SANITARY SEWER REPORT & TECHNICAL SPECIFICATIONS
FOR
VERONA SUNSET URBAN RENEWAL, LLC
BLOCK 303, LOT 4 – TOWNSHIP OF VERONA
BLOCK 301, LOT 5 AND BLOCK 401, LOT 1 – TOWNSHIP OF MONTCLAIR
ESSEX COUNTY, NEW JERSEY

MATRIXNEWORLD

Engineering Progress

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MATRIX NO. 19-720

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1.0 INTRODUCTION

The subject property consists of three (3) contiguous lots and is identified as Block 303, Lot 4 in the Township of Verona and Block 301, Lot 5 and Block 401, Lot 1 in the Township of Montclair, Essex County, New Jersey. The subject site maintains frontage on Afterglow Avenue to the east, Sunset Avenue to the north, Bloomfield Avenue to the northeast, residential properties to the east, and residential properties and Dryer Road to the south. The proposed residential development consists of one (1) residential building which contains a total of 200 units along with a parking garage, associated surface parking and loading, landscaping, lighting, water, sewer, and drainage facilities.

2.0 PROPOSED PROJECT

It is proposed to construct 200 dwelling units and associated infrastructure. 637 LF of 8" PVC sewer main, with two (2) 8" PVC services to the building. The proposed sewer main will extend to Afterglow Avenue, where it will connect to a proposed sanitary manhole.

3.0 FLOW CALCULATIONS

1. Proposed Average Daily Flow:

The following demand calculations were based on the projected flow criteria provided in N.J.A.C. 7:14A-23.3:

1 Bedroom Apartment: $Q_{avg.}$ = 150 gpd/unit x 92 units = **13,800 g.p.d.**
2 Bedroom Apartment: $Q_{avg.}$ = 225 gpd/unit x 105 units = **23,625 g.p.d.**
3 Bedroom Apartment: $Q_{avg.}$ = 300 gpd/unit x 3 units = **900 g.p.d.**

Clubhouse: $Q_{avg.}$ = 15 gpd/guest x 52 guests = **780 g.p.d.**

Office and Staff Area: $Q_{avg.}$ = 0.1 gpd/SF x 12,500 SF = **1,250 g.p.d.**

Total Proposed Flow ($Q_{avg.}$) : 40,355 gpd = 0.040 mgd

A NJDEP TWA permit is required as the proposed flow is greater than 8,000 gpd.

2. Sewer Main Capacity Analysis:

The proposed 8-inch sewer main will be sufficient to convey the proposed flows from the project as calculated below (0.036 mgd):

$$Q_d = \frac{1.486}{n} \times A \times R^{2/3} \times S^{1/2}$$

where,

Q_d = design capacity, cfs (1/2 full)
n = Mannings roughness coefficient (PVC = 0.013)
A = flow area (1/2 full) = 0.175 S.F.
R = hydraulic radius = A/WP = 0.167 ft.
S = pipe slope = 0.004 ft/ft.

$$\mathbf{Q_d = \frac{1.486}{0.013} \times 0.175 \times 0.167^{2/3} \times 0.004^{1/2} = 0.38\ cfs}$$

Q_d = 0.38 cfs x 0.6463 mgd/cfs = 0.245 mgd

Minimum Design Capacity = 2 x $Q_{avg.}$ (flowing 1/2 full)

$$\mathbf{\frac{Qd}{Q_{avg.}} = \frac{0.245\ mgd}{0.040\ mgd} = 6.13 > 2 \quad \therefore \quad OK}$$

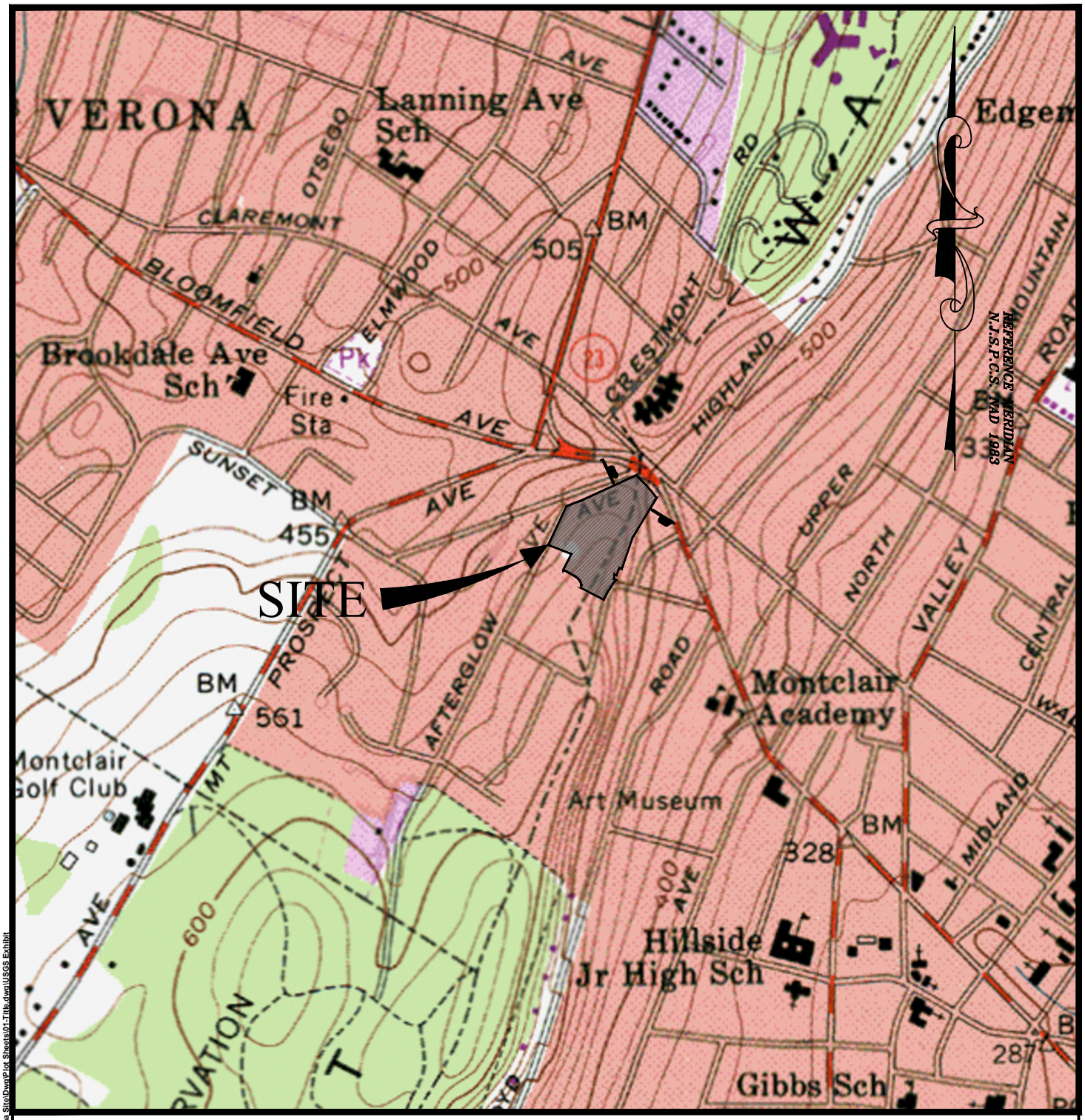
(Capacity exceeds demand)

4.0 CONCLUSION

The analysis herein demonstrates that both the proposed sewer mains can adequately convey wastewater flows from the project site.

APPENDIX A

USGS QUAD MAP



1000 500 0 1000 2000 3000

GRAPHIC SCALE
1 inch=1,000 feet

USGS QUAD MAP

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VERONA DEVELOPMENT
BLOCK 303, LOT 4 - TOWNSHIP OF VERONA
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ESSEX COUNTY, NEW JERSEY

SCALE:	PROJECT NO.:	DATE:	FIGURE NO.:
1" = 1000'	19-720	10/27/2021	APPENDIX A

APPENDIX B

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATION
SANITARY SEWERAGE SYSTEM

2A. GENERAL

2A.1 Work Included Under This Section. Furnish and perform Work to complete SANITARY SEWERAGE as shown on the Drawings or specified herein, or both.

2A.2 Work Items. The Specific items of work to be completed under this Section shall include but not be limited to the furnishing of all materials, labor and equipment required for: excavation and trench preparation; installation of pipe bedding, sewer pipes, main stubs and caps, building lateral connections and manholes; testing of the completed system; and all else necessary there for and incidental thereto.

2A.3 Laws and Regulations. Among the Laws and Regulations applicable under the Contract Documents, for all or part of the work included under this Section attention is directed to the specific requirements of:

(1) All provisions of the NJDEP Construction Permit for Sanitary Sewer Extension.

(2) Rules and Regulations of the Municipal Sewer Department and Treatment Authority.

2B. MATERIALS AND EQUIPMENT

2B.1 General Requirements. Materials and equipment shall be furnished in accordance with the Contract Documents, and shall meet the requirements of the reference or other standards as indicated below.

2B.2 Supplemental Requirements. All materials and equipment of the Sanitary Sewer Extension shall be in accordance with the Rules and Regulations of the municipality, Treatment Authority and New Jersey Department of Environmental Protection.

2B.3 Required Materials and Equipment. Required Materials and equipment to be installed under this Section shall be as follows:

2B.3.1 Sewer Pipes

(1) Polyvinyl Chloride Pipe (P.V.C.) and fittings for main diameters 4" through 15" shall be circular plastic gravity sewer pipe, Type PSM SDR-35 in accordance with ASTM D3034. Polyvinyl Chloride Pipe (P.V.C.) and fittings for main diameters 18" through 27" shall be circular gravity sewer pipe in accordance with ASTM F679. Pipe shall be furnished in maximum lengths of 20 ft. Joints for P.V.C. sewer pipe shall be bell and spigot integrally formed in pipe sections with elastomeric seals in accordance with ASTM D3212.

(2) Ductile Iron Pipe (D.I.P.) shall be circular, Thickness Class 52. Fittings shall be Ductile Iron in accordance with ANSI A21.10. Joints for Ductile Iron Pipe and Fittings shall be bell and spigot, integrally cast in pipe sections with elastomeric seals in accordance with ANSI

A21.11. Ductile Iron Pipe and Fittings shall be asphalt seal coated in accordance with ANSI A21.4.

(3) Reinforced Concrete Pipe (R.C.P.) shall be circular, Class IV, wall B in accordance with ASTM C76. Pipe shall be furnished in maximum lengths of 20 ft. Joints for reinforced concrete pipe shall be bell and spigot, integrally cast in pipe sections with steel tipped rubber gaskets in accordance with ASTM C361.

2B.3.2 Sewer Manholes

(1) Sewer Manholes shall consist of precast reinforced concrete base and riser sections, eccentric riser section and cone or flat slab top in accordance with ASTM C478. Each manhole section shall be furnished with aluminum drop front steps cast into side walls that will form a continuous internal ladder when sections are assembled. Exterior surfaces of manhole sections shall be finished with two (2) coats of asphalt epoxy seal coat material.

(2) Joints for precast concrete manholes shall be bell and spigot, integrally cast in manhole sections with O-Ring elastomeric gasket in accordance with ASTM C443. Gasket spaces between bell and spigot shall be so formed to provide either grooves or shoulders that will serve to prevent the gasket from disengaging during assembly or from being displaced by hydrostatic pressure.

(3) Manhole Pipe Connections of pipe into manhole sections shall be made watertight utilizing one of the following preformed gaskets or equal:

Lock Joint Flexible Manhole Sleeve: Elastomeric Gasket Seal that is cast in manhole base section and accepts sewer pipe as a direct pressure insert into seal.

KOR-N-SEAL Assembly or approved equal: Elastomeric Gasket Seal that is installed after the casting of the manhole base section and accepts sewer pipe in sleeve and seals by means of an external stainless steel compression clamp.

(4) Manhole Frame and Cover: Manhole frames and covers shall be constructed of cast iron, Class 30 in accordance with ASTM A48. All castings shall be close fitting, free from imperfection, thoroughly cleaned and coated with coal tar varnish. Manhole frames and covers shall be the patterns shown on the Drawings with the required lettering cast directly into each cover.

2B.3.3 Other Materials:

(1) Bedding Material for reinforced concrete pipe and precast concrete manhole base sections shall be choked crushed stone, Coarse Aggregate Size No. 57 in accordance with Section 901 of the NJDOT specifications.

(2) Bedding Materials for Polyvinyl Chloride Pipe, where on site materials prove to be unsuitable, shall be coarse sand and gravel Soil Aggregate Gradation Designation I-2 in accordance with Section 901 of the NJDOT Standard Specifications.

(3) Backfill Material for sewer pipe and manholes shall consist of the best excavated material sand and gravel which is to contain not more than 2% of elutriable clay.

(4) Concrete shall be air entraining port land cement concrete proportioned to provide a minimum compressive strength of 3,500 psi at 28 days in accordance with ACI 318 (NJDOT Class B). Ready mix concrete shall be in accordance with ASTM C94.

(5) Concrete Block and Brick shall be solid modular units in accordance with ASTM C139.

(6) Mortar and Grout used in completing sewer pipes and manholes shall be non-shrink, non-metallic materials formulated to develop high bond strength and to counteract shrinkage during curing.

2C. EXECUTION

2C.1 General Requirements. Work shall be performed in accordance with the Contract Documents, which require that all materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable Supplier.

2C.2 Elemental Requirements. All work of the Sanitary Sewer Extension shall be performed in accordance with the Rules and Regulations of the Municipal Sewer Department, the Treatment Authority and the New Jersey Department of Environmental Protection.

2C.3 Required Execution. Required execution shall be as follows:

2C.3.1 General Provisions

(1) The Sanitary Sewer Extension shall be constructed to the lines, grades, dimensions and details as shown on the Drawings. Horizontal and vertical controls for the installation of sewer mains, manholes and appurtenances shall be established by the ENGINEER.

(2) Before work is started, it shall be the responsibility of the CONTRACTOR to have all underground utilities marked out in the field by those companies whose facilities may be encountered during construction. Locations of utilities shown on the Drawings are approximate, based on the best available information. The accuracy and completeness of this information is not guaranteed by the ENGINEER, and the CONTRACTOR is advised to verify in the field all

facts concerning the location of these facilities to his own satisfaction prior to proceeding with the work.

(3) All materials required for the work shall be neatly piled and protected at the site of work. As a minimum, adequate materials shall be on hand for completion of that day's work, to insure that no trench excavation is left open overnight. Excavated materials shall be banked on one side of the trench and kept trimmed up so as to leave a clear footway of at least 2 feet between the bank and the trench. Work shall be progressed to minimize inconvenience to the owners of adjoining properties and the public in general. Gutters, driveways and street crossings must be kept clear except where unavoidable obstructed by the construction, in which case these areas shall be restored immediately after installation of the sewerage.

(4) All materials, excavation, embankments and spoils incidental to the work which are within public rights-of-way, must be protected with barricades and lights sufficient to prevent accidents. Special precautions must be taken to protect buildings and properties near the excavation. All local ordinances relating to the work and required safeguards must be strictly observed during construction.

2C.3.2 Trench Excavation

(1) Excavation shall be accomplished using suitable equipment for the conditions anticipated for the work. Excavation shall not progress more than 50 feet ahead of pipe laying operations. Not more than 50 feet of open trench shall be left uncovered following the sewer installation, unless specifically required for inspection purposes.

(2) Extreme care shall be exercised in excavating in the vicinity of existing water line, gas or drain pipes, and service connections. These facilities shall be properly protected or supported as necessary. Where such pipes or conduits form an obstruction to the line and grade of the sanitary sewerage, any removal, alteration or rearrangement of utilities shall be completed by the CONTRACTOR in a manner acceptable to the OWNER.

(3) Trenches shall first be excavated to the top of the Pipe Embedment Zone (12 inches above the crown of the pipe). Excavation for manholes and other appurtenances shall have 12 inches minimum and 24 inches maximum clearance on all sides. The ground surface adjacent to all open trenches shall be graded to prevent surface water from entering the excavation.

(4) Excavation of the Pipe Embedment Zone shall be carefully progressed to the depth of the pipe foundation or bedding and shall not exceed the maximum trench width as follows:

Diameter of Pipe	Maximum Trench Width
4" - 12"	3 ft. - 0 in.
14" - 18"	3 ft. - 6 in.
20" - 24"	4 ft. - 0 in.
27"	4 ft. - 6 in.
30"	5 ft. - 3 in.
36"	5 ft. - 9 in.

(5) Should the excavated width of the Pipe Embedment Zone exceed the maximum values listed above, the sewer pipe shall be constructed in a higher class bedding, or the class of pipe shall be increased, or both in accordance with the loading conditions at that specific location.

2C.3.3 Sheathing and Shoring

(1) Sheathing, bracing and shoring shall be utilized to support the sides of unstable trench excavations wherever necessary to maintain adjoining structures or to contain the work within easements or rights-of-way. All sheathing, bracing and shoring shall be removed as the work progresses except as specifically permitted herein.

(2) Necessary sheathing, bracing and shoring shall be furnished, placed and maintained to support the trench excavation and prevent any movement which could damage installed materials, diminish the necessary width of excavation or otherwise endanger personnel, buildings or other adjacent structures.

(3) No sheathing or shoring is to be left in place except as specifically permitted in writing by the ENGINEER. If any materials are allowed to remain in place, they shall be cut off and removed to a depth of at least 4 ft. below surfaces in road rights-of-way and at least 2 ft. in all other locations.

2C.3.4 Dewatering of Trench

(1) Groundwater conditions may be encountered throughout all or part of the trench excavation for this project. All necessary pumps, pipes, headers, well points, etc. shall be furnished to lower existing groundwater below the level of trench excavation.

(2) Discharge of groundwater resulting from the dewatering of trench excavations shall in no case be pumped directly into any body of water or drainage system. Unless a naturally vegetated drainage course is available for said discharge, suitable silt/sand traps shall be provided to remove and set suspended materials at the point of discharge.

2C.3.5 Laying of Pipe

(1) Installation of gravity sewer pipe shall be in accordance with the provisions of ASTM D2321. All pipes are to be laid in a straight alignment with uniform slope between manholes. Proper invert elevation shall be maintained by means of continuous measurements using laser, grade line or other acceptable means.

(2) Pipe bedding material shall be placed and shaped to provide full bearing along the entire length of each section of pipe. The bedding material shall extend as haunching up the sides of the pipe to provide a bearing cradle for at least one quarter of the circumference of the pipe.

(3) Due care shall be exercised during installation of the pipe to insure that the system is kept clean, free of sand, debris and any other foreign objects. Pipe joints shall be pulled up tight without rolling the gasket out of place and checked for proper alignment prior to proceeding

with installation of the next pipe section. Upon completion of the work, the entire system shall be thoroughly flushed and left ready for testing.

2C.3.6 Manhole Construction

(1) Manholes shall be constructed in the sewer alignment as the pipe laying progresses, at locations as shown on the Drawings. Precast concrete manhole base sections are to be installed on a leveling course of bedding material, minimum 12 in. in thickness.

(2) Precast concrete manhole sections shall be assembled using the gaskets to insure a watertight structure. Sections shall be placed to provide a true alignment of the interior ladder. All grappling holes and manhole sections shall be plugged and grouted after assembly.

(3) Invert channels may be precast directly in manhole base sections or built up using block, brick mortar and concrete. Finished channels shall be smooth and accurately shaped to the sewer pipes as required.

(4) Manhole frame and casting shall be set to the required grade elevation utilizing a maximum of 2 courses of precast concrete grade rings, concrete block and/or brick. The manhole frames shall be securely anchored to the manhole structure utilizing cement mortar.

(5) Where new manholes are to be set in existing sewer lines, extreme care shall be exercised so as not to damage the existing pipeline. The manhole base sections shall be carefully set over the existing pipeline and grouted in place. Invert benches shall be built up around the existing pipe using concrete. After concrete is cured, the top of the existing pipe shall be neatly cut out and removed from the manhole. Exposed pipe surfaces and imperfections shall be grouted to insure proper seal.

2C.3.7 Backfilling

(1) Backfilling of System shall be completed using the class of material and method of construction for sewer pipes and manholes in accordance with ASTM D2321. Compaction of backfill material shall be in accordance with ASTM D1557.

(2) Initial backfill shall be completed in the Pipe Embedment Zone and compacted to 95% maximum dry density. Backfilling shall progress as haunching to the springline of the pipe, first stage of initial backfill between the springline and the crown of the pipe and second stage of initial backfill from the crown of the pipe to a point 12 inches above the top of the pipe. In no case shall individual lifts of initial backfill be greater than 12 inches in thickness.

(3) Finish backfill shall be completed between the pipe embedment zone and a plane 2 feet below the finished grade level compacted to 90% maximum dry density. Backfill shall be the best excavated material free of organic matter, clay, rocks, foreign debris and other deleterious materials. Trench backfill material shall not contain fines in excess of 10% passing a No. 200 sieve, or stones larger than 2 inches in any dimension. Trench backfill shall be progressed in lifts not to exceed 24 inches in thickness.

(4) Surface backfill shall be completed in the top 2 feet of the trench excavation, compacted to 95% maximum dry density. Surface backfill material shall be placed to the sub grade level required for the various items of surface restoration specified elsewhere herein.

(5) Excess materials remaining after the completion of backfilling operations shall remain the property of the OWNER. Materials shall be disposed of at the Site of Work as directed by the OWNER.

2C.3.8 Lateral Connections

(1) Individual lateral connections shall be constructed to each unit in accordance with the provisions of the National Plumbing Code and State Plumbing Subcode. Lateral connections shall extend from a wye branch set in the main sewer pipe to a point 2 feet behind the curb or edge of roadway at the unit or lot to be serviced. Each lateral shall be terminated with a temporary cap or plug and clean out constructed to the finished grade elevation. Temporary caps or plugs shall be suitably installed and blocked to withstand the testing procedures specified herein.

(2) Where the depth of the sewer main exceeds 10 feet a deep connection consisting of a vertical riser pipe, tee and cap shall be constructed from the sewer main. The entire deep connection shall be completely encased in concrete in accordance with the detail shown on the Drawings.

2D. TESTS AND INSPECTIONS

2D.1 General Requirements. Tests and Inspections for the acceptance of materials or equipment, or Work shall be conducted in accordance with the Contract Documents, by organizations acceptable to the OWNER.

2D.2 Supplemental Requirements. All work of the Sanitary Sewer Extension and off-site trunk sewer is subject to inspection by representatives of the Municipal Sewer Department, Treatment Authority and New Jersey Department of Environmental Protection.

2D.3 Required Tests and Inspections. Required Tests and Inspections shall be as follows:

2D.3.1 Alignment Test

(1) Testing of sewer lines between manholes shall be made to determine proper grade and alignment of the sewerage system. Individual inspection of the line by observing an illuminated lamp through the pipeline from one manhole to the next or by passing a wooden ball 1 inch smaller than the pipe diameter on a stream of water through the pipeline shall be performed.

(2) Testing of the sewer lines between manholes shall also be made to determine watertight integrity of the system. Either infiltration testing where the level of groundwater is sufficiently above the pipeline or exfiltration testing where no groundwater conditions surrounds the sewerage shall be performed.

2D.3.2 Infiltration Test

(1) Infiltration tests shall be performed where groundwater levels are higher than 2 feet above the crown of the main pipe. V-notch weirs shall be installed at Strategic manhole locations throughout the system at the end of the incoming pipe. The weir assembly shall be installed to maintain a watertight seal through the pipe and thereby prevent any water from bypassing the measurement notch. After the rate of infiltration has been allowed to stabilize, measurements shall be taken on consecutive days with a minimum 24-hour period in between to determine the actual rate of infiltration for the system.

(2) The sewer main shall not be considered acceptable if the rate of infiltration exceeds 50 gallons per inch pipe diameter per mile of sewer line per day.

2D.3.3 Exfiltration Tests

(1) Exfiltration tests shall be performed on each sewer line from manhole to manhole where groundwater levels are less than 2 feet above the crown of the sewer main. Low-pressure air testing methods in accordance with the recommended procedures of the UniBell Plastic Pipe Association shall be used to determine exfiltration. Exfiltration Tests may be performed in lieu of Infiltration Tests with appropriate adjustments in air pressure to compensate for groundwater levels around the sewer pipes.

(2) Each pipeline shall be plugged at successive manholes and pressurized to at least 4.0 psig. Following temperature equalization, the air pressure in the sewer line shall be shut off above 4.0 psig for minimum time requirements as follows:

		Minimum Time Required	
Pipe Size		Minutes	Seconds
4	for 300 LF:	1	53
6		2	50
8		3	48
10		5	56
12		8	33
15		13	51
18		19	14
21	for 400 LF:	34	54
24		45	35
27		57	42
30		71	13
36		102	34

(3) The sewer main shall not be considered acceptable if the drop in pressure exceeds 0.5 psig within the minimum required time limits. All necessary repairs to the sewer main shall be affected immediately and the pipeline retested for acceptability.

2E. **SUBMITTALS**

2E.1 Show Drawings. Shop Drawings are required for the following (where applicable):

(1) Sewer Pipe
(2) Precast Concrete Manhole
(3) Manhole Frame and Cover
(4) Concrete Mix Design
(5) Bedding Material sieve Analysis