handling, storing, unpacking, protecting, and installing.
  6. Mark deliveries of component parts of equipment to identify the equipment, to permit easy accumulation of parts, and to facilitate inspection and measurement of quantity or counting of units.
  7. Immediately upon delivery, inspect shipment to assure:
    - a. That each product complies with requirements of Contract Documents and reviewed Submittals.
    - b. Quantities are correct.
    - c. Containers and packages are intact, labels are legible.
    - d. Equipment and Materials are properly protected and undamaged.
- B. Storage – The CONTRACTOR shall:
1. Store Equipment and Materials immediately after delivery and protect it as necessary until completion of the WORK. Store in accordance with MANUFACTURER's instructions with seals and labels intact and legible.
  2. Store Equipment and Materials in a manner that will not endanger the supporting construction and/or existing structures and facilities.
  3. Store Equipment and Materials that are subject to damage by elements in weathertight enclosures.
  4. Maintain temperature and humidity within ranges required by the MANUFACTURER.
  5. Protect motors, electrical equipment, plumbing fixtures, and machinery of all kinds against corrosion, moisture deteriorations, mechanical injury, and accumulation of dirt or other foreign matter.
  6. Protect exposed-machined surfaces and unpainted iron and steel as necessary with suitable rust-preventive compounds.
  7. Protect bearings and similar items with grease packing or oil lubrication.
  8. Handle and store steel plate, sheet metal, and similar items in a manner to prevent deformation.
  9. Exterior Storage – The CONTRACTOR shall:
    - a. Provide platforms, blocking, or skids to support fabricated products aboveground; and to prevent soiling, staining and damage. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
    - b. Store loose granular materials on solid surface areas to prevent mixing with foreign matter.
    - c. Provide surface drainage to prevent flow or ponding of rainwater.
  10. Equipment and Materials shall not show any pitting, rust, decay, or other deleterious effects of storage prior to final acceptance of WORK.
  11. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and are free from damage or deterioration.
- C. Handling – The CONTRACTOR shall:

1. Provide equipment and personnel necessary, to properly unload and handle Equipment and Materials, by methods to prevent damage, soiling and /or staining of the Equipment and Materials, or packaging.
  2. Handle by methods to prevent bending or overstressing. Where lifting points are designated, lift components only at those points.
  3. Provide additional protection to surrounding surfaces as necessary to prevent damage.
- D. Maintenance of Storage – The CONTRACTOR shall:
1. Inspect stored Equipment and Materials on a regularly scheduled basis.
  2. Verify that storage facilities comply with the MANUFACTURER's product storage requirements, including environmental conditions continually maintained.
  3. Verify that surfaces of products exposed to elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.
  4. For mechanical and electrical equipment in long-term storage, provide the MANUFACTURER's service instructions to accompany each item, with notice of enclosed instructions on the exterior of the package. Service the Equipment, as necessary on a regularly scheduled basis.
- E. Protection after installation – The CONTRACTOR shall:
1. Provide substantial coverings as necessary to protect all installed Equipment and Materials from damage from subsequent construction operations. Remove the protective coverings when no longer needed or as specified.

1.06 EXISTING EQUIPMENT AND MATERIALS:

- A. Equipment and Materials to be reused:
1. For Equipment and Materials specifically indicated or specified to be reused in the WORK, use special care in removal, handling, storage, and reinstallation to assure proper function in the completed WORK.
  2. Arrange for transportation, storage and handling of products which require off-site storage, restoration, or renovation and pay all costs for such work.
  3. The CONTRACTOR may at his option, furnish and install new items in lieu of those specified to be reused.
- B. Equipment and Materials designated to be removed but not reused or delivered to TOWN, shall become the property of the CONTRACTOR and shall be removed from the Site.

**PART 2 - PRODUCTS**

2.01 PRODUCTS AND MANUFACTURERS:

- A. Specified in each applicable SECTION of the Technical Specifications and/or Drawings.

2.02 PRODUCT SELECTION AND SUBSTITUTIONS:

- A. Specified in the Instructions to Bidders and General Terms & Conditions

**PART 3 - EXECUTION**

3.01 MANUFACTURER'S INSTRUCTIONS:



A. Installation:

1. When Contract Documents require that installation of WORK shall comply with MANUFACTURER's printed instructions, the CONTRACTOR shall:
  - a. Obtain and distribute copies of such instructions if not a part of Submittals, containers, or packaging to all parties involved in the installation, including a copy to the TOWN.
  - b. Maintain one complete set of instructions at the Site during installation and until Final Acceptance.
  - c. Handle, install, connect, clean, condition, and adjust all products in accordance with such instructions and in conformance with the specified requirements. Should job conditions or specified requirements conflict with the MANUFACTURER's instructions, consult with the TOWN for further instructions.
  - d. Not omit any preparatory step or installation procedure unless specifically modified or exempted by the Contract Documents, or approved in writing by the MANUFACTURER and the TOWN.
  - e. Accurately locate and align with other work, and anchor all Equipment and Materials securely in place except as required for proper movement and performance.
  - f. Clean and protect all exposed surfaces as necessary to ensure freedom from damage and deterioration until Final Acceptance.

END OF SECTION

SECTION 01630 PRODUCT OPTIONS AND SUBSTITUTIONS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. This SECTION covers the TOWN's review procedures for CONTRACTOR's requests of acceptable substitute items of material and equipment. All requests for substitution shall be made no earlier than the Effective Date of the Contract. See Instructions to the Bidders of this Contract Document. A determination of acceptability or rejection of the substitution request will be made in accordance with the General Terms and Conditions.
- B. Requests received prior to the date established above will not be considered.
- C. Substitutions may be approved at the TOWN's sole discretion where one or more of the following conditions apply:
  - 1. The substitution must be required for compliance with final interpretation of code requirements or regulations.
  - 2. The substitution must be due to the unavailability of the specified products, through no fault of the CONTRACTOR.
  - 3. The substitution may be requested when subsequent information discloses the inability of the specified products to perform properly or to fit in the designated space.
  - 4. The substitution may be requested when in the judgment of the TOWN a substitution would be substantially to the TOWN's best interests in terms of cost, time or other considerations.
- D. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals
  - 2. SECTION 01600 – Equipment and Materials

1.02 SUBSTITUTION REQUEST:

- A. Submit as required in SECTION 01300:
  - 1. Complete data substantiating compliance of the proposed substitution with the Contract Document
    - a. Product identification including MANUFACTURER's name and address
    - b. MANUFACTURER's literature including product description, performance and test data, and reference standards
    - c. Name and address of similar projects on which product was used and dates of installation
  - 2. Itemized comparison of proposed substitution with product or method specified
  - 3. Data relating to changes in the construction schedule
  - 4. Accurate cost data on proposed substitution in comparison with product or method specified
- B. In submitting the request for substitution, the CONTRACTOR makes the following representations:
  - 1. The CONTRACTOR has investigated the proposed product and has determined that it is equal or superior in all respects to that specified.
  - 2. The CONTRACTOR will provide the same warranty or guarantee for the substitution as for the product specified.
  - 3. The CONTRACTOR will coordinate installation of the accepted substitution into the WORK, making such changes as may be required for the WORK to be completed in all respects.
  - 4. The CONTRACTOR waives all claims for additional costs related to substitution that subsequently becomes apparent.
  - 5. Cost data is complete and includes all related costs under the Contract.

1.03 TOWN ENGINEER'S REVIEW:

- A. The TOWN, in evaluating the request for substitution, will consider all variations of the proposed substitute from that specified to determine the acceptability of the proposal. The TOWN may require the CONTRACTOR to furnish additional data about the proposed substitute necessary to make such a determination. The TOWN will be the sole judge of acceptability, and no substitute will be ordered or installed without the TOWN's prior written acceptance. The TOWN may require the CONTRACTOR to furnish, at the CONTRACTOR's expense, a special performance guarantee or other surety with respect to any substitute. Substitutions will not be considered if:
1. Substitutions are indicated or implied on Shop Drawings or product data submittals without a request submitted in accordance with this SECTION.
  2. Acceptance will require substantial revision to the Contract Documents.

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: This SECTION includes administrative and procedural requirements for Contract Closeout including, but not limited to, the following:
  - 1. Inspection procedures
  - 2. Project record document submittal
  - 3. Operation and maintenance manual submittal
  - 4. Submittal of warranties
  - 5. Final cleaning
  - 6. CONTRACTOR's Certification
- B. Closeout requirements for specific construction activities are included in the appropriate SECTIONS in DIVISIONS 1 through 16.
- C. Related Work Specified Elsewhere:
  - 1. SECTION 01300 - Submittals
  - 2. SECTION 01050 - Field Engineering and Surveying
  - 3. SECTION 01530 - Temporary Barriers and Controls
  - 4. SECTION 01570 – Traffic Control
  - 5. SECTION 01580 – Project IDs and Informational Signs

1.02 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, the CONTRACTOR shall satisfy the following:
  - 1. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents. Submit in accordance with SECTION 01300.
  - 2. Obtain and submit releases enabling the TOWN unrestricted use of the WORK and access to services and utilities. Include Certificates of Occupancy (C.O.), operating certificates, and similar releases, as required.
  - 3. Submit Record Documents, including but not limited to, maintenance manuals, Project photographs, damage or settlement surveys, Boundary surveys, all As-Built and Topographic Surveys as per SECTION 01050 and similar record information as specified in Paragraph 1.04. All drawings shall be scanned and submitted in accordance with SECTION 01300, and in hard copy form, 24 inch by 36 inch plan size. All other documents shall also be scanned and submitted in accordance with SECTION 01300.
  - 4. Complete final cleanup requirements, including touch up painting.
  - 5. Touch up and otherwise repair and restore marred, exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the TOWN will either proceed with inspection or advise the CONTRACTOR of unfilled requirements. The TOWN will prepare the Certificate of Substantial Completion following inspection or advise the CONTRACTOR of WORK that must be completed or corrected before the certificate will be issued.
  - 1. The TOWN will reschedule the inspection when in its opinion, the WORK is substantially complete.

1.03 FINAL ACCEPTANCE:

- A. Preliminary Procedures: Submit certification by CONTRACTOR that WORK has been completed in accordance with the Contract Documents to the knowledge of the CONTRACTOR. Before requesting final inspection, complete the following:
  - 1. Submit the final payment request with releases and supporting documentation. Include insurance certificates for products and completed operations where required.
  - 2. Submit a letter certifying that all items listed as part of the Certification of Substantial Completion have been completed or corrected.
  - 3. Submit consent of surety to final payment.
  - 4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - 5. Submit Release of Liens (from the Prime, and all Subcontractors, Vendors and Suppliers).
  - 6. Submit Maintenance Bond (if applicable).
  - 7. The above shall be submitted in accordance with SECTION 01300.
- B. Reinspection Procedure: The TOWN will reinspect the WORK upon receipt of notice that the WORK, including inspection list items from earlier inspections, has been completed.
  - 1. Upon completion of reinspection, the TOWN will advise the CONTRACTOR of WORK that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
  - 2. If necessary, the reinspection will be repeated.
- C. Return all keys furnished by the TOWN.

1.04 RECORD DOCUMENT SUBMITTALS:

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure location. Provide access to record documents for the TOWN's reference during normal working hours.
- B. As-Built Drawings: Maintain a clean, undamaged set black line white-prints of Drawings and Shop Drawings. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set. Mark the set to show the actual installation where the installation varies substantially from the WORK as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Call attention to each entry by drawing a "cloud" around the areas affected.
- C. The TOWN will make electronic copies of whatever electronic versions of the Drawings exist, available to the CONTRACTOR for As-Built purposes. The CONTRACTOR must obtain concurrence from the TOWN as to form and content of record information provided in electronic format prior to proceeding, but in general, information similar to that noted below needs to be provided.
  - 1. Record information concurrently with construction progress.
  - 2. Mark record sets with red erasable pencil. Mark each document "AS-BUILT DRAWINGS" in neat, large, printed letters.
  - 3. Mark As-Built invert elevations. Refer to SECTION 01050 for structures which require a permanent benchmark.
  - 4. Mark new information that is important to the TOWN that is not shown on Drawings or Shop Drawings.
  - 5. Note related Change-Order numbers where applicable.
  - 6. Include the following:
    - a. Where Submittals (like Shop Drawings) are used for mark-up, record a cross-reference at corresponding location on Drawings.
    - b. Field changes of dimension and detail.
    - c. Changes made by Change Order or other Modifications.

- d. Details not on original Drawings.
  - e. As-Builts shall also include a plot of the actual excavation cross-sections plotted at the same station as overlaid on top of the design cross-sections.
  - f. As-Builts shall include a plot of the actual road and embankment cross-sections plotted at the same station as overlaid on top of the design cross-sections. Refer to SECTION 01050.
  - g. Give particular attention to concealed elements that would be difficult or expensive to locate at a later date.
  - h. GPS (global positioning system) coordinates of major structures using the format lat/long DD (decimal/degree) NAD83/2007 (North American Datum).
7. Record Specifications: Maintain one (1) complete copy of the Contract Documents including addenda. Include with the Contract Documents one (1) copy of other written construction documents, such as Requests for Information (RFIs), Change Orders and modifications issued in printed form during construction.
  8. Mark these documents to show substantial variations in actual WORK performed in comparison with the text of the Specifications and modifications.
  9. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
  10. Note related As-Built information and Product Data.
  11. Upon completion of the WORK, submit Record Specifications to the TOWN for the TOWN's records on CD in PDF format.
  12. Include the following:
    - a. MANUFACTURER, trade name, catalog number, and Supplier of each product and item of equipment actually installed, including optional and substitute items
    - b. Changes made by Addendum, Change Order, or other Modifications
    - c. Related Submittals
  13. Affix the CONTRACTOR's corporate seal on the cover sheet indicating the documents within are representative of the as-built condition of the Project. The seal shall be signed by an officer of the company.
- D. Record Product Data: Provide one (1) copy of each Product Data submittal. Note related Change Orders and markup of Record Documents.
1. Mark these documents to show significant variations in actual WORK performed in comparison with information submitted. Include variations in products delivered to the Site and from the MANUFACTURER's installation instructions and recommendations.
  2. Give particular attention to concealed products and portions of the WORK that cannot otherwise be readily discerned later by direct observation.
- E. Record Sample Submitted: Immediately prior to Substantial Completion, the CONTRACTOR shall meet with the TOWN's personnel at the Project Site to determine which Samples are to be transmitted to the TOWN for record purposes. Comply with the TOWN's instructions regarding packaging, identification, and delivery to the TOWN.
- F. Miscellaneous Record Submittals: Refer to other Specification SECTIONS for requirements of miscellaneous record keeping and submittals in connection with actual performance of the WORK. Immediately prior to the date or dates of Substantial Completion (unless otherwise specified), complete miscellaneous records and place in good order. Identify miscellaneous records properly, bind or file, and submit to the TOWN for the TOWN's records.
- G. Warranties and Bonds: Submit original documents as specified in General Terms & Conditions, Supplemental Conditions, SECTION 01300, and technical specifications.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

**3.01 FINAL CLEANING:**

- A. General: The General Terms & Conditions require general cleaning during construction. Regular Site cleaning is included in SECTION 01530.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with MANUFACTURER's instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.
    - a. Clean the Site of rubbish, litter, and other foreign substances. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
    - b. Remove temporary structures, tools, equipment, supplies, and surplus materials.
    - c. Remove temporary protection devices and facilities which were installed to protect previously completed WORK.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the WORK during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the TOWN's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems, surface waters or wetlands. Remove waste materials from the Site and dispose of lawfully.
  - 1. Where extra materials of value remain after completion of associated WORK, they become the TOWN's property. Dispose of materials of no value to the TOWN as directed by the TOWN.
- E. Repairs:
  - 1. Repair damaged protective coated surfaces.
  - 2. Repair roads and other items damaged or deteriorated because of construction operations, including those which have been damaged, but are not located within the Project limits.
  - 3. Restore all ground areas affected by construction operations.

END OF SECTION

SECTION 02050 DEMOLITION

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall include the removal of existing construction to limits indicated on drawings where earthwork or other construction operations are to be performed as specified herein. The TOWN shall not be responsible for the condition of any items to be removed or salvaged.

1.02 APPLICABLE PUBLICATIONS: (Not Used)

1.03 DEFINITIONS: (Not Used)

1.04 SUBMITTALS:

- A. Schedule of Demolition:
  - 1. Submit proposed methods and operations of demolition for review and approval by the TOWN prior to the start of WORK.
- B. Permits:
  - 1. The CONTRACTOR shall be responsible for acquiring appropriate necessary permits for the work. Copies of the permits shall be submitted to the TOWN prior to commencement of demolition.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall not commence demolition prior to written permission of the TOWN.
- B. Condition of structures to be demolished:
  - 1. The TOWN assumes no responsibility for actual condition of structures to be demolished.
  - 2. Conditions existing at time of inspection for bidding purposes will be maintained by TOWN insofar as reasonably practicable.
- C. The CONTRACTOR shall remove all such foundations to one foot below the proposed sub-grades.
- D. Explosives: The use of explosives will not be permitted. The CONTRACTOR may use a non-explosive, expanding agent in drilled holes for the demolition of concrete, and shall conform to all manufacturers' recommendations, including safety precautions for mixing and placing the agent.
- E. The CONTRACTOR shall ensure the safe passage of persons around the area of demolition and clearing. The CONTRACTOR shall conduct operations to prevent injury to adjacent structures, other facilities, and any persons.
  - 1. The CONTRACTOR shall protect existing finish work that is to remain in place from damage due to demolition operations.
- F. Traffic:
  - 1. The CONTRACTOR shall conduct operations and the removal of debris to ensure minimum interference with existing access roads and other adjacent, occupied or used facilities.
  - 2. Do not close, block or otherwise obstruct access roads or other occupied or used facilities without permission from the TOWN.
- G. The CONTRACTOR shall promptly repair damages caused to adjacent facilities by demolition operations at no cost to the TOWN.
- H. Utilities Disconnection:



1. The CONTRACTOR shall perform all necessary coordination to locate, disconnect, relocate, and/or protect as needed all existing underground, aboveground, and overhead utilities within the limits of demolition prior to commencement of demolition operations. All expenses incurred for the coordination with utility companies and agencies, shall be at no cost to the TOWN.
2. The CONTRACTOR shall promptly repair damages to existing utilities that are to remain, at no cost to the TOWN.

1.07 CERTIFICATIONS AND TESTING: (Not Used)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: (Not Used)

## **PART 2 - PRODUCTS (Not Applicable)**

## **PART 3 - EXECUTION**

3.01 DEMOLITION:

- A. The CONTRACTOR shall provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
- B. If hazardous materials are found, the CONTRACTOR shall notify the TOWN immediately.
- C. The CONTRACTOR shall completely backfill below-grade areas and voids resulting from demolition work. The CONTRACTOR shall provide Select Fill and compact fill to approximate density of surrounding undisturbed soil.

3.02 DISPOSAL OF DEMOLISHED MATERIALS:

- A. The CONTRACTOR shall remove debris, rubbish, and other materials resulting from demolition operations.
- B. If hazardous materials are encountered during demolition operations, the CONTRACTOR shall comply with all applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
- C. The CONTRACTOR shall transport materials removed from demolished structures and properly dispose of them at an approved site according to the State, Federal, and local regulations.

3.03 CONNECTIONS TO EXISTING CONSTRUCTION:

- A. The CONTRACTOR shall cut and remove portions of existing construction as required to allow proper installation of new construction.
- B. The CONTRACTOR shall shore, brace and maintain existing structure(s) in a safe condition until permanent supports are completed.
- C. The CONTRACTOR shall repair all damage as a result of installation of shoring and bracing.

3.04 CLEANUP AND REPAIR:

- A. Upon completion of demolition work, the CONTRACTOR shall remove all tools, equipment, and demolished materials from site; see SECTION 1.01 and SECTION 3.02 of this specification.
- B. The CONTRACTOR shall repair demolition performed in excess of that required and return structures and surfaces to conditions existing prior to commencement of demolition work. The CONTRACTOR shall repair adjacent construction or surfaces soiled or damaged by demolition work to the satisfaction of the TOWN.

- C. The CONTRACTOR cannot burn combustible products of the demolition operation on site. The CONTRACTOR shall remove or modify as indicated all existing construction within the construction limits to the extent necessary to permit construction of the work. The CONTRACTOR shall properly dispose of the material at an approved site according to the State, Federal, and local regulations.

END OF SECTION

SECTION 02100 SITE PREPARATION

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all labor, materials, and equipment necessary for complete and proper site preparation within the areas shown on the Drawings and specified herein and observe permit conditions.

1.02 APPLICABLE PUBLICATIONS:

- A. Applicable Standards:
  - 1. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition (FDOT)

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: (Not Applicable)

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall make all excavations for piping and appurtenant structures in any material encountered to the depth and grades required, shall backfill such excavations and dispose of excess or unsuitable materials from excavation, and shall provide and place necessary fill material to properly backfill excavations, all as indicated on the drawings, specified herein, or as directed by the TOWN.
- B. Excavation, dewatering, sheeting and bracing required shall be carried out so as to prevent any possibility of undermining or disturbing the foundations of any existing structure or work, and so that all work may be accomplished and inspected in the dry, except as directed by the TOWN. Aqueous construction may be performed only with prior approval of the TOWN.

1.07 CERTIFICATIONS AND TESTINGS: (Not Applicable)

1.08 INSPECTION COORDINATION: (Not Applicable)

1.09 WARRANTY: (Not Applicable)

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

3.01 TRAFFIC CONTROL: The CONTRACTOR shall provide proper warning devices and barriers for protection of the public and workmen in accordance with FDOT Specification Section 102-3 Traffic Control and local regulations.

3.02 STANDARD CLEARING AND GRUBBING: Standard site clearing and grubbing, in accordance with FDOT Specification Section 110.2, shall be performed within the areas shown on the Drawings or otherwise noted in the above referenced specification.

3.03 EROSION CONTROL: The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104-1, 2, 3, 4, 6 and 7 and Florida Department of Environmental Protection (FDEP) regulations and permit conditions.

3.04 PROTECTION AND/OR RELOCATION OF EXISTING FACILITIES: Existing facilities such as storm drains, roadways, water lines, light poles, conduits, fences, utility and telephone lines, etc. are to be carefully protected from damage during all phases of the construction. The CONTRACTOR shall make all necessary

arrangements with the owner of the facility and be responsible for all costs involved in the proper protection, relocation or other work that such owners deem necessary. See General Terms & Conditions.

- 3.05 UNDERGROUND UTILITIES: The CONTRACTOR shall provide all necessary liaisons with other utilities (underground) by notification, 48 hours in advance, of any digging by telephoning the appropriate Utility Notification Center and local utilities.

END OF SECTION

SECTION 02110 CLEARING AND LAND PREPARATION

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall include the removal of trees and other vegetation from areas where earthwork or other construction operations specified herein are to be performed. This section also includes land preparation activities for excavation and fill areas.

1.02 APPLICABLE PUBLICATIONS:

- A. Florida Department of Transportation (FDOT)
  - 1. Specification Section 104 –Prevention, Control, and Abatement of Erosion and Water Pollution
  - 2. Standard Specifications for Road and Bridge Construction, latest edition.

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

- A. Prior to beginning the WORK, CONTRACTOR shall submit a detailed plan for clearing and land preparation in conformance with SECTION 01300. The plan shall detail the sequence of WORK and describe the CONTRACTOR's planned method of clearing and land preparation activities.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall ensure the safe passage of persons around areas of clearing and land preparation. The CONTRACTOR shall conduct its operations to prevent injury to adjacent structures, vegetation designated to remain, other facilities and persons.
- B. Traffic:
  - 1. The CONTRACTOR shall conduct its operations and the removal of cleared materials to ensure minimum interference with existing access roads and other adjacent occupied or used facilities.
  - 2. The CONTRACTOR shall not block or otherwise obstruct access roads or other occupied or used facilities without permission from the TOWN. Where blockage is allowed, the CONTRACTOR shall provide alternate routes around closed or obstructed traffic ways.
- C. The CONTRACTOR may commence clearing or land preparation within portions of the project falling within the limits of temporary construction easements or utility Right-of-Way only with specific permission from the TOWN for each activity and location. All requirements under A and B above apply within these limits.

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide 48 advance hours notice of its intention to begin new WORK activities.

1.09 WARRANTY: (Not Applicable)

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

3.01 GENERAL CLEARING:

- A. The CONTRACTOR shall remove the majority of the above grade non-native vegetative matter in the areas indicated on the plans. The CONTRACTOR shall complete the work of Clearing and Land Preparation as outlined below.
1. Mowing or the use of a bush-hog may be required in areas of heavy grass, weeds, or woody-stalked vegetation.
  2. Completely remove all designated trees within the designated project boundaries.
  3. All woody debris that measures over three-quarters inch in diameter and longer than 18-inches shall be removed.
  4. All stumps shall be ground level to six inches below the surrounding ground level. Stumps on the slopes shall be cut flush with the natural angle of the existing grade and treated immediately with a herbicide approved by the TOWN. All seedlings within the project site shall be treated with the herbicide.
  5. All plant material (whole or chipped) will be removed from the project area.
  6. Remove any garbage or other waste debris recovered during clearing.
  7. On completion of the clearing, remove all sticks, rubbish and other extraneous material and rake the ground surface in order to leave a smooth and clean appearance.
  8. Clearing and land preparation shall proceed sufficiently ahead of earthwork activities to minimize disruption and allow time for determination of the adequacy of the clearing procedure.
  9. All WORK shall be performed in accordance with approved principles of modern arboricultural methods.
  10. All trees to remain in the project area, as designated by the TOWN, shall be protected from damage by tree barricades.
  11. All WORK shall be performed without damage to existing amenities, including trees and shrubs. The CONTRACTOR shall be responsible for repair and replacement of existing amenities to the satisfaction of the TOWN. The CONTRACTOR shall protect all vegetation, habitats, or amenities on the project location as indicated on the plans.
- B. The CONTRACTOR shall clear adjacent to cut or fill sections to a minimum distance of ten (10) feet outside of slope lines unless lesser distances are specified.
- C. The CONTRACTOR may not burn cleared materials. The CONTRACTOR will be required to collect and haul all cleared materials to an approved site for disposal.

3.02 CLEARING WITHIN AREAS OF NATIVE VEGETATION: (Not Used)

3.03 EROSION CONTROL:

- A. The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104 -1, 2, 3, 4, 6 and 7 and Florida Department of Environmental Protection (FDEP) regulations and permit conditions.

END OF SECTION

SECTION 02200 EARTHWORK

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all labor, equipment, and materials for all excavating, trenching, filling, construction of embankment, backfilling, compacting, grading, and all related items of earthwork necessary to complete the WORK indicated or specified.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 - Submittals
  - 2. SECTION 02110 - Clearing and Land Preparation
  - 3. SECTION 02215 – Protection of Existing Structures
  - 4. SECTION 02220 - Excavation and Backfilling
  - 5. SECTION 02221 - Trenching, Backfilling and Compacting

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.
  - 1. American Society of Testing Materials (ASTM):
    - a. C33 - Standard Specification for Concrete Aggregates
    - b. D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using the Standard Effort (12,400 ft-lbf/ ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
    - c. D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using the Modified Effort (56,000 ft-lbf/ ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>))
    - d. D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
    - e. D3740 – Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
    - f. D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
    - g. D4254 – Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
    - h. D4564 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sleeve Method.
    - i. D4914 – Standard Test Methods for Density and Unit Weight of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
    - j. D5030 – Standard Test Method for Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
    - k. D6938 – Standard Test Method for In-place Density and Water Content of Soil and Soil-Aggregate by Nuclear Method Shallow Depth
    - l. E329 – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing

2. Florida Department of Transportation (FDOT):
    - a. Standard Specifications for Road and Bridge Construction
  3. American Association of State Highway Transportation Officials (AASHTO):
    - a. T 27 – Sieve Analysis of Fine and Course Aggregates
    - b. T 99 - Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop
    - c. T 180 – Standard Method for Moisture-Density Relations of Soils using a 10 lb (4.54 kg) Rammer and 18 in (457 mm) Drop
- B. Florida Method (FM) of Test:
1. FM T-1 011 – Florida Method of Test for Sampling Aggregates
- C. Miscellaneous Project Data:
1. Subsurface soil data logs are provided for the CONTRACTOR’s reference. Refer to the “Report of a Geotechnical Exploration, Tobie Wilson Park Improvement Project – Bulkhead Wall” by HR Engineering Services, Inc., dated July 17, 2017.

1.03 DEFINITIONS:

- A. Select Fill:
1. FDOT # 57 Stone
  2. Limerock Fill
- B. Unified Soil Classification System (USCS): USCS is a two-letter classification system used to describe the texture and grain size of a soil. In the USCS system, letters are representative as follows: G stands for gravel, S stands for sand, M stands for silt, C stands for clay, O stands for organic, P stands for poorly graded, W stands for well graded, H stands for high plasticity, and L stands for low plasticity.
- C. Excavation: Excavation shall be the removal of all materials within the defined configuration to the limits of excavation shown on the Drawings, excluding stripping material.
- D. Unsuitable Fill: Soil that does not meet the requirements for fill (or backfill) addressed thus far in this SECTION shall be considered Unsuitable Fill soil.

1.04 SUBMITTALS:

- A. Submittals shall be in accordance with SECTION 01300.
- B. The CONTRACTOR shall submit laboratory test results on the materials proposed to be used (whether native or imported) as Select Fill, Random Fill and Silica Filter Sand, Type 1 Graded Gravel and Type 2 Graded Gravel. At a minimum the laboratory testing shall include sieve analysis, organic content, USCS classification and modified proctor per ASTM D1557, as applicable. Prior to construction, the CONTRACTOR shall provide the source of each material proposed to be used.
- C. The CONTRACTOR shall submit two (2) copies of field measured cross-sections at each design cross-section for record purposes for canal excavations and levee embankments as described in this SECTION. The submittal of the field measured cross-sections shall be signed and sealed by a Professional Surveyor and Mapper licensed in the State of Florida. The CONTRACTOR shall submit to the TOWN detailed Work Plans for all work indicated or specified in this SECTION at least 14 days before the work is scheduled to begin.



1.05 QUALIFICATIONS:

- A. Geotechnical Testing Agency Qualifications: The CONTRACTOR shall furnish at his own expense an independent testing agency qualified according to ASTM E329 to perform all testing required to establish and maintain his Quality Control. This Quality Control involves conducting soil materials and rock-definition testing during earthwork operations, as documented according to ASTM D 3740.
- B. Earthwork Contractor Qualifications: The CONTRACTOR shall use an adequate number of skilled laborers and installers who are thoroughly trained and have a minimum of five (5) years of successful experience in the necessary crafts and are completely familiar with the code requirements, the contract provisions, and the methods needed for the proper performance of the WORK of this SECTION. The CONTRACTOR shall employ the adequate resources and equipment necessary to successfully perform the WORK of this SECTION on schedule.

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall excavate any material encountered to the depth and grades required, shall backfill such excavations as required, and shall dispose of excess or unsuitable materials from excavation as approved by the TOWN. The CONTRACTOR shall provide and place necessary borrow material to properly backfill excavations as indicated on the Drawings, specified herein, or as directed by the TOWN.
- B. Excavation, dewatering, sheeting, and bracing required shall be carried out so as to prevent any possibility of undermining or disturbing the foundations of any existing structure or WORK, and so that all WORK may be accomplished and inspected in the dry, except as directed by the TOWN. Aqueous construction may be performed only with prior written approval of the TOWN. Excavation and backfilling shall be in accordance with SECTION 02220 – Excavation and Backfilling.
- C. The CONTRACTOR shall furnish, at his expense, the services of a Professional Surveyor and Mapper licensed in the State of Florida for the field layout of all WORK indicated or specified in this SECTION. The CONTRACTOR's licensed surveyor shall perform all initial Site layout and shall provide follow-up verification of all WORK underway as necessary.

1.07 CERTIFICATIONS AND TESTING:

- A. The responsibility to retain the services of an independent testing laboratory shall be as defined in SECTION 01410.
- B. The CONTRACTOR shall furnish, at his own expense, all testing required to establish and maintain his Quality Control (QC) processes required or specified in this SECTION. Field density tests shall be in accordance with all applicable ASTM Standards appropriate to each type of material used in the earthwork. Failure to meet the specified density will require the CONTRACTOR to recompact and retest, at his own expense, those areas directed by the TOWN.

1.08 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide at least 48 hours advanced notice of his intention to begin new WORK activities.

1.09 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS ENCOUNTERED:**

- A. The CONTRACTOR shall consider all materials encountered in excavations as suitable for use in Random Fill, provided that they consist of two (2) or more well-graded soils and achieve the required compaction as specified in this SECTION.
- B. The CONTRACTOR shall consider all materials encountered, regardless of type, character, composition and condition thereof unclassified other than as indicated in Article 1.03 Definitions. The CONTRACTOR shall estimate the quantity of various materials included prior to submitting the Bid Form. Rock encountered shall be handled by the CONTRACTOR at no additional cost to the TOWN.

## **PART 3 - EXECUTION:**

### **3.01 SITE PREPARATION:**

- A. Clearing and Demolition: The CONTRACTOR shall perform clearing and demolition as specified in SECTIONS 02110 and 02050.

### **3.02 DISPOSAL OF SURPLUS AND UNSUITABLE MATERIAL:** The CONTRACTOR shall dispose of all excess or unsuitable material off-site or in areas otherwise approved by the TOWN.

### **3.03 EXCAVATION AND TRENCHING:**

- A. Trenching for Pipes: The CONTRACTOR shall perform trenching for pipes as shown on the Drawings, required, and specified in accordance with SECTION 02221.
- B. Sheeting and Bracing: The CONTRACTOR shall provide sheeting and bracing shown on the Drawings or as required in accordance with the following provisions.
  - 1. Use when required by the specifications or Drawings and where resulting slopes from excavation or trenching might endanger the structural integrity of in-place or proposed structures.
  - 2. Provide materials on-site prior to start of excavation. Adjust spacing and arrangement as required by conditions encountered.
  - 3. Remove sheeting and bracing as backfill progresses. Fill voids left after withdrawal with sand or other TOWN approved material.
  - 4. In-place structures damaged by sheeting and bracing activities shall be repaired by the CONTRACTOR at no additional cost to the TOWN.
  - 5. Comply with all applicable Sections of Occupational Safety and Health Administration (OSHA).
  - 6. Comply with all requirements of the Florida Trench Safety Law as specified in the General Terms and Conditions.
- C. Excavation for Structures: The CONTRACTOR shall perform excavation for structures as shown, required and specified below:
  - 1. Excavate area adequate to permit efficient erection and removal of forms.
  - 2. Trim to neat lines where details call for concrete to be deposited against earth.
  - 3. Excavate by hand in areas where confined space and access restricts the use of machines.
  - 4. Notify the TOWN immediately when excavation has reached the depth indicated on plans.

5. Restore bottom of excavation to proper elevation with concrete in areas that are over excavated.
6. Conform to the requirements of SECTION 02221.

3.04 BACKFILLING:

- A. Pipe Backfill: The CONTRACTOR shall perform pipe backfill as required, shown, and specified in accordance with SECTION 02221.
- B. Structure Backfill: The CONTRACTOR shall place structural backfill in accordance with the lines, grades, and cross-sections shown in the Drawings or as ordered by the TOWN. The CONTRACTOR shall backfill using Select Fill. Stones or rocks greater than two (2) inches (51 mm) in any dimension shall not be placed within twelve (12) inches of the structure. Lifts shall not exceed eight (8) inches. The following procedures shall be adhered to:
  1. Structure backfill shall be compacted to not less than 95% maximum dry density as measured by ASTM D1557.
  2. Backfill shall not be placed against fresh concrete without the approval of the TOWN. Once approved, backfill only after concrete has attained at least 70% design strength. Backfill adjacent to structures only after a sufficient portion of the structure has been built to resist the imposed load.
  3. Remove all debris from excavation prior to placement of material.
  4. Place backfill in level layers of thickness within the compacting ability of equipment used.
  5. Perform backfilling simultaneously on all sides of structures. For walls, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall.

3.05 RESTORATION:

- A. The CONTRACTOR shall restore all areas disturbed by construction activities to equal or better condition and to the satisfaction of the TOWN. Sod all disturbed sloped areas that are 4H:1V or steeper and/or as shown on the Drawings. Seed and mulch all other disturbed areas.

3.06 MAINTENANCE:

- A. The CONTRACTOR shall protect newly graded areas from actions of the elements.
- B. The CONTRACTOR shall fill, repair, and re-establish grades to the required elevations and slopes for any area that shows settling or erosion occurring prior to seeding.
- C. The CONTRACTOR shall maintain sodded areas in accordance with SECTION 02920.

END OF SECTION

SECTION 02215 PROTECTION OF EXISTING STRUCTURES

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall protect existing structures from damage. Follow the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 108.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 02200 - Earthwork
  - 2. SECTION 02221 - Trenching, Backfilling, and Compacting

**PART 2 - PRODUCTS**

- 2.01 MATERIALS: The CONTRACTOR shall furnish materials as required to complete the Work under this Section.

**PART 3 - EXECUTION**

- 3.01 GENERAL: Follow the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 108-2 Construction.

END OF SECTION

SECTION 02220 EXCAVATION AND BACKFILLING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all labor, materials, and equipment to perform the excavation and backfilling as shown on the Drawings.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 02110 Clearing and Land Preparation
  - 2. SECTION 02200 Earthwork
  - 3. SECTION 02221 Trenching, Backfilling & Compaction

1.02 APPLICABLE PUBLICATIONS:

- A. American Society of Testing Materials (ASTM)
  - 1. D698 Standard Test Methods for Laboratory compaction Characteristics of Soil Using the Standard Effort (56,000 ft-lbf/cu. ft.)
  - 2. D1557 Standard Test Methods for Laboratory compaction Characteristics of Soil Using the Modified Effort (12,400 ft-lbf/cu. ft.)
  - 3. D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
  - 4. D4254 Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
- B. Florida Department of Transportation
  - 1. Standard Specifications for Road and Bridge Construction, latest edition, (FDOT)
- C. Miscellaneous Project Data:
  - 1. Subsurface soil data logs are provided for the CONTRACTOR's reference. Refer to the "Report of a Geotechnical Exploration, Lakeside Retirement Community – Seawall Repair" by HR Engineering Services, Inc., dated July 24, 2018.

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: The CONTRACTOR shall submit, prior to the start of work, the planned method of construction of the embankments shown on the Drawings, or as specified herein, for the TOWN'S review. This plan shall also indicate the intended construction sequence for backfilling operation.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: Field density tests in accordance with ASTM Standards, for each type of material used in backfilling may be required. Failure to meet the specified density will require the CONTRACTOR to recompact and retest, at its own expense, those areas directed by the TOWN.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide the TOWN at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of SECTION 00700 - General Terms and Conditions.

## **PART 2 - PRODUCTS**

- 2.01 STRUCTURAL BACKFILL: The CONTRACTOR shall provide satisfactory structural backfill material which shall consist of material free of muck, stumps, rocks, or other material considered unacceptable by the TOWN. The general requirements for fill shall be in accordance with SECTION 02200 Earthwork and FDOT 120-7.1 and 7.2.
- 2.02 EMBANKMENT FILL: The CONTRACTOR shall provide embankment fill free of muck, stumps, roots, brush, vegetation or other material considered undesirable by the TOWN. The general requirements of embankment fill shall be in accordance with SECTION 02200 Earthwork and FDOT 120-7.1 and 7.2.

## **PART 3 - EXECUTION**

### **3.01 SITE PREPARATION:**

- A. Clearing and Grubbing: The CONTRACTOR shall perform clearing and grubbing in accordance with SECTION 02110 Clearing and Land Preparation and with the following provisions:
1. Perform only in areas where earthwork or other construction operations are to be performed or otherwise shown on Drawings.
  2. Protect tops, trunks, and roots of existing trees that are to remain on the site.
  3. Clear areas and dispose of other trees, brush and vegetation before starting construction.
  4. Remove tree stumps and roots larger than three inches in diameter and backfill resulting excavations with approved material.
- B. Stripping: The CONTRACTOR shall remove topsoil from areas within limits of excavation and areas designated to receive compaction as shown on the Drawings, required and as provided below:
1. Scrape area clean of all brush, grass, weeds, roots, and other material.
  2. Strip to depth of approximately six inches or to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required segregating topsoil.
  3. Stockpile topsoil in areas where it will not interfere with construction operations or existing facilities. Stockpiled topsoil shall be reasonably free of subsoil, debris and stones larger than two inches in diameter.

3.02 DISPOSAL OF SURPLUS AND UNSUITABLE MATERIAL: The CONTRACTOR shall dispose of all excess or unsuitable material off-site or in areas otherwise approved by the TOWN.

3.03 STOCKPILE OF EXCAVATED MATERIAL: The CONTRACTOR shall stockpile excavated materials in areas shown on the Drawings or in areas otherwise approved by the TOWN.

3.04 PLACEMENT OF STRUCTURAL FILL: The CONTRACTOR shall place structural backfill true to the lines, grades and, cross sections shown in the Drawings or as ordered by the TOWN. Structural backfill shall be deposited by the CONTRACTOR in horizontal layers not exceeding eight inches in depth measured loose, and shall be compacted to a density of not less than 95 percent of the maximum density at optimum soil moisture content +/- 2% as determined by ASTM D1557 Standards. Backfill shall not be placed against fresh concrete without the approval of the TOWN.

3.05 PLACEMENT OF EMBANKMENT FILL: The CONTRACTOR shall construct embankments true to the lines, grades, and cross sections shown on the Drawings or as directed by the TOWN. Fill for embankments shall be placed by the CONTRACTOR in successive layers of not more than twelve inches in thickness, measured loose, for the full width of the embankment. Each layer of the material used in the formation of the embankments shall be compacted by the CONTRACTOR to a density of at least 95 percent of the maximum density as determined by ASTM D1557 Standards. Unreasonable roughness of the surface shall be dressed out. Rocks and boulders shall not project above the finished surfaces. All areas disturbed shall be graded by the CONTRACTOR so that water drains freely at all points after construction.

3.06 COMPACTION EQUIPMENT: When placing fill adjacent to foundations or retaining walls cast in place, heavy equipment for spreading and compacting fill shall not be operated closer than a distance equal to the

height of backfill above the top of the footing; the area remaining shall be compacted in layers not more than 6 inches in compacted thickness with power-driven hand tampers suitable for the materials being compacted. Backfill shall be placed carefully around pipes or tanks to avoid damage to coatings, wrappings, or tanks. Backfill shall not be placed against foundation walls prior to 7 days after completion of the walls (cast in place part). As far as practicable, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall.

- 3.07 GRADING: The CONTRACTOR shall perform grading as shown on the Drawings, required, and provided for below:
- A. Grade and compact all areas within the project area, including excavated and filled sections and adjacent transition areas, reasonably smooth, and free from irregular surface changes.
  - B. Degree of finish shall be that ordinarily obtained from blade grader or scraper operations except as otherwise specified.
  - C. Finished rough grades shall generally be not more than one quarter foot above or below those indicated with due allowances for topsoil.
  - D. Finish all ditches, swales, and gutters to drain readily.
  - E. Provide roundings at top and bottom of banks and at other breaks in grade.
- 3.08 CLEANUP: The CONTRACTOR shall cleanup the site as required and provided for below, to the satisfaction of the TOWN:
- A. Clear surfaces of all stones, roots, grading stakes, and other objectionable materials.
  - B. Keep paved areas clean and promptly remove rock or dirt dropped upon surfaces.
- 3.09 PROTECTION AND MAINTENANCE: The CONTRACTOR shall maintain the embankments until final acceptance of all work. The maintenance shall include repairs of any erosion, slides, or other damages.

END OF SECTION

SECTION 02221 TRENCHING, BACKFILLING AND COMPACTING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all labor, materials and equipment necessary for complete and proper trenching, backfilling and compacting as specified herein.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 02200 Earthwork

1.02 APPLICABLE PUBLICATIONS:

- A. American Society of Testing Materials (ASTM):
  - 1. D698 - Standard Test Methods for Laboratory compaction Characteristics of Soil Using the Standard Effort (12,400 ft-lbf/ ft<sup>3</sup> (600 kN-m/m<sup>3</sup>))
  - 2. D1557 - Standard Test Methods for Laboratory compaction Characteristics of Soil Using the Modified Effort (56,000 ft-lbf/ ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>))
  - 3. D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
  - 4. D4254 - Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
- B. Florida Department of Transportation (FDOT):
  - 1. Standard Specifications for Road and Bridge Construction, latest edition, (FDOT)
- C. Miscellaneous Project Data:
  - 1. Subsurface soil data logs are provided for the CONTRACTOR's reference. Refer to the "Report of a Geotechnical Exploration, Lakeside Retirement Community – Seawall Repair" by HR Engineering Services, Inc., dated July 24, 2018.

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: (Not Applicable)

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall make all excavations for piping and appurtenant structures in any material encountered to the depth and grades required, shall backfill such excavations and dispose of excess or unsuitable materials from excavation, and shall provide and place necessary borrow material to properly backfill excavations, all as indicated on the drawings, specified herein, or as directed by the TOWN.
- B. Excavation, dewatering, sheeting and bracing required shall be carried out so as to prevent any possibility of undermining or disturbing the foundations of any existing structure or work, and so that all work may be accomplished and inspected in the dry, except as directed by the TOWN. Aqueous construction may be performed only with prior approval of the TOWN.

1.07 CERTIFICATIONS AND TESTINGS: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide 48 hours notice of its intention to begin new WORK activities.

1.09 WARRANTY:



- A. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

## **PART 2 - PRODUCTS**

- 2.01 MATERIALS: The CONTRACTOR shall furnish materials as required to complete the Work under this Section.

## **PART 3 - EXECUTION**

- 3.01 EXTENT OF OPEN EXCAVATION: The CONTRACTOR shall perform the excavation such that at any time the amount of excavation open will be held to a minimum consistent with normal and orderly prosecution of the work, or as restricted by permit conditions.
- 3.02 CUTTING PAVEMENT: When excavations are required in paved areas the CONTRACTOR shall conform to the following.
  - A. When excavations are to be made in paved surfaces, the pavement shall be cut ahead of the excavation by means of suitable sharp tools to provide a uniform sharp edge with minimum disturbance of remaining materials.
  - B. Asphalt paving and other improvements in the right-of-way and on other private property affected by this construction shall be duly protected and, where disturbed, shall be restored or replaced to meet original conditions.
- 3.03 TRENCH EXCAVATION: The CONTRACTOR shall perform trench excavation in accordance with the following.
  - A. All excavation for piping shall be open cut. Trench sides shall be approximately vertical between an elevation of one foot above the top of the pipe and the centerline of the pipe; otherwise, trench sides shall be as vertical as possible or as required. Trenches may be excavated by machinery to a depth that will not disturb the finish grade.
  - B. Trench width shall be as narrow as practical and shall not be widened by scraping or loosening material from the sides.
- 3.04 EXCAVATION BELOW NORMAL GRADE:
  - A. In the event the CONTRACTOR excavates below the elevation required, the CONTRACTOR shall at his own expense backfill with selected gravel and compact to obtain a suitable pipe bedding all as directed and to the satisfaction of the TOWN.
  - B. In the event unstable or unsuitable bedding material is encountered at or below the pipe bedding level, the CONTRACTOR shall remove such material and replace it with suitable compacted material.
- 3.05 BACKFILLING TRENCHES:
  - A. The CONTRACTOR shall be responsible for obtaining the necessary inspections before, during and after backfilling and shall re-excavate, refill and perform all such related work to obtain satisfactory test results.
  - B. The CONTRACTOR shall use excavated or imported materials classified as embankment fill for backfilling and such grading on the site as is required. The CONTRACTOR shall dispose of any excess fill or unstable material in areas approved by the TOWN. Pipe trenches shall be backfilled with fine, loose embankment fill (select fill) (see SECTION 02220, paragraph 2.02), free from large stones, carefully deposited on both sides of pipe and thoroughly and carefully rammed until enough fill has been placed to provide a cover of at least one foot above the pipe. The remainder of the backfill material may then be thrown in and tamped in 12-inch maximum layers. Water settling may be permitted. The CONTRACTOR shall submit written request detailing the need to perform water settling and reasons why work in the dry is not possible. The CONTRACTOR shall also submit detailed procedures for the review and approval of the TOWN. Whenever trenches have not been

properly filled, or if settlement occurs, they shall be refilled, smoothed off and finally, made to conform to the surface of the ground. Backfilling shall be carefully performed and the surface restored to the elevation shown on the plans. In unpaved areas the surface of trenches shall conform and be equal to quality, character and material of the surface immediately prior to making the excavation.

C. Place earth embedment as follows:

1. With level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length.
2. Form shallow depression under each joint to facilitate jointing.
3. Add second layer simultaneously to both sides of the pipe with care to avoid displacement of the pipe.
4. Place material in maximum 12-inch lifts.
5. Each layer shall be compacted to maximum dry density as shown on the DRAWINGS as measured by ASTM D1557.

3.06 BACKFILLING OF TRENCH UNDER ROADWAY AND AREAS TO BE PAVED: The CONTRACTOR shall place select fill material in 12-inch maximum layers after filling one foot above pipe as previously described. Each layer shall be compacted to 95 percent maximum dry density as measured by ASTM D1557 so that pavement can be placed promptly. Any pavement cut or area disturbed by this work shall be replaced to match existing.

3.07 BACKFILLING OF TRENCH OPEN AREAS: The CONTRACTOR shall place material in 12-inch maximum lifts after filling one foot above pipe as previously described. The top one-foot layer shall be compacted to 90 percent maximum dry density as measured by ASTM D1557. Each layer shall be compacted to the density of adjacent soils. Restore the surface to original grade and place sod or seed as required by the contract documents.

END OF SECTION

SECTION 02435 TURBIDITY CONTROL AND MONITORING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall furnish all necessary equipment, labor and materials and utilize appropriate means and methods of turbidity controls necessary and sufficient to ensure that the more restrictive and protective of the following are achieved at all times: (1) all applicable State water quality standards, as prescribed in Chapter 62-302.530, Florida Administrative Code (F.A.C.), incorporated by reference, (2) all applicable environmental permit conditions, as prescribed in the permits appended to the Contract, and (3) all stormwater and erosion control shall be in accordance with the Florida Department of Environmental Protection (FDEP) Florida Stormwater Erosion and Sedimentation Control Inspector's Manual.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the standards or codes of the organizations listed below in effect at the time of the advertisement for bids form a part of this SECTION to the extent referenced.
- B. The environmental protection rules and standards in the applicable sections of the Florida Administrative Code (F.A.C.) incorporated herein by reference are:
  - 1. <http://www.dep.state.fl.us/legal/Rules/rulelistnum.htm>.
  - 2. Design and Performance Standards - 62-25.025 F.A.C.
  - 3. Quality Assurance - 62-160 F.A.C.
  - 4. Surface Waters of the State - 62-301 F.A.C.
  - 5. Surface Water Quality Standards - 62-302 F.A.C.
  - 6. Generic Permits - 62-621.300(2)&(4) F.A.C.
- C. Florida Department of Environmental Protection (FDEP)
  - 1. Florida Stormwater Erosion and Sedimentation Control Inspector's Manual
- D. Florida Department of Transportation (FDOT)
  - 1. Standard Specification for Road and Bridge Construction - Sections 104-1, 2, 3, 4, 6 and 7
- E. U.S. Army Corps of Engineers (USACE)

1.03 SUBMITTALS: The CONTRACTOR shall make submittals for the turbidity control and monitoring system in accordance with SECTION 01300 and the requirements herein.

- A. Provide details of the turbidity controls proposed.
- B. Provide proposed layout of the turbidity controls and monitoring system on the Site plan.
- C. Obtain the monitoring data and prepare quarterly reports in accordance with Paragraph 3.03B.

1.04 QUALIFICATIONS:

- A. The CONTRACTOR shall have at least one (1) employee, on-site, certified by the Florida Department of Environmental Protection as a Stormwater Erosion and Sedimentation Control Inspector. The certification shall be submitted to the TOWN for review prior to the installation, inspection, maintenance, repair or replacement of any erosion or sedimentation control Best Management Practices, including but not limited to the turbidity controls. The turbidity monitoring shall be conducted according to the FDEP-approved procedures.

1.05 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

**PART 2 - PRODUCTS**

2.01 FABRIC:

- A. The CONTRACTOR shall provide floating turbidity barriers with fabric that is flexible and impermeable or of sufficiently fine mesh to prevent passage of suspended material through the fabric. Fabric shall provide not less than 60 inches vertical depth of barrier where water depths are six feet or greater. Where existing water depths are less than six feet, the floating turbidity barriers shall extend to within a foot of the bottom of the lake except in the areas with the potential for the presence of manatees the barriers shall be two (2) feet above the bottom.

2.02 FLOATS:

- A. The CONTRACTOR shall provide floats for the turbidity barriers of sufficient buoyancy to prevent the top of the barrier from submerging under any water and wind conditions. If the top of the barrier becomes submerged for any reason, the CONTRACTOR shall suspend construction operations until the condition is corrected.

2.03 ANCHORS AND WEIGHTS:

- A. The CONTRACTOR shall provide and maintain an anchor system to secure the turbidity barrier in position. Attach weights to the barrier as necessary to keep the fabric at an angle to the vertical of 30 degrees or less. Fabric material shall not be attached to the lake bottom.

**PART 3 - EXECUTION**

3.01 TURBIDITY BARRIERS:

- A. The CONTRACTOR shall install and maintain the turbidity barriers as noted in the Drawings and where necessary to maintain turbidity releases at or below the permit compliance levels. Turbidity barriers shall be installed prior to any backfilling, clearing and grubbing, dredging, or excavation and maintained in place until construction is complete and turbidity from construction has dissipated. All barriers shall be adequately marked and appropriate signage erected to identify them as obstructions to navigation.
- B. The turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. The barriers must not impede manatee movement.
- C. The applicable U.S. Army Corps of Engineers in-water work protection guidelines for the endangered West Indian Manatee incorporated herein by reference are: [http://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/endangered\\_species/Manatee/2011\\_StandardConditionsForIn-waterWork.pdf](http://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/endangered_species/Manatee/2011_StandardConditionsForIn-waterWork.pdf).
- D. Any rips or tears that occur in the turbidity barrier material during use shall be repaired or replaced immediately by the CONTRACTOR at its expense. Rips or tears that occur in the turbidity barrier material in use that are not repaired or replaced immediately by the CONTRACTOR will result in a suspension of excavation and/or construction operations, and shall require repairs and replacements as a prerequisite to the resumption of WORK.
- E. The CONTRACTOR shall keep in place and maintain all barriers until the WORK is complete (construction areas stabilized with vegetation) and turbidity levels return to the background levels based on the monitoring results. Upon completion of use, the CONTRACTOR shall remove the turbidity barriers and associated items to an off-site location at its own expense.

- F. The CONTRACTOR shall conduct its operations at all times in a manner that minimizes turbidity. The CONTRACTOR is required to conform to the State Water Quality standards as prescribed in Chapter 62-302.530, F.A.C., and to meet the special requirements of any environmental permits that have been issued.
- G. The turbidity controls shall be inspected by the CONTRACTOR every work day, after every rainfall event of 0.5 inches or greater in a 24 hour period, and after every extreme weather event that could dislodge or damage the turbidity controls, to assure that the turbidity controls remain properly installed, undamaged, and fully functional at all times.

3.02 EROSION CONTROL:

- A. The CONTRACTOR shall prevent and control erosion, sedimentation and water pollution as per the Florida Department of Transportation (FDOT) Specification Sections 104-1, 2, 3, 4, 6 and 7 and FDEP regulations and permit conditions.

3.03 MONITORING: (Not Applicable)

3.04 EXCEEDANCES OF WATER QUALITY STANDARDS

- A. If at any time, monitoring reveals the turbidity level, at the compliance sampling station is greater than 29 NTUs above the corresponding background sample in Class I or III receiving waters or greater than 0 NTU above background samples in receiving waters classified as OFW (Outstanding Florida Waters), construction activities shall cease immediately and not resume until corrective measures have been taken and turbidity has returned to an acceptable level. Turbidity violations and corrective measures shall be documented in the monitoring reports.
  - 1. The CONTRACTOR must notify the TOWN Construction Manager and the TOWN's Permitting and Compliance Staff immediately who then, per the permit, must notify the permitting agency of the exceedance. If known, the CONTRACTOR may also contact the TOWN's assigned Permitting and Compliance Staff for the Project directly.

END OF SECTION

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall provide all labor, equipment and materials necessary for the prevention of environmental damage as the result of construction operations under this Contract and for those measures set forth in other requirements of the Technical Specifications.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the standards or codes of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. The CONTRACTOR shall comply with all applicable environmental laws and regulations.
  - 1. Environmental Protection Agency (EPA)
    - a. Clean Air Act (CAA)
    - b. Clean Water Act (CWA)
    - c. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
    - d. Executive Orders and EPA requirements, as appropriate; and all general and specific Federal Permit Conditions as applicable.
    - e. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
    - f. National Environmental Laboratory Accreditation Conference (NELAC)
    - g. National Environmental Policy Act (NEPA)
    - h. National Pollution Discharge Elimination System (NPDES)
    - i. Resource Conservation and Recovery Act (RCRA)
    - j. Safe Drinking Water Act
    - k. Toxic Substance Control Act (TSCA)
  - 2. Code of Federal Regulations (CFR)
    - a. 40 CFR - Parts 109, 261.10, 260-268, 273, 279
  - 3. Florida Department of Environmental Protection (FDEP)
    - a. Florida Administrative Code (FAC)
      - i. 62-770, 62-780
    - b. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual
  - 4. Florida Department of Transportation (FDOT)
    - a. Standard Specification for Road and Bridge Construction - Sections 104-1, 2, 3, 4, 6 and 7
    - b. FDOT Contractor Requirements for Unanticipated Interaction with Protected Species – Revised 2-20-17
  - 5. Florida Statutes
    - a. Chapter 403
  - 6. National Oceanic and Atmospheric Administration (NOAA)
    - a. Coastal Zone Management Act (CZMA)
  - 7. National Park Service (NPS)
    - a. Native American Graves Protection and Repatriation Act (NAGPRA)
    - b. National Historic Preservation Act (NHPA)
  - 8. U.S. Army Corps of Engineer (USACE)
  - 9. U.S. Fish & Wildlife Service (FWS)
    - a. Endangered Species Act (ESA)

- b. Fish and Wildlife Coordination Act (FWCA)
  - c. Migratory Bird Treaty Act (MBTA)
- B. State and local codes, permits, regulations and ordinances as applicable.

1.03 DEFINITIONS:

- A. For the purpose of this SECTION, environmental damage is defined as the presence of hazardous, physical, or biological elements or agents which alter the physical, chemical or biological integrity of the environment in such a way that it represents an unacceptable risk to public health, safety or welfare; unfavorably alter ecological balances; affect other species, biological communities, or ecosystems; or degrade the quality of the environment for aesthetic, cultural, and/or historical purposes. The control of environmental damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

1.04 SUBMITTALS: Within 20 calendar days after the Notice to Proceed (NTP), the CONTRACTOR shall submit an Environmental Protection Plan (Plan) for review and acceptance by the TOWN in accordance with SECTION 01300. Approval of the Plan shall not relieve the CONTRACTOR of its responsibility for adequate and continuing control of pollutants and appropriate environmental protection measures. Approval of the Plan is conditional and predicated on satisfactory performance during construction. The TOWN reserves the right to require the CONTRACTOR to modify the Plan if it is determined that environmental protection requirements are not being met. No physical WORK at the Site shall begin prior to acceptance of the Plan. The Plan shall include, but not be limited to the following:

- A. A list of the Federal, State and Local laws, regulation and permits concerning environmental protection, pollution control and abatement that are applicable to the CONTRACTOR's proposed operations and the requirements imposed.
- B. Methods for protection of features to be preserved within the authorized WORK areas: The CONTRACTOR shall prepare a listing of methods to protect resources needing protection (trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil and historical, archeological and cultural resources).
- C. Procedures to be implemented are to provide all necessary environmental protection and to comply with applicable laws and regulations: The CONTRACTOR shall provide written assurance that immediate corrective action will be taken to correct any environment damage due to accident, natural causes or failure to follow the procedures set out in accordance with the Plan.
- D. Environmental monitoring plans, if applicable.
- E. Traffic control plan, if applicable.
- F. Drawings showing locations of proposed temporary activities, such as material storage areas or stockpiles of excess spoil or materials.
- G. Erosion and sediment control methods, for protecting surface waters, wetlands, and groundwater during construction. All stormwater and erosion control methods shall be in accordance with the FDEP Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual. The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104-1, 2, 3, 4, 6 and 7 and all applicable FDEP regulations and permit conditions.
- H. Spill Prevention Methods: The CONTRACTOR shall identify any hazardous or potentially hazardous substances to be used on the Site and indicate intended actions to prevent accidental or intentional introduction of these materials into the air, ground, water, wetlands or drainage areas. The Plan shall specify the actions that will be taken to meet the federal, state and local laws regarding labeling, storage, removal, transport and disposal of all hazardous or potentially hazardous substances.
- I. Spill Contingency Plan for hazardous, toxic or petroleum material.
- J. A WORK area plan, showing proposed activities and identifying areas of limited use or non-use, and including measures that will be taken for field identification of these areas.
- K. Identification of the person who shall be responsible for implementation of the Plan. This person shall have authority to respond for the CONTRACTOR in all environmental protection matters.

- L. A recycling and waste management plan. The CONTRACTOR shall include waste minimization efforts in the Plan.

1.05 QUALIFICATIONS:

- A. The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.
- B. When the Eastern Indigo Snake is identified as a species of concern in the environmental permits the CONTRACTOR shall supply qualified eastern indigo snake observers during ground clearing activities. Qualified Observers are defined as individuals who have been instructed by the TOWN on proper techniques and protocols for protection of the Eastern Indigo Snake during site activities. The observer's names and documentation showing completion of the TOWN's instruction shall be provided to the TOWN at least two (2) weeks prior to the commencement of ground clearing activities.

1.06 RESPONSIBILITIES:

- A. Quality Control: The CONTRACTOR shall establish and maintain quality control for the environmental protection of all items set forth herein. The CONTRACTOR shall record on daily quality control reports or attachments thereto, any problems in complying with applicable laws, regulations and ordinances, and corrective action(s) taken.
- B. Permits and Authorizations: The CONTRACTOR shall apply for and obtain all necessary permits or licenses unless the TOWN has already acquired them. The CONTRACTOR shall be responsible for implementing and complying with all terms, conditions and requirements of all permits issued for construction of the Project. The CONTRACTOR shall install speed limit signs for off-road and improved road travel for construction equipment and employee vehicles that identify speeds protective of wildlife. The CONTRACTOR shall also provide all necessary signage describing all Threatened and/or Endangered species which are identified in applicable environmental permits.
- C. Training: Prior to the onset of construction activities the CONTRACTOR and all personnel shall be trained on how to identify and implement the FDOT Contractor Requirements for Unanticipated Interaction with Protected Species. The Standard Protection Measures for the Eastern Indigo Snake dated August 12, 2013, is attached in Appendix C.

1.07 CERTIFICATIONS AND TESTINGS:

- A. All physical, chemical, and biological measurements and analyses that are necessary to comply with the monitoring requirements in all applicable permits or in this Contract must be performed according to approved methods and procedures by a commercial laboratory that is certified to perform the required analyses according to the approved methods and procedures by the National Environmental Laboratory Accreditation Conference (NELAC).

1.08 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide to the TOWN at least 48 hours advance notice of its intention to begin new WORK activities.

**PART 2 - PRODUCT (ENVIRONMENTAL PROTECTION PLAN)**

2.01 NOTIFICATION:

- A. In the event that the TOWN notifies the CONTRACTOR of any non-compliance with federal, state or local laws, permits or other elements of the CONTRACTOR's Environmental Protection Plan, the CONTRACTOR shall without delay inform the TOWN of the proposed correction action and take such action as approved.
- B. The CONTRACTOR shall notify the TOWN immediately of any warnings or notices of noncompliance, fines, citations or tickets issued directly to the CONTRACTOR by any federal, state, or local environmental protection, waste management, code enforcement, or fire, police, or public health agency.
- C. If the CONTRACTOR fails to comply, the TOWN may order all WORK to cease until corrective action has been taken. No time extensions shall be granted or damages allowed for the suspension of WORK under this circumstance.



- D. A Notice of Termination (NOT) shall be sent to the applicable federal, state, and local permit-issuing authorities with a copy to the TOWN within fourteen (14) days of final stabilization

2.02 SUMMARY:

- A. The CONTRACTOR shall submit a written report within 30 days of completion of the Project. This report shall delineate the absence, or occurrence, of reported or unreported environmental incidents during the course of the Project.

2.03 TRAINING:

- A. The CONTRACTOR shall train its personnel in relevant phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, and careful installation and monitoring of the Project to ensure continuous environmental pollution control.
- B. Due to the probability that wildlife species of concern, including but not limited to Threatened and/or Endangered species and Protected Migratory Bird species may be present within or adjacent to construction sites, prior to initiation of construction activities, the CONTRACTOR(s) will be trained by the TOWN and/or U.S. Fish & Wildlife Service on how to identify and implement appropriate protection measures for each species.

**PART 3 - EXECUTION (PROTECTION OF ENVIRONMENTAL RESOURCES)**

3.01 GENERAL:

- A. During the entire period of the Contract, the CONTRACTOR shall protect environmental resources within the Project boundaries and those affected outside the limits of construction. The CONTRACTOR shall confine its activities to the areas defined by the Drawings and specifications. Any deviations from the Drawings including, but not limited to borrow areas, disposal areas, staging areas, and alternate access routes will require additional review by the TOWN to ensure compliance with applicable environmental rules and regulations prior to implementation/or commencement of those deviations.

3.02 PROTECTION OF LAND RESOURCES:

- A. Prior to the beginning of any construction the CONTRACTOR shall delineate, install protection and be responsible for preservation of all land resources that are to be preserved or avoided within the WORK area. The CONTRACTOR shall not remove, cut, deface, injure, or destroy any land resources (trees, shrubs, vines, grasses, topsoil, or land forms) unless indicated in the Drawings or specifically authorized by the TOWN. All damaged areas shall be restored to original or better condition, to the satisfaction to the TOWN.

3.03 DISTURBED AREAS:

- A. The CONTRACTOR shall effectively prevent erosion and control sedimentation through approved materials and methods as identified in the Environmental Protection Plan. Disturbed areas will include areas of ingress and egress, construction materials storage, staging, washdown areas, and toxic, hazardous, and solid materials/waste storage areas. Disturbed areas shall be temporarily stabilized within seven (7) days of cessation of phased construction activity and permanently stabilized within fourteen (14) days of cessation of all phases of construction activity. Temporary Best Management Practices (BMPs) shall remain in place and in effect until the final Site inspection is complete and Site is certified as stabilized.

3.04 PROTECTION OF WATER RESOURCES:

- A. The CONTRACTOR shall conduct all activities in a manner to avoid pollution of surface water, ground water and wetlands. The CONTRACTOR's construction methods shall protect wetland and surface water areas from damage due to mechanical grading, erosion, sedimentation and turbid discharges. No storage or stockpiling of equipment shall be allowed within any wetland area unless specifically authorized under a permit for the Project.
- B. Water directly derived from construction activities shall not be allowed to directly discharge to water areas, but shall be collected in retention areas to allow settling of suspended materials. The CONTRACTOR shall monitor water quality of dewatering discharge into water bodies or leaving the Site in accordance with applicable environmental permits. All monitoring of any water areas that are affected by construction activities shall be the responsibility of the CONTRACTOR.

### 3.05 OIL, FUEL AND HAZARDOUS SUBSTANCE SPILL PREVENTION:

- A. The CONTRACTOR shall prepare a spill contingency plan in accordance with 40CFR, Part 109. The CONTRACTOR shall prevent oil, fuel or other hazardous substances from entering the air, ground, drainage, and local bodies of water or wetlands. In the event that a spill occurs, despite design and procedural controls, the CONTRACTOR shall take immediate action to contain and clean up the spill and report the spill immediately to the TOWN and to other appropriate federal, state, and local agency contacts. Reportable quantities (greater than 25 gallons) of petroleum-based fluids must be reported within 1 hour to the National Response Center (800-424-8802) and State Warning Point (800-320-0519) if it reaches the waters of the state or, if not, within 24 hrs to State Warning Point. Toxic and hazardous substance spills directly into waters of the state, in any quantity, must be reported immediately to the TOWN and those federal and state points of contact listed above.
- B. The CONTRACTOR shall submit a written report to the TOWN and to the State of Florida Bureau of Emergency Response providing certification of commitment of manpower, equipment and materials necessary to prevent the spread and effect expeditious cleanup and disposal. This report shall be submitted within 48 hours of the spill event.

### 3.06 MATERIALS AND WASTE MANAGEMENT:

- A. For sanitary waste management, the CONTRACTOR shall ensure that portable restrooms will be anchored on level ground with at least a 15-foot set-back from water bodies or banks or slopes thereto. For solid waste management, dumpster(s) will either be outfitted with a water-tight cover or be covered with a tarpaulin when not in use to minimize infiltration and leaching of rain with at least a 15-foot set-back from water bodies, conveyances thereto, or banks or slopes thereto. Hazardous materials storage areas and liquid refuse and hazardous waste collection and storage areas shall be denoted on the Plan.
- B. The CONTRACTOR shall ensure toxic substances and hazardous materials are stored in a locked, blast-resistant shed anchored to a bermed concrete or asphalt pad on level ground with at least a 15-foot setback from any water bodies, conveyances thereto, or banks or slopes thereto.
- C. For solid and/or hazardous waste disposal involving lead-based paint, the CONTRACTOR shall ensure containers with Toxicity Characteristic Leaching Procedure – Tetraphenylborate (TCLP TPb) concentrations in excess of the Resource Conservation and Recovery Act (RCRA) action level will be transported by a licensed hazardous waste hauler to a licensed hazardous waste disposal facility within the time limit appropriate to the generation rate and accumulated volume of hazardous waste material. Containers with TCLP TPb concentrations less than the RCRA action level shall be transported by a licensed solid waste hauler to a licensed Class I solid waste disposal facility. In either case, the CONTRACTOR shall obtain and transmit signed and dated copies of the transport and disposal manifests to the TOWN for records retention.
- D. The CONTRACTOR is prohibited from the on-site burning of hazardous wastes (aerosol cans, oil filters, etc.). All hazardous wastes shall be disposed of as required by law. Copies of relevant Material Safety Data Sheets (MSDSs) shall be appended to the Environmental Protection Plan, Safety Plan, Spill Prevention Plan, and Stormwater Pollution Prevention Plan (SWPPP).
- E. The CONTRACTOR is responsible for the materials and processes where wastes may be generated under the contracted activities. The CONTRACTOR is responsible for providing the materials in order to implement the Contract and is responsible for operating and maintaining any processes from which waste material may be generated.
- F. The CONTRACTOR is deemed to be the “generator” as defined in 40 CFR 261.10 for any hazardous wastes or spill residue that is generated during the activities encompassed in this Contract. It is recognized that it is the CONTRACTOR or a subcontractor of the CONTRACTOR whose act first causes a hazardous waste to become subject to regulation. The CONTRACTOR is a different legal entity from the owner/operator of the physical location/property where the contracted activities will be conducted. CONTRACTOR is a “person” within the meaning of Section 403.031(5), Florida Statutes.
- G. The CONTRACTOR is responsible for compliance with applicable standards of 40 CFR 260-268 and 40 CFR 273 and 279 and state regulations which adopt or reference these federal standards.
- H. The CONTRACTOR is responsible for the generation and retention of records associated with waste management practices and disposition. All records shall be maintained for a minimum of three (3) years from the date of generation. All records will be made available to the TOWN or regulatory agencies upon request.

- I. In the event of any chemical discharges associated with CONTRACTOR's or subcontractor's activities, CONTRACTOR shall be responsible for reporting, assessment and remediation of such discharges in accordance with applicable federal, state or local regulations and/or guidelines including, but not limited to, 40 CFR 264/265, Chapter 62-770, Florida Administrative Code (F.A.C.) and Chapter 62-780, F.A.C.

3.07 FISH AND WILDLIFE RESOURCE PROTECTION: The CONTRACTOR shall control and minimize interference with, disturbance to, and damage of fish and wildlife resources.

- A. If adverse impacts occur to fish and wildlife species of concern, including but not limited to Threatened and/or Endangered Species and Protected Migratory Bird Species, the CONTRACTOR shall immediately notify the TOWN and provide details of adverse impacts for determination of further action that may be required. Adverse impact is defined as any harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such activity. Threatened and/or Endangered Species that require specific protection measures as identified in the environmental permits shall be listed in the Environmental Protection Plan.
- B. In the event that the TOWN determines that an adverse impact to species of concern, including but not limited to Threatened and/or Endangered Species and Protected Migratory Bird Species occur as a result of the construction activities, the TOWN shall notify the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service for determination of further action and possibly to determine if seasonal or daily timing restrictions on construction activities is needed.
- C. The CONTRACTOR shall be aware that the Crested Caracara, indigo snake, and gopher tortoise, though not known to inhabit the Site, have been known to inhabit and nest in SFWMD right of ways.
- D. The CONTRACTOR and all personnel shall be familiar with the Plan shall be able to identify the threatened and endangered species listed in the Plan. Any activity observed by the CONTRACTOR that may result in adverse impact to threatened or endangered species shall be reported immediately to the TOWN, who shall have sole authority for any WORK stoppages, creation of a buffer area, or restart of construction activities.
- E. Any Threatened and/or Endangered Species and species of concern observed at the Site will be recorded and logged. The logs shall be provided to the TOWN on a bi-weekly basis. See attached Wildlife Log, Appendix A. If nesting activity is detected within and/or adjacent to the Site, the CONTRACTOR shall immediately contact the TOWN for determination of further action and possibly to determine if seasonal or daily timing restrictions on construction activities is needed.
- F. The CONTRACTOR shall keep construction activities under surveillance, management, and control to prevent impacts to migratory birds and their nests. The CONTRACTOR may be held responsible for harming or harassing the birds, their eggs or their nests as a result of the construction. Any nesting activity observed by the CONTRACTOR shall be reported immediately to the TOWN's Construction Manager who shall have sole authority for any work stoppages, creation of the buffer area, or restart of construction activities.

3.08 ENVIRONMENTAL PROTECTION RETENTION RECORD RETENTION:

- A. The CONTRACTOR shall retain a copy of all required permits, the Plan, the SWPPP, the Spill Prevention Plan, and all associated reports, records and documentation required by these permits or the Contract at the construction Site or an appropriate alternative location as specified in the Notice of Intent (NOI) from NTP through Notice of Termination (NOT). Such documentation includes but is not limited to soil disturbance and stabilization logs, inspection and corrective action logs, turbidity monitoring logs, wildlife observation logs and reports, TCLP and Synthetic Precipitation Leaching Procedure (SPLP) assay results, sanitary, solid, and hazardous waste transport and disposal manifests, spill reports, material safety data sheets, and any warnings, citations or notices of noncompliance, or fees, levies, fines or penalties. A copy of all such records shall be submitted to the TOWN at the time of Contract close-out.

3.09 PROTECTION OF AIR RESOURCES:

- A. The CONTRACTOR shall minimize pollution of air resources. All activities, equipment, processes and work operated or performed in accomplishing the specified construction shall be in strict accordance with the applicable air pollution standards of the State of Florida (F.S. Chapter 403 – Environmental Control and F.A.C. Section 200 – Recirculation Chiller) and all Federal emission and performance laws and standards as applicable. This includes, but is not limited to, control of particulates, dust generated by or incidental to construction activities, burning and odors.

3.10 PRESERVATION AND RECOVERY OF HISTORIC, ARCHEOLOGICAL, AND CULTURAL RESOURCES: If applicable, known historic, archeological and cultural resources within the CONTRACTOR's WORK area(s) will be designated as a "Sensitive Environmental Area" on the Drawings or other documents. If so designated, the CONTRACTOR shall install protection for these resources and shall be responsible for their preservation during the Contract's duration. The CONTRACTOR shall not distribute maps or other information on these resource locations except for distribution among the CONTRACTOR's staff with a "need to know" technical responsibility for protecting the resources.

- A. Inadvertent Discoveries: If, during construction or other activities, the CONTRACTOR observes items that may have historic or archeological value, such observations shall be reported immediately to the TOWN so that the appropriate staff may be notified and a determination made for what, if any, additional action is needed. Examples of historic, archeological and cultural resources are bones, remains, artifacts, shell, midden, charcoal or other deposits, rocks or coral, evidences of agricultural or other human activity, alignments, and constructed features. The CONTRACTOR shall cease all activities that may result in the destruction of these resources and shall prevent his employees from further removing, or otherwise damaging, such resources.
- B. Claims for Downtime due to Inadvertent Discoveries: Upon discovery and subsequent reporting of a possible inadvertent discovery of cultural resources, the CONTRACTOR shall seek to continue WORK well away from, or otherwise protectively avoiding, the area of interest, or in some other manner that strives to continue productive activities in keeping with the Contract. Should an Inadvertent Discovery be of the nature that substantial impact(s) to the WORK schedule are evident; such delays shall be coordinated with the TOWN.

END OF SECTION

**Appendix A  
Wildlife Log**

For Threatened and/or Endangered Species and Species of Concern Listed in Permit

Wood Storks Sightings, since they are so abundant, will be logged on a bi-weekly basis in coordination with Bi-weekly Construction Progress Meetings and will be reported quarterly along with other sightings.

<input type="checkbox"/> Eastern Indigo Snake <input type="checkbox"/> Bald Eagle <input type="checkbox"/> Wood Stork <input type="checkbox"/> Florida Panther <input type="checkbox"/> Caracara <input type="checkbox"/> Gopher Tortoise <input type="checkbox"/> Other	
<b>Project Name</b>	
Date of Sighting	
Time of Sighting	
Temperature	
Wind (mph)	
Weather Conditions (ex: note sky cover, raining, humid, cloudy, sunny, cool, hot, etc)	
Construction Activity Occurring	
Equipment being Used	
Condition of Animal (ex: injured, unharmed, etc)	
Behavior of Animal (ex: disoriented, aggressive, etc)	
Actions taken after sighting	
Size of Animal	
GPS Coordinates/Specific Location	
Pictures Taken (Attach pictures)	
Date this form was completed	
Observers Company/Agency	
Observers Name	Print Name:
	Signature:
Observers Contact Info	Office:
	Cell:
	Email:

**EXAMPLE FORM  
Wildlife Log**

For Threatened and/or Endangered Species and Species of Concern Listed in Permit

Wood Storks Sightings, since they are so abundant, will be logged on a bi-weekly basis in coordination with Bi-weekly Construction Progress Meetings and will be reported quarterly along with other sightings.

<input checked="" type="checkbox"/> Eastern Indigo Snake	<input type="checkbox"/> Bald Eagle	<input type="checkbox"/> Wood Stork	<input type="checkbox"/> Florida Panther
<input type="checkbox"/> Caracara	<input type="checkbox"/> Gopher Tortoise	<input type="checkbox"/> Other	
<b>Project Name</b>	C-44 Reservoir		
<b>Date of Sighting</b>	Tuesday, January 29, 2008		
<b>Time of Sighting</b>	0900		
<b>Temperature</b>	75°		
<b>Wind (mph)</b>	5-10 mph		
<b>Weather Conditions</b> (ex: note sky cover, raining, windy, humid, cloudy, sunny, cool, hot, etc)	Partial cloud/Sunny		
<b>Construction Activity Occurring</b>	Demobilization of Construction Trailers, nothing near the area snakes were sighted		
<b>Equipment being Used</b>	n/a		
<b>Condition of Animal</b> (ex: injured, unharmed, etc)	Good		
<b>Behavior of Animal</b> (ex: disoriented, aggressive, etc)	under a door in an abandoned citrus office		
<b>Actions taken after sighting</b>	Determined sex, took photos, estimated size		
<b>Size of Animal</b>	Approx 6'		
<b>GPS Coordinates/Specific Location</b>	N 27 05 33.59 W 80 26 59.90 NE Corner of Project along Eastern Levee		
<b>Pictures Taken (Attach pictures)</b>	Yes, attached		
<b>Date this form was completed</b>	Tuesday, February 5, 2008		
<b>Observers Company/Agency</b>	Land Clearing Inc.		
<b>Observers Name</b>	Print Name:		
	Signature:		
<b>Observers Contact Info</b>	Office:		
	Cell:		
	Email:		



## Appendix B

**Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.**

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

**LEGAL STATUS:** The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.



August 12, 2013

## **ATTENTION:**

**THREATENED EASTERN INDIGO  
SNAKES MAY BE PRESENT ON  
THIS SITE!!!**



Please read the following information provided by the U.S. Fish and Wildlife Service to become familiar with standard protection measures for the eastern indigo snake.

**IF YOU SEE A LIVE EASTERN  
INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

**IF YOU SEE A DEAD EASTERN  
INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

**USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:**

**North Florida ES Office – (904) 731-3336**  
**Panama City ES Office – (850) 769-0552**  
**South Florida ES Office – (772) 562-3909**

**DESCRIPTION:** The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

**SIMILAR SNAKES:** The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

**LIFE HISTORY:** The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.



**Appendix C**  
**STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE**  
**U.S. Fish and Wildlife Service**  
**August 12, 2013**



**ATTENTION:**  
**THREATENED EASTERN**  
**INDIGO SNAKES MAY BE**  
**PRESENT ON THIS SITE!!!**

**IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

**IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

**USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:**

**North Florida Field Office – (904) 731-3336**  
**Panama City Field Office – (850) 769-0552**  
**South Florida Field Office – (772) 562-3909**

**Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.**

DESCRIPTION:	The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.
SIMILAR SNAKES:	The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.
LIFE HISTORY:	The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.
PROTECTION:	The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

August 12, 2013

SECTION 02820 SECURITY FENCE

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall install fence at the locations indicated on the drawings and specified herein.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 03300 - Cast-In-Place Concrete
  - 2. SECTION 05070 – Bolted Fasteners
  - 3. SECTION 05600 – Miscellaneous Metals

1.02 APPLICABLE PUBLICATIONS:

- A. Applicable Standards:
  - 1. FDOT Standard Specifications for Road and Bridge Construction, Section 562.
  - 2. FDOT Standard Specifications for Road and Bridge Construction, Section 962.
  - 3. FDOT Standard Specifications for Road and Bridge Construction, Section 937.
  - 4. FDOT Standard Specifications for Road and Bridge Construction, Section 550.

1.03 SUBMITTALS:

- A. The CONTRACTOR shall submit as specified in SECTION 01300.

**PART 2 - PRODUCTS**

- 2.01 Chain Link Fabric – Type R Fence per Section 550-3.3 of FDOT Standard Specifications for Road and Bridge Construction, latest edition.
- 2.02 Fence Components – Per Table of Fence Components, Index 550-002 Sheet 1 of 3, and Table of Post Attachments, Index 550-002 Sheet 3 of 3.

**PART 3 - EXECUTION**

- 3.01 GENERAL: Follow the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 550-4, Construction Methods.

END OF SECTION

SECTION 02920 SODDING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall provide all labor, equipment and materials necessary to establish a stand of grass within the specified areas by furnishing and placing sod, and rolling, fertilizing, watering and maintaining the sodded areas to ensure a healthy stand of grass.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.
  - 1. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, latest edition.

1.03 SUBMITTALS:

- A. Submittals shall be in accordance with SECTION 01300 and the General Terms and Conditions of the Contract.
- B. Sod certification for grass species and location of sod source.

1.04 QUALITY ASSURANCE:

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years experience, and certified by the State of Florida.
- B. Installer: Company approved by the sod producer.
- C. Sod: Minimum age of eighteen (18) months, with root development that will support its own weight, without tearing, when suspended vertically by holding the upper two corners.
- D. The TOWN reserves the right to test, reject or approve all materials before application.

1.05 REGULATORY REQUIREMENTS:

- A. Comply with regulatory agencies for fertilizer.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver products to Site in accordance with the provisions of SECTION 01600.
- B. Store and protect products in accordance with the provisions of SECTION 01600.
- C. Deliver sod on pallets. Protect exposed roots from dehydration.
- D. Do not deliver more sod than can be laid within 48 hours.
- E. Deliver fertilizer in water proof bags showing weight, chemical analysis, and name of MANUFACTURER.
- F. The CONTRACTOR shall furnish the TOWN with the MANUFACTURER's application/installation instruction for all materials received in order that the minimum application rate of materials may be determined.

1.07 MAINTENANCE SERVICE:

- A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

1.08 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in the General Terms and Conditions.

**PART 2 - PRODUCTS**

2.01 MATERIALS:

- A. Sod:
  - 1. The sod shall be Argentine Bahia, to closely match existing as directed, with well matted roots.
  - 2. The sod shall be commercial size rectangular measuring twelve (12) inches by 24 inches or larger.
  - 3. The sod shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of two (2) inches.
  - 4. The sod shall be live, fresh and uninjured at the time of planting.
  - 5. The sod shall have a soil matt of sufficient thickness adhering firmly to the roots to withstand all necessary handling and be reasonably free of weeds and other grasses.
  - 6. The sod shall be planted as soon as possible after being harvested, and shall be shaded and kept moist from the time of harvesting until it is planted.
  - 7. The source of the sod may be inspected for approval by the TOWN prior to construction.
- B. Topsoil:
  - 1. Excavated from Site and free of weeds.
- C. Fertilizer:
  - 1. Commercial fertilizer shall be Ammonium Sulfate (21-0-0-24S) containing 21 percent nitrogen and 24 percent sulfur.
    - a. Fertilizer containing phosphorus is not acceptable.
- D. Water:
  - 1. Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

**PART 3 - EXECUTION**

3.01 SOIL PREPARATION:

- A. Any growth, rocks, or other obstructions which might interfere with maintenance operations shall be removed and disposed of properly. Remove stones over two (2) inches in any dimension and sticks, roots, rubbish and other extraneous matter.
- B. Areas to be sodded are to be graded to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions, to meet finish grades. Limit fine grading to areas which can be planted within immediate future.
- C. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting.
- D. If prepared areas are eroded or otherwise disturbed after fine grading and prior to planting they shall be restored to specified condition prior to planting.
- E. Immediately upon completion of construction, sod shall be planted in all disturbed areas and as designated in the Drawings.

3.02 FERTILIZING:

- A. Apply fertilizer in accordance with MANUFACTURER's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper two (2) inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.03 LAYING SOD:

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod tight with no open joints visible. Do not overlap. Stagger end joints twelve (12) inches minimum. Do not stretch or overlap sod pieces.
- C. Do not use sod which has been cut for more than 48 hours
- D. Peg sod at locations where sod may slide, as directed by the TOWN.
- E. Roll sod using a lightweight turf roller to provide a true and even surface.

3.04 MAINTENANCE:

- A. Water all newly grassed areas at least once a week, at a rate equivalent to 1/2" to 3/4" per week, to prevent grass and soil from drying out.
- B. Immediately replace sod in areas which show deterioration or bare spots.
- C. The CONTRACTOR shall include in pricing, water and equipment to insure adequate survival of the sod and such maintenance as filling, leveling and repairing of any washed or eroded areas as may be necessary, for sixty days after Substantial Completion.

END OF SECTION

SECTION 03100 CONCRETE FORMWORK AND ACCESSORIES

**PART 1 - GENERAL**

1.01 SCOPE:

- A. The CONTRACTOR shall provide all labor, materials and equipment for the following:
  - 1. Design and construction of all necessary formwork including the required bracing, supports, scaffolding, shoring, and other falsework to produce cast-in-place concrete in the finished structure within the required tolerances for line, grade, dimension and detail.
  - 2. Joints in concrete, complete and in place, in accordance with the Contract Documents. Joints in concrete structures shall be the types defined below and will be permitted only where indicated, unless specifically accepted by the TOWN.

1.02 APPLICABLE PUBLICATIONS: The following standard specifications shall apply to the WORK of this SECTION:

- A. American Concrete Institute (ACI)
  - 1. ACI 347 - Recommended Practice for Concrete Formwork
  - 2. ACI 117 - Standard Tolerances for Concrete Construction and Materials
- B. American Society of Testing and Materials (ASTM)
  - 1. A775 - Epoxy Coated Reinforcing Steel Bars
  - 2. C920 - Elastomeric Joint Sealant
  - 3. D412 - Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension
  - 4. D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
  - 5. D638 - Standard Test Method for Tensile Properties of Plastics
  - 6. D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
  - 7. D747 - Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
  - 8. D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber
  - 9. D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
  - 10. D2000 - Standard Classification System for Rubber Products in Automotive Applications
  - 11. D2240 - Standard Test Method for Rubber Property - Durometer Hardness
  - 12. D2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- C. US Product Standards (PS)
  - 1. PS-1 - Construction and Industrial Plywood for Concrete Forms
  - 2. PS-20 - American Softwood Lumber Standard
- D. NSF International
  - 1. NSF 61 - Drinking Water System Components - Health Effects
- E. United States Army Corps of Engineers (USACE)
  - 1. CRD-C572 - PVC Waterstops
- F. Federal Specifications
  - 1. TT-S-0227 E(3) - Sealing Compound, Elastomeric Type, Multicomponent, for Caulking, Sealing, and Glazing Buildings and Other Structures
- G. Occupational Safety and Health Association (OSHA)
  - 1. CFR Title 29 Part 1926 - Safety and Health Regulations for Construction

### 1.03 DEFINITIONS:

#### A. Construction Joints:

1. When fresh concrete is placed against a hardened concrete surface, the joint between the two pours is called a construction joint. If indicated on the drawings, joints in water bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated. The surface of the first pour may also be required to receive a coating of bond breaker as indicated.

#### B. Contraction Joints:

1. Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the earlier pour, which shall be coated with a bond breaker. The slab reinforcement shall be stopped 4-1/2 inches from the joint, which is provided with a sleeve-type dowel, to allow shrinkage of the concrete of the later pour. Waterstop and/or sealant groove shall also be provided when indicated.

#### C. Expansion Joints:

1. To allow the concrete to expand freely, a space is provided between the two pours, and the joint shall be formed as indicated. The space is obtained by placing a filler joint material against the earlier pour, to act as a form for the later pour. Unless otherwise indicated, expansion joints in water bearing members shall be provided with a center-bulb type waterstop as indicated.
2. Premolded expansion joint material shall be installed with the edge at the indicated distance below or back from finished concrete surface, and shall have a slightly tapered, dressed, and oiled wood strip secured to or placed at the edge thereof during concrete placement, which shall later be removed to form space for sealing material.
3. The space so formed shall be filled with a joint sealant material as indicated herein. In order to keep the two walls or slab elements in line the joint shall also be provided with a sleeve-type dowel as indicated.

#### D. Control Joints:

1. The function of the control joint is to provide a weaker plane in the concrete, where shrinkage cracks will probably occur. A groove, of the shape and dimensions indicated, is formed or saw-cut in the concrete. This groove is afterward filled with a joint sealant material.

### 1.04 SUBMITTALS:

- A. Falsework Calculations and Drawings: The CONTRACTOR shall submit calculations and drawings prepared and sealed by a Professional Civil Engineer registered in the State of Florida, which indicate the falsework complies with the requirements of OSHA Title 29, Part 1926.703. The submission of design details and calculations for falsework is for information only.
- B. The plans of falsework proposed to be used shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the falsework, means of protecting existing construction which supports falsework, and typical soil conditions.
- C. The CONTRACTOR shall submit placement drawings showing the location and type of all joints for each structure.
- D. Prior to production of the waterstop materials required under this SECTION, qualification samples of waterstops shall be submitted which represent in all respects the material proposed. Such samples shall consist of extruded or molded sections of each size or shape to be used. The balance of the material to be used shall not be produced until after the TOWN has reviewed the qualification samples.
- E. Prior to use of the waterstop material in the field, a sample of a prefabricated (shop made fitting) mitered cross and a tee constructed of each size or shape of material to be used shall be submitted. These samples shall be prefabricated (shop made fitting) so that the material and workmanship represent in all respects the fittings to be provided. Field samples of prefabricated (shop made fitting) fittings (crosses, tees, etc.) may also be selected at random by the TOWN for testing by a laboratory at the TOWN's expense. When tested, tensile strength across the joints shall be at least 1120 psi.

- F. The CONTRACTOR shall submit MANUFACTURER's information demonstrating compliance with requirements for the following:
1. Form ties and related accessories, including taper tie plugs, if taper ties are used
  2. Form gaskets
  3. Form release agent, including NSF certification if not using mineral oil
  4. List of form materials and locations for use
  5. Bearing Pads
  6. Neoprene Sponge
  7. Preformed Joint Filler
  8. Backing Rod
  9. Bond Breaker
  10. Waterstops
  11. Slip Dowels
  12. PVC Tubing

1.05 RESPONSIBILITIES:

- A. The CONTRACTOR is fully responsible for the design and construction of all forms and falsework to be in compliance with all applicable OSHA requirements, and the requirements of all agencies having jurisdiction on the project. The submission of design details and calculations for falsework is for information only.
- B. The CONTRACTOR shall prepare adhesion and cohesion test specimens for construction joint sealant as required herein, at intervals of 5 working days while sealants are being installed.
- C. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:
1. Sealant specimen shall be prepared between 2 concrete blocks (1-inch by 2-inch by 3-inch). Spacing between the blocks shall be 1-inch. Coated spacers (2-inch by 1-1/2-inch by 1/2-inch) shall be used to insure sealant cross-sections of 1/2-inch by 2 inches with a width of 1-inch.
  2. Sealant shall be cast and cured according to MANUFACTURER's recommendations except that curing period shall be not less than 24 hours.
  3. Following curing period, the gap between blocks shall be widened to 1-1/2-inch. Spacers shall be used to maintain this gap for 24 hours prior to inspection for failure.

1.06 CERTIFICATIONS:

- A. Form materials, which may remain or leave residues on or in the concrete, shall be certified as compliant with NSF 61.
- B. Joint materials shall be certified as compliant with NSF 61.
- C. The CONTRACTOR shall submit certified test reports from the sealant MANUFACTURER on the actual batch of material being supplied indicating compliance with requirements herein before the sealant is used on the job.

1.07 INSPECTIONS:

- A. Falsework shall be inspected for conformance with the accepted submittal. No workers will be allowed to use falsework for access and no concrete placement to related forms will be permitted until the falsework is inspected by the CONTRACTOR for conformance with the submittals and appropriately tagged. No variations or alterations to falsework, as compared to the reference submittal, will be allowed without certification of the variation by the original Professional Engineer.

1.08 WARRANTY:



- A. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

## **PART 2 - PRODUCTS**

### **2.01 FORM AND FALSEWORK MATERIALS:**

- A. Except as otherwise expressly accepted by the TOWN, lumber brought on the Site for use as forms, shoring, or bracing shall be new material. Forms shall be smooth surface forms and shall be of the following materials:
- Walls - Steel, fiberglass, or plywood panel
  - Columns - Steel, plywood, PVC, fiberglass, or spiral wound fiber forms
  - Roof and floor - Plywood
  - All other work - Steel panels, fiberglass, or plywood
- B. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:
1. Plywood shall be new, waterproof, synthetic resin bonded, exterior type, manufactured especially for concrete formwork and shall conform to Plyform Class I, B-B EXT, of PS-1, and shall be edge sealed.
  2. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with PS 20.
  3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade indicated. Metal forms shall accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO EXT Grade.
- C. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.
- D. Forms and falsework to support the roof and floor slabs shall be designed in accordance with ACI 347.

### **2.02 FORM TIES:**

- A. Ties shall be standard crimped snap ties with one-inch (1") snapback. Ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties for water-retaining structures shall have integral waterstops that tightly fit the form tie so that they cannot be moved from mid-point of the tie.
- B. Removable taper ties may be used when approved by the TOWN. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.

### **2.03 FORM RELEASING AGENT:**

- A. Form release agent shall be non-staining and shall leave no residues on or in the concrete unless certified as compliant with NSF 61 and shall not adversely affect the adhesion of paint or other coatings.

### **2.04 JOINT SEALANT FOR WATER BEARING JOINTS:**

- A. Joint sealant shall be polyurethane polymer designed for bonding to concrete, which is continuously submerged in water. No material will be acceptable which has an unsatisfactory history as to bond or durability when used in the joints of water retaining structures.
- B. Joint sealant material shall meet the following requirements (73 degrees F and 5percent R.H.):

Requirement	Value	ASTM Standard
Work Life (minutes)	45 - 180	-----
Time to Reach 20 Shore "A" Hardness (at 77 degrees F, 200 gr quantity) - max (hours)	24	-----
Ultimate Hardness	20 - 45 Shore "A"	D 2240
Tensile Strength - min (psi)	175	D 412
Ultimate Elongation - min (percent)	400	D 412
Tear Resistance - min (pounds per inch of thickness)	75	D 624 (Die C)
Color	Light Gray	-----

- C. Polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:
1. Sealant shall be 2-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ASTM C 920, or TT-S-0227 E(3) for 2-part material, as applicable.
  2. For vertical joints and overhead horizontal joints, only "non-sag" compounds shall be used; all such compounds shall conform to the requirements of ASTM C 920 Class 25, Grade NS, or TT-S-0227 E(3), Type II, Class A.
  3. For plane horizontal joints, the self-leveling compounds which meet the requirements of ASTM C 920 Class 25, Grade P, or TT-S-0227 E(3), Type I shall be used. For joints subject to either pedestrian or vehicular traffic, a compound providing non-tracking characteristics, and having a Shore "A" hardness range of 35 to 45, shall be used.
  4. Primer materials, if recommended by the sealant MANUFACTURER, shall conform to the printed recommendations of the MANUFACTURER.
- D. Sealants for non-waterstop joints in concrete shall conform to SECTION 07920.

#### 2.05 JOINT MATERIALS:

- A. Bearing Pad: Bearing pad shall be neoprene conforming to ASTM D 2000, BC 420, 40 durometer hardness unless otherwise indicated.
- B. Neoprene Sponge: Sponge shall be neoprene, closed-cell, expanded, conforming to ASTM D 1056, Type 2C5-E1.
- C. Joint Filler
  1. Joint filler for expansion joints in water holding structures shall be neoprene conforming to ASTM D1056, Type 2C5-E1.
  2. Joint filler material in other locations shall be of the preformed non-extruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752, for Type I, except as otherwise indicated.

#### 2.06 BACKING ROD:

- A. Backing rod shall be an extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant material and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at eight (8) psi. The rod shall be 1/8-inch larger in diameter than the joint width except that a one-inch diameter rod shall be used for a 3/4-inch wide joint.

#### 2.07 BOND BREAKER:

- A. Bond breaker shall contain a fugitive dye so that areas of application will be readily distinguishable.
- B. Bonding agent for hydrophilic waterstop shall be the MANUFACTURER's recommended adhesive for wet, rough concrete.

2.08 SLIP DOWELS:

- A. Slip dowels in joints shall be smooth epoxy-coated bars, conforming to ASTM A 775.

2.09 PVC TUBING:

- A. PVC tubing in joints shall be Schedule SDR 13.5, conforming to ASTM D 2241.

2.10 CHAMFER STRIP:

- A. Provide three quarter inch triangular fillets, milled clear straight grained wood, surfaced each side, or extruded vinyl type, with or without nail flange to form all exposed concrete edges such as columns, pilasters, beams, curbs, equipment pads, tops of walls, and as indicated. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4" chamfers. Re-entrant corners in concrete members shall not have fillets, unless otherwise indicated.

**PART 3 - EXECUTION**

3.01 FORMS:

- A. Forms shall conform to the shape, lines, and dimensions as shown on the Drawings and shall be substantial and sufficiently tight to prevent leakage. Forms shall be properly braced or tied so as to maintain position and shape. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by CONTRACTOR's personnel and by the TOWN and shall be in sufficient number and properly installed. During concrete placement, the CONTRACTOR shall continually monitor plumb and string line form positions and immediately correct deficiencies.
- B. The CONTRACTOR shall be fully responsible for the adequacy of the formwork in its entirety and any forms that are unsafe or inadequate in any respect shall promptly be removed from the WORK and replaced. The CONTRACTOR shall provide worker protection from protruding reinforcement bars in accordance with applicable safety codes.
- C. The CONTRACTOR may reuse forms only if in good condition and only if acceptable to the TOWN. Reused forms shall be thoroughly cleaned and may require light sanding between uses to obtain a uniform surface texture on all exposed concrete surfaces. Forms shall not be reused if they have developed defects that would affect the surface texture of exposed concrete. Exposed concrete surfaces are defined as surfaces, which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the TOWN.
- D. Forms shall be sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.
- E. Immediately before the placing of reinforcing, faces of all forms in contact with concrete shall receive a thorough coating of form release agent. Any excess agent shall be satisfactorily removed before placing concrete. If using mineral oil, the CONTRACTOR shall oil the forms at least two weeks in advance of their use. Care shall be exercised to keep oil/release agent off the surfaces of steel reinforcement and other items to be embedded in concrete.
- F. The CONTRACTOR shall supply sufficient number of forms of each kind to permit the required rate of progress to be maintained.
- G. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state, and Federal regulations.

3.02 FORM DESIGN:

- A. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and

effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete.

- B. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form.
- C. The CONTRACTOR shall provide adequate clean-out holes at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the TOWN. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of SECTION 03300. The size, number, and location of such form windows shall be as acceptable to the TOWN.

### 3.03 FORM CONSTRUCTION:

- A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of concrete shall be added to the indicated thickness of a concrete member, where concrete is permitted to be placed against trimmed ground, in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.
- B. Construction Joints: Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the TOWN. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.
- C. Form Ties
  - 1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties, which cause spalling of the concrete upon form stripping or tie removal, will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.
  - 2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls, which are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout, which shall match the color and texture of the surrounding wall surface.

### 3.04 JOINT CONSTRUCTION:

- A. Joint Location:

1. Construction joints and other types of joints shall be provided where indicated. When not indicated, construction joints shall be provided at 25-foot maximum spacing for all concrete construction. Where joints are indicated spaced greater than 40 feet apart, additional joints shall be provided to maintain the 25-foot maximum spacing. The location of all joints, of any type, shall be submitted for acceptance by the TOWN.
- B. Joint Preparation:
1. The CONTRACTOR shall take special care in preparing concrete surfaces at joints where bonding between 2 sections of concrete is required. Unless otherwise indicated, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of SECTION 03300. Except on horizontal wall construction joints, wall to slab joints, or where otherwise indicated, at all joints where waterstops are required, the joint face of the first pour shall be coated with a bond breaker as indicated herein.
- C. Construction Joint Sealant:
1. Construction joints in water-bearing floor slabs, and elsewhere as indicated, shall be provided with tapered grooves which shall be filled with a construction joint sealant. The material used for forming the tapered grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant. After removing the forms from the grooves, all laitance and fins shall be removed, and the grooves shall be sandblasted. The grooves shall be allowed to become thoroughly dry, after which they shall be blown out; immediately thereafter, they shall be primed, bond breaker tape placed in the bottom of the groove, and filled with the construction joint sealant. The primer shall be furnished by the sealant MANUFACTURER. No sealant will be permitted to be used without a primer. Care shall be used to completely fill the sealant grooves. Areas designated to receive a sealant fillet shall be thoroughly cleaned, as outlined for the tapered grooves, prior to application of the sealant.
  2. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the MANUFACTURER, taking special care to properly mix the sealant prior to application. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant. Sealant shall achieve final cure at least 7 days before the structure is filled with water.
  3. Sealant shall be installed by a competent waterproofing specialty contractor who has a successful record of performance in similar installations.
  4. Thorough, uniform mixing of 2-part, catalyst-cured materials is essential; special care shall be taken to properly mix the sealer before its application. Before any sealer is placed, the CONTRACTOR shall arrange to have the crew doing the WORK carefully instructed on the proper method of mixing and application by a representative of the sealant MANUFACTURER.
  5. Any joint sealant which fails to fully and properly cure after the MANUFACTURER's recommended curing time for the conditions of the WORK hereunder shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured or partially cured sealant and primer, and shall be re-sealed with the indicated joint sealant. Costs of such removal, joint treatment, re-sealing, and appurtenant WORK shall be the CONTRACTOR's responsibility.

### 3.05 REMOVAL OF FORMS:

- A. Careful procedures for the removal of forms shall be strictly followed, and this WORK shall be done with care so as to avoid injury to the concrete or workers. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28-day strength (0.75f'c) in SECTION 03300. No forms shall be disturbed or removed under an individual panel or unit before the concrete in all the adjacent panels or units have attained 0.75f'c strength and have been in place for a minimum of 7 days. The time required to establish said strength shall be determined by the TOWN, who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7-day minimum, then that time shall be used as the minimum length of

time. Forms for vertical walls of water holding structures shall remain in place at least 36 hours after the concrete has been placed.

- B. Forms for parts of the WORK not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347.

3.06 FALSEWORK:

- A. The CONTRACTOR shall be responsible for the design, engineering, construction, maintenance, and safety of all falsework, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements herein.
- B. The CONTRACTOR shall design and construct falsework to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.
- C. The CONTRACTOR shall place falsework upon a solid footing, safe against undermining, and protected from softening. When the falsework is supported on timber piles, the maximum calculated pile loading shall be as recommended by the CONTRACTOR's geotechnical engineer and shall not exceed 20 tons. When falsework is supported on any portion of the structure which is already constructed, the load imposed by the falsework shall be spread, distributed, and braced in such a way as to avoid any possibility of damage to the structure.

3.07 TOLERANCES:

- A. The variation from plumb, level and required lines shall not exceed 1/4-inch in any ten feet (10') of length, non cumulative, and there shall be no offsets or visible waviness in the finished surface. All other tolerances shall be within the tolerances of ACI 117 - Standard Tolerances for Concrete Construction and Materials.

END OF SECTION

SECTION 03200 CONCRETE REINFORCEMENT

**PART 1 - GENERAL**

1.01 SCOPE:

- A. The CONTRACTOR shall furnish all labor, materials and equipment to provide and properly place all concrete reinforcement steel, welded wire fabric, couplers, and concrete inserts for use in the reinforced concrete and masonry construction and all appurtenant work, including all the wires, clips, supports, chairs, spacers, and other accessories as shown on the drawings and as specified herein.

1.02 APPLICABLE PUBLICATIONS: The most recent revision of the following standard specifications shall apply to the WORK of this SECTION:

- A. American Concrete Institute (ACI):
  - 1. ACI 318 - Building Code Requirements for Reinforced Concrete
  - 2. ACI SP-66 - Detailing Manual
- B. American Society of Testing and Materials (ASTM):
  - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
  - 2. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
  - 3. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  - 4. ASTM A775 - Standard Specification for Epoxy-Coated Reinforcing Steel Bars
- C. Concrete Reinforcing Steel Institute (CRSI):
  - 1. Recommended Practice for Placing Reinforcing Bars
- D. Florida Building Code, Latest Edition

1.03 DEFINITIONS: (Not Used)

1.04 SUBMITTALS: The CONTRACTOR shall submit the following:

- A. Mill Certifications of Grade 60 reinforcing steel or stainless steel, as required
- B. Complete bar schedule, bar details and erection drawings in conformance with ACI SP-66
- C. Mill certificates shall be delivered with each shipment of reinforcing bars.

1.05 QUALIFICATIONS: (Not Used)

1.06 RESPONSIBILITIES: (Not Used)

1.07 CERTIFICATIONS:

- A. International Code Council Evaluation Service (ICC-ES) Certifications for mechanical couplers, if allowed
- B. Mill Certifications of Grade 60 reinforcing steel

1.08 INSPECTION COORDINATION:

- A. The CONTRACTOR shall provide sufficient notice and opportunity to the TOWN to review the placement of the reinforcing steel before the concrete is placed. The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in the General Terms and Conditions.

## **PART 2 - PRODUCTS**

### **2.01 REINFORCING BARS:**

- A. Metal reinforcement shall be deformed type bars conforming to ASTM A615, Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Grade 60, unless otherwise specified. Reinforcing steel shall be fabricated for the shapes and dimensions indicated on the Drawings and in compliance with ACI 318. All bars shall be bent cold.
- B. Replace all reinforcement with bends and kinks not shown on fabrication Shop Drawings. Remove from job site all such reinforcing and replace with new fabricated steel. Field bending of reinforcement at the work site is prohibited.
- C. Welded wire fabric reinforcement shall conform to the requirements of ASTM A185, and the details indicated. Do not use fabric that has been rolled. Install flat sheets only.
- D. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A82.
- E. Mechanical couplers shall be provided where indicated and where approved by the TOWN. The couplers shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be provided. This shall apply to all mechanical splices, including those splices intended for future connections. Reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross section of the bar.
- F. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall meet the requirements in SECTION 03600.

- 2.02 ACCESSORIES: All chairs and bolsters shall conform to ACI SP-66 and the CRSI Manual of Standard Practices and shall have galvanized or plastic legs.

## **PART 3 - EXECUTION**

### **3.01 PLACEMENT AND ANCHORAGE:**

- A. Bar supports shall be spaced in accordance with CRSI.
  - 1. Reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers that are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall provide concrete, metal, plastic, or other acceptable bar chairs and spacers.
  - 2. Limitations on the use of bar support materials shall be as follows.
    - a. Concrete Dobies: permitted at all locations except where architectural finish is required.
    - b. Wire Bar Supports: permitted only at slabs over dry areas, interior non-hydraulic wall surfaces, and exterior wall surfaces.
    - c. Plastic Bar Supports: permitted at all locations except on grade.
- B. Reinforcement shall be accurately placed in accordance with the Drawings and shall be adequately secured in position with not less than 16-gauge annealed wire. The placement tolerances shall be in



accordance with ACI 318, paragraph 7.5, Placing Reinforcement and the CRSI Manual of Standard Practices except where in conflict with the requirements of the Building Code.

- C. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.
- D. Bars additional to those indicated which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.
- E. Additional reinforcement around openings:
  - 1. Place an equivalent area of steel around pipe or opening and extend on each side and top and bottom sufficiently to develop bond in each bar.
  - 2. Refer to details on Drawings for bar extension length on each side of opening.
  - 3. Where welded wire fabrics are used, provide extra reinforcing using fabric or deformed bars.
- F. Bars may be moved as necessary to avoid interference with other reinforcement steel continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.
- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than three (3) feet on centers in any direction. Welded wire fabric shall not be placed on the ground and hooked into place in the freshly placed concrete.
- H. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than 30 inches on center. The construction practice of placing welded wire fabric on the ground and hooking it into place in the freshly placed concrete shall not be used.

### 3.02 CONCRETE COVER:

- A. The concrete cover over reinforcement shall conform to ACI 318, paragraph 7.7, Concrete Protection for Reinforcement, unless otherwise indicated. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.

### 3.03 SPLICING:

- A. All lap splices of bar reinforcement shall be as indicated and conform to Chapter 12 of ACI 318 or as otherwise approved by the TOWN. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.
- B. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each two running feet. Wires shall be staggered and tied in such a manner that they cannot slip.
- C. Splices in column spiral reinforcement, when necessary, shall be made by a lap of 1-1/2 turns.
- D. Reinforcing shall not be straightened or rebent in a manner which will injure the material. Bars shall be bent or straight as indicated. Do not use bends different from the bends indicated. Bars shall be bent cold, unless otherwise permitted by the TOWN. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the TOWN.
- E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as indicated. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. Couplers intended for future connections shall be recessed a minimum of 1/2 inch from the concrete surface. After the concrete is placed, the coupler shall be plugged with plastic plugs which have an O-ring seal and the recess filled with sealant to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged.

### 3.04 CLEANING AND PROTECTION:

- A. Unless indicated otherwise, mechanical coupler spacing and capacity shall match the spacing and capacity of the reinforcing indicated for the adjacent section.

- B. Reinforcement shall be free of all materials that will reduce bond.
- C. Reinforcement steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- D. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be re-inspected and, if necessary, re-cleaned or sandblasted.
- E. Properly cap all vertical reinforcement steel if area is subject to having workers above the reinforcement area.

3.05 INSTALLATION OF DRILLED REINFORCING STEEL DOWELS:

- A. For drilling and grouting information see SECTION 03600.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

**PART 1 - GENERAL**

1.01 SCOPE:

- A. The WORK of this SECTION consists of furnishing all labor, equipment, supplies, and materials necessary for the proper placement, curing, finishing, protection, and repair of the cast-in-place concrete required by the Contract Documents.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals
  - 2. SECTION 01410 – Testing and Quality Control
  - 3. SECTION 02200 – Earthwork
  - 4. SECTION 03100 - Concrete Formwork and Accessories
  - 5. SECTION 03200 - Concrete Reinforcement
  - 6. SECTION 03600 – Grout

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.
  - 1. American Concrete Institute (ACI)
    - a. 117 - Standard Tolerance for Concrete Construction and Materials
    - b. 301 - Structural Concrete for Buildings
    - c. 304.2R - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
    - d. 305 - Committee Report on Hot-Weather Concreting
    - e. 306 - Committee Report on Cold-Weather Concreting
    - f. 308 - Standard Specification for Curing Concrete
    - g. 309 - Consolidation of Concrete
    - h. 318 - Building Code Requirements for Reinforced Concrete
    - i. 350 – Code Requirements for Environmental Engineering Concrete Structures
  - 2. American Society for Testing and Materials (ASTM):
    - a. C31 - Making and Curing Concrete compression and Flexure Test Specimens in the Field
    - b. C33 – Standard Specification for Concrete Aggregates
    - c. C39 - Compressive Strength of Cylindrical Concrete Specimens
    - d. C94 - Standard Specification for Ready-Mixed Concrete
    - e. C127 - Test Method for Specific Gravity and Absorption of Coarse Aggregate
    - f. C128 - Test Method for Specific Gravity and Absorption of Fine Aggregate
    - g. C136 - Method for Sieve Analysis of Fine and Coarse Aggregates
    - h. C143 - Test Method for Slump of Hydraulic Cement Concrete
    - i. C150 – Standard Specification for Portland Cement
    - j. C156 - Test Method for Water Retention by Concrete Curing Materials
    - k. C157 - Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete
    - l. C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

- m. C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
  - n. C260 - Specification for Air Entraining Admixtures for Concrete
  - o. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
  - p. C494 - Standard Specification for Chemical Admixtures for Concrete
  - q. C566 - Test Method for Total Moisture Content of Aggregate by Drying
  - r. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
  - s. C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
  - t. C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation
  - u. C1157 – Performance Specification for Hydraulic Cements
  - v. C1240 - Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout
  - w. D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
  - x. D2419 - Test Methods for Sand Equivalent Value of Soils and Fine Aggregate
  - y. E96 - Standard Specification for Water Vapor Transmission of Materials
  - z. E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- 3. Federal Specifications
    - a. UU-B-790A - Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant)
  - 4. Florida Building Code and Local Building Codes as appropriate
  - 5. Florida Department of Transportation (FDOT)
    - a. Standard Specifications for Road and Bridge Construction, latest edition.

1.03 DEFINITIONS:

- A. Structural Concrete: Concrete to be used in all cases except where indicated otherwise in the Contract Documents.
- B. Pea Gravel Concrete: Concrete in thin sections and areas with congested reinforcing, at the option of the CONTRACTOR and with written approval of the TOWN for the specific location.
- C. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, pavements, fence and guard post embedment, underground pipe encasement, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise indicated.
- D. Lean Concrete: Concrete to be used for thrust blocks, pipe trench cut-off blocks and cradles that are indicated on the Drawings as unreinforced. Lean concrete shall be used as protective cover for dowels intended for future connection.
- E. Tremie Concrete: Concrete placed underwater. To be used as a seal (slab) under precast L-section as shown or described on drawings.
- F. Hydraulic Structure: A concrete structure for the containment, treatment, or transmission of water, wastewater, other fluids, or gases.

1.04 SUBMITTALS:

- A. Mix Designs:
  - 1. Prior to beginning the WORK and within 14 days after issuance of the Notice to Proceed, the CONTRACTOR shall submit preliminary concrete mix designs which shall show the

proportions and gradations of all materials proposed for each class and type of concrete. Mix designs shall be tested by an independent testing laboratory acceptable to the TOWN. All costs related to such testing shall be CONTRACTOR'S responsibility. Since laboratory trial batches require 35 calendar days to complete, the CONTRACTOR shall test a minimum of two mix designs for each class of concrete.

2. Test data relating to the cement, aggregate, and admixtures shall be less than six months old. Furnish the submittals in accordance with ACI 301 for the following:
  - a. Mill tests for cement
  - b. Admixture certification. Chloride ion content shall be included.
  - c. Aggregate gradation test results and certification
3. Where ready-mix concrete is used, the CONTRACTOR shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount allowed to be added at the Site for the specific design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

B. Other

1. The CONTRACTOR shall submit materials and methods for curing.
2. The CONTRACTOR shall submit product specifications, data, and installation instructions for all miscellaneous products called for in this specification.
3. Tremie Concrete:
  - a. Placement Plan: The CONTRACTOR shall submit detailed plans for concrete placement, which shall include method and equipment used, pipe spacing, and location throughout the duration of placement, and the planned locations to be used for relocating pipes as placement progresses. The plan shall be submitted at least 20 days prior to commencing of concrete placement. No concrete shall be placed until the CONTRACTOR has received written approval from the TOWN.
  - b. Placement Procedures: The CONTRACTOR shall submit placement procedures which include details of stable platform for support of tremie operations, and procedures for preventing water flowing across or through the underwater placement site during concreting.

1.05 QUALIFICATIONS:

- A. Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

1.06 RESPONSIBILITIES: (not used)

1.07 CERTIFICATIONS AND TESTING:

A. General

1. Concrete and other materials for testing shall be furnished by the CONTRACTOR, and the CONTRACTOR shall assist the TOWN in obtaining samples, and disposal and cleanup of excess material.
2. The testing laboratory will meet or exceed the requirements of ASTM C1077.
3. The cost of trial batch, laboratory, and shrinkage tests on cement, aggregates, and concrete, will be the CONTRACTOR'S responsibility.

B. Trial Batch and Laboratory Tests

1. Tests for determining slump shall be in accordance with the requirements of ASTM C143.
2. Testing for aggregate shall include sand equivalence, reactivity, organic impurities, abrasion resistance, and soundness, according to ASTM C33.
3. A testing laboratory approved by the TOWN shall prepare a trial batch of each class of concrete, based on the preliminary concrete mixes submitted by the CONTRACTOR. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments will be considered refinements to the mix design and will not be the basis for extra compensation to the CONTRACTOR. Concrete shall conform to the requirements of this SECTION, whether the aggregate proportions are from the CONTRACTOR'S preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch shall be prepared using the aggregates, cement, and admixture proposed for the Project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage, and 6 compression test specimens from each batch.
4. The determination of compressive strength shall be made in accordance with ACI 318, Section 5.3.
5. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C136. Values shall be given for percent passing each sieve.
6. The final selection of the Tremie Concrete mix design shall be based upon test placements underwater in a placement box or in a pit that can be de-watered after placement. Test placements shall be examined for concrete flatness, amount of laitance present, quality of concrete at the extreme flow distance of the test. The TOWN shall determine the acceptance or rejection of the mix based on the results of the test.

C. Field Tests

1. The responsibility to retain the services of an independent testing laboratory shall be as defined in SECTION 01410.
2. The CONTRACTOR shall pay the cost of any additional tests and investigation on WORK that does not meet the specifications.
3. Tests on pumped concrete shall be taken at the point of final placement.
4. Compressive Test: Compressive test specimens shall be taken during construction from the first placement of each class of concrete placed each day and for each 150 cubic yards or fraction thereof each day.
  - a. Each set of test specimens shall consist of five (5) cylinders. Specimens shall be made in accordance with ASTM C31. Specimens shall be 6-inch diameter by 12-inch high cylinders.
  - b. Compression tests shall be performed in accordance with ASTM C39. Two (2) cylinders shall be broken at seven (7) days and two (2) at 28 days, and the remaining cylinder shall be held to verify test results, if needed.
  - c. The acceptance of the test results shall be the average of the strengths of the two specimens tested at 28 days as per ACI 318. Evaluation and acceptance of the concrete shall be per ACI 318, Chapter 5.
5. Slump Tests: One (1) slump test shall be taken per truckload in accordance with ASTM C143.
6. Air Content: Air content shall be determined for each compressive test taken in accordance with ASTM C231 or by ASTM C173.
7. Aggregate testing shall be made every twelve (12) months during construction to insure continued compliance with these Specifications.
8. Concrete that fails to meet the ACI requirements and these Specifications is subject to removal and replacement.
9. Temperature: Concrete temperature shall be recorded in accordance with ASTM C1064.

10. During placement of concrete underwater, sampling and testing of slump, air content, and temperature shall be taken every hour, or for every 200 cubic yards of concrete placed. Sounding in various locations shall also be conducted at the same interval.

1.08 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

**PART 2 - MATERIALS**

2.01 GENERAL:

- A. All materials shall be classified as acceptable for potable water use according to NSF Standard 61.
- B. Cement for concrete that will contact potable water shall not be obtained from kilns that burn metal rich hazardous waste fuel.
- C. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments.
- D. Materials shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.
- E. Storage of materials shall conform to the requirements of Section 205 of ACI 301.

2.02 CEMENT:

- A. Cement shall be standard Portland Cement Type I conforming to ASTM C150 and C1157.
- B. Tremie concrete cement shall be standard Portland Cement Type II conforming to ASTM C150 and C1157.
- C. A minimum of 85 percent of cement by weight shall pass a 325 screen.
- D. A single brand of cement shall be used throughout the WORK, and prior to its use, the brand shall be accepted by the TOWN.
- E. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the TOWN, if requested, regarding compliance with these Specifications.

2.03 AGGREGATES:

- A. Aggregates shall be obtained from pits acceptable to the TOWN, shall be non-reactive, and shall conform to the requirements of ASTM C33.
- B. When tested in accordance with ASTM C33, the loss resulting after five (5) cycles of the soundness test, shall not exceed ten (10) percent for fine aggregate and twelve (12) percent for coarse aggregate, when using sodium sulfate.
- C. When tested in accordance with ASTM C33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.
- D. Course Aggregates:
  1. Coarse aggregates shall be crushed stone, gravel or other approved inert material having clean, hard, durable, uncoated particles conforming to ASTM C33.
  2. The coarse aggregates shall be prepared and handled in two (2) or more size groups for combined aggregates with a maximum size greater than 3/4-inch. When the aggregates are proportioned for each batch of concrete, the 2 size groups shall be combined.
  3. When tested in accordance with ASTM C33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.
- E. Fine Aggregates:

1. Fine aggregates shall be clean sand conforming to ASTM C33.
2. When tested in accordance with ASTM D2419, the sand equivalency shall not be less than 75 percent for an average of three (3) samples, nor less than 70 percent for an individual test. Gradation of fine aggregate shall conform to ASTM C33 when tested in accordance with ASTM C136 for the fineness modulus of the sand used, including the optional grading in Section 6.2. The fineness modulus of sand used shall not be over 3.1.
3. When tested in accordance with ASTM C33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

2.04 WATER:

- A. The water used in the concrete mix and for curing shall be clean, potable, and in accordance with ACI 318. Water shall be free from objectionable quantities of silty organic matter, alkali, salts, and other impurities.
- B. The water shall be considered potable, for the purposes of this SECTION only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.

2.05 ADMIXTURES:

- A. General: All admixtures shall be compatible and be furnished by a single MANUFACTURER capable of providing qualified field service representation. Admixtures shall be used in accordance with MANUFACTURER's recommendations. If the use of an admixture is producing an inferior end result, the CONTRACTOR shall discontinue use of the admixture. Admixtures shall not contain thiocyanates or more than 0.05 percent chloride ion, and shall be non-toxic after 30 days.
- B. Air Entraining Admixtures:
  1. Air entraining admixture shall conform to ASTM C260. Air content shall be tested at the point of placement.
  2. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
  3. Sufficient air-entraining agent shall be used to provide a total air content of 5 percent. Concrete floors to receive a shake-on floor hardener shall have an air content not to exceed three (3) percent or as recommended by the hardener MANUFACTURER.
- C. Set Controlling and Water Reducing Admixtures:
  1. Admixtures may be added at the CONTRACTOR'S option, subject to the TOWN's approval, to control the set, effect water reduction, and increase workability. The cost of adding an admixture shall be the CONTRACTOR'S responsibility. Concrete containing an admixture shall be first placed at a location determined by the TOWN. Admixtures shall conform to the requirements of ASTM C494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.
  2. Concrete shall not contain more than one water-reducing admixture.
  3. Set retarding admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently greater than 80 degrees F, a set retarding admixture shall be used. Set retarding admixture shall conform to ASTM C494 Type B or D.
  4. Set accelerating admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently less than 40 degrees F, a non-corrosive set accelerating admixture shall be used. Set accelerating admixture shall conform to ASTM C494 Type C or E.
  5. Normal range water reducer shall conform to ASTM C494, Type A. The quantity of admixture used and the method of mixing shall be in accordance with the MANUFACTURER's instructions and recommendations.



6. High range water reducer shall conform to ASTM C494, Type F or G. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified. No more than fourteen (14) ounces of water reducer per sack of cement shall be used. Water reducer shall be considered as part of the mixing water when calculating the water/cement ratio.
  - a. If the high range water reducer is added to the concrete at the Site, it may be used in conjunction with the same water reducer added at the batch plant. Concrete shall have a slump of three (3) inches plus or minus 1/2-inch prior to adding the high range water reducing admixture at the Site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the primary system.
  - b. Concrete shall be mixed at mixing speed for a minimum of 70 mixer revolutions or five (5) minutes after the addition of the high range water reducer, unless recommended otherwise by the MANUFACTURER.
- D. Anti-washout admixture may be used for concrete placed underwater. The admixture shall be added at the MANUFACTURER's recommended dosage rate. The admixture shall be an aqueous solution and the water in such solution shall be counted as mixing water for the purpose of determining the water cement ratio of the concrete. Trial batches shall be made to verify compatibility of the materials and mix design performance.

#### 2.06 CURING MATERIALS:

- A. Curing compound shall conform to ASTM C309, Type I. Curing compound shall be white pigmented, resin based and compliant with local VOC requirements. When curing compound must be removed for finishes or grouting, it shall be of a dissipating type. Sodium silicate compounds shall not be allowed.
- B. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 grams per square centimeter of surface.
- C. Polyethylene-coated waterproof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, have a minimum thickness of two (2) mils, and be permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A. The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 gram per square centimeter of surface.
- D. Polyethylene-coated burlap for use as concrete curing blanket shall be minimum 4-mil thick, white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 grams per square centimeter of surface.
- E. Curing mats for use in Curing Method 6 below, shall be heavy shag rugs or carpets or cotton mats quilted at 4-inches on center. Curing mats shall weigh a minimum of twelve (12) ounces per square yard when dry.

#### 2.07 MISCELLANEOUS MATERIALS:

- A. Damp proofing agent shall be an asphalt emulsion conforming to ASTM D1227, Type III, Class 1.
- B. Evaporation retardant shall create a monomolecular film on the concrete. The retardant shall have no effect on cement hydration and shall meet local VOC requirements. Evaporation retardant shall not affect adhesion of curing compounds or other treatments and shall not affect the color of the concrete.
- C. Floor hardener shall be provided at the following locations:
  1. Control Buildings at the S-40 and S-41 sites – Generator and Control Rooms.
  2. Surface hardener shall be system of integral hardening admixture, shake-on hardener, and surface applied liquid hardener acceptable for both indoor and outdoor applications.

3. Integral hardening admixture shall be a non-chloride admixture that will produce high strength, durable, hard, non-dusting abrasive resistant concrete. Admixture shall react with the portland cement to produce more complete hydration.
  4. Shake-on hardener shall be a ready to use, heavy-duty emery shake-on floor hardener. Aggregate shall consist of no less than 35% aluminum oxide. Hardener shall produce a hard, non-slip floor that will not rust.
  5. Surface applied liquid hardener shall be a water borne chemical hardener and dustproof. Hardener shall meet local VOC requirements and shall be a solution of silicates and fluosilicates.
- D. Reinforcement shall be per SECTION 03200.
- E. Damp proofing agent shall be a waterborne emulsified-asphalt. Damp proofing shall be suitable for "green" or slightly damp surfaces and shall withstand normal expansion and contraction of the concrete. Damp proofing agent shall breath to allow vapors to escape. Damp proofing agent shall meet local VOC requirements.
- F. Bonding agents shall be 100% solids, epoxy adhesives conforming to the following:
1. For bonding freshly-mixed, plastic concrete to hardened concrete, bonding agent shall be a medium viscosity adhesive conforming to ASTM C881 Type II, Grade 2, Class C,
  2. For bonding hardened concrete or masonry to steel, bonding agent shall be a non-sagging gel adhesive conforming to ASTM C881 Type I or IV, Grade 3, Class C.
- G. Vapor Barrier:
1. Vapor Barrier shall consist of a composite of heavy kraft paper, asphalt, fiberglass reinforcement, and polyethylene film unless otherwise indicated on the Drawings. The composite shall be laminated under heat and pressure.
  2. Vapor Barrier shall comply with federal specification UU-B-790A, Type I, Grade A, Style 4. Vapor Barrier shall have a water vapor permeance of less than 0.30 perms when tested per ASTM E96.
  3. Vapor Barrier shall be installed under concrete slabs of all habitable spaces. Barrier shall be installed per the MANUFACTURER recommendations and per ASTM E1643.
- H. Non-Waterstop Joint Material:
1. Preformed Joint Material: Preformed asphalt-impregnated fiber conforming to ASTM D1751.
  2. Bond Breaker: All bond breakers shall be roofing felt or 15 mils minimum dry film thickness of bituminous paint as indicated.
- I. Flyash for Tremie Concrete
1. Flyash shall be Class F pozzolan conforming to the requirements of ASTM C618. The pozzolan shall be obtained from a single source and shall comprise 15 percent of the volume of the cementitious material in the Tremie Concrete. The remaining 85 percent of the cementitious material volume shall be Portland cement conforming to ASTM C150 Type II.

## 2.08 CONCRETE DESIGN REQUIREMENTS:

- A. General: Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated. The exact proportions in which these materials are to be used for different parts of the WORK will be determined during the trial batch process. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage, and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results. All changes shall be subject to review by the TOWN.
- B. Fine Aggregate Composition:

1. In mix designs for structural concrete, the percentage of fine aggregate in total aggregate by weight shall be as indicated in the following table.

<b>Fine Aggregate</b>	
<b>Fineness Modulus</b>	<b>Maximum Percent</b>
2.7 or less	41
2.7 to 2.8	42
2.8 to 2.9	43
2.9 to 3.1	44

2. For other concrete, the maximum percentage of fine aggregate of total aggregate, by weight, shall not exceed 50.
  3. Fine aggregate shall be 50 percent, plus or minus five (5) percent by volume of total aggregates for Tremie Concrete.
- C. High range water reducer shall not be used in Tremie Concrete except in conjunction with an anti-washout admixture to provide the degree of workability required for proper placement and consolidation.
- D. Duct bank concrete shall contain an integral red-oxide coloring pigment. Concrete shall be dyed red throughout. Surface treatment to color duct banks will not be acceptable.
- E. Water/Cement Ratio and Compressive Strength:
1. Water/cement ratio is given for aggregates in saturated-surface dry condition, and total moisture of all aggregates, calculated by ASTM C566, less the absorption of the aggregate as calculated by ASTM C127 and C128, shall represent total free moisture in the aggregate to determine the water/cement ratio. Total free moisture of aggregates shall be added to batch water to estimate water content of concrete. Concrete shall have the following minimum properties:

F. Concrete Proportions:

<b>Type of Work</b>	<b>Min 28-Day Compressive Strength (psi)</b>	<b>Maximum Size Aggregate (in)</b>	<b>* Cement Content per cubic yd (lbs)</b>	<b>* Maximum W/C Ratio (by weight)</b>
<b>Structural Concrete</b>				
Roof, floor slabs, columns, walls, and all other concrete items not indicated elsewhere.	4,500	1	564 to 600	0.45
12-inch and thicker walls, slabs on grade, and footings (optional)	4,500	1-1/2	564 to 600	0.45
Precast Sections	5,000	1-1/2	564 to 600	0.45
Tremie Concrete	4,500	3/4	658 minimum	0.45
<b>Pea Gravel Concrete</b>				
Thin sections and areas with congested reinforcing, at the CONTRACTOR'S option and with the written approval of the TOWN for the specific location.	4,500	3/8	752 to 788	0.40

Sitework concrete	3,000	1	470 (min)	0.50
Lean concrete	2,000	1	376 (min)	0.60

\* The cement content and water cement ratio are based on total cementitious material including silica fume, slag or fly ash.

NOTE: The CONTRACTOR is cautioned that the limiting parameters above are not a mix design. Admixtures may be required to achieve workability required by the CONTRACTOR'S construction methods and aggregates. The CONTRACTOR is responsible for providing concrete with the required workability and strength.

- G. Adjustments to Mix Design: The CONTRACTOR may elect to decrease the water/cement ratio to achieve the strength and shrinkage requirements and/or add water reducers, as required to achieve workability. The mixes shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish, and the CONTRACTOR shall be entitled to no additional compensation because of such changes. Any changes to the accepted concrete mix design shall be submitted to the TOWN for review and shall be tested again in accordance with these Specifications.
- H. When using a floor hardener, the water/cement ratio shall not be greater than specified by the hardener MANUFACTURER.

2.09 CONSISTENCY:

- A. The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation and which can be compacted by vibratory methods to give the desired density, impermeability, and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C143. The slumps shall be as follows:

Part of Work	Slump (in)
All concrete, unless indicated otherwise	3-inches plus or minus 1-inch
With high range water reducer added	7-inches plus or minus 2-inches
Pea gravel mix	7-inches plus or minus 2-inches
Ductbank and pipe encasement	5-inches plus or minus 1-inch
Concrete with hardener	Per Hardener MANUFACTURER
Tremie Concrete	7-inches plus or minus 1-1/2 -inches

2.10 MEASUREMENT:

- A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the CONTRACTOR and acceptable to the TOWN.
- B. Weighing tolerances:

Material	Percent of Total Weight
Cement	1
Aggregates	3
Admixtures	3

- C. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the TOWN and capable of measuring the water in variable amounts within a tolerance of one percent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any required amount of water to each batch of

concrete. A positive quick-acting valve shall be used for a cut-off in the water line to the mixer. The operating mechanism shall prevent leakage when the valves are closed.

### **PART 3 - EXECUTION**

#### **3.01 PROPORTIONING AND MIXING:**

- A. Proportioning of the mix shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301.
- B. Mixing shall conform to the requirements of Chapter 7 of ACI 301.
- C. Slumps shall be as indicated herein.
- D. Retempering of concrete or mortar that has partially hardened shall not be permitted.

#### **3.02 PREPARATION OF SURFACES FOR CONCRETING:**

- A. General: Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Vapor Barrier
  - 1. Vapor Barrier shall be installed under on-grade building floor slabs of occupiable (non-hydraulic) structures and at other locations indicated.
  - 2. Base shall be leveled, compacted, and tamped per SECTION 02200. Remove sharp edges, projection materials and roughness that might penetrate vapor barrier. Install barrier with width parallel with the direction of the pour of the concrete.
  - 3. Place, protect, and repair defects in sheet according to ASTM E1643, and the MANUFACTURER's written instructions. Seams shall be lapped and sealed in accordance with ASTM E1643.
  - 4. The CONTRACTOR shall exercise care to avoid puncturing or tearing the vapor barrier during installation. Patch punctures and tears as they occur.
- C. Joints in Concrete:
  - 1. All joints shall be installed where indicated on the Drawings or where otherwise approved by the TOWN. The surface of the construction joint shall be rough and prior to placement shall be cleaned and moistened with water.
  - 2. Concrete surfaces upon or against which new concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the TOWN, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, foreign material, and be roughened to a minimum 1/4-inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting, sandblasting or chipping (exposing aggregate) followed by thorough washing. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.
  - 3. After the surfaces have been prepared, all approximately horizontal construction joints shall be covered with a 6-inch lift of a pea gravel mix. The mix shall be placed and spread uniformly. Wall concrete shall follow immediately and shall be placed upon the fresh pea gravel mix. If high range water reducer is used in the wall concrete, then the pea gravel joint topping does not need to be used.
- D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work; provided that construction joints shall be made only where acceptable to the TOWN.
- E. Embedded Items:

1. No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the TOWN at least 4 hours before placement of concrete. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.
  2. Inserts or other embedded items shall conform to the requirements herein.
  3. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations indicated on the Drawings or shown by Shop Drawings and shall be acceptable to the TOWN before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- F. **Placing New Concrete Against Old:** Where new concrete is to be placed against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting, sandblasting or chipping to expose aggregate. The joint surface shall be coated with an epoxy bonding agent unless indicated otherwise by the TOWN.
- G. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the WORK. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, shall be the CONTRACTOR's responsibility and shall be subject to the review of the TOWN.
- H. **Corrosion Protection:** Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.
- I. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall, where practicable, be provided during the placing of concrete.
- J. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.
- K. **Cleaning:** The surfaces of metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

### 3.03 CONVEYING:

- A. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation or loss of material.
- B. No aluminum materials shall be used in conveying any concrete.
- C. Ends of chutes, hopper gates, and all other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the TOWN. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the indicated consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered.
- D. **Pumping:**

1. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
  2. The pumping equipment shall have two (2) cylinders and be designed to operate with one cylinder in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the Site during pumping.
  3. The minimum diameter of the hose conduits shall be in accordance with ACI 304.
  4. Pumping equipment and hose conduits that are not functioning properly shall be replaced.
  5. Aluminum conduits for conveying the concrete shall not be permitted.
  6. Concrete samples for slump, air content, and test cylinders will be taken at the placement end of the hose.
- E. Tremie Equipment:
1. Tremie pipes shall be fabricated of heavy gauge steel pipe to withstand all anticipated handling stresses and shall be sized to prevent aggregate-caused locking. Pipes shall be fabricated in sections such that the upper sections can be removed as the placement progresses. The pipe sections shall be joined with flanges and gasket to prevent water being sucked in the concrete during placement. The tremie pipe shall be marked to facilitate quick determination of the distance from the water surface to the mouth of the tremie.
  2. Suitable sized funnel or hopper shall be provided for the tremie to allow transfer of adequate volume of concrete from the delivery device to the tremie. A stable platform shall be provided for the tremie support during the placement operation.

#### 3.04 DELIVERY:

- A. Ready-mixed concrete shall be batched, mixed, transported and delivered in accordance with these specifications and ASTM C94 including the following supplementary requirements.
1. Concrete shall be discharged within 1-1/2 hours from the time concrete was mixed, if centrally mixed, or from the time the original water was added, if transit-mixed, or before the drum has been revolved 300 revolutions, whichever is first.
  2. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one-inch when the required slump is 3-inches or less, or if they differ by more than 2-inches when the required slump is more than 3-inches, the mixer shall not be used on the WORK unless the causative condition is corrected and satisfactory performance is verified by additional slump tests. Mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.
  3. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the TOWN.
  4. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the MANUFACTURER of equipment. Additional mixing, if any, shall be at the speed designated by the MANUFACTURER of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

#### 3.05 PLACING:

- A. Non-Conforming Work or Materials: Concrete which during or before placing is found not to conform to the requirements indicated herein shall be rejected and immediately removed from the WORK. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced.

- B. Unauthorized Placement: No concrete shall be placed except in the presence of a duly authorized representative of the TOWN. The CONTRACTOR shall notify the TOWN in writing at least 24 hours in advance of placement of any concrete.
- C. Concrete shall not be dropped more than four feet (4') without use of chutes or tremies. Concreting shall be a continuous operation until placement of the section is complete. All concrete shall be worked around reinforcement and embedded items. If vibrators are used, care shall be taken not to segregate concrete. Vibrators will not be allowed to move concrete within the form. All forms and subgrade shall be dampened prior to placement and excess water removed.
- D. Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this SECTION.
- E. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement. As the WORK progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.
- F. Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, means such as hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6-feet in horizontal direction. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2-feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in wall forms shall not exceed 5-feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.
- G. Concrete with hardener shall be placed per the hardener MANUFACTURER's written recommendations.
- H. Placing New Concrete Against Old: Epoxy adhesive bonding agent shall be applied to the old surfaces according to the MANUFACTURER's written recommendations. This provision shall not apply to joints where waterstop is provided, see SECTION 03100.
- I. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F or less than 55 degrees F for sections less than 12-inches thick, nor less than 50 degrees for all other sections. The CONTRACTOR shall be entitled to no additional compensation on account of the temperature requirements.
- J. Hot Weather Placement
  1. Placement of concrete in hot weather shall conform to ACI 305 and the following:
  2. When the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.
  3. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as pre-cooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete below 90 degrees F as it is placed.
- K. Cold Weather Placement
  1. Placement of concrete in cold weather shall conform to ACI 306.1, and the following:
  2. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the minimum temperature.
  3. Remove all ice and frost from the surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of



6-inches. Reinforcement and embedded items shall be warmed to above 32 degrees F prior to concrete placement.

4. Maintain the concrete temperature above 50 degrees F for at least 72 hours after placement.
- L. Order of Placing Concrete
1. The order of placing concrete in all parts of the WORK shall be acceptable to the TOWN. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints at the indicated locations. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least five (5) days for hydraulic structures and two (2) days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two (2) adjacent wall panels have cured at least ten (10) days for hydraulic structures and 4 days for all other structures.
  2. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and laitance shall be removed.
- M. Placing Concrete Underwater
1. Tremie Concrete shall be placed per ACI 304.2 Chapter 8 for placing concrete underwater.
  2. Starting Placement
    - a. Prior to Tremie Concrete placement, the CONTRACTOR shall use proper means to prevent flow of water across or through the placement site.
    - b. The CONTRACTOR shall determine the spacing of tremie pipes for concrete placement but shall maintain a minimum of one pipe for each 300 square feet of concrete placed.
    - c. Tremie started using the end plate, dry pipe technique shall be filled with concrete before being raised off the bottom. The pipe shall be initially raised sufficiently to establish a mound around the mouth of the tremie pipe.
    - d. Tremie started using a go-devil shall be lifted a maximum of 6-inches to allow water to escape, then concrete shall be added to the tremie slowly to force the go-devil downward. Once the go-devil reaches the mouth of the tremie, the tremie shall be lifted to allow the escape of the go-devil, and the forming of a mound around the mouth of the pipe.
    - e. Tremie pipe shall be adequately embedded in the fresh concrete, and slowly raised so as to prevent "loss of seal". Should a "loss of seal" occur in a tremie, placement through that tremie must be terminated immediately, and the tremie pipe removed. The flow must be restarted with the end plate, dry pipe technique, a go-devil shall not be used to restart a tremie after loss of seal.
  3. Placing
    - a. Placement of concrete shall be as continuous as possible through the tremie. Placement interruptions less than 30 minutes are allowed to restart without any special procedure. Placement interruptions between 30 minutes and the initial setting time shall be treated by removal, resealing, and restarting the tremie.
    - b. Placement interruptions longer than the initial setting time are to be treated as horizontal construction joints. The concrete surface shall be "green cut" by a diver after it sets. The concrete surface shall be water jetted immediately prior to resuming concrete placement.
    - c. The rate of concrete rise shall be established based on the concrete production of the local area and the spacing of the pipes. The volume of concrete shall be monitored throughout the placement to detect placement problems, such as underrun or overrun. Should underrun or overrun occur, corrective actions such as readjusting the rate of concrete rise, and alternating the pipe spacing shall be taken to ensure proper placement.
    - d. Tremie blockage shall be cleared with caution to prevent "loss of seal".

- e. The pipe delivering concrete must be secured and remain fixed horizontally while concrete is flowing, so as not to damage the concrete surface, and create additional laitance, and lead to "loss of seal".
4. Post-Placement Evaluation
- a. Concrete placed underwater shall be evaluated after completion of placing with, but not limited to the methods below.
  - b. Coring in area of maximum concrete flow, or in area where "loss of seal" occurred during placement.
  - c. After de-watering, accurately surveying the entire concrete surface to evaluate the adequacy of the concrete placement, such as cracks, voids, and honeycomb. The defects shall be clearly marked for repair. The concrete shall be protected from dryness, or damages until repairs are completed.
  - d. As determined by the TOWN, the area of questionable concrete quality shall be cored and tested for compressive strength.

3.06 TAMPING AND VIBRATING:

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete. Vibrators shall be Group 3 per ACI 309, high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required. Group 2 vibrators may be used only at specific locations when accepted by the TOWN.
- B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall not contact the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.07 CURING AND DAMPPROOFING: Concrete shall be cured for a minimum of five (5) days after placement in accordance with the methods indicated below for the different parts of the WORK.

Surface to be Cured or Dampproofed	Method
Unstripped forms	1
Wall sections with forms removed	6
Construction joints between footings and walls, and between floor slab and columns	2
Encasement and ductbank concrete and thrust blocks	3
All concrete surfaces not specifically indicated in this Paragraph	4
Floor slabs on grade in hydraulic structures	5
Slabs on grade to receive an adhered floor finish	6 (Omit curing compound)
Slabs not on grade	6
Concrete with hardener	Per manufacturer's written recommendations
Tremie Concrete	8

- A. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 7 days of placing the concrete, curing shall be continued in accordance with Method 6 below.

- B. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.
- C. Method 3: The surface shall be covered with moist earth not less than 4 hours or more than 24 hours after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.
- D. Method 4: The surface shall be sprayed with a liquid curing compound.
1. It shall be applied in accordance with the MANUFACTURER's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film that will seal thoroughly.
  2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the 7-day curing period. If the seal is damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
  3. Wherever curing compound has been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.
  4. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces and within two (2) hours after removal of forms. Repairs to formed surfaces shall be made within the two (2) hour period; provided, however, that any such repairs which cannot be made within the said two (2) hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound.
  5. At locations where concrete is placed adjacent to a panel which has been coated with curing compound, the panel shall have curing compound reapplied to an area within 6-feet of the joint and to any other location where the curing membrane has been disturbed.
  6. Prior to final acceptance of the WORK, all visible traces of curing compound shall be removed from all surfaces in such a manner that does not damage the surface finish.
- E. Method 5:
1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. The concrete shall be given a coat of curing compound in accordance with Method 4 above. Not less than one hour or more than four (4) hours after the curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting, or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2-inch wide strips of sealing tape or with edges lapped not less than 3-inches and fastened together with a waterproof cement to form a continuous watertight joint.
  2. The curing blankets shall be left in place during the 7-day curing period and shall not be removed until after concrete for adjacent work has been placed. If the curing blankets become torn or otherwise ineffective, the CONTRACTOR shall replace damaged sections. During the first three (3) days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8-inch minimum thickness, laid over the curing blanket. The CONTRACTOR shall add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.
- F. Method 6: This method applies to both walls and slabs.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least seven (7) consecutive days beginning immediately after the concrete has reached final set or forms have been removed.
  2. Until the concrete surface is covered with the curing medium, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed.
  3. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held substantially in contact with the concrete surface to prevent being dislodged by wind or any other causes. Edges shall be continuously held in place.
  4. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.
  5. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, the entire concrete surface shall be wetted, and curing compound shall be immediately applied to the entire surface in accordance with Method 4 above.
  6. The CONTRACTOR shall dispose of excess water from the curing operation to avoid damage to the WORK.
- G. Method 8: This method applies to Tremie Concrete. Concrete shall be cured for not less than 14 days after placing, by continuous submerging of the top surface with a minimum of 6-inches of water for the full duration of curing period. Curing compound shall not be used for curing. If a reinforced slab is to be placed over the Tremie Concrete, then the concrete surface shall be kept damp by applying of water using nozzles or extending the submerging period until the placement of the slab.

3.08 CONCRETE FINISHES:

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions indicated are defined as tolerances and are indicated herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used
- B. Formed Surfaces:
1. No treatment is required after form removal except for curing, repair of defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as indicated.
- C. Unformed Surfaces:

After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each WORK operation as necessary to prevent drying shrinkage cracks. The classes of finish for unformed concrete surfaces are designated and defined as follows:	
Area	Finish
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with grouted tile or topping grout	U2
Water bearing slabs with slopes 10 percent and less	U3
Water bearing slabs with slopes greater than 10 percent	U4
Slabs not water bearing	U4
Slabs to be covered with built-up roofing	U2
Interior slabs and floors to receive architectural finish	U3
Top surface of walls subject to foot traffic	U4

Top surface of walls not subject to foot traffic	U3
Floors to receive surface hardener	U5

1. Finish U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.
2. Finish U2 - (Float Finish)
  - a. Compact, accurately screed and float to a true uniform surface.
  - b. Surfaces shall be floated with wood or metal floats or a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted.
  - c. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Test surface with straightedge and eliminate high and low spots of more than 1/8 inch in ten (10) feet. Surface irregularities shall not exceed 1/4-inch.
  - d. Joints and edges shall be tooled where indicated or as determined by the TOWN.
3. Finish U3 - (Hand-Troweled Finish)
  - a. Finish surface as in Finish U2 - Float Finish and after the surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, trowel with steel trowel to obtain a smooth dense finish after concrete has hardened to ring under the trowel.
  - b. The finish shall produce a smooth dense uniform surface free of all irregularities, blemishes, ripples, and trowel marks.
4. Finish U4 - (Nonskid Finish)
  - a. Trowel the Finish U3 - Hand-trowel Finish surface to remove local depressions or high points. In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated.
  - b. The resulting surface shall be rough enough to provide a nonskid finish.
5. Finish U5 - (Surface hardener)
  - a. Immediately after screeding, shake on hardener shall be applied per the MANUFACTURER's written recommendations.
  - b. Surface shall receive a minimum of two coats of a liquid hardener per the MANUFACTURER's written recommendations.
  - c. CONTRACTOR shall notify hardener MANUFACTURER three (3) working days prior to hardened concrete floor being placed.
  - d. Hardener MANUFACTURER shall provide continuous supervision of concrete and hardener placements, supplying TOWN with a report of each day's placement. Cost of supervision is to be borne by CONTRACTOR.

3.09 ARCHITECTURAL FINISH:

- A. General: Architectural finishes shall be provided only where specifically indicated below. In all other locations, the paragraph entitled Concrete Finishes shall apply.

Location	Finish
All formed and unformed surfaces above grade and exposed to view	Burlap Finish

- B. Immediately after the forms have been stripped, the concrete surface shall be inspected and any poor joints, voids, rock pockets, or other defective areas shall be repaired and form-tie holes filled as indicated herein.
- C. Architectural finishes shall not be applied until the concrete surface has been repaired as required and the concrete has cured at least 14 days.

- D. Architecturally treated concrete surfaces shall conform to the accepted sample in texture, color, and quality. It shall be the CONTRACTOR'S responsibility to maintain and protect the concrete finish.
- E. Burlap Finish:
  - 1. Wet and fill all voids using mortar with the same sand-cement ratio as original concrete. Use approximately 20 percent white cement to match concrete color.
  - 2. The freshly applied grout shall be vigorously rubbed into the concrete surface with a wood float filling all small air holes. After all the surface grout has been removed with a steel trowel, the surface shall be allowed to dry.
  - 3. Once dry, strike off all excess mortar flush with the surface using a burlap or canvas cloth with a circular motion.
  - 4. Remove all rough spots and rub with cloth to leave a surface of uniform texture and appearance without any appearance of a paint or grout film.
  - 5. Finish shall result in a coating of mortar that will fill all small voids and air holes, leaving a smooth surface.
  - 6. Cure as specified under "Curing Concrete".
  - 7. The entire cleaning operation for any area shall be completed the day it is started, and no grout shall be left on the surface overnight.
  - 8. Cleaning operations for any given day shall be terminated at panel joints. It is required that the various operations be carefully timed to secure the desired effect.
  - 9. Before beginning any of the final treatment on exposed surfaces, the CONTRACTOR shall treat in a satisfactory manner a trial area of at least 200 square feet in some inconspicuous place selected by the TOWN and shall preserve said trial area undisturbed until the completion of the job.

### 3.10 PROTECTION:

- A. The CONTRACTOR shall protect concrete against damage until final acceptance.
- B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

### 3.11 DEFECTIVE SURFACE TREATMENTS:

- A. Patching Concrete:
  - 1. Patch all tie holes, honeycombs or other defects with a Portland Cement and sand grout.
  - 2. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, plus not less than 1/32-inch depth of the surface film from all hard portions by means of an efficient sandblast.
  - 3. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends.
  - 4. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. Holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section and other imperfections having a depth greater than their least surface dimension shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.
  - 5. The grout shall not be richer than one (1) part cement and three (3) parts sand with the amount of mixing water enough to produce a workable mix. For exposed walls, the cement shall contain such a proportion of white Portland cement as is required to make the color of the patch

match the color of the surrounding concrete. The patch shall be finished in such a manner as to match the adjoining surfaces.

6. Surfaces of repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.
- B. Defective Concrete:
1. Any concrete which is not formed as shown on the Drawings or does not conform to the Contract tolerances or shows defects which reduce its structural adequacy, shall be removed from the job by the CONTRACTOR at his expense unless the TOWN grants written permission to patch the defective area.
- C. Exposed Concrete Surfaces:
1. As soon as forms are removed, exposed surfaces shall be carefully examined and all ridges, ribs and other imperfections shall be rubbed with an abrasive stone or ground in a satisfactory manner in order to secure a smooth, uniform and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted
  2. No repairs shall be made until after inspection by the TOWN.
  3. In no case will extensive patching of honeycombed concrete be permitted
  4. Concrete containing minor voids, pinholes, honeycombing, or similar depression defects shall be repaired as indicated above.
  5. Concrete containing extensive voids, holes, honeycombing, or similar depression defects shall be completely removed and replaced. Repairs and replacements shall be performed promptly.
- D. Repairs to Tremie Concrete
1. After the post-placement evaluation, and with the defects clearly identified, and inspected by the TOWN, repair can proceed prior to or after the curing period. Concrete must be prevented from dryness before the starting of repair, and if repair is to be completed after curing, the repaired area and the total surface are shall be cured in accordance with these specifications. Plastering or coating of surfaces will not be permitted.
  2. Defective surfaces to be repaired shall be cut back from true line a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted.
  3. Cracks 1/16-inch or wider shall be repaired by injection of epoxy grout, injection procedures shall be as recommended by the grout MANUFACTURER.
  4. Laitance, soft materials, voids, and honeycombs shall be completely removed, and cut back to a minimum of 1/2-inch below the sound concrete surface.
  5. Depressions greater than 3-inches, including those formed as a result of cut backs of laitance, voids, and honeycombs, shall be repaired with concrete. Depressions less than 3-inches shall be filled with non-shrink grout per SECTION 03600. Depressions less than 3-inches can be filled with concrete when the top slab is poured.

### 3.12 REINFORCEMENT:

- A. Reinforcement shall be in accordance with SECTION 03200, of these Specifications. Concrete protection for the reinforcement shall conform to the requirements ACI 318, paragraph 7.7.1.

### 3.13 CONSTRUCTION TOLERANCES:

- A. The CONTRACTOR shall set and maintain concrete forms and perform finishing operations to ensure that the completed WORK is within tolerances. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the permissible variation from lines, grades, or dimensions indicated on the Drawings. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 117.

- B. The following non-cumulative construction tolerances apply to finished walls and slab unless otherwise indicated:

Item	Tolerance
Variation of the constructed linear outline from the established position in plan.	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation from the level or from the grades indicated.	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation from plumb	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation in the thickness of slabs and walls.	Minus 1/4-inch; Plus 1/2-inch
Variation in the locations and sizes of slabs and wall openings	Plus or minus 1/4-inch
Tremie Concrete	Plus or Minus 3 inches

3.14 CARE AND REPAIR OF CONCRETE:

- A. The CONTRACTOR shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed WORK, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete.

END OF SECTION



SECTION 03375 EXCAVATABLE FLOWABLE FILL

**PART 1 - GENERAL**

1.01 SCOPE OF WORK:

- A. This SECTION specifies the requirements for excavatable flowable fill used for trenches, support for pipe structures, culverts, utility cuts and other works where cavities exist and where firm support is needed for pavements and structural elements. Flowable fill may also be used to fill water and sewer lines, and fuel tanks placed out of service, and at other locations approved by the Engineer of Record.

1.02 APPLICABLE PUBLICATIONS:

- A. ASTM C403/C403M, Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance, latest edition.

1.03 DEFINITIONS: (Not Used)

1.04 SUBMITTALS: (Not Used)

1.05 QUALIFICATIONS: (Not Used)

1.06 INSPECTION AND COORDINATION: The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide 48 hour advance notice of its intention to begin new WORK activities.

1.07 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

**PART 2 - PRODUCTS**

2.01 MATERIALS:

- A. The CONTRACTOR shall furnish materials conforming with the requirements specified in Division III of the F.D.O.T. Standard Specifications for Road and Bridge Construction, latest edition, and herein. Specific references are as follows:
  - 1. Portland Cement (Types I, II or III) Section 931.
  - 2. Fly Ash, Slag and other Pozzolanic Materials for Portland Cement Concrete Section 929.
  - 3. Fine Aggregate (Sand)\* Section 902.
  - 4. Water Section 923.

\* Any clean sand with 100% passing 3/8" sieve and not more than 10% passing with 200 mesh may be used.

2.02 MIX PROPORTIONS:

- A. The CONTRACTOR shall be responsible for producing a flowable mixture using these guidelines and by adjusting his mixture design as called for by circumstances or as may be directed by the Engineer of Record.
- B. Flowable fill material shall be proportioned to produce a 28-day compressive strength of approximately 50-150 psi.
- C. General mix quantities are as follows:

<u>Components</u>	<u>Pounds per Cubic Yard</u>
Cement	50-100*
Fly Ash or Granulated Blast Furnace Slag	0-600

Fine Sand	2,750 (Adjust to yield one cubic yard of flowable fill)
Water	500 (Maximum)

\* The percentage of cement may be increased above these limits only when early strength is required and future removal is unlikely.

- D. Weights for fine aggregate and water shall be adjusted according to cementitious content. The mix proportions shall be adjusted for removability, pumpability and flowability. If required, strength test data shall be provided prior to batching.
- E. If required by the Engineer of Record, the flowability can be measured by afflux time determined in accordance with ASTM C 939 and shall be 30 seconds ± 5 seconds as measured on mortar passing the No. 4 sieve. The equipment required to perform this test shall be provided by the CONTRACTOR.

2.03 APPROVED MIXES OF "FLOWABLE FILL": Submit mix designs to the Engineer for approval. The following are suggest mix guides for excavatable flowable fill:

	Excavatable
Cement	75-100 lb/yd <sup>3</sup>
Pozzolans or Slag	None
Water	*
Air**	5-35%
28 Day Compressive Strength	Maximum 100 psi
Unit Weight**	90-110 lb/ft <sup>3</sup>
Fine Aggregate	***
<p><u>*Mix designs shall produce a consistency that will result in a flowable self-leveling product at time of placement.</u></p> <p><u>**The requirements for percent air, compressive strength and unit weight are for laboratory designs only and are not intended for jobsite acceptance requirements.</u></p> <p><u>***Fine Aggregate shall be proportioned to yield 1yd<sup>3</sup></u></p>	

**PART 3 - EXECUTION**

3.01 PRODUCTION AND PLACING:

- A. Flowable fill shall be produced and delivered using concrete construction equipment. Placing flowable fill shall be done by chute, pumping or other methods approved by the Engineer of Record.

3.02 CONSTRUCTION REQUIREMENTS:

- A. The flowable fill shall be placed to the designated fill line without vibration or other means of compaction. Placement shall be avoided during inclement weather, e.g. rain or ambient temperatures below 40 degrees F. The CONTRACTOR shall take all necessary precautions to prevent any damages caused by the hydraulic pressure of the fill during placement prior to hardening. Also, necessary means to confine the material within the designated space shall be provided by the CONTRACTOR.

3.03 ACCEPTANCE:

- A. The flowable shall be proportioned and placed as specified herein. In general, the strength desired is the maximum hardness that can be excavated at a later date using conventional excavating equipment. No curing protection is required.
- B. The fill shall be left undisturbed until material obtains sufficient strength. Sufficient strength is 35 psi penetration resistance as measured using a hand held penetrometer, in accordance with ASTM C403/C403M. The penetrometer shall be provided by the CONTRACTOR.
- C. All flowable fill areas subject to traffic loads must have a durable riding surface.
- D. An approved type of accelerator may be approved for the placement of "Flowable Fill" in traffic areas when submitted to the Department for D.O.T. approval.

END OF SECTION

**PART 1 - GENERAL**

1.01 SCOPE:

- A. The work of this Section consists of furnishing all labor, materials, supplies, and equipment necessary for design, construction, delivery, and installation of plant-precast concrete products for below grade construction, including connections, required by the Drawings or as specified herein.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 01300 – Submittals
  - 2. SECTION 03100 Concrete Formwork and Accessories
  - 3. SECTION 03200 Concrete Reinforcement
  - 4. SECTION 03300 Cast-in-Place Concrete
  - 5. SECTION 03600 Grout
  - 6. SECTION 05600 Miscellaneous Metals
  - 7. SECTION 07920 Sealants & Caulking

1.02 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- A. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. Standard Specification for Highway Bridges
  - 2. Standard Specifications for Transportation Materials and Methods of Sampling and Testing
- B. American Concrete Institute (ACI)
  - 1. ACI 211.1 (1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
  - 2. ACI 211.2 (1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
  - 3. ACI 305R (1999) Hot Weather Concreting
  - 4. ACI 318/318R (2005) Building Code Requirements for Structural Concrete and Commentary
  - 5. ACI 350/350R-01 Code Requirements for Environmental Engineering Concrete Structures and Commentary
  - 6. ACI 517.2R (1987; R 1992) Accelerated Curing of Concrete at Atmospheric Pressure
- C. American Concrete Pipe Association (ACPA)
  - 1. ACPA 01-102 (2000) Concrete Pipe Handbook
  - 2. ACPA 01-110 (1984) Design Manual for Sulfide and Corrosion Prediction and Control
  - 3. ACPA QPC (2005; Ver 3.0) QCast Plant Certification Manual
- D. American Welding Society (AWS)
  - 1. AWS D1.1 (2006; Errata 2006) Structural Welding Code - Steel
  - 2. AWS D1.4 (2005; E 2005) Structural Welding Code – Reinforcing Steel
- E. ASTM International (ASTM)
  - 1. ASTM A 36 (2005) Carbon Structural Steel
  - 2. ASTM A 82 (2005a) Steel Wire, Plain, for Concrete Reinforcement
  - 3. ASTM A 153 (2005) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

4. ASTM A 184 Specification for Fabricated Deformed Steel Mats for Concrete Reinforcement
5. ASTM A 185 (2006; E 2006) Steel Welded Wire Reinforcement, Plain, for Concrete
6. ASTM A 36 (2005) Carbon Structural Steel
7. ASTM A 496 (2005) Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
8. ASTM A 497 (2006; R 2006) Steel Welded Wire Reinforcement, Deformed, for Concrete
9. ASTM A 615 (2006a) Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
10. ASTM A 706 (2006a) Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
11. ASTM A 767 (2005) Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
12. ASTM A 775 (2006) Epoxy-Coated Reinforcing Steel Bars
13. ASTM A 82 (2005a) Steel Wire, Plain, for Concrete Reinforcement
14. ASTM A 884 (2006) Epoxy-Coated Steel Wire and Welded Wire Reinforcement
15. ASTM C14 Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe
16. ASTM C 31 (2006) Making and Curing Concrete Test Specimens in the Field
17. ASTM C 33 (2003) Concrete Aggregates
18. ASTM C 39 (2005e1) Compressive Strength of Cylindrical Concrete Specimens
19. ASTM C 40 Test Method for Organic Impurities in Fine Aggregates for Concrete
20. ASTM C 42 Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
21. ASTM C 70 Standard Test Method for Surface Moisture in Fine Aggregate
22. ASTM C 76 Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
23. ASTM C 78 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
24. ASTM C 94 Specification for Ready-Mixed Concrete
25. ASTM C 117 Standard Test Method for Materials Finer than 75- $\mu\text{m}$  (No. 200) Sieve in Mineral Aggregates by Washing
26. ASTM C 123 Standard Test Method for Lightweight Particles in Aggregate
27. ASTM C 125 Standard Terminology Relating to Concrete and Concrete Aggregates
28. ASTM C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
29. ASTM C 138 (2001a) Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
30. ASTM C 142 Standard Test Method for Clay Lumps and Friable Particles in Aggregates
31. ASTM C 143 (2005a) Slump of Hydraulic Cement Concrete
32. ASTM C 150 (2005) Portland Cement
33. ASTM C 171 (2003) Sheet Materials for Curing Concrete
34. ASTM C 172 Standard Practice for Sampling Freshly Mixed Concrete
35. ASTM C 173 (2001e1) Air Content of Freshly Mixed Concrete by the Volumetric Method
36. ASTM C 192 (2006) Making and Curing Concrete Test Specimens in the Laboratory
37. ASTM C 231 (2004) Air Content of Freshly Mixed Concrete by the Pressure Method
38. ASTM C 260 (2006) Air-Entraining Admixtures for Concrete
39. ASTM C 309 (2006) Liquid Membrane-Forming Compounds for Curing Concrete
40. ASTM C 330 (2005) Lightweight Aggregates for Structural Concrete
41. ASTM C 361 Specification for Reinforced Concrete Low-Head Pressure Pipe
42. ASTM C 403 Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
43. ASTM C 443 (2005a) Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

44. ASTM C 478 Specification for Precast Reinforced Concrete Manhole Sections
45. ASTM C 494 (2005a) Standard Specification for Chemical Admixtures for Concrete
46. ASTM C 497 Test Methods for Concrete Pipe, Manhole Sections, or Tile
47. ASTM C 506 Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe
48. ASTM C566 Test Method for Total Evaporable Moisture Content of Aggregate by Drying
49. ASTM C 595 (2006) Blended Hydraulic Cements
50. ASTM C 617 Standard Practice for Capping Cylindrical Concrete Specimens
51. ASTM C 618 (2005) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
52. ASTM C 655 Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe.
53. ASTM C 685 Specification for Concrete Made by Volumetric Batching and Continuous Mixing
54. ASTM C 805 Test Method for Rebound Number of Hardened Concrete
55. ASTM C 822 Standard Terminology Relating to Concrete Pipe and Related Products
56. ASTM C 825 Specification for Precast Concrete Barriers
57. ASTM C 857 Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
58. ASTM C 858 Specification for Underground Precast Concrete Utility Structures
59. ASTM C 877 (2002; E 2005) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
60. ASTM C 890 Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
61. ASTM C 891 (1990; R 2003) Installation of Underground Precast Concrete Utility Structures
62. ASTM C 913 Specification for Precast Concrete Water and Wastewater Structures
63. ASTM C 920 (2005) Elastomeric Joint Sealants
64. ASTM C 923 (2002) Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
65. ASTM C 979 Specifications for Pigments for Integrally Colored Concrete
66. ASTM C 985 Standard Specification for Nonreinforced Concrete Specified Strength Culvert, Storm Drain, and Sewer Pipe
67. ASTM C 990 (2006) Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
68. ASTM C 1018 Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading)
69. ASTM C 1064 (2005) Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
70. ASTM C 1107 (2005) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
71. ASTM C 1116 (2003) Fiber-Reinforced Concrete and Shotcrete
72. ASTM C 1157 Performance Specification for Hydraulic Cements
73. ASTM C 1227 Rev A Standards Specifications for Precast Concrete Septic Tanks
74. ASTM C 1231 Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders
75. ASTM C 1240 (2005) Silica Fume Used in Cementitious Mixtures
76. ASTM C 1244 (2005a; E 2006) Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill

77. ASTM C 1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
  78. ASTM C 1293 Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
  79. ASTM C 1399 Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete
  80. ASTM C 1433 Standard Specifications for Precast Reinforced Concrete Box Culverts, Storm Drains and Sewers
  81. ASTM C 1478 (2006) Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals
  82. ASTM C 1504 Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts, Storm Drains
  83. ASTM C 1550 Standard Test Method for Flexural Toughness of Fiber Reinforced Concrete (Using Centrally Loaded Round Panel)
  84. ASTM C 1577 Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers Designed according to AASHTO LRFD.
  85. ASTM C 1582 Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete
  86. ASTM C 1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
  87. ASTM C 1603 Standard Test Method for Measurement of Solids in Water
  88. ASTM C 1611 Standard Test Method for Slump Flow of Self-Consolidating Concrete
  89. ASTM C 1613 Standard Specification for Precast Concrete Grease Interceptors
  90. ASTM D 2240 Standard Test Method for Rubber Property – Durometer Hardness
  91. ASTM G 109 Standard Test Method for Determining the Effects of Chemical Admixtures on the Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments
- F. Concrete Reinforcing Steel Institute (CRSI)
    1. Manual of Standard Practice Placing Reinforcing Bars
  - G. State of Florida Department of Transportation (FDOT) Standard Specification for Road and Bridge Construction
  - H. National Precast Concrete Association (NPCA)
    1. NPCA QC Manual (2005; R 2006) Quality Control Manual for Precast Plants
  - I. Precast/Prestressed Concrete Institute (PCI)
    1. PCI MNL-116 Manual for Quality Control for Plants and Production of Structural Precast Concrete Products
    2. PCI MNL-120 Design Handbook
    3. PCI MNL-127 Recommended Practice for Erection

### 1.03 SUBMITTALS

- A. Preconstruction Submittals
  1. Quality Control Procedures
    - a. Quality control procedures established by the precast manufacturer in accordance with NPCA QC Manual and/or ACPA QPC.
- B. Shop Drawings
  1. Standard Precast Units
    - a. The drawings for standard precast concrete units shall be shop drawings furnished by the precast concrete producer for approval by the TOWN. These drawings shall demonstrate

that the applicable industry design standards have been met. Include installation and construction information on shop drawings. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. The precast concrete units shall be produced in accordance with the approved shop drawings. The shop drawings shall indicate assumptions used in the design of standard units. The TOWN will verify that the design assumptions are suitable for the proposed application.

2. Custom-Made Precast Units
    - a. The drawings for custom-made precast concrete units shall be shop drawings furnished by the precast concrete producer for approval by the TOWN. Show on these drawings complete design, installation, and construction information in such detail as to enable the TOWN to determine the adequacy of the proposed units for the intended purpose. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. The precast concrete units shall be produced in accordance with the approved shop drawings.
- C. Product Data
1. Standard Precast Units
    - a. Cut sheets, for standard precast concrete units, showing conformance to project drawings and requirements, and to applicable industry design standards listed in this specification.
  2. Proprietary Precast Units
    - a. Standard plans or informative literature, for proprietary precast concrete units. Make available supporting calculations and design details upon request. Provide sufficient information as to demonstrate that such products will perform the intended task.
  3. Embedded Items
    - a. Product data sheets and proper installation instruction for anchors, lifting inserts and other devices. Clearly indicate the products dimensions and safe working load.
  4. Accessories
    - a. Proper installation instructions and relevant product data for items including, but not limited to, sealants, gaskets, connectors, steps, cable racks and other items installed before or after delivery.
- D. Design Data
1. Design Calculations
    - a. The precast concrete producer shall supply precast concrete unit design calculations and concrete mix design proportions and appropriate mix design test data. Structural design calculations shall be signed by a Licensed Professional Engineer Registered in the State of Florida.
- E. Test Reports
1. Copies of material certifications and/or laboratory test reports, including mill tests and all other test data, for portland cement, aggregate, admixtures, and curing compound proposed for use on this project.
  2. Copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, abrasion and absorption.
  3. Sufficient documentation, when the use of self-consolidating concrete (SCC) is proposed, showing a minimum of 30-days production track records demonstrating that SCC is appropriate for casting of the product.
  4. Copies of in-plant QA/QC inspection reports, upon the request of the TOWN
- F. Certificates
1. Quality Control Procedures



- a. Quality control procedures established in accordance with the NPCA “Quality Control Manual for Precast Concrete Plants” and/or the ACPA QCast Plant Certification Manual.

1.04 GENERAL REQUIREMENTS

Furnish precast concrete units designed and fabricated by an experienced and acceptable precast concrete manufacturer who has been regularly and continuously engaged in the manufacture of precast concrete work similar to that indicated on the drawings for at least five (5) years. Coordinate precast work with the work of other trades.

1.05 DESIGN

- A. Standard Precast Units - Design standard precast concrete units to withstand indicated design load conditions in accordance with the applicable industry design standards of ACI 318/318R, ASTM, AASHTO, FDOT, and ACPA. Design must also consider stresses induced during handling, shipping and installation as to avoid product cracking or other handling damage. Indicate design loads for precast concrete units on the Shop Drawings and submit all design calculations and drawings prepared and sealed by a Professional Engineer registered in the State of Florida, for approval prior to fabrication.
- B. Non Standard Precast Units - Submit design calculations and drawings of non-standard custom-made precast units, prepared and sealed by a Professional Engineer Registered in the State of Florida, for approval prior to fabrication. Include in the calculations the analysis of units for lifting stresses and the sizing of lifting devices. Design analysis shall indicate which codes the design was based on.
- C. Proprietary Precast Units - Products manufactured under franchise arrangements must conform to all the requirements specified by the franchiser. Items not included in the franchise specification, but included in this specification, must conform to the requirements in this specification. Submit design calculations and drawings of proprietary precast units, prepared and sealed by a Professional Engineer Registered in the State of Florida, for approval prior to fabrication.
- D. Joints and Sealants - Provide joints and sealants between adjacent units of the type and configuration indicated on shop drawings meeting specified design and performance requirements.
- E. Concrete Mix Design
  - 1. Concrete Mix Proportions - Base selection of proportions for concrete on the methodology presented in ACI 211.1 for normal weight concrete and ACI 211.2 for lightweight concrete. Develop the concrete proportions using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. At a minimum of thirty days prior to precast concrete unit manufacturing, the precast concrete producer will submit a mix design for each strength and type of concrete that will be used. Furnish a complete list of materials, including quantity, type, brand and applicable data sheets for all mix design constituents as well as applicable reference specifications. The use of self-consolidating concrete is permitted, provided that mix design proportions and constituents meet the requirements of this specification.
  - 2. Concrete Strength - Provide precast concrete units with a 28-day compressive strength (f'c) of 5000 psi.
  - 3. Water-to-Cement Ratio - The cement content shall not be less than 564 pounds per cubic yard. The water cement ratio shall be not greater than 0.4.
  - 4. Air Content - The air content of concrete that will be exposed to freezing conditions shall be within the limits given below.

NOMINAL MAXIMUM AGGREGATE SIZE	AIR CONTENT % MODERATE EXPOSURE
3/8 inch	4.5 to 7.5
1/2 inch	4.0 to 7.0

3/4 inch	3.5 to 6.5
1.0 inch	3.0 to 6.0
1.5 inch	3.0 to 6.0

5. Corrosion Control: Follow design recommendations outlined in Chapter 7 of ACPA 01-102 or the ACPA 01-110 when hydrogen sulfide is indicated as a potential problem.
6. Sulfate Resistance: Follow the guidelines outlined in ACI 350-01, Code Requirements for Environmental Engineering Concrete Structures and ACI 350R-01, Commentary when the potential for sulfate attack exists due to injurious concentrations of sulfates from soil or water.

#### 1.06 QUALITY ASSURANCE

Demonstrate adherence to the standards set forth in NPCA QC Manual and/or ACPA QPC. Meet requirements written in the subparagraphs below.

- A. NPCA and ACPA Plant Certification - The precast concrete producer shall be certified by the National Precast Concrete Association's and/or the American Concrete Pipe Association's Plant Certification Program prior to and during production of the products for this project.
- B. Qualifications, Quality Control and Inspection
  1. Qualifications - Select a precast concrete producer that has been in the business of producing precast concrete units similar to those specified for a minimum of five (5) years. The precast concrete producer must maintain a permanent quality control department or retain an independent testing agency on a continuing basis.
  2. Quality Control Procedures
    - a. Show that the following QC tests are performed as required and in accordance with the ASTM standards indicated.
      - i. Slump: Perform a slump test for each 150 cu yd of concrete produced, or once a day, whichever comes first. Perform slump tests in accordance with ASTM C143.
      - ii. Temperature: Measure the temperature of fresh concrete when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C1064.
      - iii. Compressive Strength: Make at least four compressive strength specimens for each 150 cubic yards of concrete of each mix in accordance with the following Standards: ASTM C31, ASTM C192, ASTM C39.
      - iv. Air Content: Perform tests for air content on air-entrained, wet-cast concrete for each 150 cu yd of concrete, but not less often than once each day when air-entrained concrete is used. Determine the air content in accordance with either ASTM C231 or ASTM C173 for normal weight aggregates and ASTM C173 for lightweight aggregates.
      - v. Unit Weight: Perform tests for unit weight a minimum of once per week to verify the yield of batch mixes. Perform unit weight tests for each 100 cu yd of lightweight concrete in accordance with ASTM C138.
    - b. Submit test reports as specified in the Submittals paragraph and documentation to demonstrate compliance with the above subparagraphs.
  3. Inspection - The TOWN may place an inspector in the plant when the units covered by this specification are being manufactured. The burden of payment for plant inspection will be clearly detailed in the specification. The precast concrete producer shall give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the TOWN'S right to enforce contractual provisions after units are transported or erected.

#### 1.07 HANDLING, STORAGE AND DELIVERY

- A. Handling: Handle, transport, and store products in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on shop drawings.
- B. Storage: Store units off the ground or in a manner that will minimize potential damage.
- C. Delivery: Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the TOWN for quality and final acceptance.

#### 1.08 INSPECTION COORDINATION

The CONTRACTOR shall provide access to the WORK for the TOWN as requested for inspection. The CONTRACTOR shall provide 48-hour notice of its intention to begin new WORK activities.

#### 1.09 WARRANTY

- A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Cement: Furnish cement conforming to ASTM C150 and C1157, Type I, II, or III, or AASHTO M85 Type I or II. Only one brand of cement shall be used. "Low alkali" requirement may be waived if aggregates are not reactive as defined in Appendix to ASTM C33. Submit laboratory test reports.
- B. Water: Furnish water potable or free of deleterious substances in amounts harmful to concrete or embedded metals.
- C. Aggregates
  - 1. Selection: Furnish aggregates conforming to ASTM C33. Provide aggregates not containing any substance, which may be deleteriously reactive with the alkalies in the cement.
  - 2. Aggregates for Lightweight Concrete: ASTM C330
- D. Admixtures: No admixture may contain chlorides, bromides, fluorides, or other corrosive chemicals.
  - 1. Air-Entraining: ASTM C260
  - 2. Accelerating, Retarding, Water Reducing Moderate to High: ASTM C494
  - 3. Pigments: Non-fading and lime-resistant
- E. Reinforcement
  - 1. Reinforcing Bars
    - a. Deformed Billet-steel: ASTM A615
    - b. Deformed Low-alloy steel: ASTM A706
  - 2. Reinforcing Wire
    - a. Plain Wire: ASTM A82
    - b. Deformed Wire: ASTM A496
  - 3. Welded Wire Fabric
    - a. Plain Wire: ASTM A185
    - b. Deformed Wire: ASTM A497
  - 4. Epoxy Coated Reinforcement
    - a. Reinforcing Bars: ASTM A775
    - b. Wires and Fabric: ASTM A884

- 5. Galvanized Reinforcement
    - a. Provide galvanized reinforcement conforming to ASTM A767
  - F. Synthetic Fiber Reinforcement - Synthetic fiber shall be polypropylene with a denier less than 100 and a nominal fiber length of 2 inch.
  - G. Grout - Nonshrink Grout shall conform to ASTM C1107. Cementitious grout shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.
- 2.02 Inserts and Embedded Metal - All items embedded in concrete shall be of the type required for the intended task, and meet the following standards.
- A. Structural Steel Plates, Angles, etc.: ASTM A36
  - B. Hot-dipped Galvanized: ASTM A153
  - C. Proprietary Items: In accordance with manufacturers published literature
- 2.03 Accessories
- A. Rubber Gaskets for Circular Concrete Sewer Pipe and Culvert Pipe: ASTM C443.
  - B. External Sealing Bands for Noncircular Sewer, Storm Drain and Culvert Pipe: ASTM C877.
  - C. Preformed Flexible Joint Sealants for Concrete Pipe, Manholes, and Manufactured Box Sections: ASTM C990.
  - D. Elastomeric Joint Sealants: ASTM C920
- 2.04 Pipe Entry Connectors - Pipe entry connectors shall conform to ASTM C923 or ASTM C1478.

### **PART 3 - EXECUTION**

#### **3.01 FABRICATION AND PLACEMENT**

Perform fabrication in accordance with NPCA QC Manual and/or ACPA QPC unless specified otherwise.

- A. Forms - Use forms, for manufacturing precast concrete products, of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Construct forms so that the forces and vibrations to which the forms will be subjected can cause no product damage. Clean forms of concrete build-up after each use. Apply form release agents according to the manufacturer's recommendations. Do not allow form release agent to build up on the form casting surfaces.
- B. Reinforcement - Follow applicable ASTM Standards or ACI 318/318R for placement and splicing. Fabricate cages of reinforcement either by tying the bars, wires or welded wire fabric into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4. Position reinforcing as indicated on the Drawings. Ensure that the concrete cover conforms to specified requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 inch. Provide concrete cover not less than 1/2 inch. Take positive means to assure that the reinforcement does not move significantly during the casting operations.
- C. Embedded Items - Position embedded items at locations specified in the design documents. Perform welding in accordance with AWS D1.1 when necessary. Hold rigidly in place inserts, plates, weldments, lifting devices and other items to be imbedded in precast concrete products so that they do not move significantly during casting operations.

#### **3.02 CONCRETE**

- A. Concrete Mixing - Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.
- B. Concrete Placing - Deposit concrete into forms as near to its final location as practical. Keep the free fall of the concrete to a minimum. Consolidate concrete in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Use vibrators to consolidate concrete with frequencies and amplitudes sufficient to produce well consolidated concrete.
  - 1. Hot Weather Concreting - Recommendations for hot weather concreting are given in detail in ACI 305R. During hot weather, give proper attention to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing shall not exceed 90 degrees F.
- C. Concrete Curing - Commence curing immediately following the initial set and completion of surface finishing.
  - 1. Curing by Moisture Retention - Prevent moisture evaporation from exposed surfaces until adequate strength for stripping is reached by one of the following methods:
    - a. Cover with polyethylene sheets a minimum of 6 mils thick per ASTM C171.
    - b. Cover with burlap or other absorptive material and keep continually moist.
    - c. Use of a membrane-curing compound applied at a rate not to exceed 200 square ft/gallon, or per manufacturers' recommendations according to ASTM C309.
  - 2. Curing with Heat and Moisture –  
Do not subject concrete to steam or hot air until after the concrete has attained its initial set. Apply steam, if used, within a suitable enclosure which permits free circulation of the steam in accordance with ACI 517.2R. If hot air is used for curing, take precautions to prevent moisture loss from the concrete. The temperature of the concrete shall not be permitted to exceed 150 degrees F. These requirements do not apply to products cured with steam under pressure in an autoclave.
- D. Surface Finish - Finish unformed surfaces of wet-cast precast concrete products as specified in the contract documents. If no finishing procedure is specified, finish such surfaces using a strike-off to level the concrete with the top of the form.
  - 1. Formed Non-Architectural Surfaces - Cast surfaces against approved forms following industry practices in cleaning forms, designing concrete mixes, placing and curing concrete. Normal color variations, form joint marks, small surface holes caused by air bubbles, and minor chips and spalls will be accepted but no major imperfections, honeycombs or other major defects will be permitted.
  - 2. Unformed Surfaces - Finish unformed surfaces with a vibrating screed, or by hand with a float. Normal color variations, minor indentations, minor chips and spalls will be accepted but no major imperfections, honeycombs, or other major defects shall be permitted.
  - 3. Special Finishes - Troweled, broom or other finishes shall be according to the requirements of project documents and performed per industry standards or supplier specifications. Submit finishes for approval when required by the project documents. The sample finishes shall be approved prior to the start of production.
- E. Stripping Products from Forms - Do not remove products from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.
- F. Patching and Repair - No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.
  - 1. Repairing Minor Defects - Defects that will not impair the functional use or expected life of a precast concrete product may be repaired by any method that does not impair the product.
  - 2. Repairing Honeycombed Areas - When honeycombed areas are to be repaired, remove all loose material and cut back the areas into essentially horizontal or vertical planes to a depth at which

coarse aggregate particles break under chipping rather than being dislodged. Use proprietary repair materials in accordance with the manufacturer's instructions. If a proprietary repair material is not used, saturate the area with water. Immediately prior to repair, the area should be damp, but free of excess water. Apply a cement-sand grout or an approved bonding agent to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

3. Repairing Major Defects - Products with major defects will not be accepted by the TOWN.
- G. Shipping Products - Do not ship products until they are at least 5 days old, unless it can be shown that the concrete strength has reached at least 75% of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

### 3.03 INSTALLATION

- A. Site Access - Provide adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete products.
- B. General Requirements
  1. Install precast concrete products to the lines and grades shown in the contract documents or otherwise specified.
  2. Lift products by suitable lifting devices at points provided by the precast concrete producer.
  3. Install products in accordance with the precast concrete producer's instructions. In the absence of such instructions, install underground utility structures in accordance with ASTM C891. Install pipe, inlets, manholes and drainage structures in accordance with the procedures outlined by the American Concrete Pipe Association and Sections 425 and 430 of the FDOT Specifications.
- C. Water Tightness - Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, pipe-entry connectors and inserts should be used to ensure the integrity of the entire system.

END OF SECTION

SECTION 03600 GROUT

**PART 1 - GENERAL**

1.01 SCOPE:

- A. The CONTRACTOR shall furnish all equipment, labor and material for the proper placement and curing of grout as indicated on the Drawings and as specified herein.

1.02 APPLICABLE PUBLICATIONS: The following standard specifications shall apply to the WORK of this SECTION:

- A. American Society of Testing and Materials (ASTM)
  - 1. C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars
  - 2. C307 - Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
  - 3. C496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
  - 4. C531 - Test Method for Linear Shrinkable and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing
  - 5. C579 - Test Methods for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacing and Polymer Concretes
  - 6. C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
  - 7. C827 - Test Method for Early Volume Change of Cementitious Mixtures
  - 8. C881 - Specification for Epoxy-Resin-Base Bonding Systems for Concrete
  - 9. C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
  - 10. C939 - Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
  - 11. C1090 - Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout
  - 12. C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
  - 13. C1339 - Standard Test Method for Flowability and Bearing Area of Chemical-Resistant Polymer Machinery Grouts
  - 14. D648 - Test Method for Deflection Temperature of Plastics Under Flexural Load
  - 15. D695 - Test Method for Compressive Properties of Rigid Plastics
- B. International Concrete Repair Institute (ICRI)
  - 1. Technical Guide for Selecting and Specifying Concrete Surface preparation for Sealers, Coatings, and Polymer Overlays
- C. American Institute of Steel Construction (AISC)
  - 1. Manual of Steel Construction
- D. American Concrete Institute (ACI)
  - 1. Building Code Requirements for Structural Concrete (ACI 318, latest edition)
- E. International Code Council (ICC), formerly the International Conference of Building Officials (ICBO)

1.03 DEFINITIONS: (Not Used)

1.04 SUBMITTALS: The CONTRACTOR shall submit the following:

- A. MANUFACTURER's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout and adhesive anchor system used in the WORK, and location of use.
- B. Name and telephone number of MANUFACTURER's representative, who will give on-site job service. The representative shall have at least one (1) year of experience with the chosen grouts.

1.05 QUALIFICATIONS:

- A. Adhesive anchor installers shall be trained and qualified at the site by MANUFACTURER's representative before installing any adhesive anchors.

1.06 RESPONSIBILITIES:

- A. The CONTRACTOR shall assist the TOWN in obtaining specimens for testing and shall furnish all materials necessary for fabricating the test specimens.
- B. The cost of laboratory tests on grout will be paid by the TOWN except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of defective WORK, and re-testing all at no increased cost to the TOWN.
- C. The MANUFACTURER of prepackaged grouts shall provide on-site technical assistance within 72 hours of request at no cost to the TOWN.

1.07 CERTIFICATIONS AND TESTING: The CONTRACTOR shall provide to the TOWN three (3) copies of certified test results for all tests required herein.

- A. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.
- B. Certification that all grout used on the project contains no chlorides or other chemicals that cause corrosion.
- C. MANUFACTURER's certification that their non-shrink grout does not contain aluminum, zinc, or magnesium powders, used as a method of expansion.
- D. ICC certifications for all adhesive anchors.

1.08 INSPECTION COORDINATION:

- A. All adhesive anchor installations shall have special inspections as recommended by the ICC report on the adhesive anchors and local codes.

1.09 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

**PART 2 - PRODUCTS**

2.01 APPLICATION:

- A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not:

TYPE OF GROUT	APPLICATION
Cement Grout	Surface repairs
Non-Shrink – Class I	Beam and column (1 or 2 story) base plates less than 16 inches in the least dimension.
	Storage tanks and other non-motorized equipment and machinery under 30 horsepower
	Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc. (Where placement time is less than 20 min.)



TYPE OF GROUT	APPLICATION
	Repair of holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material
	Any application not listed, where grout is called for on the Drawings
Non-Shrink - Class II	Column base plates (greater than 2 story or larger than sixteen (16) inches in the least dimension)
	Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc. (where placement time exceeds 20min.)
	Under precast concrete elements
	Repair of holes and defects in concrete members which are water bearing or in contact with soil or other fill materials
Non-Shrink Epoxy	Machinery over 30 horsepower and equipment under 30 horsepower but subject to severe shock loads and high vibration
Epoxy Anchor Grout	All anchor bolts and reinforcing steel required to be set in grout that are not in high temperature or high fire risk areas.
Topping Grout	Toppings and concrete/grout fill less than three (3) inches thick
Structural Concrete per 03300	Toppings and concrete/grout fill greater than three (3) inches thick

2.02 MATERIALS:

A. Cement Grout:

1. Cement grout shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 4000 psi, unless indicated otherwise.
2. Cement grout materials shall be as indicated in SECTION 03300 – Cast-in-Place Concrete.

B. Non-Shrink Grouts (Cement Based):

1. General:

- a. Cement Based Non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas-liberating, non-ferrous, grout, requiring only the addition of water.
- b. MANUFACTURER's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout indicated herein shall be that recommended by the MANUFACTURER for the particular application.
- c. Grout shall not contain chlorides or additives, which may contribute to corrosion.
- d. Grout shall be formulated to be used at any consistency from fluid to plastic.
- e. Non-Shrink grout shall have the following minimum properties when tested at a fluid consistency at 28 days:

Tensile Splitting Strength	ASTM C496	500 psi minimum
Flexural Strength	ASTM C580	1000 psi minimum
Bond Strength (concrete to grout)	ASTM C882 modified	1900 psi minimum

- f. Grout shall be certified for use in marine environments.

2. Class I Non-Shrink Grout:

- a. Class I Non-Shrink Grout shall have a minimum 28-day compressive strength of 5000 psi, when mixed at a fluid consistency.
- b. Class I Non-Shrink grout shall meet the requirements of ASTM C1107, Grade B or C, when mixed to fluid, flowable and plastic consistencies.

- c. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827. The grout when tested shall not bleed or segregate at maximum allowed water.
  - d. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.
  - e. Provide certification together with independent test data that the expansion at 3 or 14 days does not exceed the 28-day expansion and that its non-shrink property is not based on gas production or gypsum expansion.
3. Class II Non-Shrink Grout:
- a. Class II Non-Shrink grout shall be a high precision, fluid, extended working time grout. The minimum 28-day compressive strength shall be 7500 psi, when mixed at a fluid consistency.
  - b. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827.
  - c. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.
  - d. Class II grout shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C827 at temperature extremes of 45 to 90 degrees F in accordance with ASTM C1107.
  - e. Class II Non-Shrink grouts shall meet the requirements of ASTM C1107; Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C939.
  - f. The grout when tested shall not bleed or segregate at maximum allowed water.
  - g. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.

C. Non-Shrink Epoxy Grout:

- 1. Non-Shrink Epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the MANUFACTURER. MANUFACTURER's instructions shall be printed on each container in which the materials are packaged.
- 2. Epoxy grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827, (modified for epoxy grouts by using an indicator ball with a specific gravity between 0.9 and 1.1).
- 3. Epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested according to ASTM C531.
- 4. The epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C579, method B.
- 5. The mixed epoxy grout shall have a minimum working life of 90 to 120 minutes at 70 degrees F.
- 6. The effective bearing area shall be a minimum of 95% EBA in accordance with ASTM C1339.
- 7. The chemical formulation of the epoxy grout shall be that recommended by the MANUFACTURER for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.
- 8. Non-Shrink Epoxy grout shall have the following minimum properties when tested at 7 days:

Bond Strength to Concrete	ASTM C882 modified	3000 psi minimum
Bond Strength to Steel	ASTM C882 modified	1700 psi minimum

Flexural Strength	ASTM C580	2500 psi minimum
Tensile Strength	ASTM C307	2000 psi minimum

D. Epoxy Anchor Grout:

1. Epoxy anchor grout shall be a non-sag paste conforming to ASTM C881 Type IV, Class C, Grade 3 with the exception of gel time.
2. Heat deflection temperature per ASTM D648 shall be a minimum 120 degrees F.
3. MANUFACTURER shall certify that the epoxy grout will maintain 90 percent of its strength up to a temperature of 125 degrees F.
4. Grout shall come in a two-chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
5. Epoxy anchor grout shall be capable of being used in submersed applications once cured.
6. Compressive strength per ASTM D695 shall be 10,000-psi minimum.
7. In vertical and overhead locations, anchor seal plugs shall be used.
8. If the average working or operating temperature will be over 100° F or in a high fire risk area, use cement based non-shrink grout and oversized holes.
9. Embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar. Embedment shall not exceed 67% of the member depth.

E. Topping Grout and Concrete/Grout Fill:

1. Where fill is thicker than 3 inches, structural concrete, as specified in SECTION 03300, may be used if approved by the TOWN.
2. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as specified herein. All materials and procedures indicated for normal concrete in SECTION 03300, shall apply unless indicated otherwise.
3. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45.
4. Coarse aggregate shall be graded as follows:

U.S. STANDARD SIEVE SIZE	PERCENT BY WEIGHT PASSING
1/2"	100
3/8"	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

5. Final mix design shall be as determined by trial mix design as indicated in SECTION 03300, except that drying shrinkage tests are not required.
6. Strength: Minimum compressive strength of topping grout and concrete/grout fill at 28 days shall be 4000 psi.

2.03 **CURING:** Curing materials shall be as specified in SECTION 03300, and as recommended by the MANUFACTURER of prepackaged grouts.

2.04 **CONSISTENCY:**

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.
- B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4 inches.

## 2.05 MEASUREMENT OF INGREDIENTS:

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the MANUFACTURER.

## **PART 3 - EXECUTION**

### 3.01 GENERAL:

- A. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the TOWN.
- B. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of saturation period excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.
- C. Surface preparation, curing, and protection of cement grout shall be in accordance with SECTION 03300. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.
- D. All surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete or other deleterious materials.
- E. Shade the WORK sites from sunlight for at least 24 hours before and 48 hours after grouting.
- F. Contact the grout MANUFACTURER's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

### 3.02 GROUTING PROCEDURES:

- A. General: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the MANUFACTURER.
- B. All structural, equipment, tanks, and piping support bases shall be grouted, unless indicated otherwise.
  - 1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout, or a thickness as indicated on the Drawings.
  - 2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against all surfaces, and joints shall be sealed as recommended by the grout MANUFACTURER to be liquid-tight. Forms shall be coated as recommended by the grout MANUFACTURER for easy form release. Where this method of placement is not practical or where required by the TOWN, alternate grouting methods shall be submitted for acceptance by the TOWN.
- C. Drilled anchors and Reinforcing Bars:
  - 1. General: Drilled anchors and reinforcing bars shall be installed in strict accordance with the MANUFACTURER's instructions. Holes shall be roughened with a brush on a power drill, and cleaned. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength. Anchors shall not be loaded until the grout has reached its indicated strength in accordance with the MANUFACTURER's instructions.
  - 2. Epoxy Adhesive Anchors:
    - a. Grout shall be proportioned and mixed with automatic equipment.

- b. Embedment shall be in accordance with the MANUFACTURER's instructions, unless otherwise indicated on the Drawings.
- c. The hole diameter shall be as recommended by the epoxy MANUFACTURER but shall be no larger than 0.25 inch greater than the diameter of the outer surface of the bolt threads or the reinforcing bar deformations.
- d. Holes shall be drilled by methods that do not interfere with the proper bonding of the epoxy.
- e. Existing reinforcing steel in the vicinity of the proposed holes shall be located prior to drilling. The location of holes shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.
- f. Holes shall be blown clean with clean, dry compressed air to remove all dust and loose particles. Holes shall be dry.
- g. Reinforcing bars and anchors shall be installed per the MANUFACTURER's written installation instructions.

D. Topping Grout and Concrete/Grout Fill:

- 1. All mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively where accepted by the TOWN, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.
- 2. The minimum thickness of grout topping and concrete/grout fill shall be one inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2-inches wide by 1-1/2-inches deep.
- 3. The base slab shall be thoroughly cleaned and wetted to saturated surface dry (SSD) condition per International Concrete Repair Institute Standards for Surface Preparations, prior to placing topping and fill. No topping concrete shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement. If it does dry, it must be immediately removed using wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment MANUFACTURER after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.
- 4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.
- 5. The surface shall be tested with a straight edge to detect high and low spots, which shall be immediately eliminated. When the topping and/or fill have hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.
- 6. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the TOWN, the tank shall be filled with sufficient water to cover the entire floor for fourteen (14) days.

3.03 CONSOLIDATION:

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.04 CURING:

- A. Cement based grouts shall be cured per SECTION 03300 and per the MANUFACTURER's recommendations.

3.05 FIELD TESTING:

- A. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the TOWN to ensure continued compliance with these specifications. The specimens will be made by the TOWN or its representative.
- B. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C109 (Using 2-in or 50mm Cube Specimens), at intervals during construction selected by the TOWN. A set of three specimens will be made for testing at 7 days, 28 days, and each additional time period as appropriate.
- C. Compression tests and fabrication of specimens for topping grout, and concrete/grout fill will be performed as specified in SECTION 03300, at intervals during construction as selected by the TOWN.
- D. All material, already placed, which fails to meet the requirements of these specifications, is subject to removal and replacement at the cost of the CONTRACTOR.
- E. The cost of all laboratory tests on mortar and grout will be borne by the TOWN, but the CONTRACTOR shall assist the TOWN in obtaining specimens for testing. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on WORK performed which does not meet the specifications. The CONTRACTOR shall provide all services necessary to conduct the compression tests.
- F. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C579, Method B, at intervals during construction as selected by the TOWN. A set of three specimens will be made for testing at 7 days, and each earlier time period as appropriate.

3.06 CONSTRUCTION TOLERANCES:

- A. Construction tolerances shall be as indicated in SECTION 03300, unless indicated otherwise.

END OF SECTION

SECTION 05070 BOLTED FASTENERS

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The WORK of this SECTION consists of furnishing all labor, materials and equipment necessary for installation of bolted fasteners as shown on the Drawings.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 05600 – Miscellaneous Metals

1.02 SHOP DRAWINGS:

- A. Shop Drawings shall include bolted connections and the type, size and length of bolts including washers.

1.03 APPLICABLE STANDARDS AND PUBLICATIONS:

- A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.
  - 1. American Society of Testing Materials (ASTM)
    - a. A36 – Standard Specification for Carbon Structural Steel
    - b. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
    - c. A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi (pounds per square inch) Tensile Strength
    - d. A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi (kips per square inch) Minimum Tensile Strength.
    - e. A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
    - f. A563 – Standard Specification for Carbon and Alloy Steel Nuts
    - g. F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
    - h. F436 – Standard Specification for Hardened Steel Washers
    - i. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
    - j. F594 - Standard Specification for Stainless Steel Nuts
  - 2. American National Standards Institute (ANSI)
    - a. B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
    - b. B18.2.2 - Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
    - c. B18.2.6 - Metric Fasteners for Use in Structural Applications
  - 3. American Institute of Steel Construction (AISC)
  - 4. Specifications for Structural Joints Using ASTM A325 or A490 bolts, approved April 1978, by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation
  - 5. American Concrete Institute (ACI) – Chapter 17 of ACI 318-14 or Appendix D of ACI 318-11.

1.04 WARRANTY:

- A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

1.05 TEMPLATES:

- A. Templates shall be furnished by the Fabricator to the job, together with instructions for the setting of anchors, anchor bolts and bearing plates.

1.06 INSPECTION AND TESTING:

- A. Field inspections and tests shall include fit-up, preparation of surface and bolting.

**PART 2 - MATERIALS**

2.01 GENERAL

- A. All bolts, nuts and washers not designated stainless steel shall comply with ASTM F1554, Grade 105. ASTM A325 bolts shall be used for connections as indicated on the Drawings.
- B. All threaded rods not designated stainless steel shall comply with ASTM F1554, Grade 105.
- C. All stainless steel bolts, threaded rods, nuts and washers shall comply with ASTM F593 and ASTM F594 unless otherwise noted.
- D. ASTM F593 bolts shall be a group 2 alloy in the CW condition.

2.02 HIGH STRENGTH BOLTS:

- A. High strength bolts not designated stainless steel shall conform to the requirements of ASTM A325. The bolt dimensions shall conform to the current requirements of ANSI B18.2.6 for heavy hex structural bolts.
- B. Stainless steel high strength bolts shall conform to the requirements of ASTM F593. All bolts shall be a group 2 alloy in the CW condition. The bolt dimensions shall conform to the current requirements of ANSI B18.2.1 for heavy hex structural bolts.

2.03 ALLOY STEEL BOLTS: Alloy steel bolts shall conform to the requirements of ASTM A490.

2.04 NUTS:

- A. Nut dimensions shall conform to ANSI B18.2.2 for heavy hex nuts.
- B. Nuts for bolts not designated stainless steel shall conform to ASTM A563.
- C. Nuts for stainless steel bolts shall conform to ASTM F594. ASTM F594 nuts alloy group shall match the stainless steel bolt alloy group.

2.05 WASHERS:

- A. Flat, circular and square washers for bolts not designated stainless steel shall conform to ASTM F436, Type 1.
- B. Compressible-washer type direct tension indicators for all connections shall conform to ASTM A959, Type 325.
- C. Flat, circular and square washers for stainless steel bolts shall conform to ASTM F593 and meet the dimensional requirements of ASTM F436. ASTM F593 washers alloy group shall match the stainless steel bolt alloy group.

2.06 ANCHOR BOLTS:

- A. Anchor bolts for equipment and machinery, where permanently anchored into concrete, shall be stainless steel, unless otherwise shown. The diameter, length, and any bend dimensions shall be as required by the equipment or machinery MANUFACTURER. Unless otherwise required, use 3/4 inch minimum diameter and other geometry shown on the Drawings. Furnish a minimum of two (2) nuts and a washer of the same material for each bolt. Provide sleeves as required or as shown for location adjustment.



- B. Submerged use is defined as any connection to concrete from a point one (1) foot six (6) inches above the maximum water surface in a water-holding basin and any connection below that point.
- C. Anchor bolts for other uses to anchor fabricated metalwork or structural building, or structural frame components in areas of wet use or washdown areas shall be stainless steel. Furnish two (2) nuts and one (1) washer per bolt of the same material as the bolt, unless otherwise shown.

2.07 STAINLESS STEEL FASTENERS LUBRICANT (ANTI-SEIZING):

- A. Where stainless steel nuts and machined bolts, anchor bolts, concrete anchors, and all other threaded fasteners are used, the CONTRACTOR shall apply an anti-seizing lubricant to the threads prior to making up the connections. The lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper.

2.08 ANCHORING SYSTEMS FOR CONCRETE:

- A. Expansion (Wedge) Anchors:
  - 1. Expansion anchors shall not be used except in dry areas, unless otherwise indicated on the Drawings.
  - 2. Provide Type 316 stainless steel anchors; sizes as shown on the Drawings.
  - 3. Expansion anchors shall be: ITW Trubolt Wedge Anchors, manufactured by ITW Redhead, Michigan City, IN; Hilti Kwik Bolt 3, manufactured by Hilti Corporation, Tulsa, OK; Wej-It Anchors, manufactured by Wej-It Fastening Systems, Norwalk, CT; or TOWN approved equal.
  - 4. Provide ICC or other similar building code organization recommendations regarding safe allowable design loads.
- B. Adhesive Anchors:
  - 1. Adhesive anchors shall be used for anchoring metal components in damp, below grade or submerged locations and where indicated on the Drawings.
  - 2. Adhesive anchors shall be Hilti HIT-RE 500 V3 epoxy anchoring system with ASTM F593 Type 316 stainless steel threaded HAS-R rod, nuts and washers, as manufactured by Hilti Corporation, Tulsa, OK, or TOWN approved equal.
  - 3. Adhesive anchors shall be installed per the requirements of ACI 318-14 Section 17.8.1 or ACI 318-11 Section D.9.2.2.
  - 4. Per the requirements of ACI 318-14 Section 17.8.2.1 or ACI 318-11 Section D.9.2.1:
    - a. Minimum age of concrete: 28 Days – full design compressive strength achieved.
    - b. Concrete Temperature Range: 23°F to 104°F (-5°C to 40°C).
    - c. Moisture Condition of Concrete at Time of Installation: Anchors may be installed in dry concrete and water-saturated concrete, as defined by the manufacturer. Anchors may also be installed in submerged (as defined in Section 2.06 Item B.) conditions following the manufacturer's recommendations. Anchors may not be installed in water filled holes.
    - d. Requirements for hole drilling and preparation: Hole drilling and preparation shall be per the manufacturer's instructions and recommendations. Holes for adhesive anchors must be drilled with a carbide tipped hammer drill bit, unless noted otherwise, per the manufacturer's recommendations.

2.09 BOLTS AND FASTENERS:

- A. Bolts and fasteners not permanently embedded in concrete, but located outdoors in areas subject to the weather; chemical handling areas; equipment rooms subject to drainage, leakage, and washdown; and in galleries and trenches, shall be Type 316 stainless steel as hereinbefore specified.
- B. Bolts for flanges of piping, valves, and other similar connections shall be as specified in other sections or as shown on the Drawings.

2.10 FABRICATION:

- A. Structural material shall be fabricated and assembled in the shop. Assembled pieces shall be taken apart for the removal of burrs and shavings produced by the reaming operation. Parts not connected in the shop shall be secured by bolts to prevent damage in shipment and handling.
- B. Surfaces of joints for bolted connections shall be clean, bright metal. Fit-up of the parts shall be inspected and approved by the laboratory inspector prior to making final connection.
  - 1. Holes for bolts shall be 1/16 inch larger than the diameter of the bolt.
  - 2. ASTM A307 bolts transmitting shear shall be threaded to such a length that no more than one thread will be within the grip of the metal. The bolts shall be of the length that will extend through, but no more than 1/4 inch beyond the nut. Nuts shall be tightened while bolt heads are tapped with a hammer. Tightening shall progress outward from the center of the joint. Nuts shall be locked after final tightening.
  - 3. Bolted connections using ASTM A325 bolts shall conform to the Specifications for Structural Joints using ASTM A325 or A490 bolts. Bolt threads shall be excluded from the shear planes of the contact surfaces between the connected parts and the bolts shall be tightened by the "Turn-of-Nut" method.

2.11 TAMPER RESISTANCE FASTENERS:

- A. Fasteners removable only by use of a special tool.

**PART 3 - EXECUTION**

3.01 INSTALLATION:

- A. Fasteners shall be tightened in properly aligned holes to provide, when all fasteners in the joint are tight, at least the minimum tension required by AISC Specification for Bolted Connections. The turn-of-the-nut method shall be utilized for all high-strength bolts as defined by AISC Specification for Bolted Fasteners.
- B. Concrete Anchors:
  - 1. Installation shall not begin until the concrete or masonry receiving the anchors has attained its design strength. An anchor shall not be installed closer than six (6) times its diameter to either an edge of the concrete or masonry, or to another anchor, unless specifically detailed otherwise on the Drawings. Install in strict accordance with MANUFACTURER's written instructions. Use MANUFACTURER's recommended drills and equipment.

3.02 REUSE:

- A. A490 bolts and galvanized A325 bolts shall not be reused. Other A325 bolts may be reused, if approved by the TOWN.

3.03 BOLTED PARTS:

- A. The slope of the bolted parts in contact with the bolt head and nut shall not exceed 1:20 with respect to a plane normal to the bolt axis. Holes shall be punched and reamed, or drilled, and shall have a diameter nominally 1/16 inch in excess of the nominal bolt diameter. Over-size, short slotted and long slotted holes shall conform to the requirements of AISC Specifications for Structural Joints.

3.04 GALVANIZING:

- A. The galvanizing of the bolts, nuts and washers shall conform to the requirements of ASTM A153.

END OF SECTION

SECTION 05521 PEDESTRIAN/BICYCLE BULLET RAILING

**PART 1 - GENERAL**

1.01 SCOPE:

- A. Summary of Work: The CONTRACTOR shall install fence at the locations indicated on the drawings and specified herein.
- B. Related Work Specified Elsewhere:
  - 1. SECTION 03300 - Cast-In-Place Concrete
  - 2. SECTION 05070 – Bolted Fasteners
  - 3. SECTION 05600 – Miscellaneous Metals

1.02 APPLICABLE PUBLICATIONS:

- A. Applicable Standard Specifications:
  - 1. FDOT Standard Specifications for Road and Bridge Construction, Section 937.
  - 2. FDOT Standard Specifications for Road and Bridge Construction, Section 962.
  - 3. FDOT Standard Specifications for Road and Bridge Construction, Section 965.
  - 4. FDOT Standard Specifications for Road and Bridge Construction, Section 932-2.5.
  - 5. FDOT Standard Specifications for Road and Bridge Construction, Section 926.

1.03 SUBMITTALS:

- A. The CONTRACTOR shall submit as specified in SECTION 01300.

**PART 2 - PRODUCTS**

- 2.01 Pedestrian/Bicycle Bullet Railing Details – Per Standard Plans, Index 550-002 Sheets 1 to 3.

**PART 3 - EXECUTION**

- 3.01 GENERAL: Follow the requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 515, Construction Methods.

END OF SECTION

SECTION 05600 MISCELLANEOUS METALS

**PART 1 - GENERAL**

- 1.01 MATERIALS: Materials shall be new, free from defects impairing strength, durability of appearance, and of best commercial quality for intended purposes.
- 1.02 SUBMITTALS: Submit for acceptance fully detailed shop and erection drawings for all miscellaneous metal work required for this project. Include with submittal color selections as required.
- 1.03 RELATED WORK SPECIFIED ELSEWHERE:
- A. SECTION 05100 Structural Steel
- 1.04 WARRANTY:
- A. The MANUFACTURER shall warrant the EQUIPMENT, MATERIALS and PRODUCTS specified in this section against defective materials and workmanship with the MANUFACTURER'S standard warranty, but for no less than one year from the date of Substantial Completion, and as described in Article 13 of Section 00700 - General Terms and Conditions.
- B. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

**PART 2 - PRODUCTS**

- 2.01 BASIC MATERIALS:
- A. Miscellaneous Structural Shapes: ASTM A36
- B. Miscellaneous Aluminum Shapes: ASTM B221, alloy 6063 T-5, Sheet: ASTM B 209, alloy 3003, tempered as required
- C. Miscellaneous Iron Castings: ASTM A48, Class 30
- D. Anchors and Fastenings: Compatible with material to be fastened
- E. Shop Primer: No. 5210 Universal Primer by Glidden
- F. Isolator for Aluminum and Specified Galvanized Metals: Aluminum pigmented bituminous paint or epoxy
- 2.02 FINISHES:
- A. Hot-dipped galvanizing ASTM A386, Class C, for angle thresholds and all other shapes cast-in or directly attached to concrete or masonry.
- B. Shop Primer: One coat on all ferrous metals not scheduled or required to be galvanized.
- C. Caustic Etch and Lacquer: Miscellaneous aluminum.
- 2.03 SHOP FABRICATED ITEMS:
- A. Metal Stairs: To detail conforming to all codes and regulations governing industrial stairs.
- B. Pipe Railings: 1-1/2-inch diameter schedule 40, all welded construction, galvanized after fabrication.
- C. Angle Thresholds, Corner Guards, and Other Shapes Indicated as Cast-In-Construction: Weld round-rod back anchors as detailed or required. At corners, miter, weld and grind smooth. Follow basic material requirements.
- D. Steel Pipe Stanchions: 4" diameter schedule 40 galvanized steel pipe, heights as shown on the Drawings.

### **PART 3 - EXECUTION**

#### 3.01 INSTALLATION:

- A. Follow accepted shop and erection drawings. Coordinate with work of Section 03100 for items cast into concrete.
- B. Isolate aluminum surfaces in contact with other surfaces with two (2) coats of specified paint.
- C. Isolate galvanized surfaces to be cast into concrete with two (2) coats of specified paint.

#### 3.02 FIELD WELDING: Conform to AWS Code Standards. Use certified welders.

#### 3.03 MISCELLANEOUS:

- A. Furnish all fastenings including lag screws, rods, bolts, washers, nuts, and inserts as required to complete all work.
- B. Embed pipe stanchions minimum 3 inches below grade in minimum 1-foot-4-inches diameter by 3-foot-6-inches deep 3000 psi concrete.

END OF SECTION

## SECTION 07920 SEALANTS AND CAULKINGS

### PART 1 - GENERAL

- 1.01 SCOPE: The CONTRACTOR shall furnish all labor, materials and equipment necessary for sealing and caulking as specified herein.
- 1.02 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
- A. American Society for Testing and Materials (ASTM) Publications: C920-79 Elastomeric Joint Sealants.
- 1.03 SUBMITTALS:
- A. Certifications of Conformance of Compliance: Submit certificates from the manufacturers attesting that materials meet the specified requirements.
- B. Manufacturer's Descriptive Data: Submit complete descriptive data for each type of material. Clearly mark data to indicate the type the CONTRACTOR intends to provide. Data shall state conformance to specified requirements. Data for sealant and caulking shall include joint preparation, application instructions, shelf life, mixing instructions for multi-component sealants, and recommended cleaning solvents.
- C. Colors: Submit one (1) sample of each color for each sealant and caulking type to verify that products match the colors indicated. Where colors are not indicated, submit not less than four (4) different samples of manufacturers' standard colors for selection by the TOWN.
- 1.04 SAMPLE JOINTS: Before sealant and caulking work is started, provide a sample of each type of finished joint where directed on the project. The sample shall show the workmanship, bond, and color of sealant or caulking. The workmanship, bond, and color of sealant or caulking work throughout the project shall match the approved sample joints.
- 1.05 ENVIRONMENTAL CONDITIONS: The ambient temperature shall be within the limits of 40 and 100 degrees F. when the sealant and caulking are applied.
- 1.06 DELIVERY AND STORAGE: Deliver materials to the job site in the manufacturer's external shipping containers, unopened, with brand names, date of manufacture, color, and materials designated clearly thereon. Containers of elastomeric sealant shall be labeled as to type, class, grade and use. Carefully handle and store all materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 100 degrees Fahrenheit or less than 40 degrees Fahrenheit.
- 1.07 WARRANTY:
- A. The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in the General Terms and Conditions.

### PART 2 - PRODUCTS

- 2.01 MATERIALS: Products shall conform to the reference documents listed for each use. Color of sealant and caulking shall match adjacent surface color unless specified otherwise. For ASTM C920 sealants, use a sealant that has been tested on the type(s) of substrate to which it will be applied.
- A. Interior Caulking or Sealant: ASTM C920, Type S, Grade NS, Class 12.5 or 25, Use NT. Color of caulking or sealant shall be white.
- B. Exterior Sealant: For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Color of sealant shall be gray unless in contact with window frame where it shall be dark brown or bronze.

- C. Exterior sealants used adjacent to or above roof surfaces shall be compatible with asphaltic bituminous roofing products, should contact be made with the roofing system, that would not have adverse affects to either product.
- D. Floor Joint Sealant: ASTM C920, Type M, Grade P, Class 25, Use T. Color of sealant shall be gray.
- E. Primer for Sealant: Use a non-staining, quick-drying, of type and consistency as recommended by the sealant manufacturer for the particular application.
- F. Bond Breakers: Use the type and consistency recommended by the sealant manufacturer for the particular application.
- G. Backstops: Use a closed cell polyurethane or polyethylene foam free from oil or other staining elements as recommended by the sealant manufacturer. Backstop material shall be compatible with the sealant. Do not use oakum and other types of absorptive materials as backstops.

### **PART 3 - EXECUTION**

3.01 SURFACE PREPARATION: Surfaces shall be clean, dry to the touch, and free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Where adequate grooves have not been provided, clean out grooves to a depth of ½-inch and grind to a minimum width of ¼-inch without damage to the adjoining work. No grinding shall be required on metal surfaces.

- A. Steel Surfaces: Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a solvent that leaves no residue.
- B. Aluminum or Bronze Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. Use non-staining solvents recommended by the item manufacturer.

3.02 SEALANT PREPARATION: Do not modify the sealant by addition of liquids, solvents or powders. Mix multi-component elastomeric sealants in accordance with manufacturer's printed instructions.

3.03 APPLICATION:

- A. Backstops: Where joint cavities are constructed deeper than indicated, tightly pack the back or bottom with backstop material to provide a joint of the depth indicated. Install backstops dry and free of tears or holes.
- B. Primer: Just prior to application of the sealant or caulking compound, clean out all loose particles from joints. Apply primer in accordance with compound manufacturer's directions. Do not apply primer to exposed finish surfaces.
- C. Bond Breaker: Provide bond breakers as recommended by the sealant manufacturer for each type of joint and sealant used.
- D. Sealant and Caulking Compounds: Use a compound that is compatible with the material to and against which it is applied. Do not use a compound that has exceeded its shelf life or has become too jelled to be discharged in a continuous flow from the gun. Apply the compound in accordance with the manufacturer's printed instructions. Force the compound into joints with sufficient pressure to fill the joints solidly. Compound shall be uniformly smooth and free of wrinkles.
  - 1. Interior Sealant and Caulking: Provide sealant or caulking at all exposed joints in the building and at all joints indicated to receive sealants or caulking.
  - 2. Exterior Sealant: Provide sealant at all joints around the perimeter of openings and at all exposed joints on the building and at all joints indicated to receive sealant.
  - 3. Floor Joint Sealant: Provide sealant in all control joints and in other floor joints indicated or specified.

3.04 PROTECTION AND CLEANING:

- A. Protection: Protect areas adjacent to joints from compound smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.
- B. Cleaning: Immediately scrape off fresh compound that has been smeared on masonry and rub clean with a solvent as recommended by the compound manufacturer. Upon completion of compound application, remove all remaining smears and stains resulting therefrom and leave the work in a clean and neat condition.

END OF SECTION



## **APPENDIX A – Report of Geotechnical Exploration**

July 24, 2018  
(Revised November 26, 2018)

R.J. Behar & Company Inc.  
6861 SW 196<sup>th</sup> Avenue, Suite 302  
Pembroke Pines, Florida 33332

Attention: Mr. Robert Behar, P.E.  
Project Manager

Subject: Report of a Geotechnical Exploration  
**Lakeside Retirement Community – Seawall Repair**  
Town of Medley, Florida  
HRES Project No. HR18-1393R

Dear Bob:

HR Engineering Services, Inc. (HRES) has completed three (3) test borings at the subject site. This report briefly outlines our field testing techniques and presents the data obtained from the SPT borings, laboratory testing, and groundwater condition at the time of SPT boring drilling. In addition, the report provides soil parameters based on SPT data for the proposed wall repair on NW 105<sup>th</sup> Way.

#### **PROJECT INFORMATION**

The project consists of the replacement of the existing damaged seawall that runs along NW 105<sup>th</sup> Way, on the west and north banks of Lake Lowell. Based on information obtained from RJ Behar & Company and our site visits, the existing seawall consists of gabion wall with a cast-in-place concrete cap. The existing wall has settled as much as a foot and has move towards the lake. Our recommended wall replacement alternative consists of a concrete cantilever wall, partly precast and partly cast-in-place. Please refer to the Evaluation and Recommendation sections of this report for more details on the recommended wall replacement alternative.

#### **FIELD TESTING – TEST BORINGS**

Three (3) test borings (BS-1, BS-2, BS-3) were performed, each to a depth of 50 feet. The reported locations of the test borings (northings, eastings, stations and offsets) are approximate. Field Exploration Plans showing approximate test boring locations are provided in the Attachments. The Report of Core Boring sheet attached graphically show the penetration resistances and present the soil descriptions for the test borings. The stratification lines and depth designations on the Report of Core Borings represent approximate boundaries between soil types. In some instances, the transition between soil types may be gradual. The water depth shown on the Report of Core Borings represent the condition at the time of our field exploration.

The test borings were made in general accordance with ASTM-D-1586, "Penetration Test and Split-Barrel Sampling of Soils." Each boring was advanced using a 3-inch ID casing and a rotary drilling

process. At regular intervals, the drilling tools were removed and soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-lb automatic hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. An engineer then examined the samples in order to confirm the field classifications.

**LABORATORY TESTING – SOIL TESTING**

Three (3) grain size tests and 3 organic content tests were performed on selected samples from Test Borings BS-1 through BS-3. In addition, a total of 3 moisture content tests were performed in conjunction with the classification tests. The Summary of Laboratory Testing and Laboratory Test Results are attached to this report.

The grain size tests were performed to determine the particle size and distribution of samples tested. The samples were dried, weighed, and washed over a # 200 mesh sieve. The dried samples were then passed through a standard set of nested sieves to determine the grain size distribution of the soil particles coarser than the # 200 sieve. This test was conducted in general accordance with ASTM C 136 (AASHTO T 27 or T 311).

The amount of organic material in the sample was determined by measuring the loss due to ignition, expressed as a percentage of soil weight subject to ignition. This test was conducted in general accordance with ASTM D-2974.

**LABORATORY TESTING – CORROSIVITY CLASSIFICATION TESTING**

Corrosivity classification testing was performed on 1 representative groundwater sample obtained from the Test Boring BS-2. This testing included pH, chlorides and sulfates contents and resistivity results. The Florida Department of Transportation Requirements Manual, Section 1.3 Environmental Classifications outlines the ranges of groundwater chemical properties considered corrosive to reinforced concrete substructure. In addition, that section environmentally classifies the superstructure based on factors located near the proposed structure(s). Based on this classification, an environment may be Slightly Aggressive, Moderately Aggressive, or Extremely Aggressive.

The laboratory test results show both the steel and concrete substructures to be in a Moderately Aggressive Environment. Due to their location, the superstructure will be in a Slightly Aggressive Environment. The following table summarizes the test results:

**Table 1: Corrosion Classification Test Results**

Test No.	Resistivity ohms-cm	pH	Sulfates ppm	Chlorides ppm	Sub-structure Environmental Classification	
					Steel	Concrete
BS-2	2,801	9.3	2	38	MA	MA

**GROUNDWATER CONDITION**

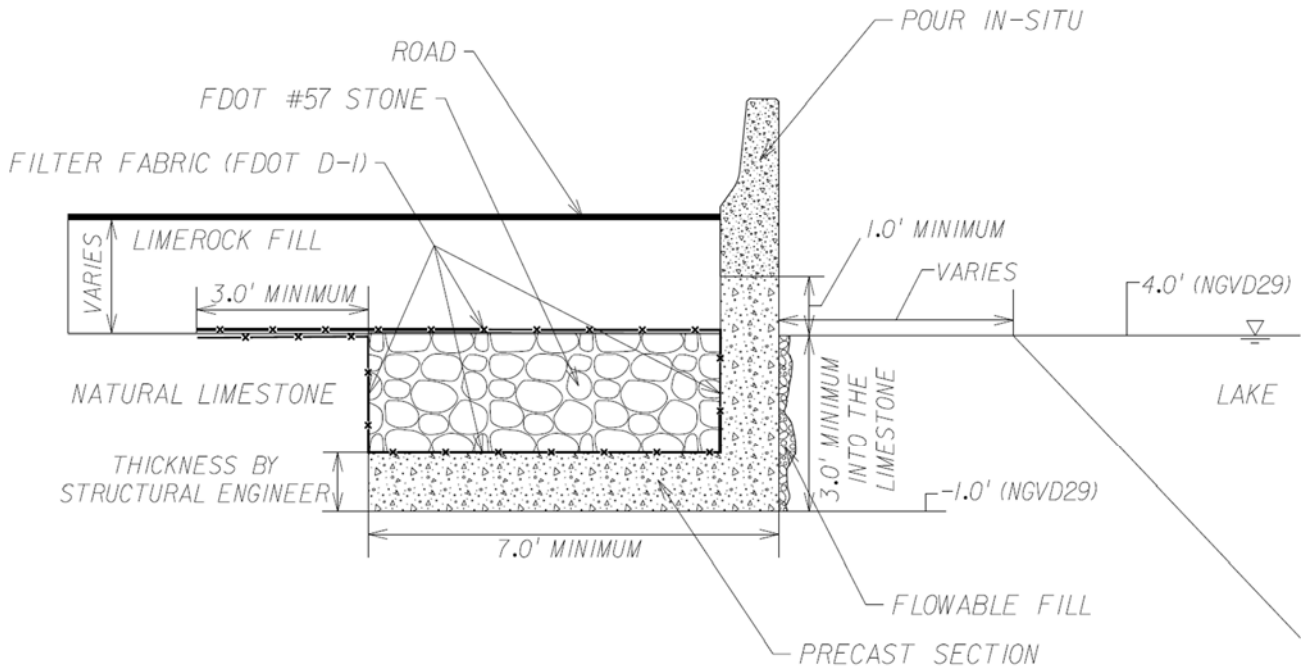
The groundwater level in the borings was measured at the time of drilling. Groundwater levels in the test boring were encountered at elevations ranging from 2.7 to 3.8 feet, NGVD29. An average October Ground Water Elevation of 4.0 feet, NGVD29 and an average Yearly High Water Elevation of 5.0 feet, NGVD29 were estimated for the project area based on U.S. Geological Survey (2002) “Average Altitude of the Water Table (1990-99) and Frequency Analysis of Water Levels (1974-99) in the Biscayne Aquifer, Miami-Dade County, Florida”. Based on this information, a seasonal high groundwater elevation of 5.0 feet, NGVD29 is recommended.

Fluctuation in the observed groundwater levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors such as a storm surge and the effect of the storm surge on Lake Lowell and the past damage to the seawall. Since groundwater level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

**EVALUATION OF THE PROPOSED CONCRETE CANTILEVER WALL**

Based on our field exploration, the natural limestone is encountered at an approximate depth of 3 to 4 feet, measured from the existing ground. A shallow foundation support embedded a minimum of 3 feet into the limestone layer was assumed for the proposed L-shaped cantilever retaining wall. Hence, the minimum total height of wall considered was 7 feet. This height may vary. A sketch showing the proposed wall geometry is presented below:

**Figure 1: Wall Geometry**



The retaining wall geotechnical evaluation includes stability check for the following:

- Bearing capacity failure;
- Lateral sliding;
- Overturning; and
- Rotational slip surface failure.

The soil properties used in the analyses are presented below:

- Foundation soil consists of natural limestone with a total unit weight of 120 pcf. For bearing and overturning stability purposes an angle of internal friction ( $\phi$ ) of 38 degrees was used. For sliding stability check, a friction angle between the preformed concrete wall footing and limestone was assumed 22 degrees. Global slope stability check was performed by modeling the limestone layer with a cohesion value of 800 psf.
- Retained soil consists of FDOT #57 Stone (below water table and extending 1 foot above water table) and limerock fill (above FDOT #57 Stone), both assumed to have angle of internal friction ( $\phi$ ) of 34 degrees and a total unit weight ( $\gamma$ ) of 115 pcf.

A summary of the wall analysis results is provided in the next section of this report. Detailed Stability analysis is included in the Attachments.

## RECOMMENDATIONS

### Basis for Recommendations

The following recommendations are based upon the previously presented project information and structural conditions along with the data obtained in this exploration. The field data have been compared with previous performances of structures bearing on soils similar to those encountered at this site. The discovery of any site and/or subsurface condition during construction, which deviates from the data obtained in this exploration, should also be reported to us for our evaluation.

### Cantilever Wall Analysis Summary

A summary of our analysis of the proposed cantilever wall is presented in Table 2 below. Based on the results of our analysis, the proposed wall was found to be stable against sliding, overturning and bearing capacity failures. The wall will satisfy all the capacity to demand ratios (CDR) and safety factor (SF) requirements of AASHTO LRFD ( $CDR_{bearing} \geq 1.0$ ,  $CDR_{sliding} \geq 1.0$ ,  $CDR_{overturning} \geq 1.0$ ,  $CDR_{eccentricity} \leq 1.0$  and  $SF_{global} \geq 1.5$ ).

**Table 2: Summary of Wall Stability Analysis**

Approx. Wall Height (H), ft.	Min. Wall Base Width, ft.	Assumed Base and Stem Thickness, ft.	Nominal Bearing Resistance, ksf	Factored Bearing Resistance, ksf	Demand/Capacity Ratios (CDR)				SF Global Stability
					Bearing	Eccentricity	Overturning	Sliding	
7.0	7.0	1.5	11	6	$\geq 1.0$	$\leq 1.0$	$\geq 1.0$	$\geq 1.0$	$\geq 1.5$

## **CONSTRUCTION RECOMMENDATIONS**

It is recommended that the proposed L-shaped wall be installed, as follows:

1. Prepare excavation for the wall. Clean the bottom of excavation. Some FDOT #57 Stone can be placed to help level the bearing surface.
2. Place a precast L-section such that the top of the L-section is at least 1 foot above the water table and has reinforcement sticking out for the cast-in-place section to be constructed above. Tongue and groove are required to provide extra support between precast segments.
3. Place fill behind the partial wall. Fill requirements are described in the next section of the report.
4. Pour the cast-in-place portion of the wall.
5. Fill any gap left in front of the wall (between the precast section and the limestone) with flowable fill to provide additional safety against sliding of the wall.

## **EXCAVATION AND BACKFILLING**

The wall footing will bear on the natural limestone. The existing material should be excavated down to the bottom of the proposed footing. A minimum footing embedment of 3 feet into the limestone layer is required. After placing the precast wall section, backfill should be placed on the wall footing. Since this backfilling will be under water, we recommend using FDOT #57 Stone as the backfill material up to the ground water elevation plus 1 foot. In order to prevent the migration of finer soils into it, the # 57 Stone fill should be wrapped with FDOT Type D-1 filter fabric as shown in Figure 1. Compacted limerock fill should be used above #57 Stone fill to the base of the proposed roadway.

## **TEMPORARY SOIL STABILIZATION SYSTEM**

A temporary soil stabilization system may be required to temporarily support the excavation for the wall footing (the excavation may be in the order of 7 feet deep). The Contractor should provide this support system and its means and methods of construction. Shop drawings of the system should be provided by the Contractor.

## **CONSTRUCTION PLANS AND SPECIFICATIONS REVIEW**

It is recommended that this office be provided the opportunity to make a general review of the foundation and earthwork plans and specifications prepared from the recommendations presented in this report. Our report has been written in a guideline recommendation format and is not appropriate for use as a specification. It is recommended that this report not be made a part of the contract documents; however, it should be made available to prospective contractors for information purposes.

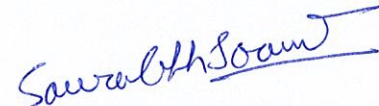
## **SAMPLE STORAGE**

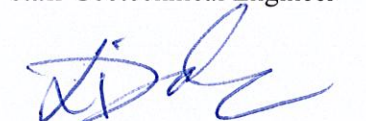
We shall retain the soil samples retrieved for this exploration program at our office for a period of 60 days from the date of this report. Following this period, we will discard these samples.

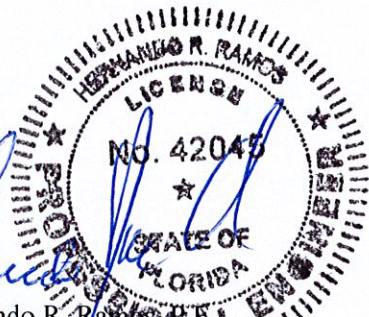
We are pleased to be of service to you on this phase of your project. If you have any questions concerning this report or desire assistance in evaluating the data, please contact us.

Sincerely,

**HR ENGINEERING SERVICES, INC.**  
**(Certificate of Authorization No. 7991)**

  
Saurabh Saawant  
Staff Geotechnical Engineer

  
Liladhar Niraula, P.E.  
Project Geotechnical Engineer  
Florida Registration 69917

  
Hernando R. Ramos  
Principal Geotechnical Engineer  
Florida Registration 42045  
11/26/18

- Attachments:
- Site Location Map
  - Field Exploration Plan
  - Summary of Test Boring Locations
  - Report of Core Borings
  - Summary of Laboratory Testing
  - Laboratory Test Results – Soil Testing
  - Laboratory Test Results – Corrosivity Classification Testing
  - Cantilever Retaining Wall Stability Analyses

- Distribution:
- Addressee (1)
  - File (1)

## **ATTACHMENTS**





**SITE LOCATION MAP**

DRAWN BY: SS      DATE: 07/24/18  
 PROJECT No: HR18-1393R      SCALE: NTS

**HRES**  
 HR Engineering Services, Inc.

LAKESIDE RETIREMENT COMMUNITY  
 TOWN OF MEDLEY, FLORIDA

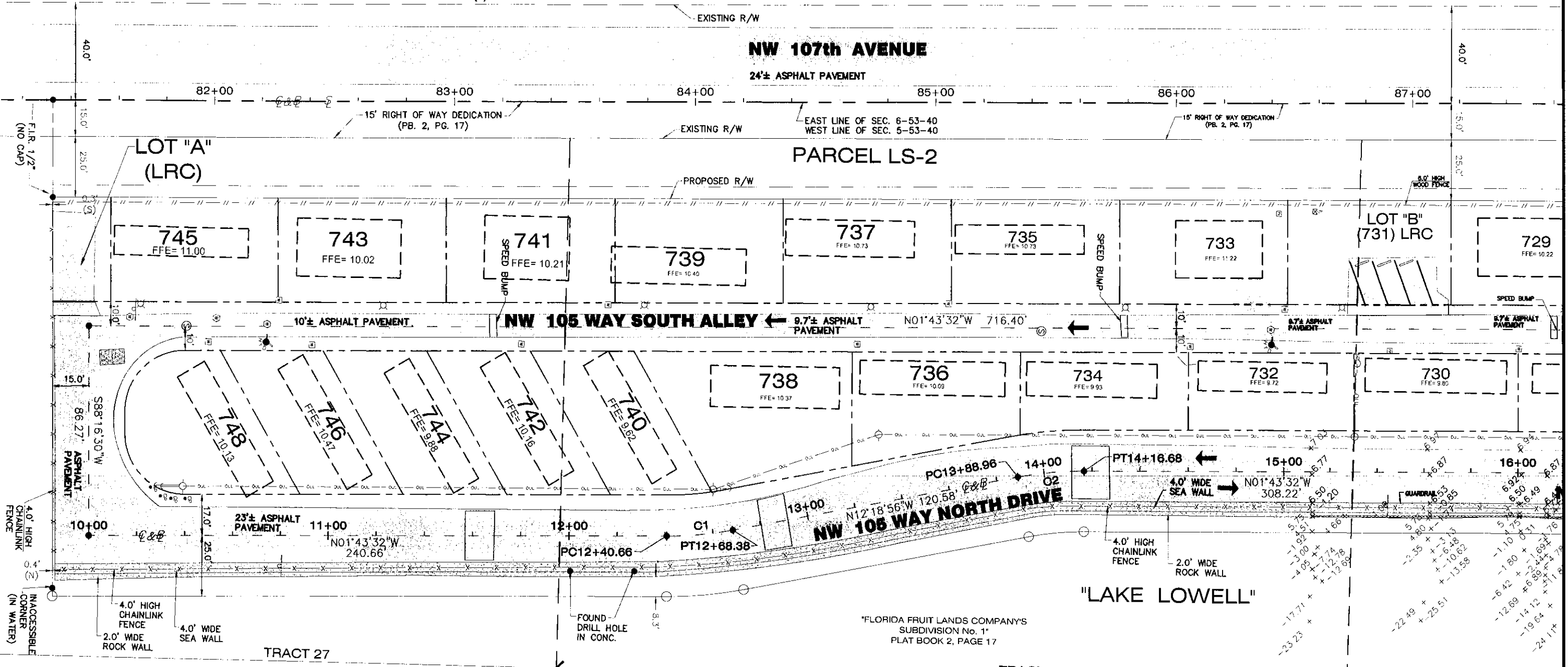
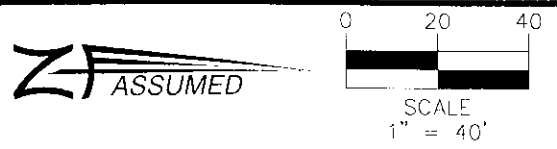
**SUMMARY OF BORING LOCATIONS  
LAKESIDE RETIREMENT COMMUNITY  
TOWN OF MEDLEY, FLORIDA  
HR ENGINEERING SERVICES, INC.  
HRES PROJECT No. HR18-1393R  
JULY 24, 2018**

TEST No.	PLANE COORDINATES		STATION	OFFSET, ft.
	LATITUDE	LONGITUDE		
BS-1	25.86844	-80.36628	38+50	10.0 R
BS-2	25.86846	-80.36923	28+80	9.0 R
BS-3	25.86641	-80.37058	16+55	5.0 R

**Notes:**

Plane coordinates were taken using a hand-held GPS and are approximate within 10 feet.

Station and Offset are referenced to Baseline Survey NW 105 Way



**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

**REVISIONS**

NO.	DATE	DESCRIPTION	BY
1.	12/27/2017	REV.1 TOWN ENGINEER COMMENTS	6.
2.	03/23/2018	REVISION	7.
3.	06-12-18	UPDATE SURVEY	8.
4.			9.
5.			10.

**HADONNE**  
 LAND SURVEYOR AND MAPPERS  
 3D LASER SCANNING  
 UTILITY COORDINATION  
 SUBSURFACE UTILITY ENGINEERING  
 8700 W Flagler St, Suite 420 • Miami, FL 33174 • P. +1(305)266-1188 • F. +1(305)267-6845 • W. www.hadonne.com

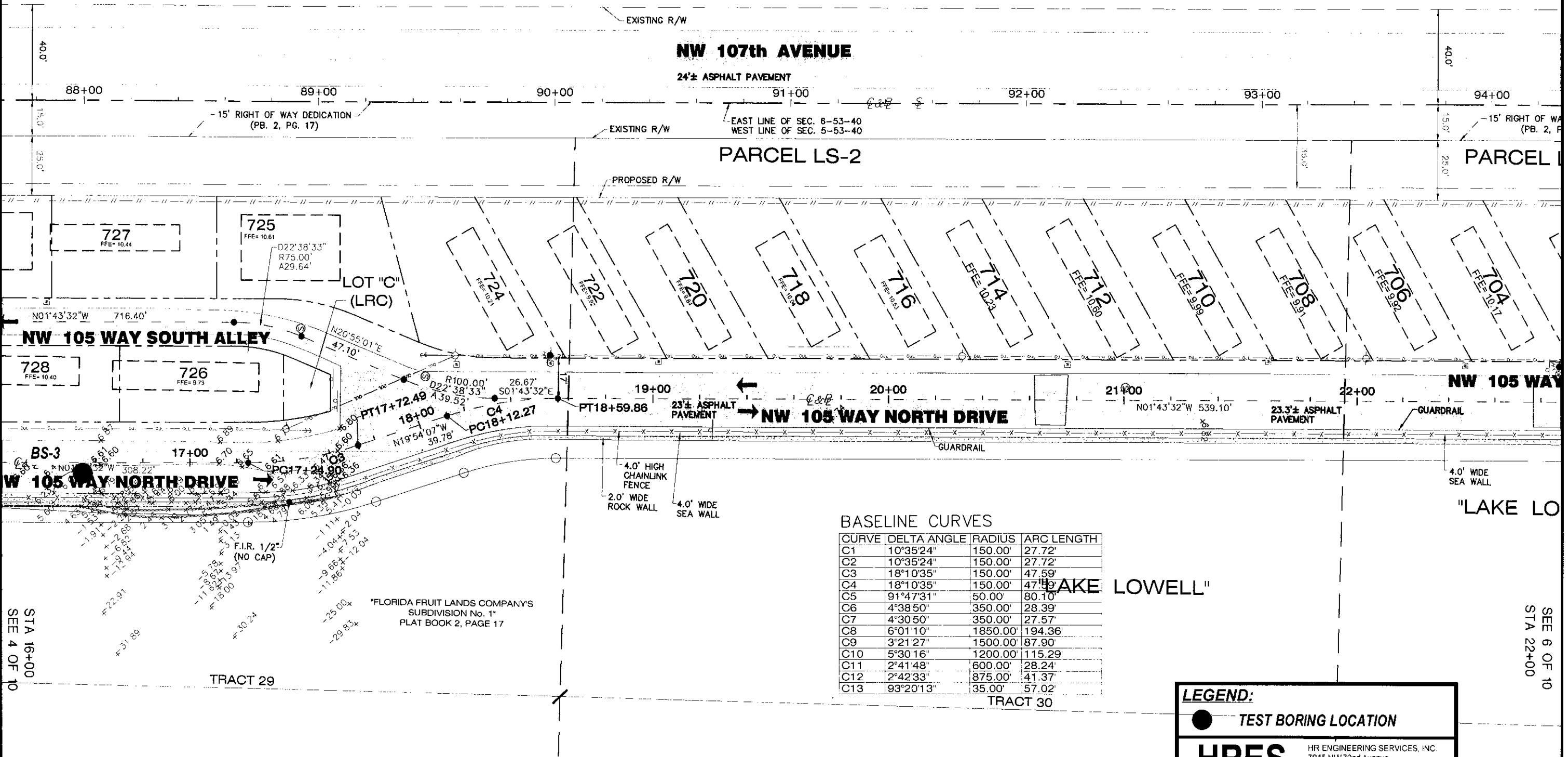
**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 748 - 729**

Job No.: 14003  
 Field Book: 329/14  
 DRAWN BY: MJL  
 TECH BY: RI  
 QA/QC BY: AH  
 4/10

SEE 5 OF 10  
 STA 16+00



**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

**LEGEND:**

● TEST BORING LOCATION

**HRES** HR ENGINEERING SERVICES, INC.  
7815 NW 72nd Avenue  
Medley, Florida 33166  
Ph: 305-888-8880/305-888-8770 Fax  
Cert. of Authorization No. 7991

**REVISIONS**

1. 12/27/2017	REV.1 TOWN ENGINEER COMMENTS	6.
2. 02/20/2018	REVISION	7.
3. 06-12-18	UPDATE SURVEY	8.
4.		9.
5.		10.

**HADONNE**  
LAND SURVEYOR AND MAPPERS  
3D LASER SCANNING  
UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING  
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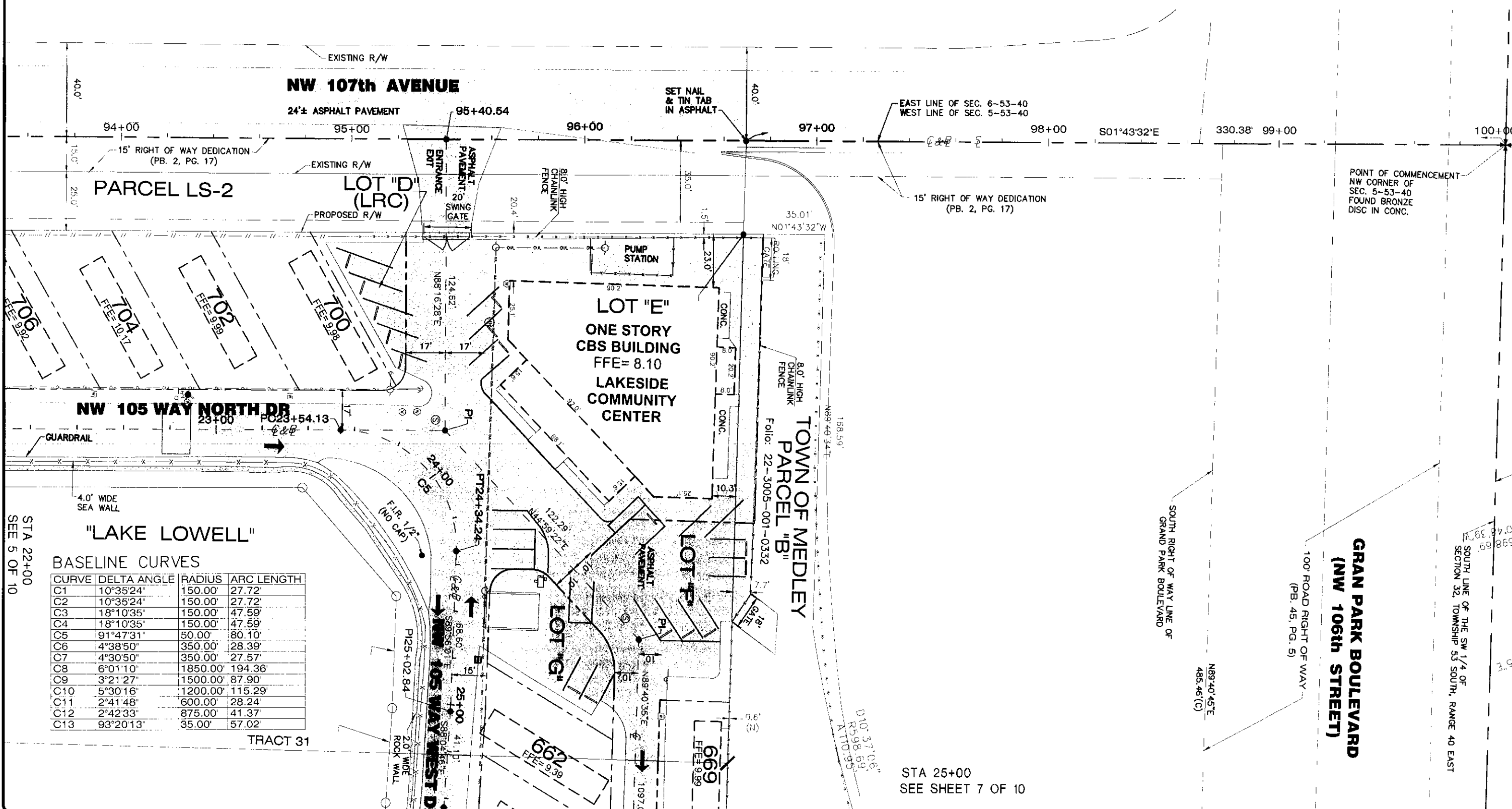
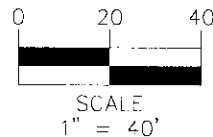
**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 729 - 706**

Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
5/10

ZF ASSUMED



"LAKE LOWELL"  
BASELINE CURVES

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

STA 22+00  
SEE 5 OF 10

STA 25+00  
SEE SHEET 7 OF 10

REVISIONS

1.	12/27/2017	REV.1 TOWN ENGINEER COMMENTS	6.
2.	03/26/2018	REVISION	7.
3.	08-12-18	UPDATE SURVEY	8.
4.			9.
5.			10.



**HADONNE**

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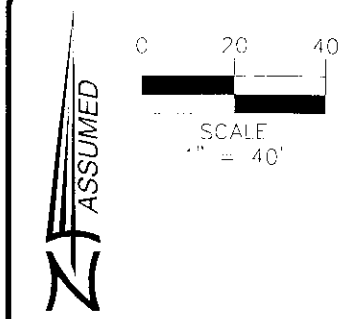
LAND SURVEYOR AND MAPPERS  
3D LASER SCANNING  
UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 706 • 669**

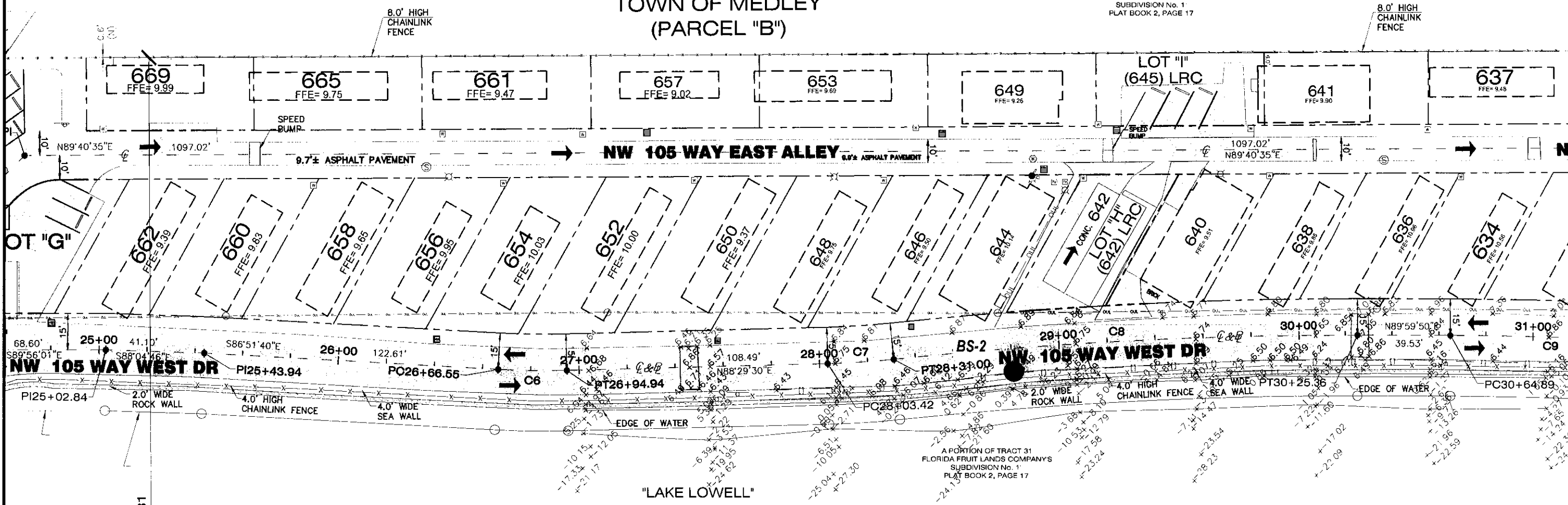
Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
6/10



TOWN OF MEDLEY  
(PARCEL "B")

A PORTION OF TRACT 32  
FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1  
PLAT BOOK 2, PAGE 17

8.0' HIGH  
CHAINLINK  
FENCE



BASELINE CURVES

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
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C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

LEGEND:

● TEST BORING LOCATION

**HRES**

HR ENGINEERING SERVICES, INC.  
7815 NW 72nd Avenue  
Medley, Florida 33166  
Ph. 305-888-8880/305-888-8770 Fax  
Cert. of Authorization No. 7991

SEE 8 OF 10  
STA 31+00

STA 25+00  
SEE 6 OF 10

REVISIONS	
1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 06-12-18 UPDATE SURVEY	8.
4.	9.
	10.



**HADONNE**

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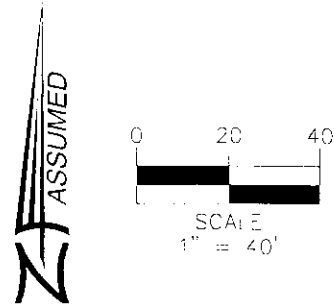
LAND SURVEYOR AND MAPPERS  
3D LASER SCANNING  
UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

SITE PLAN

LOTS 669 - 634

Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
7/10

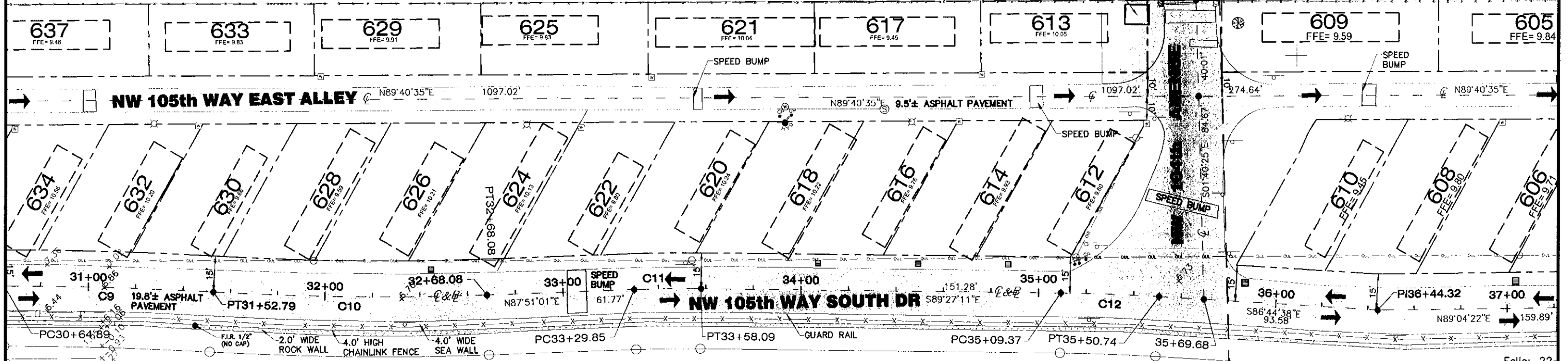


**PARCEL "B"  
(TOWN OF MEDLEY)**

A PORTION OF TRACT 32  
FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1  
PLAT BOOK 2, PAGE 17

Folio: 22--3005--001--0700

WEST 263.72 FEET OF TRACT 17  
FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1  
PLAT BOOK 2, PAGE 17



A PORTION OF TRACT 31  
FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1  
PLAT BOOK 2, PAGE 17

"LAKE LOWELL"

A PORTION OF TRACT 18  
FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1  
PLAT BOOK 2, PAGE 17

**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

STA 31+00  
SEE 7 OF 10

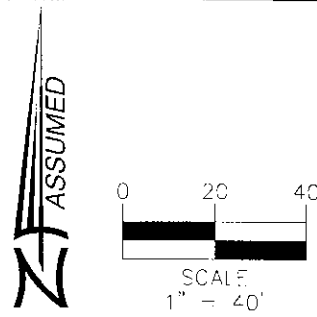
SEE 9 OF 10  
STA 37+00

REVISIONS	
1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 08-12-18 UPDATE SURVEY	8.
4.	9.
5.	10.

**HADONNE**  
LAND SURVEYOR AND MAPPERS  
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SUBSURFACE UTILITY ENGINEERING  
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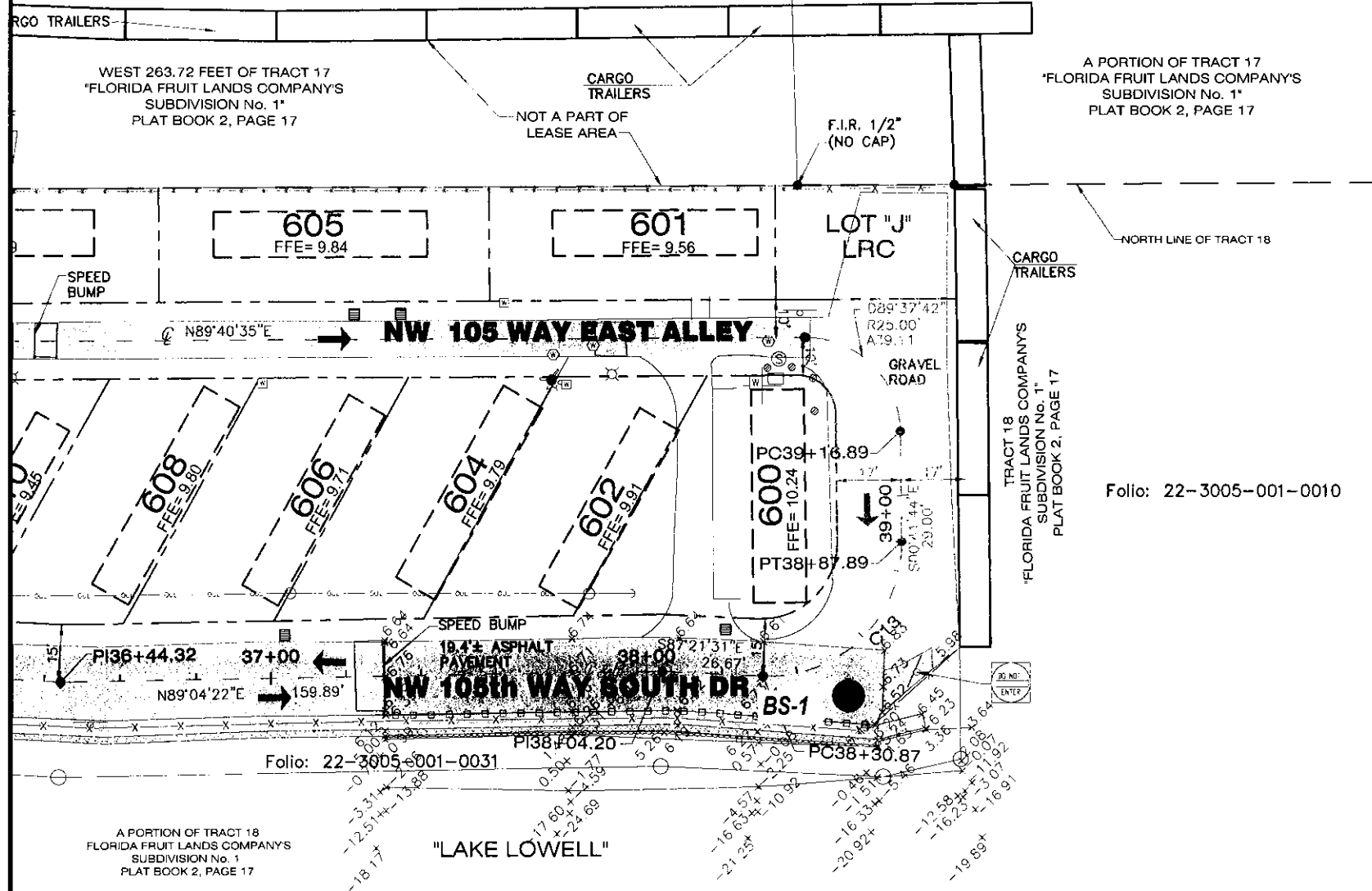
**LAKESIDE RETIREMENT COMMUNITY**  
**SITE PLAN**  
**LOTS 637 - 605**

Job No.:	14003
Field Book:	329/14
DRAWN BY:	MJL
TECH BY:	RI
QA/QC BY:	AH
	8/10



Folio: 22-3005-001-0180

Folio: 22-3005-001-0700



Folio: 22-3005-001-0010

**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

**LEGEND:**

● TEST BORING LOCATION

**HRES** HR ENGINEERING SERVICES, INC.  
7815 NW 72nd Avenue  
Medley, Florida 33166  
Ph: 305-888-8880/305-888-8770 Fax  
Cert. of Authorization No. 7991

STA 37+00  
SEE 8 OF 10

NO.	DATE	REVISIONS
1.	12/27/2017	REV.: TOWN ENGINEER COMMENTS
2.	03/20/2018	REVISION
3.	06-12-18	UPDATE SURVEY
4.		
5.		

**HADONNE**

LAND SURVEYOR AND MAPPERS  
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**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

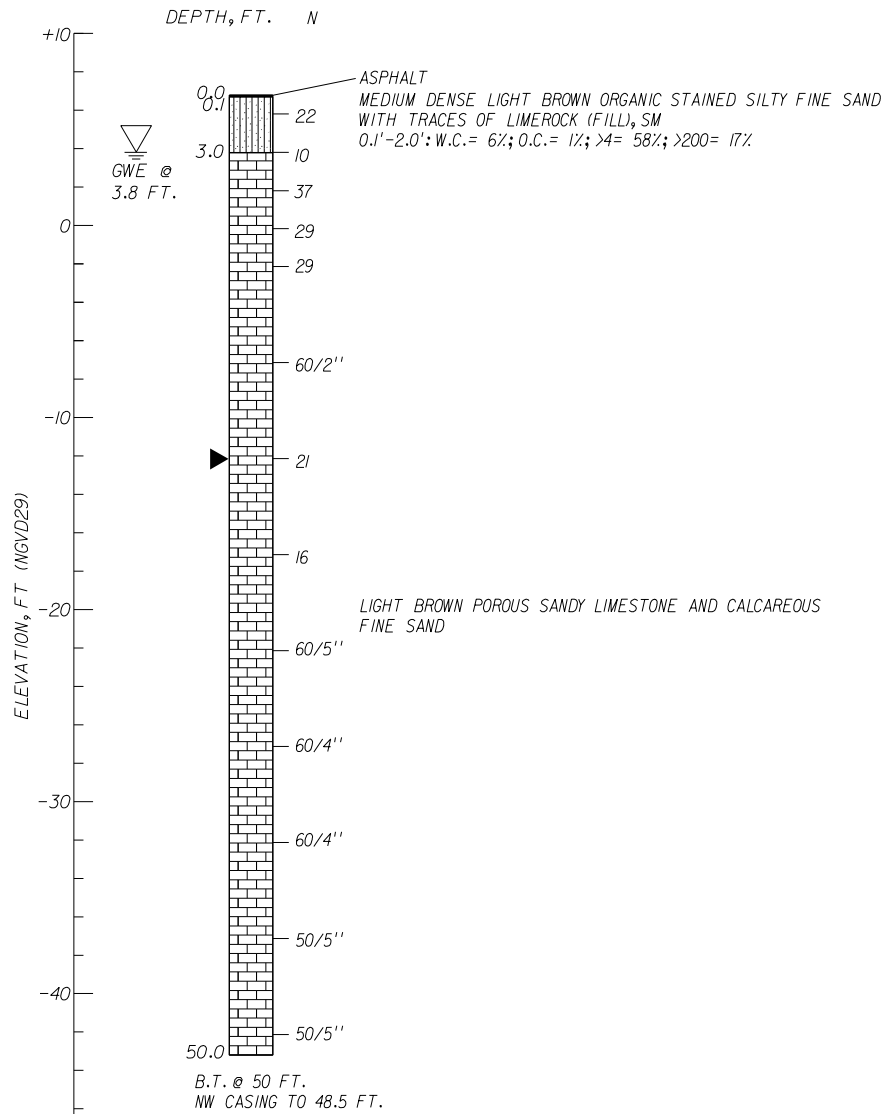
**LOTS 608 - 600**

Job No.:	14003
Field Book:	329/14
DRAWN BY:	MJL
TECH BY:	RI
QA/QC BY:	AH
	9/10



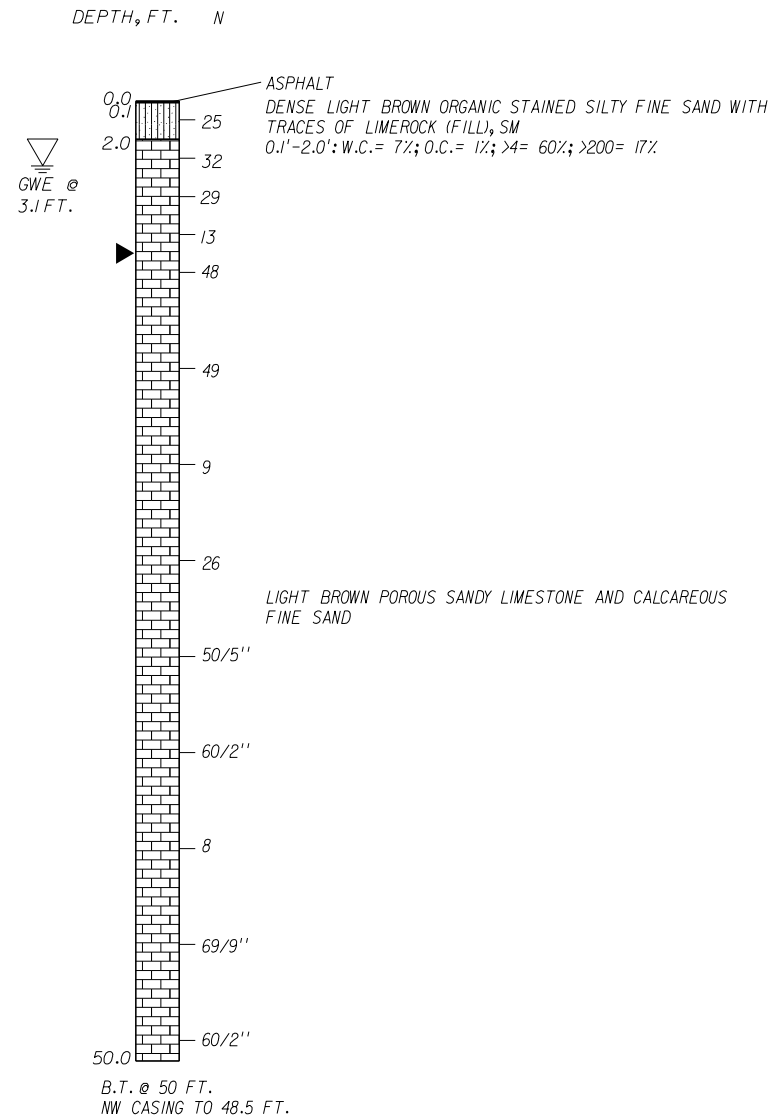
BS-1

LATITUDE: 25.86844°  
 LONGITUDE: -80.36628°  
 STATION: 38+50  
 OFFSET: 10.0 RT  
 ELEVATION: 6.8 FT.  
 DATE: 07/16/18



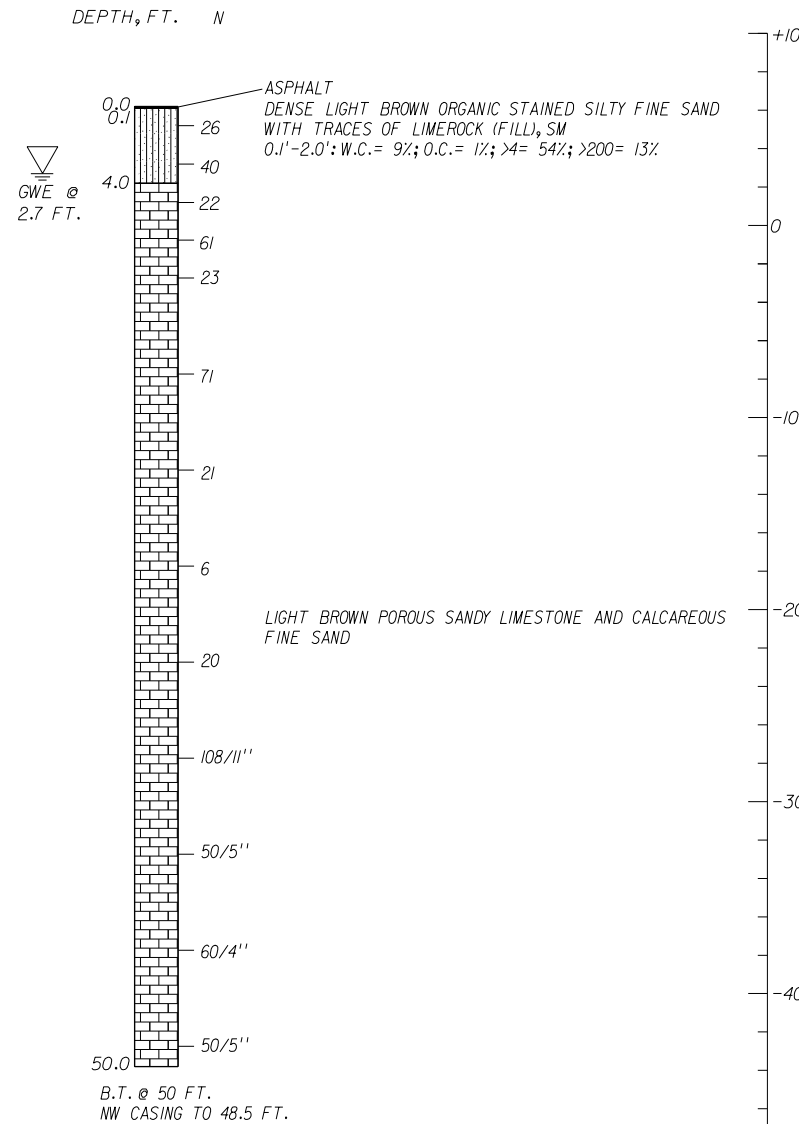
BS-2

LATITUDE: 25.86846°  
 LONGITUDE: -80.36923°  
 STATION: 28+80  
 OFFSET: 9.0 RT  
 ELEVATION: 6.5 FT.  
 DATE: 07/17/18



BS-3

LATITUDE: 25.86641°  
 LONGITUDE: -80.37058°  
 STATION: 16+55  
 OFFSET: 5.0 RT  
 ELEVATION: 6.2 FT.  
 DATE: 07/17/18



**LEGEND:**

	ASPHALT		SILTY SAND
	LIMESTONE WITH SOME FINE SAND OR AND FINE SAND		

WATER LOSS

GROUND WATER LEVEL AT BORING COMPLETION

B.T. BORING TERMINATED

N: STANDARD PENETRATION RESISTANCE (AUTOMATIC HAMMER)

W.C.: WATER CONTENT

O.C.: ORGANIC CONTENT

>4: PERCENT PASSING #4 SIEVE

>200: PERCENT PASSING #200 SIEVE

HAMMER WEIGHT = 140 LB

DROP HEIGHT = 30 IN

THE TEST BORINGS WERE PERFORMED BY HRES USING A CME-55 TRUCK MOUNTED RIG.

GRANULAR MATERIALS:

RELATIVE DENSITY	SPT N-VALUE (BLOWS/12 INCHES)
VERY LOOSE	<3
LOOSE	3-8
MEDIUM DENSE	8-24
DENSE	24-40
VERY DENSE	>40

SILTS AND CLAYS:

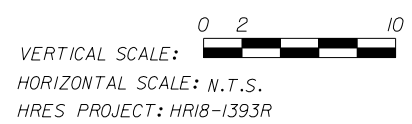
CONSISTENCY	SPT N-VALUE (BLOWS/12 INCHES)
VERY SOFT	<1
SOFT	1-3
FIRM	3-6
STIFF	6-12
VERY STIFF	12-24
HARD	>24

ENVIRONMENTAL CLASSIFICATION

SUBSTRUCTURE: MODERATELY AGGRESSIVE

SUPERSTRUCTURE: SLIGHTLY AGGRESSIVE

Resistivity ohms-cm	pH	Sulfates ppm	Chlorides ppm
2801	9.3	2	38



REVISIONS						DRAWN BY: ME 07-18	TOWN OF MEDLEY FLORIDA	SHEET TITLE: REPORT OF CORE BORINGS	REF. DWG. NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						CHECKED BY: SS 07-18	ROAD NO.	COUNTY	PROJECT ID
						DESIGNED BY: SS 07-18	----	-----	-----
						CHECKED BY: HRR 07-18	PROJECT NAME: LAKESIDE RETIREMENT COMMUNITY		
						SHEET NO.			

HERNANDO R. RAMOS, P.E.  
 P.E. LICENSE NUMBER 42045  
 HR ENGINEERING SERVICES, INC  
 7815 NW 72ND AVENUE  
 MEDLEY, FLORIDA 33166  
 CERTIFICATE OF AUTHORIZATION 7991

HRES User 11/30/2018 11:10:14 AM \\Hres6\drive6\SAURABH\HR18-1393R Lakeside Community\sggeo1.dgn

**SUMMARY OF LABORATORY TEST RESULTS**  
**LAKESIDE RETIREMENT COMMUNITY**  
 TOWN OF MEDLEY, FLORIDA  
 HR ENGINEERING SERVICES, INC.  
 HRES PROJECT No. HR18-1393R  
 JULY 24, 2018

Test Boring No.	USCS Class.	Sample Depth (ft)	Grain Size Distribution - Percent Passing										ATTERBERG LIMITS			Moisture Content %	Material in Sample, %		
			3/4"	3/8"	No. 4	No. 10	No. 40	No. 60	No. 100	No. 200	LIQUID LIMIT	PLASTIC INDEX	Organic Loss of Ignition, %	Gravel	Sand		Fines		
BS-1	SM	0.1-2.0	85	72	58	47	34	30	23	17	-	-	1	6	42	41	17		
BS-2	SM	0.1-2.0	90	73	60	48	32	28	21	17	-	-	1	7	40	43	17		
BS-3	SM	0.1-2.0	85	67	54	42	28	24	18	13	-	-	1	9	46	41	13		

# HR ENGINEERING SERVICES, INC.

7815 N.W. 72nd Avenue - Medley, Florida 33166

Phone (305) 888-8880, Fax (305) 888-8770

## REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: Lakeside Retirement Community Project No.: HR18-1393R  
Boring No.: BS-1 Sample No.: 1 Depth: 0.1-2.0  
Date: 07/19/18

Technician:	E.M
Date Sample Placed in Oven:	07/19/2018
Time in / Out of Oven :	07/19/18 4:00 PM TO 07/20/18 4:00 PM
Wt. of Wet Soil + Can, grams	545.80
Wt. of Dry Soil + Can, grams	514.20
Wt. of Can, grams No. 300	8.90
Wt. of Dry Soil, grams	505.30
Wt. of Moisture, grams	31.60
Water Content, w%	6%
Date Sample Placed in Furnace:	07/21/18
Time in / out of furnace (minimum 6 hrs):	07/21/18 12:00 PM TO 07/21/18 6:00 PM
Weight of Crucible & Oven-Dried Sample:	26.10
Weight of Crucible and Sample After Ignition:	26.00
Weight of Crucible: No. 165	15.70
Weight of Oven-Dried Soil:	10.40
Weight Loss due to Ignition:	0.10
Percent Organics:	1%


Moisture Content Test was performed in general accordance with ASTM D 2216 (AASHTO T 265)

Organic Content Test was performed in general accordance with ASTM D 2974 (AASHTO T 267)

Respectfully Submitted,  
HR Engineering Services, Inc.

USCS Classification:

SM

  
Hernando R. Ramos, P.E.  
Florida Registration No. 42045

**GRAIN SIZE DATA SHEET**

Project Name: Lakeside Retirement Community		Project No.: HR18-1393R				
Boring No.: BS-1		Sample No.: 1	Depth: 0.1-2.0			
Date: 07/21/2018		Tested By: E.M				
Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	0.00	0.00	0	100	
3/4"	19.00	71.60	71.60	15	85	
3/8"	9.51	64.50	136.10	28	72	
4	4.76	64.40	200.50	42	58	USCS Classification:
10	2.00	52.90	253.40	53	47	SM
40	0.420	60.70	314.10	66	34	
60	0.250	21.20	335.30	70	30	
100	0.149	35.40	370.70	77	23	
200	0.074	27.10	397.80	83	17	
PAN						

Total Dry Weight Before Wash, (gr) =	478.90
Percent Finer than No. 200 Sieve by Wash Method=	17%

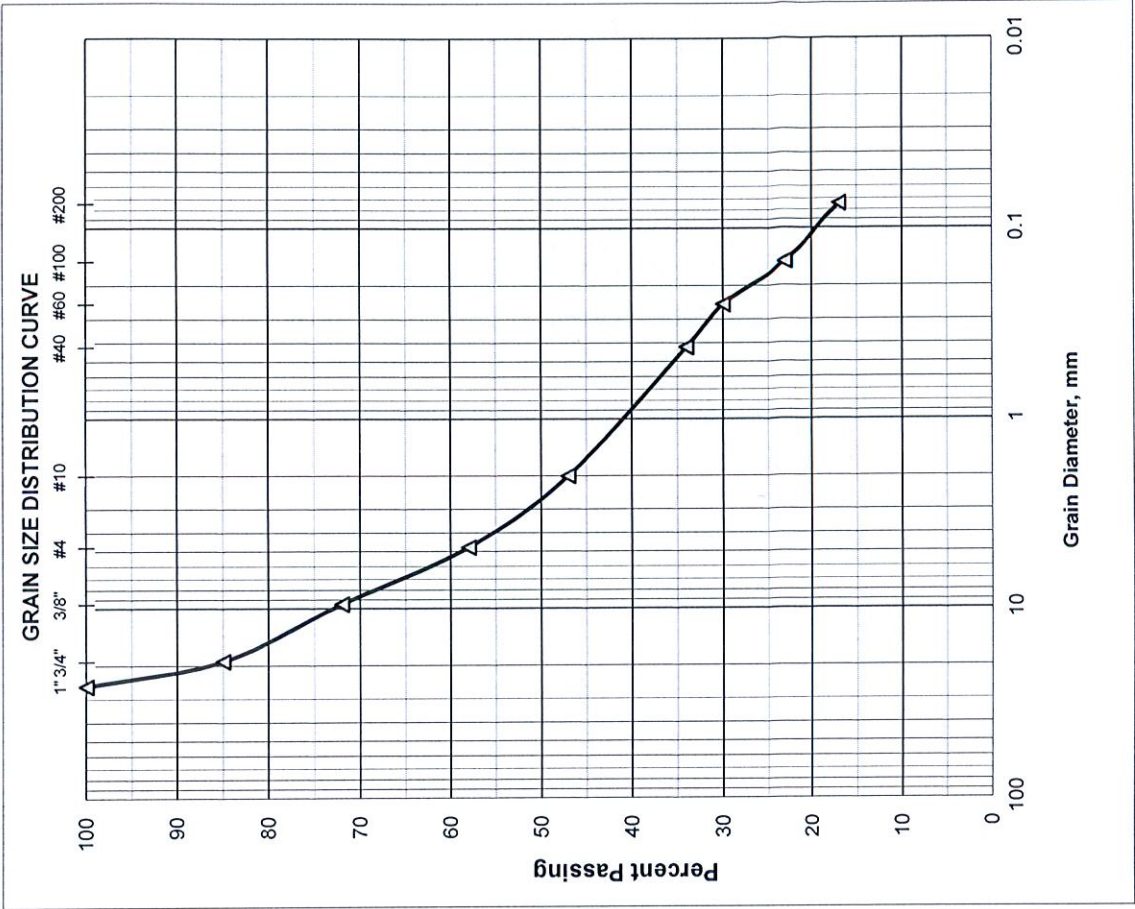
Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)  
 Moisture Content Test performed in general accordance with ASTM D 2216 (ASSHTO T 265)

Material in Sample (%)	
Gravel	≤ No. 4 42
Coarse Sand	>No. 4-≤ No. 40 24
Fine Sand	>No. 40-≤ No. 200 17
Silt and Clays	>No. 200 17
Water Content	6%

Respectfully Submitted,  
**HR Engineering Services, Inc.**



Hernando R. Ramos, P.E.  
 Florida Registration No. 42045





# HR ENGINEERING SERVICES, INC.

7815 N.W. 72nd Avenue - Medley, Florida 33166

Phone (305) 888-8880, Fax (305) 888-8770

## REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: Lakeside Retirement Community Project No.: HR18-1393R  
Boring No.: BS-2 Sample No.: 1 Depth: 0.1-2.0  
Date: 07/19/18

Technician:	E.M
Date Sample Placed in Oven:	07/19/2018
Time in / Out of Oven :	07/19/18 4:00 PM TO 07/20/18 4:00 PM
Wt. of Wet Soil + Can, grams	574.50
Wt. of Dry Soil + Can, grams	535.60
Wt. of Can, grams No. 301	8.90
Wt. of Dry Soil, grams	526.70
Wt. of Moisture, grams	38.90
Water Content, w%	7%
Date Sample Placed in Furnace:	07/21/18
Time in / out of furnace (minimum 6 hrs):	07/21/18 12:00 PM TO 07/21/18 6:00 PM
Weight of Crucible & Oven-Dried Sample:	27.70
Weight of Crucible and Sample After Ignition:	27.60
Weight of Crucible: No. 234	17.50
Weight of Oven-Dried Soil:	10.20
Weight Loss due to Ignition:	0.10
Percent Organics:	1%

Moisture Content Test was performed in general accordance with ASTM D 2216 (AASHTO T 265)

Organic Content Test was performed in general accordance with ASTM D 2974 (AASHTO T 267)

Respectfully Submitted,

HR Engineering Services, Inc.

USCS Classification:

SM



Hernando R. Ramos, P.E.

Florida Registration No. 42045

**HR ENGINEERING SERVICES, INC.**  
 7815 N.W. 72nd Avenue - Medley, Florida 33166  
 Phone (305) 888-8880, Fax (305) 888-8770

**GRAIN SIZE DATA SHEET**

Project Name: Lakeside Retirement Community		Project No.: HR18-1393R				
Boring No.: BS-2		Sample No.: 1	Depth: 0.1-2.0			
Date: 07/21/2018		Tested By: E.M				
Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	0.00	0.00	0	100	
3/4"	19.00	53.60	53.60	10	90	
3/8"	9.51	87.90	141.50	27	73	
4	4.76	62.90	204.40	40	60	USCS Classification:
10	2.00	63.80	268.20	52	48	SM
40	0.420	81.70	349.90	68	32	
60	0.250	22.50	372.40	72	28	
100	0.149	37.00	409.40	79	21	
200	0.074	20.00	429.40	83	17	
PAN						

Total Dry Weight Before Wash, (gr) = **516.40**  
 Percent Finer than No. 200 Sieve by Wash Method = **17%**

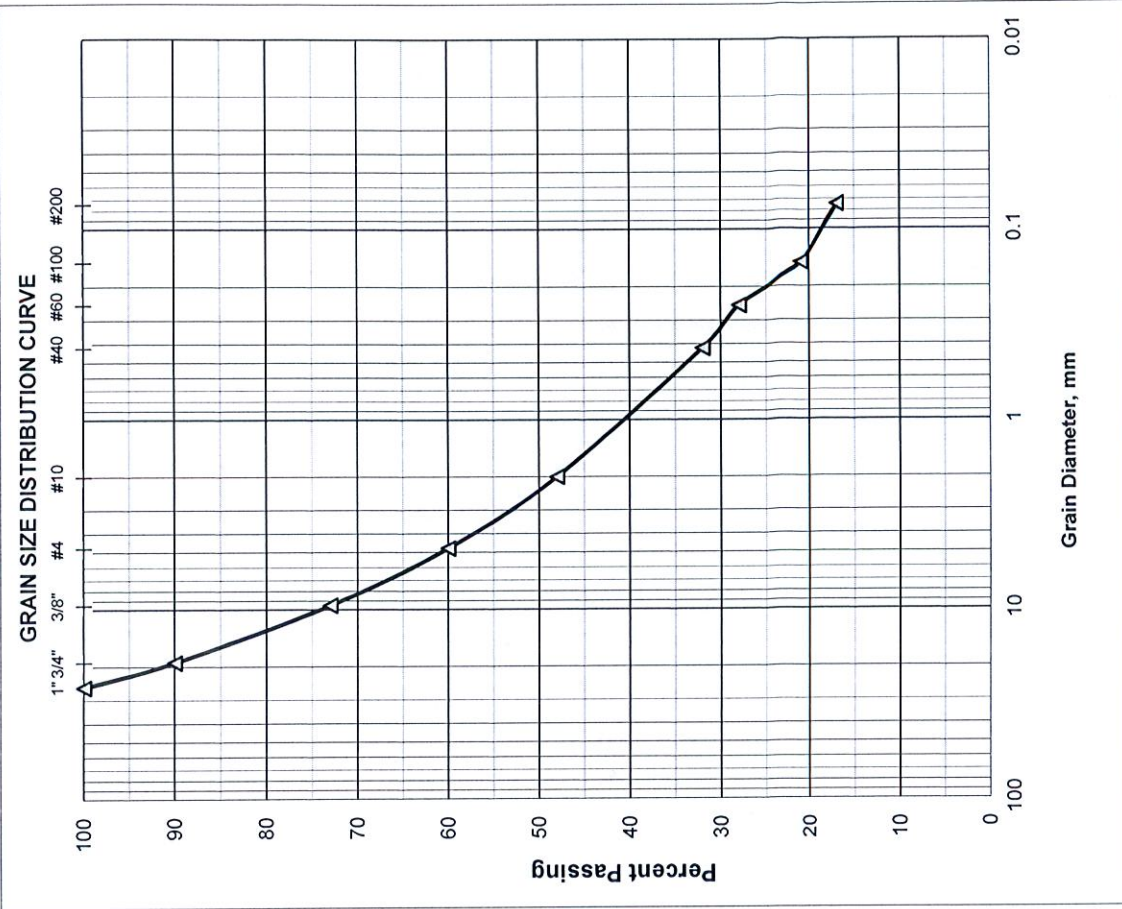
Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)  
 Moisture Content Test performed in general accordance with ASTM D 2216 (ASSHTO T 265)

Material in Sample (%)	
Gravel	≤ No. 4 40
Coarse Sand	>No. 4-≤ No. 40 28
Fine Sand	>No. 40-≤ No. 200 15
Silt and Clays	>No. 200 17
Water Content 7%	

Respectfully Submitted,  
**HR Engineering Services, Inc.**



Hernando R. Ramos, P.E.  
 Florida Registration No. 42045





# HR ENGINEERING SERVICES, INC.

7815 N.W. 72nd Avenue - Medley, Florida 33166

Phone (305) 888-8880, Fax (305) 888-8770

## REPORT OF MOISTURE AND ORGANIC CONTENT BY LOSS ON IGNITION

Project Name: Lakeside Retirement Community Project No.: HR18-1393R  
Boring No.: BS-3 Sample No.: 1 Depth: 0.1-2.0  
Date: 07/19/18

Technician:	E.M
Date Sample Placed in Oven:	07/19/2018
Time in / Out of Oven :	07/19/18 4:00 PM TO 07/20/18 4:00 PM
Wt. of Wet Soil + Can, grams	637.00
Wt. of Dry Soil + Can, grams	586.90
Wt. of Can, grams No. 302	8.90
Wt. of Dry Soil, grams	578.00
Wt. of Moisture, grams	50.10
Water Content, w%	9%
Date Sample Placed in Furnace:	07/21/18
Time in / out of furnace (minimum 6 hrs):	07/21/18 12:00 PM TO 07/21/18 6:00 PM
Weight of Crucible & Oven-Dried Sample:	26.70
Weight of Crucible and Sample After Ignition:	26.60
Weight of Crucible: No. 299	16.50
Weight of Oven-Dried Soil:	10.20
Weight Loss due to Ignition:	0.10
Percent Organics:	1%

Moisture Content Test was performed in general accordance with ASTM D 2216 (AASHTO T 265)

Organic Content Test was performed in general accordance with ASTM D 2974 (AASHTO T 267)

Respectfully Submitted,  
HR Engineering Services, Inc.



USCS Classification:

SM

Hernando R. Ramos, P.E.  
Florida Registration No. 42045

**HR ENGINEERING SERVICES, INC.**  
 7815 N.W. 72nd Avenue - Medley, Florida 33166  
 Phone (305) 888-8880, Fax (305) 888-8770

**GRAIN SIZE DATA SHEET**

Project Name: Lakeside Retirement Community		Project No.: HR18-1393R				
Boring No.: BS-3	Sample No.: 1	Depth: 0.1-2.0				
Date: 07/21/2018		Tested By: E.M				
Sieve Size	Particle Size, mm.	Weight on Sieve, gr.	Accumulated Weight, gr.	Percent Retained	Percent Passing	REMARKS
1	25.70	0.00	0.00	0	100	
3/4"	19.00	86.60	86.60	15	85	
3/8"	9.51	99.50	186.10	33	67	
4	4.76	73.40	259.50	46	54	USCS Classification:
10	2.00	69.90	329.40	58	42	
40	0.420	79.00	408.40	72	28	SM
60	0.250	21.90	430.30	76	24	
100	0.149	35.30	465.60	82	18	
200	0.074	25.20	490.80	87	13	
PAN						

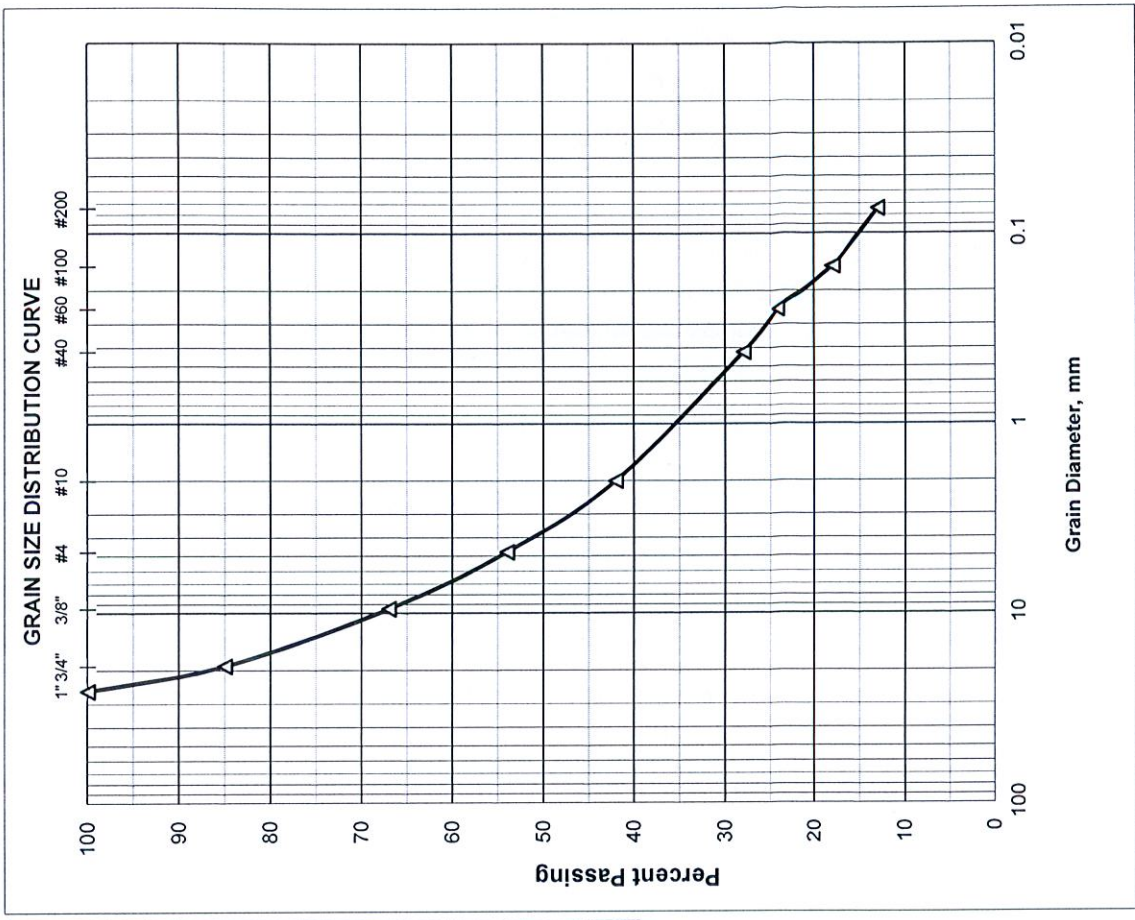
Total Dry Weight Before Wash, (gr) =	<b>567.20</b>
Percent Finer than No. 200 Sieve by Wash Method=	<b>13%</b>

Sieve Analysis Test performed in general accordance with ASTM C 136 (AASHTO T 27 or T 311)  
 Moisture Content Test performed in general accordance with ASTM D 2216 (ASSHTO T 265)

Material in Sample (%)		
Gravel	≤ No. 4	46
Coarse Sand	>No. 4-≤ No. 40	26
Fine Sand	>No. 40-≤ No. 200	15
Silt and Clays	>No. 200	13
Water Content		9%

Respectfully Submitted,  
 HR Engineering Services, Inc.

Hernando R. Ramos, P.E.  
 Florida Registration No. 42045





**HR ENGINEERING SERVICES, INC.**  
Corrosion Series

**Project Name:** LAKESIDE RETIREMENT COMMUNITY

**Project Number:** HR18-1393R

**Date:** 07/23/18

**Tested by:** E.M

Sample No.	Sampling Date	Sample Type	Resistivity, ohm-cm.	Chlorides, ppm	Sulfates, ppm	pH	Testing Date	Sub-Structure Environmental Classification	
								Steel	Concrete
BS-2	07/17/18	Water	2,801	38	2	9.3	07/23/18	MA	MA

MA: Moderately Aggressive

Tests performed in accordance with Florida Method of Test Corrosion Series in Soil and Water, Designation FM 5-550 through FM 5-553

# HR ENGINEERING SERVICES, INC.

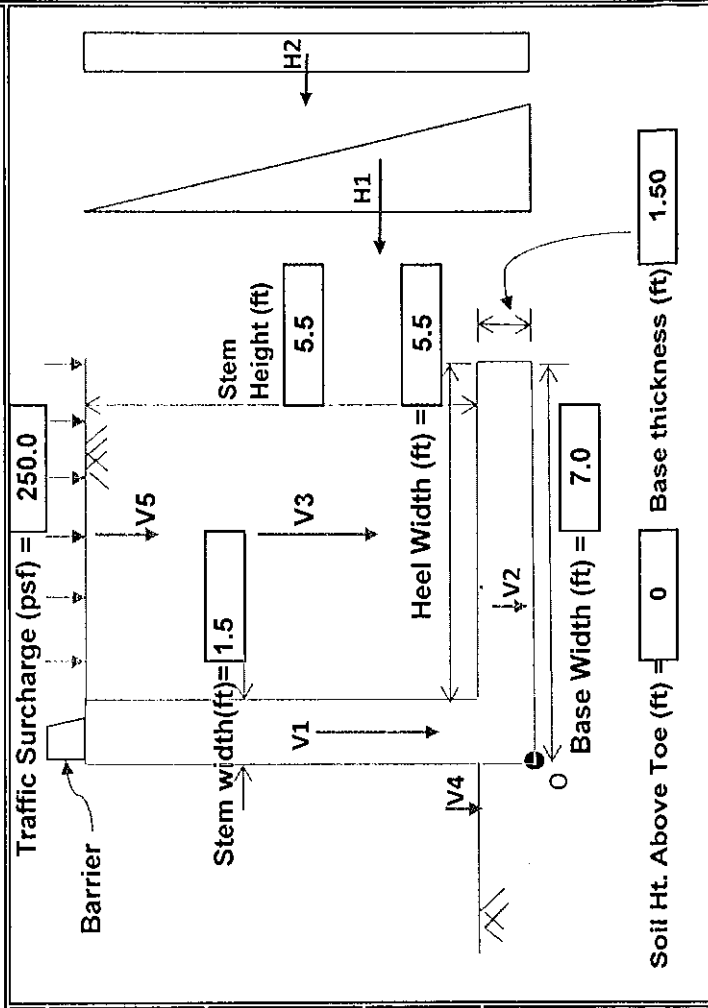
Job: Lakeside Retirement Community  
 Description: Cantilever Retaining Wall Design  
 Wall ID:

Project No.: HR18-1393R  
 Computed by: LN  
 Checked by: HRR

Sheet: 1 of 1  
 Date: 7/18/2018  
 Date: 7/18/2018

## GENERAL INPUT

Foundation Soil Parameters		
Equivalent soil's unit weight ( $\gamma$ )	120	pcf
Equivalent angle of internal friction ( $\phi$ )	38	Degree
Cohesion (c)	0	psf
Retaining Wall Backfill Soil Parameters		
Backfill unit weight ( $\gamma$ )	115	pcf
Backfill angle of internal friction ( $\phi$ )	34	Degree
Backfill coeff. of active earth pressure ( $K_a$ )	0.283	
Barrier Details		
Weight of Barrier, if any (kip/ft)	0.42	
Centroidal distance of barrier wt. from 'O'	0.6	



## 1) CHECK FOR BEARING

Resistance Factor	0.55	Ref: AASHTO LRFD, Table 11.5.7-1
Load Factors:		
Dead load factor (Concrete)	1.25	AASHTO LRFD, Table 3.4.1 1 & 2
Dead load factor (Soil)	1.35	
Live load factor	1.75	
Active pressure load factor	1.5	

Reference: AASHTO LRFD 2012

Bearing Capacity Factors		Shape Factors		Depth factor	
Nc	0	Sc	1	dq	1
Nq	48.9	Sq	1		
Ny	78	Sy	1		

Water Table correction factors:	Cwq =	0.5	Cwy =	0.5
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# HR ENGINEERING SERVICES, INC.

Job: Lakeside Retirement Community  
 Description: Cantilever Retaining Wall Design  
 Wall ID:

Project No.: HR18-1393R  
 Computed by: LN  
 Checked by: HRR

Sheet: 1 of 1  
 Date: 7/18/2018  
 Date: 7/18/2018

## Estimate Force and Moment

Item	Load, kip/ft		Centroidal distance from Toe ("O"), ft	Factored Moment about "O", kip-ft/ft	Factored $\Sigma V$ (kip/ft)	Factored $\Sigma H$ (kip/ft)	$\Sigma M$ (kip-ft/ft)
	Unfactored	Factored					
<b>Vertical Force</b>							
Stem of wall	1.238	1.547	0.75	1.160			
Base/footing of wall	1.575	1.969	3.50	6.891			
Soil above Heel	3.479	4.696	4.25	19.959			
Soil above Toe	0.000	0.000	0.00	0.000			
Traffic surcharge load on Heel	1.375	2.406	4.25	10.227	11.143	2.063	32.728
Barrier	0.420	0.525	0.60	0.315			
<b>Horizontal Force</b>							
Active pressure on the wall, H1	0.797	1.196	-2.33	-2.791			
Hori. Press. due to traffic surcharge, H2	0.495	0.867	-3.5	-3.033			

Distance to the resultant vertical force from "O", $X = \Sigma Mo / \Sigma V$ (ft)	2.937
Eccentricity $e = \text{Base width} / 2 - X$ (ft)	0.563
Effective base/footing width (ft), $B' = B - 2e$	5.874

$\Sigma V$ -unfactored	8.086	kip/ft
$\Sigma H$ -unfactored	1.293	kip/ft

<b>Inclination Factors</b>	
$i_q$	$i_y$
0.706	0.593

$$i_q = \left[ 1 - \frac{H}{(V + cBL \cot \phi_f)} \right]^n$$

$$i_y = \left[ 1 - \frac{H}{V + cBL \cot \phi_f} \right]^{(n+1)}$$

$$n = \left\{ (2 + L/B) / (1 + L/B) \right\} \cos^2 \theta + \left\{ (2 + B/L) / (1 + B/L) \right\} \sin^2 \theta$$

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{s,q} + 0.5 \gamma B V_{im} C_{s,y}$$

in which:

$$N_{cm} = N_c s_c i_c$$

$$N_{qm} = N_q s_q d_q i_q$$

$$N_{ym} = N_y s_y i_y$$

<b>Nominal Bearing Capacity</b>	
$q_n$ (ksf)	11.26

Ref: AASHTO LRFD 2012

Ref: AASHTO LRFD 2012

# HR ENGINEERING SERVICES, INC.

Job: Lakeside Retirement Community  
 Description: Cantilever Retaining Wall Design  
 Wall ID:

Project No.: HR18-1393R  
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Sheet: 1 of 1  
 Date: 7/18/2018  
 Date: 7/18/2018

Factored bearing resistance, $q_R = \phi q_n$ (ksf)		6.19
Factored Vertical stress beneath footing		
$\sigma_{vmax}$	$\sigma_{vmin}$	$\sigma_{vavg}$
2.360	0.824	1.897
Check: $\sigma_{vavg} < q_R$		YES, OK

## 2) CHECK FOR SLIDING AND OVERTURNING (ECCENTRICITY)

Resistance Factor,  $\phi_r$  1 Ref: AASHTO LRFD, Table 11.5.7-1

Load Factors:	Unfactored	Factored
Dead load factor (Concrete)	0.9	AASHTO LRFD, Table 3.4.1-1 & 2
Dead load factor (Soil)	1	
Live load factor	1.75	
Active pressure load factor	1.5	
* Angle of Friction for sliding ( $\phi_s$ )	22	Degrees

\* Assumed friction angle for formed concrete against Limestone.

## Estimate Force and Moment

Item	Load, kip/ft		Centroidal distance from Toe ("O"), ft	Factored Moment about "O", kip-ft/ft	Factored $\Sigma V$ (kip/ft)	Factored $\Sigma H$ (kip/ft)	$\Sigma M_o$ (kip-ft/ft)
	Unfactored	Factored					
<b>Vertical Force</b>							
Stem of wall	1.238	1.114	0.75	0.835			
Base/footing of wall	1.575	1.418	3.50	4.961			
Soil above Heel	3.479	3.479	4.25	14.785			
Soil above Toe	0.000	0.000	0.00	0.000			
Barrier	0.420	0.378	0.60	0.227	6.388	2.063	14.984
<b>Horizontal Force</b>							
Active pressure on the wall, H1	0.797	1.196	-2.33	-2.791			
Hori. Press. due to traffic surcharge, H2	0.495	0.867	-3.5	-3.033			

# HR ENGINEERING SERVICES, INC.

Job: Lakeside Retirement Community  
 Description: Cantilever Retaining Wall Design  
 Wall ID:  
 Project No.: HR18-1393R  
 Computed by: LN  
 Checked by: HRR  
 Sheet 1 of 1  
 Date: 7/18/2018  
 Date: 7/18/2018

Distance to the resultant vertical force from "O", $X = \Sigma Mo / \Sigma V$ (ft)	2.346		
Eccentricity $e = \text{Base width} / 2 - X$ (ft)	1.154	$e < B/4$ ?	Yes
Resisting Moment, $\Sigma M_R$ (kip-ft/ft)	20.808		
Driving/Overturning Moment, $\Sigma M_D$ (kip-ft/ft)	5.824		
$\Sigma M_R / \Sigma M_D$	3.573	$\Sigma M_R / \Sigma M_D \geq 1$ ?	Yes, safe against overturning
Nominal Sliding Resistance, $R_n = \Sigma V \times \tan \phi_s$	2.581		
Factored Sliding Resistance, $R_R = \phi R_n$	2.581	$\Sigma H < R_R$ ?	Yes, safe against sliding

Table 11.5.7-1—Resistance Factors for Permanent Retaining Walls

Wall-Type and Condition		Resistance Factor
Nongravity Cantilevered and Anchored Walls		
Axial compressive resistance of vertical elements		Article 10.5 applies
Passive resistance of vertical elements		0.75
Pullout resistance of anchors <sup>(1)</sup>	<ul style="list-style-type: none"> <li>• Cohesionless (granular) soils</li> <li>• Cohesive soils</li> <li>• Rock</li> </ul>	0.65 <sup>(1)</sup> 0.70 <sup>(1)</sup> 0.50 <sup>(1)</sup>
Pullout resistance of anchors <sup>(2)</sup>	<ul style="list-style-type: none"> <li>• Where proof tests are conducted</li> </ul>	1.0 <sup>(2)</sup>
Tensile resistance of anchor tendon	<ul style="list-style-type: none"> <li>• Mild steel (e.g., ASTM A615 bars)</li> <li>• High strength steel (e.g., ASTM A722 bars)</li> </ul>	0.90 <sup>(3)</sup> 0.80 <sup>(3)</sup>
Flexural capacity of vertical elements		0.90
Mechanically Stabilized Earth Walls, Gravity Walls, and Semigravity Walls		
Bearing resistance	<ul style="list-style-type: none"> <li>• Gravity and semigravity walls</li> <li>• MSE walls</li> </ul>	0.55 0.65
Sliding		1.0
Tensile resistance of metallic reinforcement and connectors	Strip reinforcements <sup>(4)</sup> <ul style="list-style-type: none"> <li>• Static loading</li> </ul> Grid reinforcements <sup>(4)(5)</sup> <ul style="list-style-type: none"> <li>• Static loading</li> </ul>	0.75 0.65
Tensile resistance of geosynthetic reinforcement and connectors	<ul style="list-style-type: none"> <li>• Static loading</li> </ul>	0.90
Pullout resistance of tensile reinforcement	<ul style="list-style-type: none"> <li>• Static loading</li> </ul>	0.90
Prefabricated Modular Walls		
Bearing		Article 10.5 applies
Sliding		Article 10.5 applies
Passive resistance		Article 10.5 applies

<sup>(1)</sup> Apply to presumptive ultimate unit bond stresses for preliminary design only in Article C11.9.4.2.

<sup>(2)</sup> Apply where proof test(s) are conducted on every production anchor to a load of 1.0 or greater times the factored load on the anchor.

<sup>(3)</sup> Apply to maximum proof test load for the anchor. For mild steel apply resistance factor to  $F_y$ . For high-strength steel apply the resistance factor to guaranteed ultimate tensile strength.

<sup>(4)</sup> Apply to gross cross-section less sacrificial area. For sections with holes, reduce gross area in accordance with Article 6.8.3 and apply to net section less sacrificial area.

<sup>(5)</sup> Applies to grid reinforcements connected to a rigid facing element, e.g., a concrete panel or block. For grid reinforcements connected to a flexible facing mat or which are continuous with the facing mat, use the resistance factor for strip reinforcements.

elements, failure of one of these foundation elements usually does not cause the entire foundation unit to reach failure, i.e., due to load sharing and overall redundancy. Therefore, the reliability of the foundation unit is usually more, and in many cases considerably more, than the reliability of the individual foundation element. Hence, a lower reliability can be successfully used for redundant foundations than is typically the case for the superstructure.

Note that not all of the resistance factors provided in this Article have been derived using statistical data from which a specific  $\beta$  value can be estimated, since such data were not always available. In those cases, where data were not available, resistance factors were estimated through calibration by fitting to past allowable stress design safety factors, e.g., the AASHTO *Standard Specifications for Highway Bridges* (2002).

Additional discussion regarding the basis for the resistance factors for each foundation type and limit state is provided in Articles 10.5.5.2.2, 10.5.5.2.3, 10.5.5.2.4, and 10.5.5.2.5. Additional, more detailed information on the development of the resistance factors for foundations provided in this Article, and a comparison of those resistance factors to previous Allowable Stress Design practice, e.g., AASHTO (2002), is provided in Allen (2005).

Scour design for the design flood must satisfy the requirement that the factored foundation resistance after scour is greater than the factored load determined with the scoured soil removed. The resistance factors will be those used in the Strength Limit State, without scour.

The foundation resistance after scour due to the design flood shall provide adequate foundation resistance using the resistance factors given in this Article.

#### 10.5.5.2.2—Spread Footings

#### C10.5.5.2.2

The resistance factors provided in Table 10.5.5.2.2-1 shall be used for strength limit state design of spread footings, with the exception of the deviations allowed for local practices and site specific considerations in Article 10.5.5.2.

**Table 10.5.5.2.2-1—Resistance Factors for Geotechnical Resistance of Shallow Foundations at the Strength Limit State**

		Method/Soil/Condition	Resistance Factor
Bearing Resistance	$\phi_b$	Theoretical method (Munfakh et al., 2001), in clay	0.50
		Theoretical method (Munfakh et al., 2001), in sand, using <i>CPT</i>	0.50
		Theoretical method (Munfakh et al., 2001), in sand, using <i>SPT</i>	0.45
		Semi-empirical methods (Meyerhof, 1957), all soils	0.45
		Footings on rock	0.45
		Plate Load Test	0.55
Sliding	$\phi_\tau$	Precast concrete placed on sand	0.90
		Cast-in-Place Concrete on sand	0.80
		Cast-in-Place or precast Concrete on Clay	0.85
		Soil on soil	0.90
	$\phi_{ep}$	Passive earth pressure component of sliding resistance	0.50

### 10.6.3—Strength Limit State Design

#### 10.6.3.1—Bearing Resistance of Soil

##### 10.6.3.1.1—General

Bearing resistance of spread footings shall be determined based on the highest anticipated position of groundwater level at the footing location.

The factored resistance,  $q_R$ , at the strength limit state shall be taken as:

$$q_R = \Phi_b q_n \quad (10.6.3.1.1-1)$$

where:

$\Phi_b$  = resistance factor specified in Article 10.5.5.2.2

$q_n$  = nominal bearing resistance (ksf)

Where loads are eccentric, the effective footing dimensions,  $L'$  and  $B'$ , as specified in Article 10.6.1.3, shall be used instead of the overall dimensions  $L$  and  $B$  in all equations, tables, and figures pertaining to bearing resistance.

##### C10.6.3.1.1

The bearing resistance of footings on soil should be evaluated using soil shear strength parameters that are representative of the soil shear strength under the loading conditions being analyzed. The bearing resistance of footings supported on granular soils should be evaluated for both permanent dead loading conditions and short-duration live loading conditions using effective stress methods of analysis and drained soil shear strength parameters. The bearing resistance of footings supported on cohesive soils should be evaluated for short-duration live loading conditions using total stress methods of analysis and undrained soil shear strength parameters. In addition, the bearing resistance of footings supported on cohesive soils, which could soften and lose strength with time, should be evaluated for permanent dead loading conditions using effective stress methods of analysis and drained soil shear strength parameters.

The position of the groundwater table can significantly influence the bearing resistance of soils through its effect on shear strength and unit weight of the foundation soils. In general, the submergence of soils will reduce the effective shear strength of cohesionless (or granular) materials, as well as the long-term (or drained) shear strength of cohesive (clayey) soils. Moreover, the effective unit weights of submerged soils are about half of those for the same soils under dry conditions. Thus, submergence may lead to a significant reduction in the bearing resistance provided by the foundation soils, and it is essential that the bearing resistance analyses be carried out under the assumption of the highest groundwater table expected within the service life of the structure.

Footings with inclined bases should be avoided wherever possible. Where use of an inclined footing base cannot be avoided, the nominal bearing resistance determined in accordance with the provisions herein should be further reduced using accepted corrections for inclined footing bases in Munfakh, et al. (2001).

Because the effective dimensions will vary slightly for each limit state under consideration, strict adherence to this provision will require re-computation of the nominal bearing resistance at each limit state.

Further, some of the equations for the bearing resistance modification factors based on  $L$  and  $B$  were not necessarily or specifically developed with the intention that effective dimensions be used. The designer should ensure that appropriate values of  $L$  and  $B$  are used, and that effective footing dimensions  $L'$  and  $B'$  are used appropriately.



Consideration should be given to the relative change in the computed nominal resistance based on effective versus gross footing dimensions for the size of footings typically used for bridges. Judgment should be used in deciding whether the use of gross footing dimensions for computing nominal bearing resistance at the strength limit state would result in a conservative design.

### 10.6.3.1.2—Theoretical Estimation

#### 10.6.3.1.2a—Basic Formulation

#### C10.6.3.1.2a

The nominal bearing resistance shall be estimated using accepted soil mechanics theories and should be based on measured soil parameters. The soil parameters used in the analyses shall be representative of the soil shear strength under the considered loading and subsurface conditions.

The nominal bearing resistance of spread footings on cohesionless soils shall be evaluated using effective stress analyses and drained soil strength parameters.

The nominal bearing resistance of spread footings on cohesive soils shall be evaluated for total stress analyses and undrained soil strength parameters. In cases where the cohesive soils may soften and lose strength with time, the bearing resistance of these soils shall also be evaluated for permanent loading conditions using effective stress analyses and drained soil strength parameters.

For spread footings bearing on compacted soils, the nominal bearing resistance shall be evaluated using the more critical of either total or effective stress analyses.

Except as noted below, the nominal bearing resistance of a soil layer, in ksf, should be taken as:

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{uq} + 0.5\gamma B N_{\gamma m} C_{w\gamma} \quad (10.6.3.1.2a-1)$$

in which:

$$N_{cm} = N_c s_c i_c \quad (10.6.3.1.2a-2)$$

$$N_{qm} = N_q s_q d_q i_q \quad (10.6.3.1.2a-3)$$

$$N_{\gamma m} = N_{\gamma} s_{\gamma} i_{\gamma} \quad (10.6.3.1.2a-4)$$

where:

$c$  = cohesion, taken as undrained shear strength (ksf)

$N_c$  = cohesion term (undrained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

The bearing resistance formulation provided in Eqs. 10.6.3.1.2a-1 through 10.6.3.1.2a-4 is the complete formulation as described in the Munfakh, et al. (2001). However, in practice, not all of the factors included in these equations have been routinely used.

$N_q$  = surcharge (embedment) term (drained or undrained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

$N_\gamma$  = unit weight (footing width) term (drained loading) bearing capacity factor as specified in Table 10.6.3.1.2a-1 (dim)

$\gamma$  = total (moist) unit weight of soil above or below the bearing depth of the footing (kcf)

$D_f$  = footing embedment depth (ft)

$B$  = footing width (ft)

$C_{wq}, C_{w\gamma}$  = correction factors to account for the location of the groundwater table as specified in Table 10.6.3.1.2a-2 (dim)

$s_c, s_\gamma, s_q$  = footing shape correction factors as specified in Table 10.6.3.1.2a-3 (dim)

$d_q$  = correction factor to account for the shearing resistance along the failure surface passing through cohesionless material above the bearing elevation as specified in Table 10.6.3.1.2a-4 (dim)

$i_c, i_\gamma, i_q$  = load inclination factors determined from Eqs. 10.6.3.1.2a-5 or 10.6.3.1.2a-6, and 10.6.3.1.2a-7 and 10.6.3.1.2a-8 (dim)

For  $\phi_f = 0$ :

$$i_c = 1 - mH/cBLN_c \quad (10.6.3.1.2a-5)$$

For  $\phi_f > 0$ :

$$i_c = i_q - [(1 - i_q)/(N_q - 1)] \quad (10.6.3.1.2a-6)$$

in which:

$$i_q = \left[ 1 - \frac{H}{(V + cBL \cot \phi_f)} \right]^n \quad (10.6.3.1.2a-7)$$

$$i_\gamma = \left[ 1 - \frac{H}{V + cBL \cot \phi_f} \right]^{(n+1)} \quad (10.6.3.1.2a-8)$$

$$n = [(2 + L/B)/(1 + L/B)] \cos^2 \theta + [(2 + B/L)/(1 + B/L)] \sin^2 \theta \quad (10.6.3.1.2a-9)$$

Most geotechnical engineers nationwide have not used the load inclination factors. This is due, in part, to the lack of knowledge of the vertical and horizontal loads at the time of geotechnical explorations and preparation of bearing resistance recommendations.

Furthermore, the basis of the load inclination factors computed by Eqs. 10.6.3.1.2a-5 to 10.6.3.1.2a-8 is a combination of bearing resistance theory and small scale load tests on 1 in. wide plates on London Clay and Ham River Sand (Meyerhof, 1953). Therefore, the factors do not take into consideration the effects of depth of embedment. Meyerhof further showed that for footings with a depth of embedment ratio of  $D_f/B = 1$ , the effects of load inclination on bearing resistance are relatively small. The theoretical formulation of load inclination factors were further examined by Brinch-Hansen (1970), with additional modification by Vesic (1973) into the form provided in Eqs. 10.6.3.1.2a-5 to 10.6.3.1.2a-8.

It should further be noted that the resistance factors provided in Article 10.5.5.2.2 were derived for vertical loads. The applicability of these resistance factors to design of footings resisting inclined load combinations is not currently known. The combination of the resistance factors and the load inclination factors may be overly conservative for footings with an embedment of approximately  $D_f/B = 1$  or deeper because the load inclination factors were derived for footings without embedment.

where:

$B$  = footing width (ft)

$L$  = footing length (ft)

$H$  = unfactored horizontal load (kips)

$V$  = unfactored vertical load (kips)

$\theta$  = projected direction of load in the plane of the footing, measured from the side of length  $L$  (degrees)

In practice, therefore, for footings with modest embedment, consideration may be given to omission of the load inclination factors.

Figure C10.6.3.1.2a-1 shows the convention for determining the  $\theta$  angle in Eq. 10.6.3.1.2a-9.

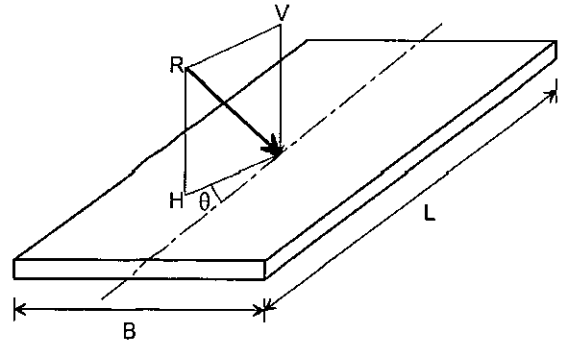


Figure C10.6.3.1.2a-1—Inclined Loading Conventions

Table 10.6.3.1.2a-1—Bearing Capacity Factors  $N_c$  (Prandtl, 1921),  $N_q$  (Reissner, 1924), and  $N_\gamma$  (Vesic, 1975)

$\phi_f$	$N_c$	$N_q$	$N_\gamma$	$\phi_f$	$N_c$	$N_q$	$N_\gamma$
0	5.14	1.0	0.0	23	18.1	8.7	8.2
1	5.4	1.1	0.1	24	19.3	9.6	9.4
2	5.6	1.2	0.2	25	20.7	10.7	10.9
3	5.9	1.3	0.2	26	22.3	11.9	12.5
4	6.2	1.4	0.3	27	23.9	13.2	14.5
5	6.5	1.6	0.5	28	25.8	14.7	16.7
6	6.8	1.7	0.6	29	27.9	16.4	19.3
7	7.2	1.9	0.7	30	30.1	18.4	22.4
8	7.5	2.1	0.9	31	32.7	20.6	26.0
9	7.9	2.3	1.0	32	35.5	23.2	30.2
10	8.4	2.5	1.2	33	38.6	26.1	35.2
11	8.8	2.7	1.4	34	42.2	29.4	41.1
12	9.3	3.0	1.7	35	46.1	33.3	48.0
13	9.8	3.3	2.0	36	50.6	37.8	56.3
14	10.4	3.6	2.3	37	55.6	42.9	66.2
15	11.0	3.9	2.7	38	61.4	48.9	78.0
16	11.6	4.3	3.1	39	67.9	56.0	92.3
17	12.3	4.8	3.5	40	75.3	64.2	109.4
18	13.1	5.3	4.1	41	83.9	73.9	130.2
19	13.9	5.8	4.7	42	93.7	85.4	155.6
20	14.8	6.4	5.4	43	105.1	99.0	186.5
21	15.8	7.1	6.2	44	118.4	115.3	224.6
22	16.9	7.8	7.1	45	133.9	134.9	271.8

**Table 10.6.3.1.2a-2—Coefficients  $C_{wq}$  and  $C_{wy}$  for Various Groundwater Depths**

$D_w$	$C_{wq}$	$C_{wy}$
0.0	0.5	0.5
$D_f$	1.0	0.5
$>1.5B + D_f$	1.0	1.0

Where the position of groundwater is at a depth less than 1.5 times the footing width below the footing base, the bearing resistance is affected. The highest anticipated groundwater level should be used in design.

**Table 10.6.3.1.2a-3—Shape Correction Factors  $s_c$ ,  $s_p$ ,  $s_q$**

Factor	Friction Angle	Cohesion Term ( $s_c$ )	Unit Weight Term ( $s_y$ )	Surcharge Term ( $s_q$ )
Shape Factors $s_c, s_p, s_q$	$\phi_f = 0$	$1 + \left(\frac{B}{5L}\right)$	1.0	1.0
	$\phi_f > 0$	$1 + \left(\frac{B}{L}\right)\left(\frac{N_q}{N_c}\right)$	$1 - 0.4\left(\frac{B}{L}\right)$	$1 + \left(\frac{B}{L} \tan \phi_f\right)$

**Table 10.6.3.1.2a-4—Depth Correction Factor  $d_q$**

Friction Angle, $\phi_f$ (degrees)	$D_f/B$	$d_q$
32	1	1.20
	2	1.30
	4	1.35
	8	1.40
37	1	1.20
	2	1.25
	4	1.30
	8	1.35
42	1	1.15
	2	1.20
	4	1.25
	8	1.30

The parent information from which Table 10.6.3.1.2a-4 was developed covered the indicated range of friction angle,  $\phi_f$ . Information beyond the range indicated is not available at this time.

The depth correction factor should be used only when the soils above the footing bearing elevation are as competent as the soils beneath the footing level; otherwise, the depth correction factor should be taken as 1.0.

Linear interpolations may be made for friction angles in between those values shown in Table 10.6.3.1.2a-4.

*10.6.3.1.2b—Considerations for Punching Shear*

*C10.6.3.1.2b*

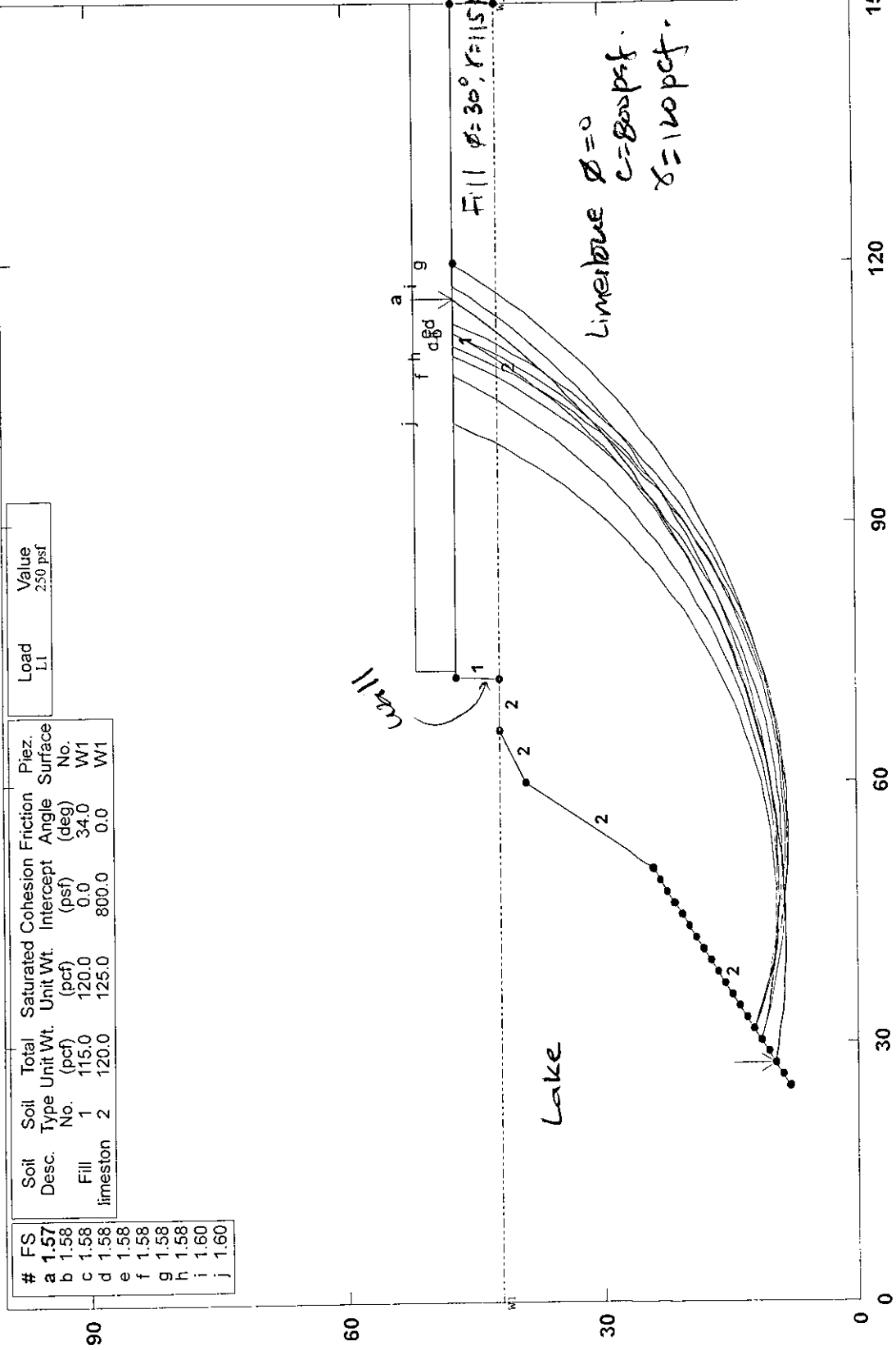
If local or punching shear failure is possible, the nominal bearing resistance shall be estimated using reduced shear strength parameters  $c^*$  and  $\phi^*$  in Eqs. 10.6.3.1.2b-1 and 10.6.3.1.2b-2. The reduced shear parameters may be taken as:

Local shear failure is characterized by a failure surface that is similar to that of a general shear failure but that does not extend to the ground surface, ending somewhere in the soil below the footing. Local shear failure is accompanied by vertical compression of soil below the footing and visible bulging of soil adjacent to the footing but not by sudden rotation or tilting of the

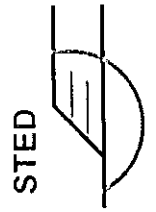
$c^* = 0.67c$  (10.6.3.1.2b-1)

# Lakeside Retirement Community Stability of slope with wall on top

c:\drive5\hr18-1393r city of medley- lakeside retirement community\global\global.pl2 Run By: HRES 7/25/2018 09:42AM



PCSTABL5M/si FSmin=1.57  
 Safety Factors Are Calculated By The Modified Bishop Method



\*\* PCSTABL5M \*\*

by  
Purdue University

--Slope Stability Analysis--  
Simplified Janbu, Simplified Bishop  
or Spencer's Method of Slices

Run Date: 7/25/2018  
Time of Run: 09:42AM  
Run By: HRES  
Input Data Filename: C:Global.in  
Output Filename: C:Global.OUT  
Unit: ENGLISH  
Plotted Output Filename: C:Global.PLT

PROBLEM DESCRIPTION Lakeside Retirement Community  
Stability of slope with wall on top

BOUNDARY COORDINATES

6 Top Boundaries  
7 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	25.00	8.00	50.00	24.00	2
2	50.00	24.00	60.00	39.00	2
3	60.00	39.00	66.00	42.00	2
4	66.00	42.00	72.00	42.00	2
5	72.00	42.00	72.10	47.00	1
6	72.10	47.00	150.00	47.00	1
7	66.00	42.00	150.00	42.00	2

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	115.0	120.0	.0	34.0	.00	.0	1
2	120.0	125.0	800.0	.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	42.00
2	150.00	42.00

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	73.00	150.00	250.0	.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 20 Points Equally Spaced Along The Ground Surface Between X = 25.00 ft.  
and X = 50.00 ft.

Each Surface Terminates Between X = 60.00 ft.  
and X = 120.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 8.00 ft.

2.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

\* \* Safety Factors Are Calculated By The Modified Bishop Method \* \*

Failure Surface Specified By 52 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	27.63	9.68
2	29.61	9.37
3	31.59	9.10
4	33.58	8.88
5	35.57	8.70
6	37.56	8.57
7	39.56	8.48
8	41.56	8.43
9	43.56	8.43
10	45.56	8.48
11	47.56	8.57
12	49.55	8.70
13	51.55	8.88
14	53.53	9.11
15	55.52	9.38
16	57.49	9.69
17	59.46	10.05
18	61.42	10.45
19	63.37	10.90
20	65.31	11.39
21	67.23	11.92
22	69.15	12.50
23	71.05	13.12
24	72.94	13.78
25	74.81	14.49
26	76.66	15.23
27	78.50	16.02
28	80.32	16.85
29	82.12	17.72
30	83.90	18.63
31	85.66	19.58
32	87.40	20.57
33	89.12	21.60
34	90.81	22.67
35	92.48	23.77
36	94.12	24.91
37	95.73	26.09
38	97.32	27.31
39	98.89	28.56

40	100.42	29.84
41	101.92	31.16
42	103.40	32.51
43	104.84	33.90
44	106.25	35.31
45	107.63	36.76
46	108.97	38.24
47	110.29	39.75
48	111.57	41.29
49	112.81	42.85
50	114.02	44.45
51	115.19	46.07
52	115.83	47.00

Circle Center At X = 42.5 ; Y = 97.3 and Radius, 88.9

\*\*\* 1.574 \*\*\*

Failure Surface Specified By 49 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.26	11.37
2	32.21	10.91
3	34.17	10.50
4	36.14	10.15
5	38.12	9.86
6	40.10	9.61
7	42.09	9.42
8	44.09	9.29
9	46.09	9.21
10	48.09	9.18
11	50.09	9.21
12	52.08	9.30
13	54.08	9.44
14	56.07	9.63
15	58.05	9.88
16	60.03	10.18
17	62.00	10.54
18	63.96	10.95
19	65.90	11.41
20	67.83	11.93
21	69.75	12.49
22	71.65	13.12
23	73.54	13.79
24	75.40	14.51
25	77.24	15.29
26	79.07	16.11
27	80.86	16.99
28	82.64	17.91
29	84.39	18.88
30	86.11	19.90
31	87.80	20.97
32	89.46	22.08
33	91.09	23.24
34	92.69	24.44
35	94.26	25.69
36	95.79	26.97
37	97.28	28.30
38	98.74	29.67
39	100.16	31.08
40	101.54	32.52
41	102.88	34.01
42	104.18	35.53
43	105.44	37.08
44	106.66	38.67
45	107.83	40.29
46	108.95	41.95
47	110.03	43.63



48        111.07      45.34  
49        112.01      47.00

Circle Center At X = 48.0 ; Y = 82.3 and Radius, 73.1

\*\*\*      1.580      \*\*\*

Failure Surface Specified By 49 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.58	12.21
2	33.46	11.52
3	35.35	10.89
4	37.27	10.32
5	39.21	9.81
6	41.16	9.37
7	43.12	8.99
8	45.10	8.68
9	47.08	8.43
10	49.07	8.25
11	51.07	8.14
12	53.07	8.09
13	55.07	8.10
14	57.07	8.18
15	59.06	8.33
16	61.05	8.54
17	63.03	8.82
18	65.00	9.16
19	66.96	9.57
20	68.90	10.04
21	70.83	10.57
22	72.74	11.17
23	74.63	11.83
24	76.49	12.55
25	78.33	13.33
26	80.15	14.17
27	81.93	15.07
28	83.69	16.03
29	85.41	17.05
30	87.10	18.12
31	88.75	19.25
32	90.36	20.43
33	91.94	21.67
34	93.47	22.95
35	94.96	24.29
36	96.41	25.67
37	97.80	27.10
38	99.16	28.57
39	100.46	30.09
40	101.71	31.65
41	102.91	33.25
42	104.05	34.89
43	105.15	36.57
44	106.18	38.28
45	107.16	40.02
46	108.08	41.79
47	108.95	43.60
48	109.75	45.43
49	110.38	47.00

Circle Center At X = 53.6 ; Y = 68.9 and Radius, 60.9

\*\*\*      1.581      \*\*\*

Failure Surface Specified By 50 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.58	12.21
2	33.46	11.54
3	35.37	10.93
4	37.29	10.37
5	39.23	9.88
6	41.18	9.45
7	43.15	9.08
8	45.12	8.77
9	47.11	8.52
10	49.10	8.33
11	51.09	8.21
12	53.09	8.15
13	55.09	8.15
14	57.09	8.21
15	59.09	8.34
16	61.08	8.52
17	63.06	8.77
18	65.04	9.08
19	67.00	9.46
20	68.96	9.89
21	70.90	10.38
22	72.82	10.94
23	74.72	11.55
24	76.60	12.22
25	78.47	12.95
26	80.30	13.74
27	82.12	14.58
28	83.90	15.49
29	85.66	16.44
30	87.39	17.45
31	89.08	18.52
32	90.74	19.63
33	92.36	20.80
34	93.95	22.02
35	95.50	23.28
36	97.01	24.59
37	98.47	25.95
38	99.90	27.36
39	101.28	28.81
40	102.61	30.30
41	103.90	31.83
42	105.13	33.40
43	106.32	35.01
44	107.46	36.65
45	108.55	38.33
46	109.58	40.05
47	110.56	41.79
48	111.48	43.56
49	112.35	45.36
50	113.08	47.00

Circle Center At X = 54.1 ; Y = 72.4 and Radius, 64.2

\*\*\* 1.583 \*\*\*

Failure Surface Specified By 50 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.58	12.21
2	33.47	11.56
3	35.38	10.98
4	37.31	10.45
5	39.26	9.98
6	41.22	9.58

7	43.19	9.23
8	45.17	8.95
9	47.15	8.73
10	49.15	8.57
11	51.15	8.48
12	53.15	8.44
13	55.15	8.47
14	57.14	8.56
15	59.14	8.72
16	61.13	8.94
17	63.11	9.22
18	65.08	9.56
19	67.04	9.96
20	68.98	10.42
21	70.91	10.95
22	72.82	11.53
23	74.72	12.17
24	76.59	12.88
25	78.44	13.64
26	80.26	14.46
27	82.06	15.33
28	83.83	16.26
29	85.57	17.25
30	87.28	18.29
31	88.96	19.38
32	90.60	20.53
33	92.20	21.72
34	93.76	22.97
35	95.29	24.26
36	96.77	25.60
37	98.22	26.99
38	99.61	28.42
39	100.97	29.89
40	102.27	31.41
41	103.53	32.96
42	104.74	34.56
43	105.89	36.19
44	107.00	37.85
45	108.05	39.55
46	109.05	41.29
47	110.00	43.05
48	110.89	44.84
49	111.72	46.66
50	111.86	47.00

Circle Center At X = 53.2 ; Y = 72.3 and Radius, 63.9

\*\*\* 1.583 \*\*\*

Failure Surface Specified By 47 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.26	11.37
2	32.21	10.91
3	34.17	10.51
4	36.14	10.17
5	38.12	9.89
6	40.11	9.66
7	42.10	9.50
8	44.10	9.39
9	46.10	9.35
10	48.10	9.36
11	50.10	9.43
12	52.09	9.56
13	54.08	9.76
14	56.07	10.01
15	58.04	10.32
16	60.01	10.68

17	61.96	11.11
18	63.90	11.60
19	65.83	12.14
20	67.74	12.74
21	69.63	13.39
22	71.50	14.10
23	73.34	14.87
24	75.17	15.69
25	76.97	16.56
26	78.74	17.49
27	80.48	18.47
28	82.19	19.50
29	83.88	20.59
30	85.53	21.72
31	87.14	22.90
32	88.72	24.12
33	90.26	25.40
34	91.76	26.72
35	93.23	28.08
36	94.65	29.49
37	96.03	30.93
38	97.37	32.42
39	98.66	33.95
40	99.90	35.52
41	101.10	37.12
42	102.25	38.75
43	103.35	40.42
44	104.40	42.12
45	105.40	43.86
46	106.35	45.62
47	107.04	47.00

Circle Center At X = 46.6 ; Y = 76.6 and Radius, 67.3

\*\*\* 1.583 \*\*\*

Failure Surface Specified By 53 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.26	11.37
2	32.19	10.83
3	34.13	10.35
4	36.08	9.91
5	38.05	9.53
6	40.02	9.19
7	42.00	8.90
8	43.98	8.67
9	45.97	8.48
10	47.97	8.35
11	49.97	8.27
12	51.97	8.24
13	53.97	8.26
14	55.97	8.33
15	57.96	8.45
16	59.95	8.62
17	61.94	8.84
18	63.92	9.12
19	65.90	9.44
20	67.86	9.82
21	69.82	10.24
22	71.76	10.71
23	73.69	11.24
24	75.61	11.81
25	77.51	12.43
26	79.39	13.10
27	81.26	13.82
28	83.11	14.58
29	84.93	15.40

30	86.74	16.25
31	88.52	17.16
32	90.29	18.11
33	92.02	19.10
34	93.73	20.14
35	95.41	21.22
36	97.07	22.34
37	98.69	23.51
38	100.29	24.71
39	101.85	25.96
40	103.38	27.25
41	104.88	28.57
42	106.35	29.93
43	107.77	31.33
44	109.17	32.77
45	110.52	34.24
46	111.84	35.74
47	113.12	37.28
48	114.36	38.85
49	115.56	40.45
50	116.71	42.08
51	117.83	43.74
52	118.90	45.43
53	119.84	47.00

Circle Center At X = 52.2 ; Y = 86.6 and Radius, 78.4

\*\*\* 1.583 \*\*\*

Failure Surface Specified By 48 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	31.58	12.21
2	33.48	11.59
3	35.40	11.04
4	37.34	10.54
5	39.29	10.11
6	41.26	9.74
7	43.24	9.44
8	45.22	9.19
9	47.21	9.02
10	49.21	8.90
11	51.21	8.85
12	53.21	8.86
13	55.21	8.94
14	57.20	9.08
15	59.19	9.29
16	61.17	9.56
17	63.15	9.89
18	65.11	10.28
19	67.05	10.74
20	68.99	11.26
21	70.90	11.84
22	72.79	12.48
23	74.67	13.19
24	76.51	13.95
25	78.34	14.77
26	80.13	15.65
27	81.90	16.58
28	83.64	17.58
29	85.34	18.62
30	87.01	19.72
31	88.65	20.88
32	90.24	22.08
33	91.80	23.34
34	93.31	24.65
35	94.78	26.00
36	96.21	27.40

37	97.60	28.85
38	98.93	30.33
39	100.22	31.86
40	101.46	33.44
41	102.64	35.04
42	103.78	36.69
43	104.86	38.37
44	105.89	40.09
45	106.86	41.84
46	107.77	43.62
47	108.63	45.42
48	109.32	47.00

Circle Center At X = 51.8 ; Y = 71.3 and Radius, 62.4

\*\*\* 1.584 \*\*\*

Failure Surface Specified By 52 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.26	11.37
2	32.22	10.95
3	34.19	10.58
4	36.16	10.26
5	38.14	9.99
6	40.13	9.77
7	42.12	9.59
8	44.12	9.46
9	46.12	9.39
10	48.12	9.36
11	50.11	9.37
12	52.11	9.44
13	54.11	9.56
14	56.10	9.72
15	58.09	9.94
16	60.08	10.20
17	62.05	10.51
18	64.02	10.86
19	65.98	11.27
20	67.93	11.72
21	69.86	12.22
22	71.79	12.77
23	73.70	13.36
24	75.59	14.00
25	77.47	14.69
26	79.33	15.42
27	81.17	16.20
28	83.00	17.02
29	84.80	17.88
30	86.58	18.79
31	88.34	19.74
32	90.08	20.74
33	91.79	21.78
34	93.47	22.85
35	95.13	23.97
36	96.76	25.13
37	98.36	26.33
38	99.93	27.56
39	101.47	28.84
40	102.98	30.15
41	104.46	31.50
42	105.91	32.88
43	107.32	34.30
44	108.69	35.75
45	110.03	37.24
46	111.34	38.75
47	112.60	40.30
48	113.83	41.88

49	115.02	43.49
50	116.17	45.13
51	117.28	46.79
52	117.41	47.00

Circle Center At X = 48.3 ; Y = 91.5 and Radius, 82.2

\*\*\* 1.597 \*\*\*

Failure Surface Specified By 45 Coordinate Points

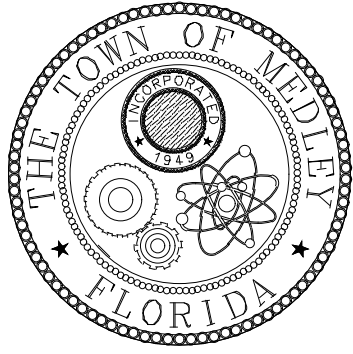
Point No.	X-Surf (ft)	Y-Surf (ft)
1	30.26	11.37
2	32.21	10.91
3	34.17	10.52
4	36.14	10.19
5	38.13	9.93
6	40.12	9.73
7	42.11	9.59
8	44.11	9.52
9	46.11	9.52
10	48.11	9.58
11	50.11	9.71
12	52.10	9.90
13	54.08	10.16
14	56.05	10.48
15	58.02	10.87
16	59.96	11.32
17	61.90	11.84
18	63.81	12.42
19	65.71	13.06
20	67.58	13.76
21	69.43	14.52
22	71.25	15.34
23	73.05	16.23
24	74.81	17.17
25	76.54	18.16
26	78.24	19.22
27	79.91	20.33
28	81.54	21.49
29	83.12	22.70
30	84.67	23.97
31	86.18	25.29
32	87.64	26.65
33	89.05	28.07
34	90.42	29.52
35	91.74	31.03
36	93.01	32.57
37	94.23	34.16
38	95.40	35.78
39	96.51	37.44
40	97.57	39.14
41	98.57	40.87
42	99.52	42.63
43	100.41	44.43
44	101.23	46.25
45	101.55	47.00

Circle Center At X = 45.2 ; Y = 70.6 and Radius, 61.1

\*\*\* 1.602 \*\*\*

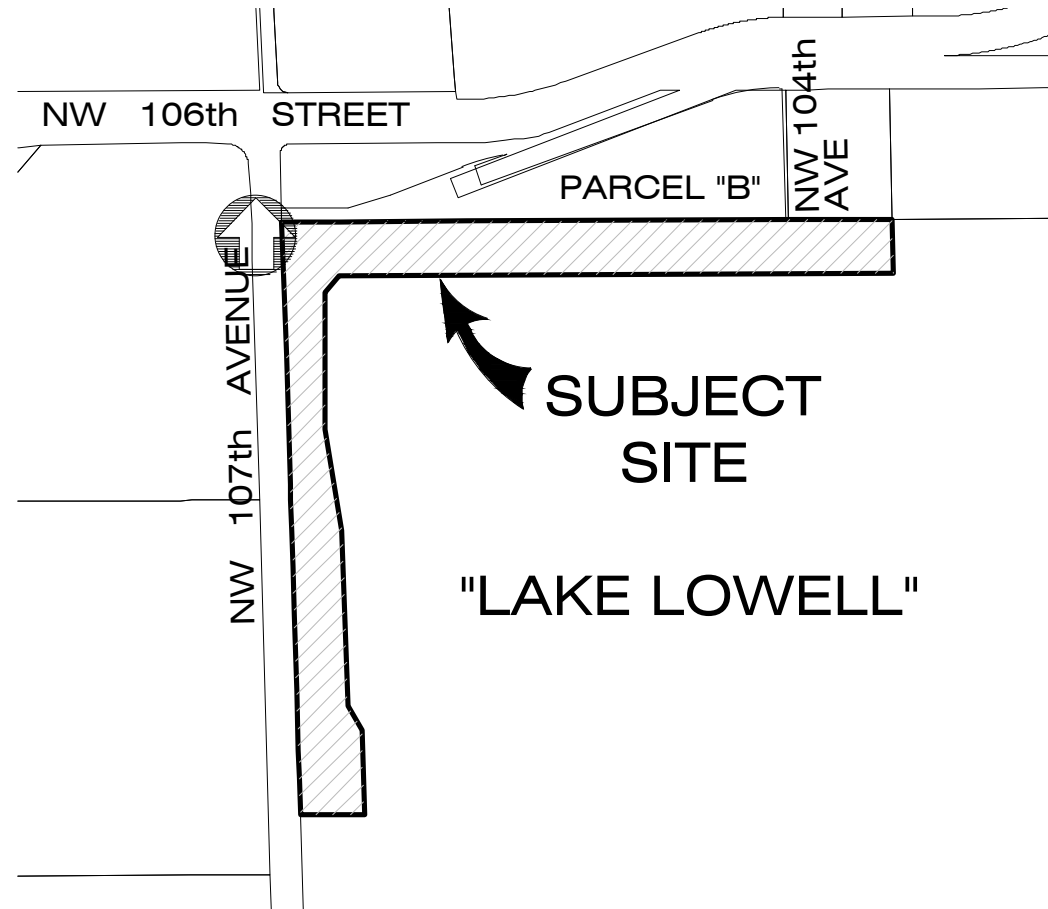
## **APPENDIX B – Topographic Survey**





# TOWN OF MEDLEY LAKESIDE RETIREMENT COMMUNITY 10601 NW 105 WAY, MEDLEY FL. 33178 SITE PLAN

PROJECT No. LS-1305



SECTION 5 - TOWNSHIP 53 SOUTH - RANGE 40 EAST

LOCATION MAP  
NOT TO SCALE

**PREPARED FOR:**

**SENIOR SOCIAL SERVICES DEPARTMENT  
TOWN OF MEDLEY  
7777 NW 72 AVENUE  
MEDLEY FL 33166  
WWW.TOWNOFMEDLEY.COM**

**INDEX OF SURVEY PLANS:**

1. COVER SHEET
2. LEGAL DESCRIPTION
3. KEY MAP
4. LOTS 748-729
5. LOTS 729-706
6. LOTS 706-669
7. LOTS 669-634
8. LOTS 637-605
9. LOTS 608-600

**TOWN COUNCIL:**

MAYOR ROBERT MARTELL  
VICE-MAYOR IVAN PACHECO  
COUNCILPERSON JACK MORROW  
COUNCILPERSON EDGAR AYALA  
COUNCILPERSON GRISELIA DIGIACOMO

APPROVED ON-----,2018  
UNDER RESOLUTION-----OF THE TOWN COUNCIL

-----  
LIZMAN VALIDO  
SOCIAL SERVICES DIRECTOR

-----  
DATE

-----  
JORGE E. CORZO, PE  
TOWN ENGINEER

-----  
DATE

-----  
SARA SINATRA, AICP  
CONSULTING TOWN PLANNER

-----  
DATE

**REVISIONS**

1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 06-12-18 UPDATE SURVEY	8.
4.	9.
5.	10.



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SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN  
COVER SHEET**

Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
1/10

**LEGAL DESCRIPTION:**

(PARCEL LS-1)

A portion of land lying in Tracts 18, 27, 28, 29, 30 and 31 of "FLORIDA FRUITLANDS COMPANY'S SUBDIVISION", according to the plat thereof as recorded in Plat Book 2, at Page 17, of the Public Records of Miami-Dade County, Florida, in Section 5, Township 53 South, Range 40 East, being more particularly described as follows:

COMMENCE at the NW corner of Said Section 5; thence S 01°43'32" E, for 330.38 feet; thence N 89°40'35" E for 40.01 feet to the POINT OF BEGINNING of the hereinafter described parcel of land;  
 thence N 89°40'35" E for 1585.89 feet; thence S 00°41'44" E for 151.11 feet;  
 thence S 77°06'47" W for 21.06 feet; thence N 87°21'31" W for 58.86 feet;  
 thence S 89°04'22" W for 160.02 feet; thence N 86°44'38" W for 94.49 feet;  
 thence to a tangent curve to the left having a radius of 850.00 feet, along said curve through a central angle of 02°42'33", an arc length of 40.19 feet;  
 thence N 89°27'11" W for 151.28 feet; thence to a tangent curve to the left having a radius of 575.00 feet, along said curve through a central angle of 02°41'48", an arc length of 27.06 feet; thence S 87°51'01" W for 61.77 feet; thence to a tangent curve to the right having a radius of 1225.00 feet, along said curve through a central angle of 05°30'16", an arc length of 117.69 feet; to a reverse curve to the left having a radius of 1475.00 feet, along said curve through a central angle of 03°21'27", an arc length of 86.44 feet;  
 thence S 89°59'50" W for a distance of 39.53 feet; thence to a tangent curve to the left having a radius of 1825.00 feet, along said curve through a central angle of 06°01'10", an arc length of 191.73 feet; to a reverse curve to the right having a radius of 375.00 feet, along said curve through a central angle of 04°30'50", an arc length of 29.54 feet; thence S 88°29'30" W for 108.49 feet; thence to a tangent curve to the right having a radius of 375.00 feet, along said curve through a central angle of 04°38'50", an arc length of 30.42 feet; thence N 86°51'40" W for 122.35 feet; thence N 88°04'46" W for 40.43 feet; thence N 89°56'01" W for 47.97 feet; thence S 46°53'19" W for 61.75 feet; thence S 01°47'25" E for 478.59 feet; thence to a tangent curve to the left having a radius of 125.00 feet, along said curve through a central angle of 18°06'42", an arc length of 39.51 feet; thence S 19°54'07" E for 39.11 feet; thence to a tangent curve to the right having a radius of 175.00 feet, along said curve through a central angle of 18°10'35", an arc length of 55.52 feet; thence S 01°43'32" E for a distance of 308.22 feet; thence to a tangent curve to the left having a radius of 125.00 feet, along said curve through a central angle of 10°35'24", an arc length of 23.10 feet; thence S 12°18'56" E for 120.58 feet; thence to a tangent curve to the right having a radius of 175.00 feet, along said curve through a central angle of 10°35'24", an arc length of 32.35 feet; thence S 01°43'32" E for 255.66 feet; thence S 88°16'30" W for 164.28 feet; thence N 01°43'30" W for 1536.12 feet to the POINT OF BEGINNING.

Containing 419,317 Square Feet or 9.6 Acres, more or less, by calculations.

For Horizontal Control:

The following Horizontal Control Data were obtained from the Florida Permanent Network Web Site (a Florida Reference Station Service Provider, www.myfloridagps.com).

Florida Permanent Network Control Stations:

Name: MIAMI 6 (MIAMI)  
 Code: MIAMI  
 Geographic Coordinates:  
 Latitude: 25°30' 03.79601" N  
 Longitude: 80°33' 00.43281" W  
 State Plane Coordinates:  
 Northing: 509,427.49 US Feet  
 Easting: 931,640.11 US Feet  
 Creation Date: 08-02-2010  
 Receiver Type: TRIMBLE NETRS  
 Satellite System: GPS Only  
 Coverage Radius: 30 km

Name: MIAMI 3 (RICHMOND)  
 Code: RMND  
 Geographic Coordinates:  
 Latitude: 25°36' 49.58922" N  
 Longitude: 80°23' 02.14116" W  
 State Plane Coordinates:  
 Northing: 465,790.41 US Feet  
 Easting: 859,175.16 US Feet  
 Creation Date: 08-02-2010  
 Receiver Type: LEICA GRX1200PRO  
 Satellite System: GPS Only  
 Coverage Radius: 30 km

The above control stations are based upon the Florida State Plane Coordinates, Florida East Zone, North American Datum (NAD) of 1983 and an adjustment made by the National Geodetic Survey-Cors 1996 (NAD86/CORS96).

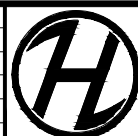
Elevations as shown hereon are based on the National Geodetic Vertical Datum of 1929, as per Miami-Dade County's Benchmark Number M-101, Elevation 7.22 feet.

**LEGEND:**

- |   |                             |                                 |
|---|-----------------------------|---------------------------------|
| DRWY = DRIVEWAY                             | P.G. = PAGE                 | Ⓣ = TELEPHONE MANHOLE           |
| D.M.E. = DRAINAGE MAINTENANCE EASEMENT      | P.O.B. = POINT OF BEGINNING | Ⓧ = DRAINAGE MANHOLE            |
| C.M.E. = CANAL MAINTENANCE EASEMENT         | ℙ = PROPERTY LINE           | Ⓢ = SANITARY SEWER MANHOLE      |
| UE = UTILITY EASEMENT                       | N.T.S. = NOT TO SCALE       | T.B.M. = TEMPORARY BENCH MARK   |
| A = ARC DISTANCE                            | = ELEVATION                 | Ⓜ = PARKING METER               |
| BLDG. = BUILDING                            | ℙ = WATER OUTLET            | ℙ = FLAG POLE                   |
| C.B. = CATCH BASIN                          | BL. = BLOCK                 | F.F.E. = FINISH FLOOR ELEVATION |
| C.B.S. = CONCRETE BLOCK STRUCTURE           | ⊙ = CLEANOUT                | S.I.R. = SET IRON REBAR         |
| CH. = CHORD DISTANCE                        | ℙ = MONUMENT LINE           | P.O.C. = POINT OF COMMENCEMENT  |
| c = CALCULATED VALUE                        | ■ = DRAINAGE CATCH BASIN    | F.N. = FOUND NAIL               |
| (C) = CLEAR                                 | △ = CENTRAL ANGLE           | P.T. = POINT OF TANGENCY        |
| ℄ = CENTER LINE                             | ⊙ = TRAFFIC SIGN            | E.N.C. = ENCROACHMENT           |
| CONC. = CONCRETE                            | ⊙ = CATCH BASIN (INLET)     | F.H. = FIRE HYDRANT             |
| P.R.C. = POINT OF REVERSE CURVE             | ⊙ = MAST ARM                | F.I.P. = FOUND IRON PIPE        |
| P.C. = POINT OF CURVATURE                   | ⊙ = WOOD UTILITY POLE       | F.I.R. = FOUND IRON REBAR       |
| F.N.D. = FOUND NAIL/DISK                    | ⊙ = ANCHOR POLE             | L.F.E. = LOWEST FLOOR ELEVATION |
| P.C.C. = POINT OF COMPOUND CURVE            | ⊙ = CONCRETE LIGHT POLE     | L.P. = LIGHT POLE               |
| ℄ = BASELINE                                | ⊙ = CONCRETE POWER POLE     | (M) = MEASURED VALUE            |
| N.G.V.D. = NATIONAL GEODETIC VERTICAL DATUM | ⊙ = FIRE HYDRANT            | (R) = RECORD VALUE              |
| INV. EL. = INVERT ELEVATION                 | ⊙ = ELECTRIC BOX            | — — — = RIGHT OF WAY LINE       |
| P.B. = PLAT BOOK                            | ⊙ = CABLE TV BOX            | — · — · — = PROPERTY LINE       |
| P.C.P. = PERMANENT CONTROL POINT            | ⊙ = WIRE PULL BOX           | — — — = EASEMENT LINE           |
| CMP = CORRUGATED METAL PIPE                 | ⊙ = WATER VALVE             | — — — = IRON FENCE              |
| P.I. = POINT OF INTERSECTION                | ⊙ = SEWER VALVE             | — // — // — = WOOD FENCE        |
| B/C = BLOCK CORNER                          | ⊙ = METAL LIGHT POLE        | — X — X — = CHAIN LINK FENCE    |
| R = RADIUS                                  | ⊙ = WATER MANHOLE           | — OUL — = OVERHEAD UTILITY LINE |
| RAD. = RADIAL                               |                             | ⊙ = BRICK                       |
| RES. = RESIDENCE                            |                             | ⊙ = CONCRETE                    |
| R/W = RIGHT OF WAY                          |                             | ⊙ = GRAVEL                      |
| SEC. = SECTION                              |                             | ⊙ = TILE                        |
| S.I.P. = SET IRON PIPE                      |                             | ⊙ = PAVEMENT                    |
| T.O.P. = TOP OF PIPE                        |                             | ⊙ = CBS WALL                    |
| SWK = SIDEWALK                              |                             |                                 |

REVISIONS

1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 06-12-18 UPDATE SURVEY	8.
4.	9.
5.	10.



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 3D LASER SCANNING  
 UTILITY COORDINATION  
 SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LEGAL DESCRIPTION & GENERAL NOTES**

Job No.: 14003  
 Field Book: 329/14  
 DRAWN BY: MJL  
 TECH BY: RI  
 QA/QC BY: AH  
 2/10

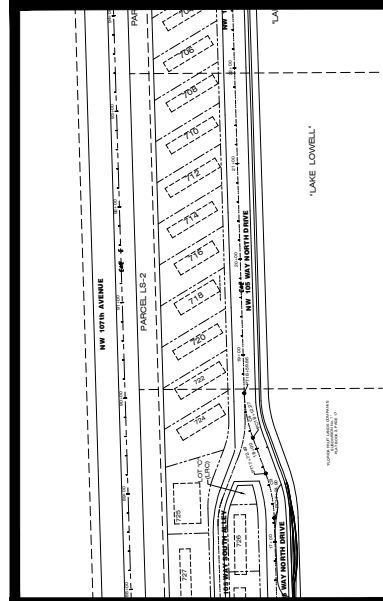
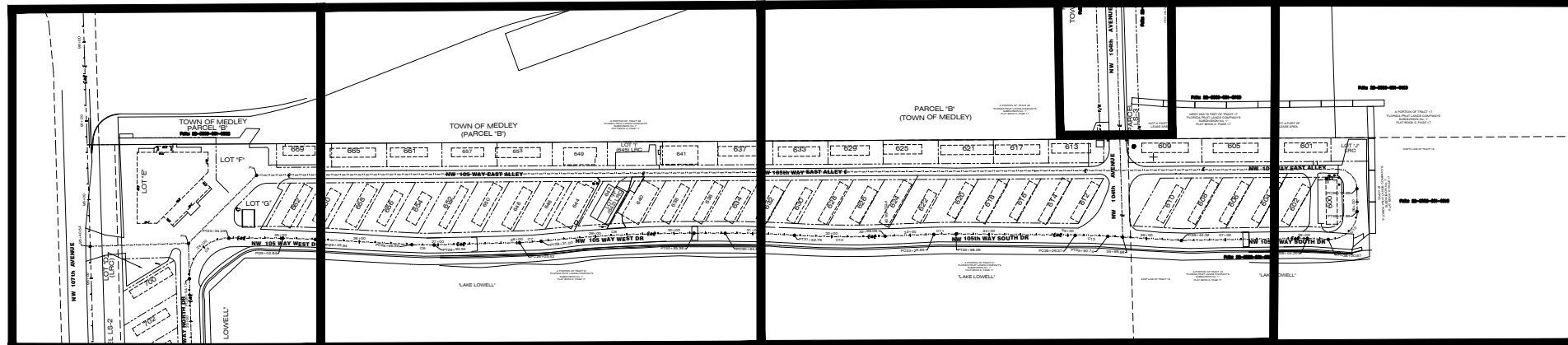
LOTS 706 TO 669  
SHEET 6

LOTS 669 TO 637  
SHEET 7

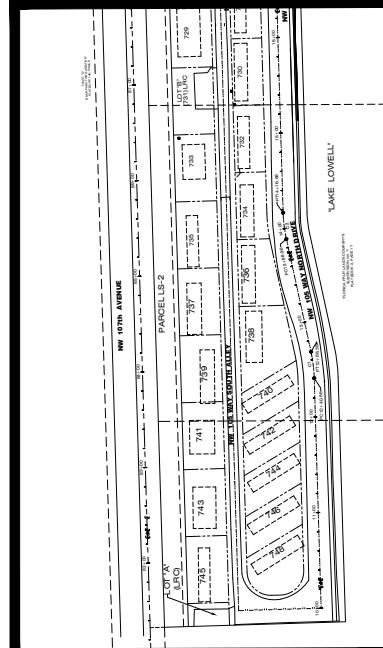
LOTS 637 TO 605  
SHEET 8

NW 104 AVE  
SHEET 10

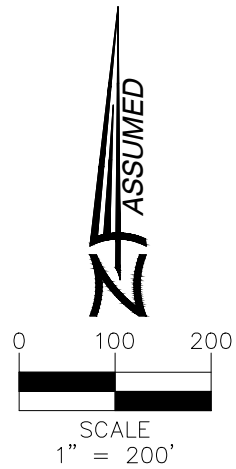
LOTS 605 TO 600  
SHEET 9



SHEET 5  
LOTS 729 TO 706



SHEET 4  
LOTS 748 TO 729



REVISIONS

1.	12/27/2017	REV.1 TOWN ENGINEER COMMENTS	6.
2.	03/20/2018	REVISION	7.
3.	06-12-18	UPDATE SURVEY	8.
4.			9.
5.			10.



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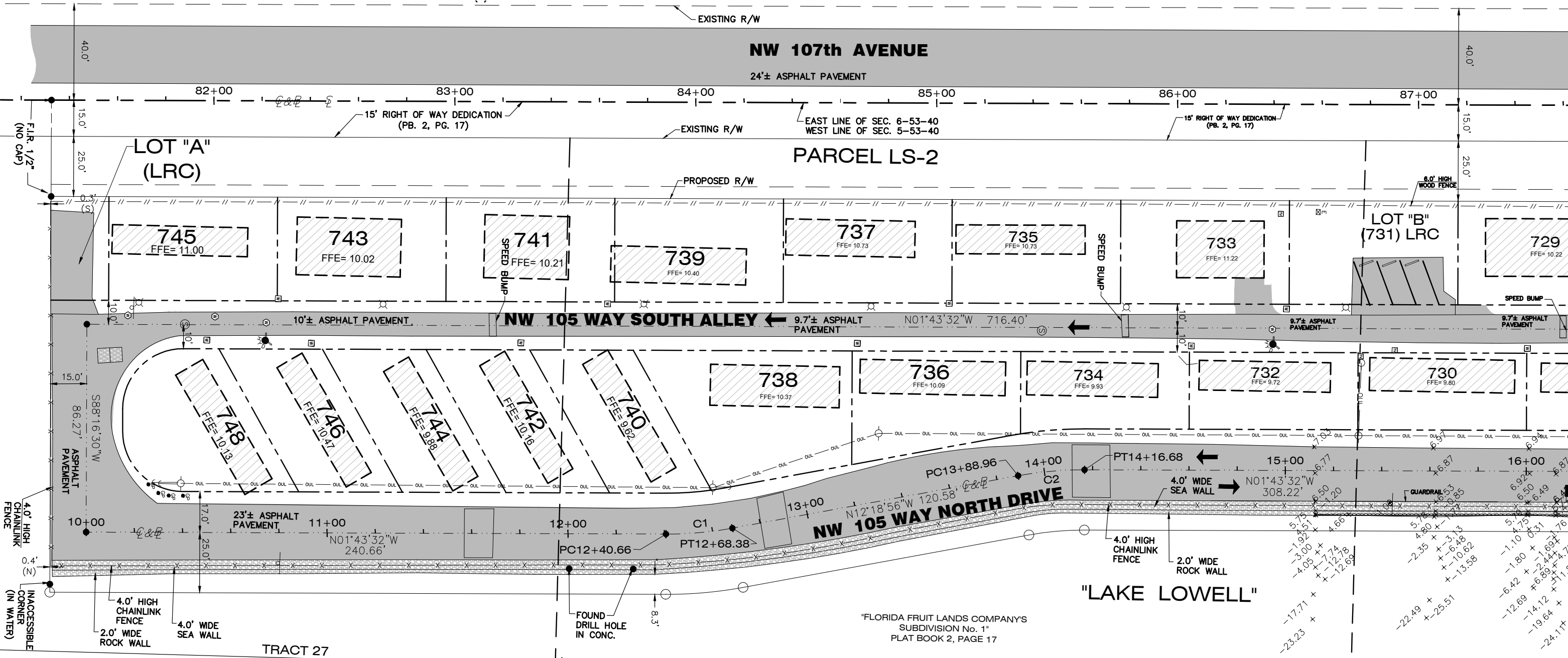
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UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**KEY MAP**

Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
3/10



**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

**REVISIONS**

1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
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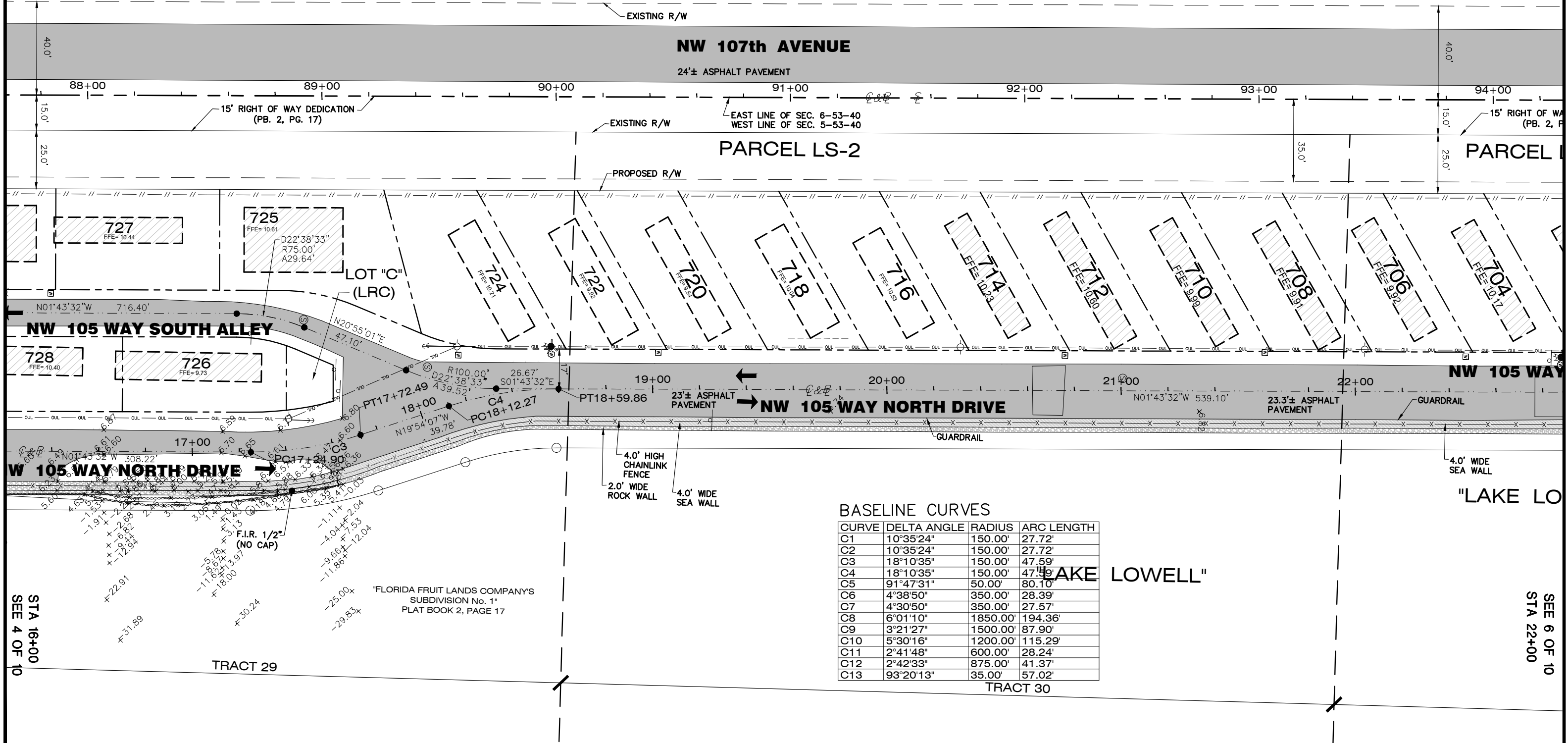
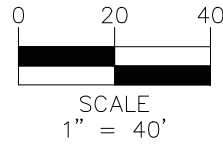
**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 748 - 729**

Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
4/10

SEE 5 OF 10  
STA 16+00



BASELINE CURVES

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

STA 16+00  
SEE 4 OF 10

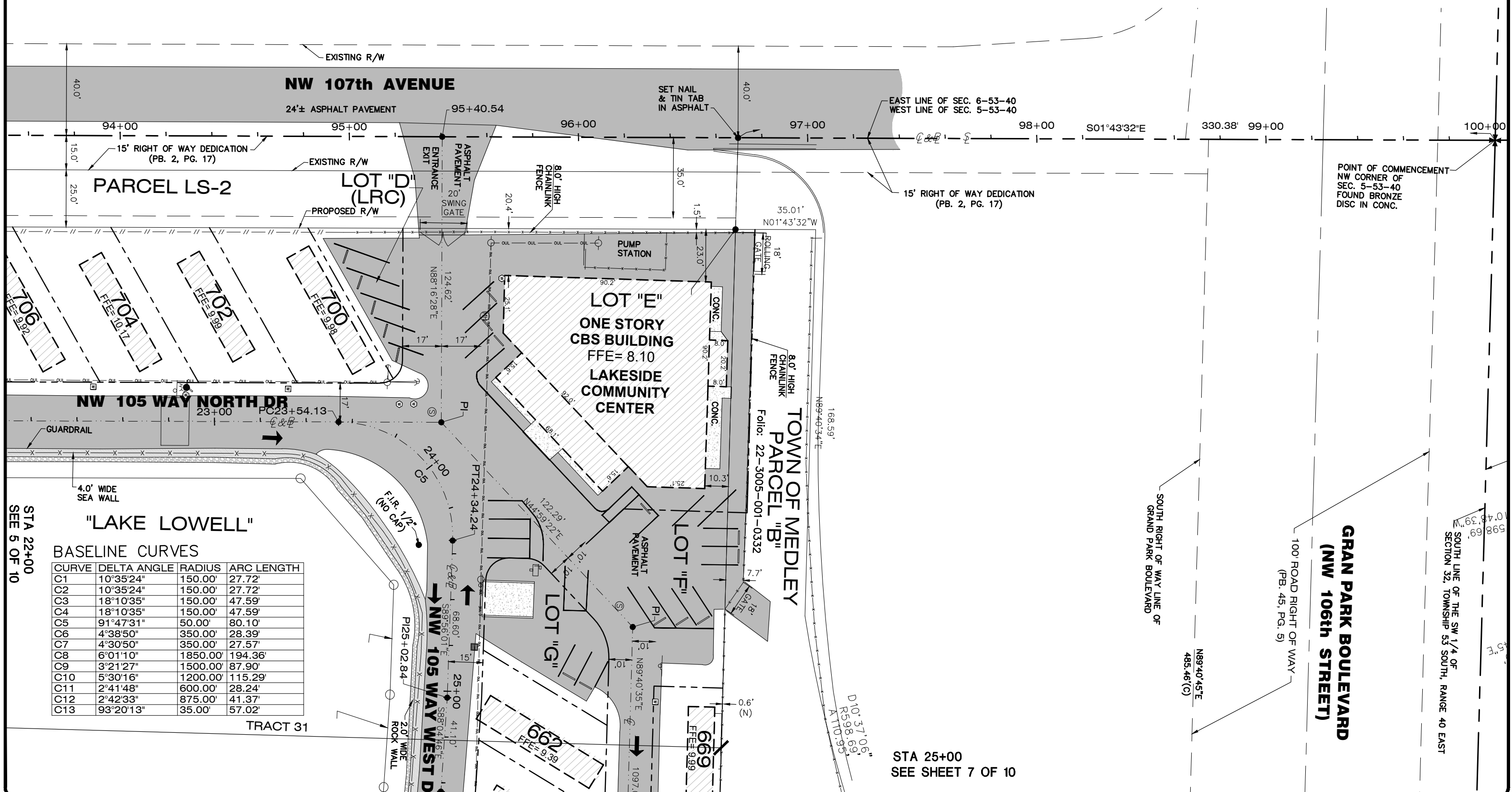
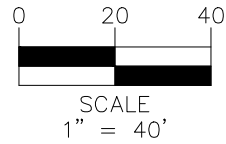
STA 22+00  
SEE 6 OF 10

REVISIONS	
1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 06-12-18 UPDATE SURVEY	8.
4.	9.
5.	10.

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**LAKESIDE RETIREMENT COMMUNITY**  
**SITE PLAN**  
**LOTS 729 - 706**

Job No.:	14003
Field Book:	329/14
DRAWN BY:	MJL
TECH BY:	RI
QA/QC BY:	AH
5/10	



POINT OF COMMENCEMENT  
NW CORNER OF  
SEC. 5-53-40  
FOUND BRONZE  
DISC IN CONC.

"LAKE LOWELL"  
BASELINE CURVES

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

STA 22+00  
SEE 5 OF 10

STA 25+00  
SEE SHEET 7 OF 10

REVISIONS

1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 06-12-18 UPDATE SURVEY	8.
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5.	10.

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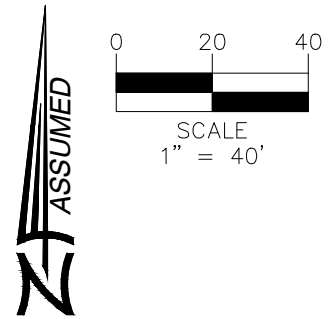
LAND SURVEYOR AND MAPPERS  
3D LASER SCANNING  
UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

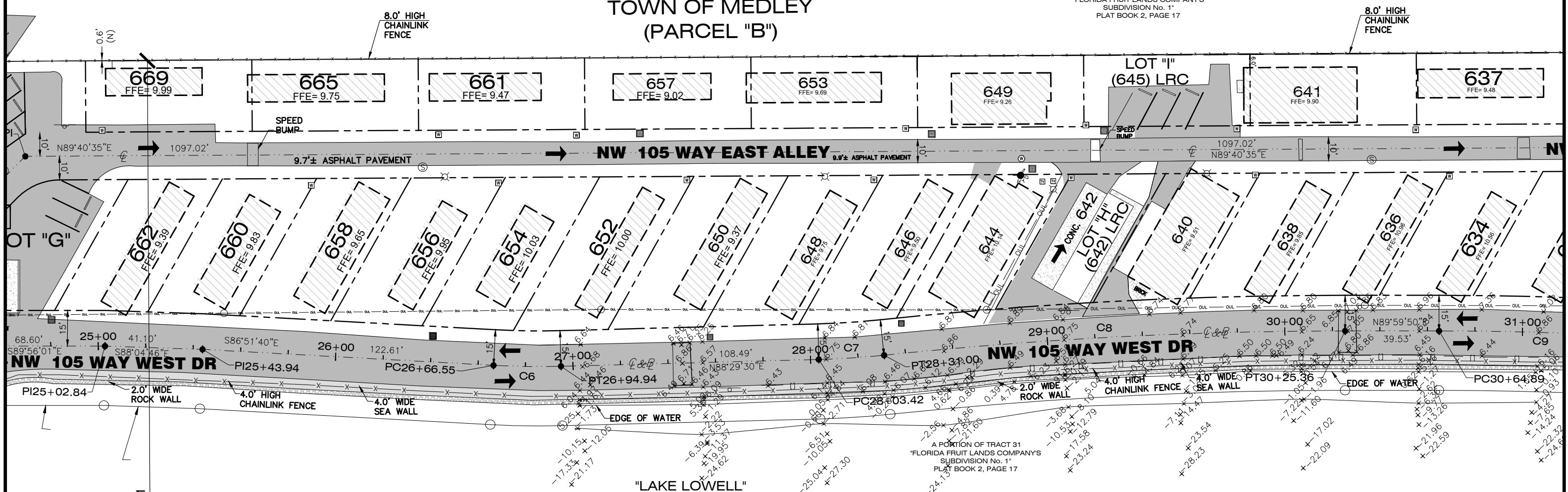
**LOTS 706 - 669**

Job No.:	14003
Field Book:	329/14
DRAWN BY:	MJL
TECH BY:	RI
QA/QC BY:	AH
	6/10



TOWN OF MEDLEY  
(PARCEL "B")

A PORTION OF TRACT 32  
"FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1"  
PLAT BOOK 2, PAGE 17



BASELINE CURVES

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

STA 25+00  
SEE 6 OF 10

SEE 8 OF 10  
STA 31+00

REVISIONS

1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
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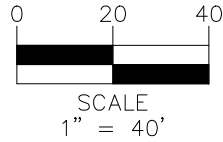
LAND SURVEYOR AND MAPPERS  
3D LASER SCANNING  
UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 669 - 634**

Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
7/10

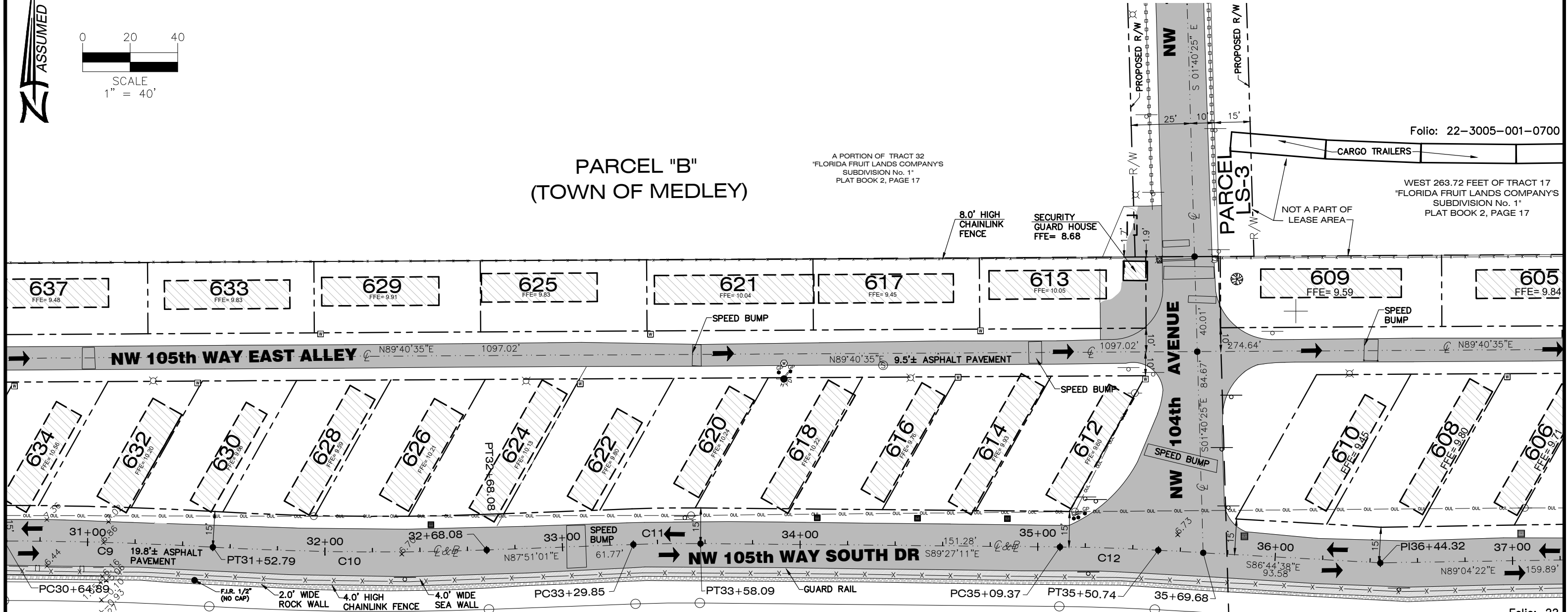


**PARCEL "B"  
(TOWN OF MEDLEY)**

A PORTION OF TRACT 32  
"FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1"  
PLAT BOOK 2, PAGE 17

Folio: 22-3005-001-0700

WEST 263.72 FEET OF TRACT 17  
"FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1"  
PLAT BOOK 2, PAGE 17



A PORTION OF TRACT 31  
"FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1"  
PLAT BOOK 2, PAGE 17

"LAKE LOWELL"

A PORTION OF TRACT 18  
"FLORIDA FRUIT LANDS COMPANY'S  
SUBDIVISION No. 1"  
PLAT BOOK 2, PAGE 17

**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
C3	18°10'35"	150.00'	47.59'
C4	18°10'35"	150.00'	47.59'
C5	91°47'31"	50.00'	80.10'
C6	4°38'50"	350.00'	28.39'
C7	4°30'50"	350.00'	27.57'
C8	6°01'10"	1850.00'	194.36'
C9	3°21'27"	1500.00'	87.90'
C10	5°30'16"	1200.00'	115.29'
C11	2°41'48"	600.00'	28.24'
C12	2°42'33"	875.00'	41.37'
C13	93°20'13"	35.00'	57.02'

STA 31+00  
SEE 7 OF 10

SEE 9 OF 10  
STA 37+00

**REVISIONS**

1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
2. 03/20/2018 REVISION	7.
3. 06-12-18 UPDATE SURVEY	8.
4.	9.
5.	10.



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UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

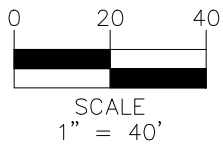
**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 637 - 605**

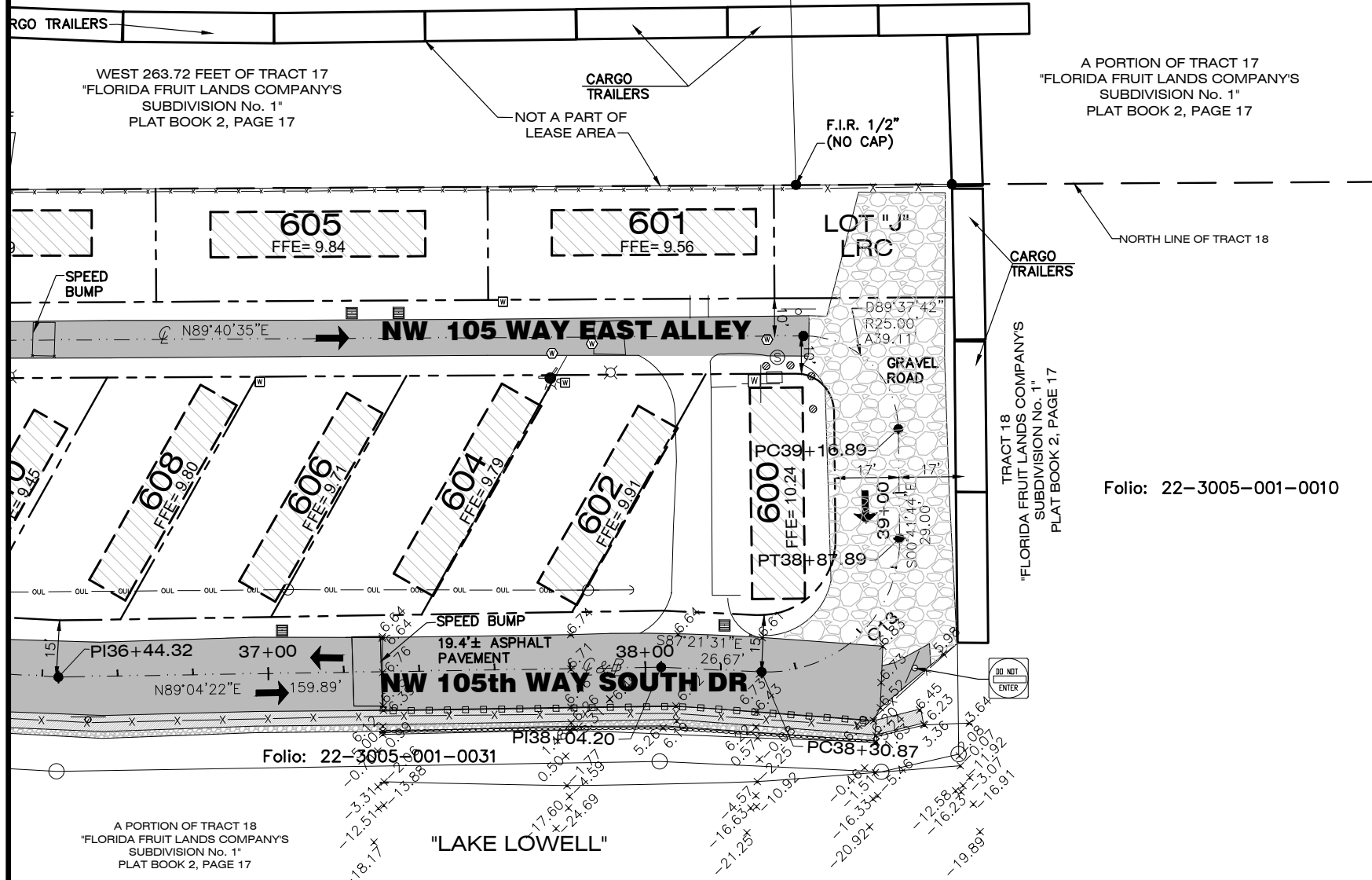
Job No.: 14003  
Field Book: 329/14  
DRAWN BY: MJL  
TECH BY: RI  
QA/QC BY: AH  
8/10





Folio: 22-3005-001-0180

Folio: 22-3005-001-0700



Folio: 22-3005-001-0010

**BASELINE CURVES**

CURVE	DELTA ANGLE	RADIUS	ARC LENGTH
C1	10°35'24"	150.00'	27.72'
C2	10°35'24"	150.00'	27.72'
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STA 37+00  
SEE 8 OF 10

REVISIONS	
1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
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4.	9.
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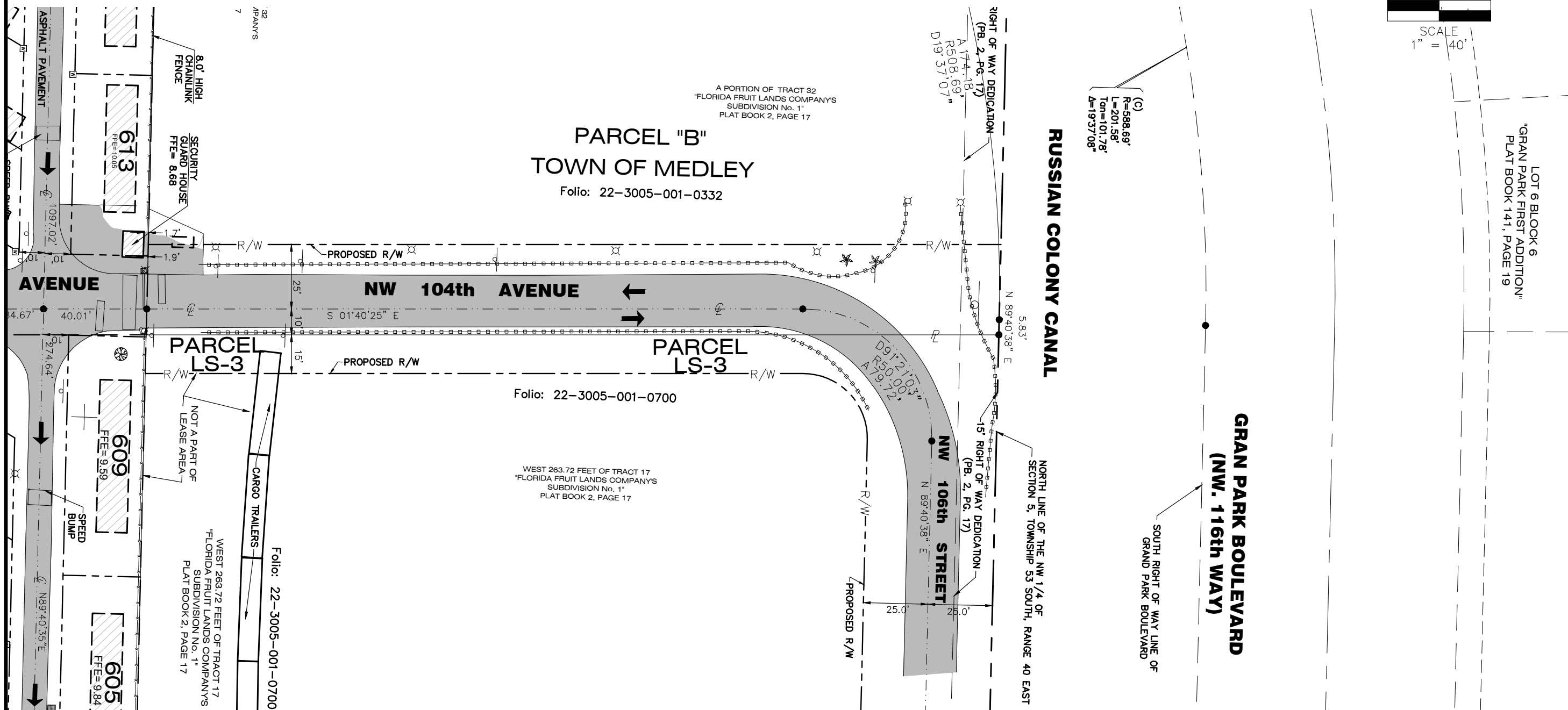
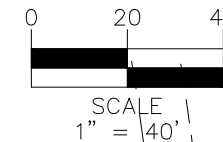
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UTILITY COORDINATION  
SUBSURFACE UTILITY ENGINEERING

**LAKESIDE RETIREMENT COMMUNITY**

**SITE PLAN**

**LOTS 608 - 600**

Job No.:	14003
Field Book:	329/14
DRAWN BY:	MJL
TECH BY:	RI
QA/QC BY:	AH
	9/10



SEE 8 OF 10

REVISIONS	
1. 12/27/2017 REV.1 TOWN ENGINEER COMMENTS	6.
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**LAKESIDE RETIREMENT COMMUNITY**  
**SITE PLAN**  
**NW 104th AVENUE**

Job No.:	14003
Field Book:	329/14
DRAWN BY:	MJL
TECH BY:	RI
QA/QC BY:	AH
	10/10