Colliers
Engineering
& Design

Engineer's Report For Water Demand

November 17, 2023

Prestige Commerce Center

Block 4.46, Lots 1.04 & 1.07
Township of North Brunswick, Middlesex County, New Jersey

Prepared for:

Prestige Properties & Development Co., Inc.
546 Fifth Avenue, 15th Floor
New York, New York

Prepared by:

Vincent D. Kelly, PE
New Jersey Professional Engineer
License No. GE55812

Colliers Engineering & Design
101 Crawfords Corner Road
Suite 3400
Holmdel New Jersey 07733
Main: 877 627 3772
Colliersengineering.com

Project No. 21000124A

Colliers
Engineering
& Design

Table of contents

Introduction 1

Projected Water Demand 1

Appendix A
Tax Map
Aerial Map
Soils Map

Appendix B
Cost Estimate

Appendix C
Technical Specifications

Colliers Engineering & Design

Introduction

This engineer's report for water demand is being submitted as part of the site plan development application known as Prestige Commerce Center located on lots 1.04 & 1.07 of block 4.46 as shown on Sheet 19 on the Official Tax Map of the Township of North Brunswick, Middlesex County, New Jersey. This report was prepared in accordance with the New Jersey Department of Environmental Protection (NJDEP) and current industry standards and practices for water construction. The purpose of this report is to summarize the water demand generated from the proposed development.

The project location is currently developed as an overflow parking lot associated with the Regal Cinema. The proposed development proposes modifying existing site conditions to remove ninety-five (95) parking spaces and the construction of two (2) pad sites. These pad sites include a Freddy's quick service restaurant and a spec building with two (2) restaurant tenants.

Additional site improvements include, but are not limited to, pavement, curb, sidewalk, utility relocation, landscaping, and lighting.

Projected Water Demand

In accordance with N.J.A.C. 7:10-12.6 Safe Drinking Water Act Rules for the residential and commercial demands, the estimated Average Daily Demand is calculated as follows:

Pad B (Freddy's):

Category	Measurement Unit	Units	GPD Per Unit	Factor	Total GPD
Restaurant (Fast Food)	Seat Capacity	43	10	2*	860
Total:					860

*Demand Projections shall be calculated by multiplying certified seating capacity by 10 gallons per day for kitchen and sanitary demand then by a factor of 2 for establishments that operate from 7 – 12 hours a day. Freddy's Operating hours are 10:30 A.M. to 10:00 P.M.

Total = 430 GPD

Pad C (Tenants):

Category	Measurement Unit	Units	GPD Per Unit	Factor	Total GPD
Restaurant	Seat Capacity	100	10	3*	3,000
Restaurant	Seat Capacity	100	10	3*	3,000
Total:					6,000

*Demand Projections shall be calculated by multiplying certified seating capacity by 10 gallons per day for kitchen and sanitary demand then by a factor of 3 reflecting more than 12 hours of operation. This factor was used for conservative measures since the proposed tenants have not been chosen yet.

Total = 6,860 GPD

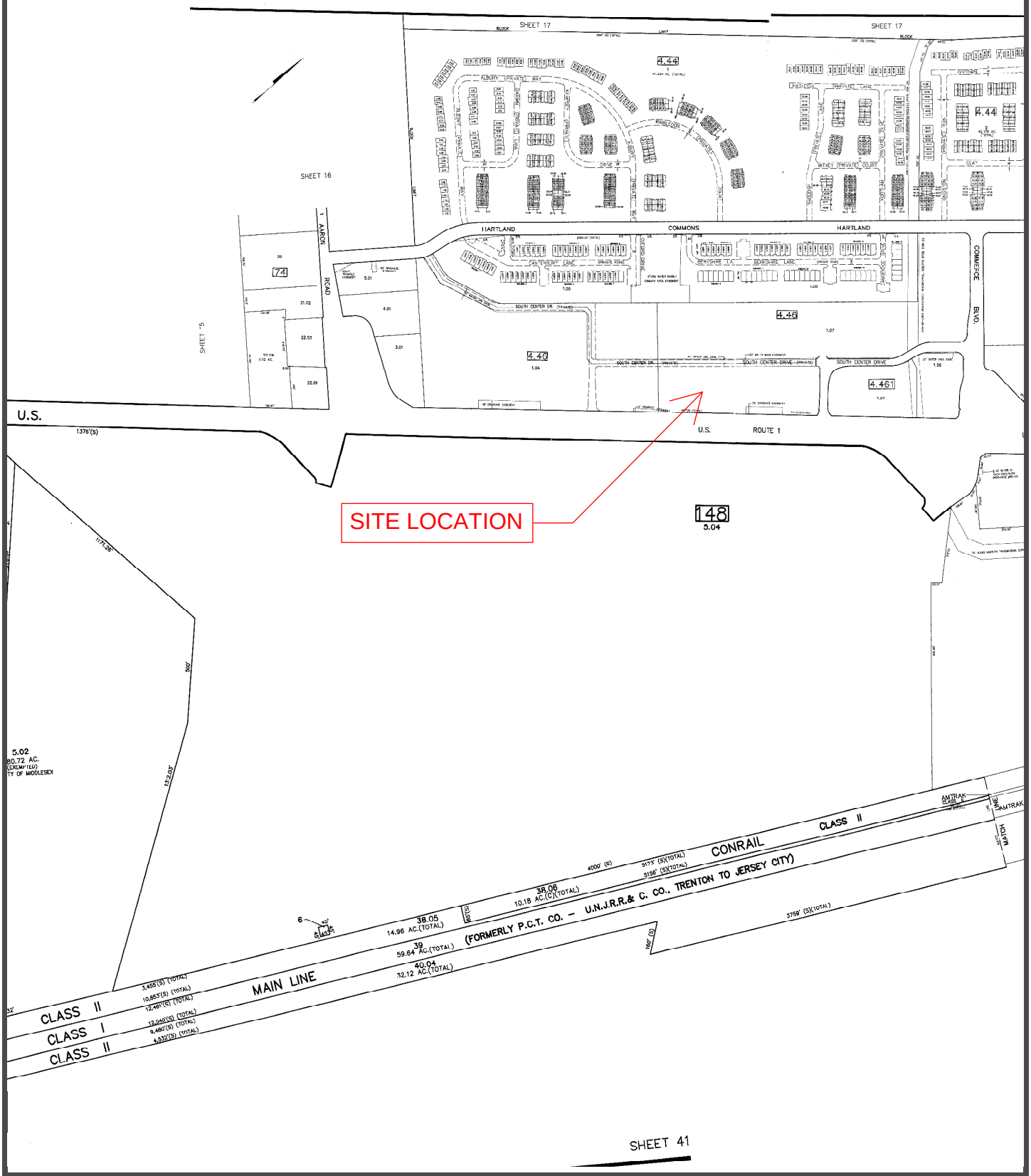
Peak Daily Demand = 3 x Average Daily Demand

3 x 6,860 GPD = 20,580 GPD = **0.0206 MGD**

Colliers
Engineering
& Design

Appendix A

Tax Map
Aerial Map
Soils Map



Colliers Engineering & Design

Figure 1: Tax Map

Township of North Brunswick – Prestige Commerce Center

Scale: NTS

Date: October 19, 2023

Project No. 21000124A

Colliers Engineering & Design

Figure 2: Aerial Map

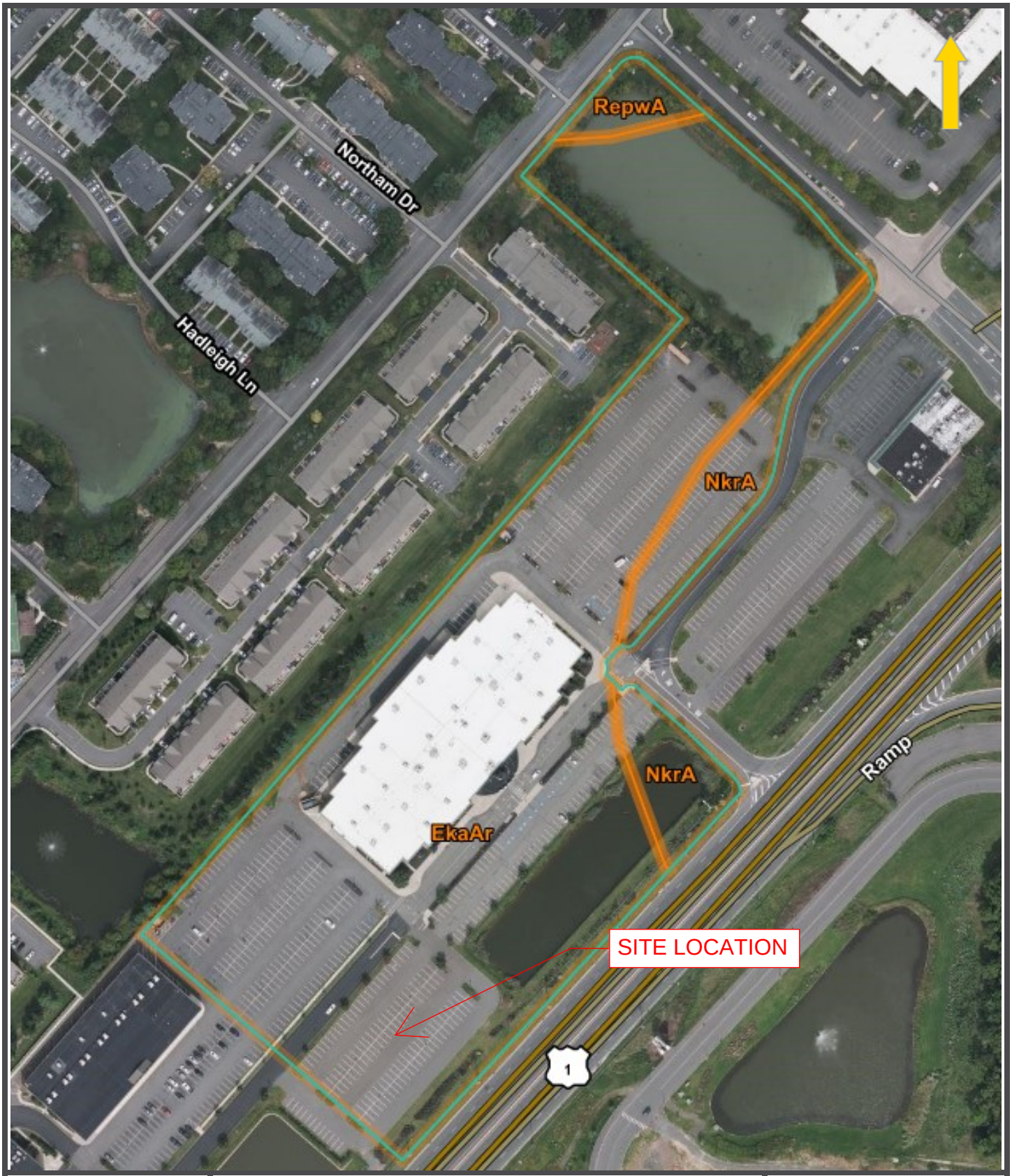
Township of North Brunswick – Freddy's

Source: Google Earth

Scale: NTS

Date: October 19, 2023

Project No. 21000124A



Colliers Engineering & Design

Figure 3: Soils Map

Township of North Brunswick – Freddy's

Source: Web Soil Survey

Scale: NTS

Date: October 19, 2023

Project No. 21000124A

Colliers
Engineering
& Design

Appendix B

Cost Estimate

PRELIMINARY OPINION OF PROBABLE COST
For
Prestige Properties
Township of North Brunswick, Middlesex County, New Jersey
Date: 10/19/23
CED Project No: 21000124A

Prepared By: MB
Checked By: VDK

	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
WATER					
On Site:					
2" Copper Water Service Line	193	LF	$21.00	$4,053.00	
4" DIP	83	LF	$36.00	$2,988.00	
6" DIP	43	LF	$45.00	$1,935.00	
Fire Hydrant Assembly-Complete	1	EA	$4,000.00	$4,000.00	
Connect to Existing Water	4	EA	$5,000.00	$20,000.00	
			Subtotal		**$32,976.00**
			SUBTOTAL:	$32,976.00	
			CONSTRUCTION STAKEOUT:	$989.28	
			15% CONTINGENCY:	$4,946.40	
			TOTAL:	**$38,911.68**	
Notes:					

1.) This preliminary construction cost estimate has been prepared based upon review of plans entitled " Preliminary & Final Major Site Plan for Prestige Commerce Center" as prepared by Colliers Engineering & Design dated April 27, 2023.

2.) The unit pricing included is based upon available pricing indices or this firm's historical experience in the general geographical area. It is only an approximation and shall not be used for any other purpose than an informational budgetary estimate. Actual construction costs are based upon current market conditions and other constructability factors.

3.) This preliminary construction cost estimate excludes costs that may be associated with the dewatering, unforeseen sub-surface conditions, environmental conditions, earthwork, adverse weather conditions, material requirements, temporary utility installations, electrical transformer costs, water meter costs, etc. This estimate shall not be utilized for proforma or finance purposes.

4.) The unit pricing for pipes and structures assumes depths up to ten feet (10'). For additional depths of installation, price adjustments should be made accordingly.

Colliers
Engineering
& Design

Appendix C

Technical Specifications

TABLE OF CONTENTS

SECTION	TITLE
1560	Soil Erosion and Sediment Control
1570	Maintenance and Protection of Traffic
2140	Dewatering, Removal of Water and Protection From Flooding
2161	Temporary Sheeting and Bracing
2220	Borrow Excavation
2230	Bedding
2600	Water Mains
2653	Water Service Connections

SECTION 1560

SOIL EROSION AND SEDIMENT CONTROL

1. DESCRIPTION

This section includes the furnishing of all materials and the installation of proper measures to reasonably control soil erosion from construction operations and prevent any sediment-laden flows from the construction site. Such work may include the installation of water diversion structures, diversion ditches, and sediment basins, seeding and mulching, or sodding critical areas to provide temporary protection.

2. MATERIALS

Materials shall conform to the requirements of appropriate current articles of "Standard for Soil Erosion and Sediment Control in New Jersey," current edition, and the "Standard Specifications for Road and Bridge Construction of the N.J. Department of Transportation," current edition, are made a part of the specifications by this reference and will not be repeated herein. In case of conflict between the above-mentioned requirements, the standard requiring the higher in terms of quality of materials and workmanship shall prevail.

3. METHODS OF CONSTRUCTION

Soil erosion and sediment control work shall include, but not be limited to, the following:

1. All soil erosion and sediment control practices on this project shall be constructed in accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey," or as approved for this project.

2. The smallest practicable area of land shall be exposed at any one time during the project and wherever feasible natural vegetation shall be retained and protected. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner, which will minimize soil erosion.

3. A schedule of construction operations shall be submitted to the Engineer for his approval.

4. A minimum of 72-hours notice shall be given to the Engineer and Soil Conservation District prior to the start of construction of grading. This notice can be verbal, but must be followed by a written statement not less than 48-hours prior to start-up.

5. All soil erosion and sediment control devices shall be in place prior to any major soil disturbance or installed and removed in their property sequence to allow for further operations on the site.

6. All sediment control structures shall be checked and maintained on a regular basis and all basins shall be cleaned periodically when storage capacity is affected by siltation.

7. During construction, any additional control measures as deemed necessary to prevent erosion or control sediment beyond those measures shown on the approved plans shall be installed or employed at the direction of the Engineer.

8. After completion of construction, soil and sediment controls shall be left in place until all disturbed areas are stabilized.

9. Disturbed areas, including roadway embankments, shall be maintained in a rough graded condition and temporarily seeded and/or mulched until proper weather conditions exist for the establishment of permanent vegetative cover.

10. All areas disturbed by construction on which permanent, semi-permanent, or temporary seeding has not been made and all slopes with a grade steeper than 2:1 shall be mulched, as a temporary measure to mitigate the potential effects of erosion. Mulch shall be applied at a rate of 2 tons per acre or equivalent measure, according to State standards.

11. All areas disturbed by construction, including soil stockpiles, which will not be used or constructed upon within 30 days shall be immediately mulched or temporarily seeded as appropriate.

12. All areas disturbed by construction, which will not be constructed upon within six (6) months, are to be stabilized with permanent type seeding and fertilizing. Permanent vegetation shall be initiated within seven (7) days and completed within thirty (30) days.

13. All disturbed areas shall be topsoiled, limed, and fertilized prior to both temporary and permanent seeding in conformance with the provisions of the item "Topsoil and Seeding".

14. Hay bales shall be deemed unacceptable filter material in areas greater than one-half (1/2) acre.

15. Access and haul roads shall be protected with stone access strips and coarse stone filters in appropriate locations.

16. No stream shall be forded at any time during construction.

17. Storm drainage inlets are to be either capped or protected by temporary filter devices to prevent the entry of sediment carried by runoff water until vegetation and/or paving is established as planned.

18. Wherever well points, pumps, or other dewatering methods are used care shall be taken to provide for the elimination of erosion and entrapment of sediment at the outfall of sedimentation basins used for control of silt laden water resurfacing from dewatering.

19. All drainage swales shall be parabolic in shape, unless otherwise noted, and shall conform to SCS design standards.

20. Drainage swales and other structures shall be located in the field so as to retain as much of the original vegetation as possible, especially large trees.

END OF SECTION

SECTION 1570

MAINTENANCE AND PROTECTION OF TRAFFIC

1. DESCRIPTION

Maintenance and protection of traffic shall consist of supplying, installing, and maintaining adequate traffic control devices as specified herein, and the supplying of Uniformed Traffic Directors. It is the Contractor's responsibility to provide and maintain a safe vehicular and pedestrian traffic protection system.

Prior to the start of construction, a written plan of the methods, facilities, and devices for the maintenance and protection of traffic shall be approved and initialed by the local police department. Two (2) copies of the approved signed plan shall be given to the Engineer. The following are minimum requirements of the plan:

The Standard Specifications for Road and Bridge Construction of the New Jersey Department of Transportation, 1989 edition, Subsection 110.01 shall be made a part of this Item.

The following is added to Subsection 110.01 of the Standard Specifications:

> When vehicular or pedestrian traffic, or both is to be maintained through the work area, the Contractor shall plan and carry out his work to provide for the convenient and safe passage of such traffic.

2. TRAFFIC CONTROL DEVICES

2.01 Construction Signs

As a minimum, the Contractor shall provide, erect, maintain and replace if necessary the signs hereinafter enumerated, for each direction of traffic, on traveled lanes affected by the work of the project:

> One (1) sign W20-1, approximately 200' in advance of the limits of the project and in advance of each separate work area within the project, where deemed appropriate by the Engineer.
>
> One (1) sign G20-2 not more than 100' beyond the limits of the project.

All signs shall be erected and maintained in a substantial manner to be approved by the Engineer, and shall be maintained so as to provide maximum visibility and legibility at all times.

Additional signs shall be provided where shown on the plans or directed by the Engineer.

2.02 Barricades, Type IIIA

This barricade, shall not be used in any area where contact with public vehicular traffic is possible. Open excavation areas and other similar situations in areas far removed from traveled ways may require this type barricade and its use shall be only upon direction by the Engineer.

Materials and construction shall be as shown on the plans or as directed by the Engineer.

Facings shall be reflective sheeting in orange and white stripes. Orange shall conform to standard shown on highway color tolerance chart, visually determined by comparison with the Highway color tolerance charts using the Munsell Notation according to ASTM D1535. Color tolerance charts are on file at the office of the Department's Traffic Engineer, 1035 Parkway Avenue, Trenton, New Jersey. Reflective sheeting shall conform to the requirements specified in Subsection 916.06 of the Standard Specifications.

Lighting, if necessary, shall be placed and shall be of the type as directed by the Engineer.

2.03 Drums

Drums shall be plastic, acceptable to the Engineer, and shall be faced with alternate orange and white stripes of reflective sheeting conforming to the requirements specified and as shown on the plans. Each drum when used to delineate the edge of a traveled way on detour curves, lane changes, lane closures and other similar conditions shall be lighted with a steady burning light as hereinafter specified. All drums used at other locations shall be lighted with a low intensity flashing warning light.

2.04 Traffic Cones

Traffic cones shall be of plastic or rubber of 28" minimum overall height, 1-3/4" minimum outside diameter at the top and 7-1/2" minimum diameter at the bottom tapering to 14" minimum square base. The minimum weight of the cones shall be 7 pounds exclusive of attachments. They shall be kept clean and bright for maximum target value. Traffic cones shall be reflectorized or equipped with steady burning lights when used during the hours specified below for steady burning lights. The cones shall be subject to the Engineer's approval before and during the time of their use on the project. Cones shall be of such construction that they have good stability and do not topple easily.

Rubber cones shall be painted safety orange or orange conforming to standard colors as specified for barricades. The cones shall be painted at the place of manufacturer. Reflective sheeting may be substituted for paint and shall conform to the requirements specified in Subsection 916.06 of the Standard Specifications.

Plastic cones shall be poly-vinyl chloride. The color shall be molded into the plastic.

Cones bases may be of the breakaway ballasted type.

2.05 Barricade, Type I

Barricades, Type I shall be used to delineate traffic hazards on the project site where shown on the plans or directed by the Engineer. Barricade, Type I shall be in accordance with the plans and shall be lighted with a low intensity flashing warning light as hereinafter specified. The rails shall be faced with reflective sheeting as specified for the rails on Barricades, Type IIA. Reflective sheeting shall conform to the required specified in Subsection 916.06 of the Standard Specifications.

2.06 Delineator Guide Posts

Delineator Guide Posts shall be used to channelize traffic where shown on the plans or directed by the Engineer. The guideposts shall be in accordance with the plans and shall be made of polyethylene or polyvinyl chloride, 36" in height. Posts shall be color as specified for traffic cones. Posts shall have a separate base, which shall be cemented to the roadway by use of an approved epoxy cement. Posts shall be so constructed that they will bend away when struck by the average passenger vehicle and will spring back into position. When moving the poses to new locations as shown on the plans or directed by the Engineer, it may be necessary to destroy the base in order to remove it completely from the roadway. If such is the case the contractor shall furnish new bases as required.

2.07 Vertical Panels

Vertical panels shall be used for warning and delineation at the edge of traveled ways, where delineation and warning devices are required in a specified location for a relatively long period of time and shall be placed where directed by the Engineer.

Materials for vertical panels shall be as shown on the plans.

2.08 Breakaway Barricades

Breakaway Barricades shall be used as a warning and delineation device at the edge of the traveled way and shall be constructed as shown on the plans. Breakaway Barricades shall be placed where directed by the Engineer.

Materials for Breakaway Barricades shall be as shown on the plans. Breakaway Barricades shall be lighted with low intensity flashing warning lights, unless otherwise directed by the Engineer.

3. TRAFFIC DIRECTORS

Traffic Directors shall be provided when and where called for in the plans or supplementary specifications or as directed by the Engineer. Traffic Directors shall be trained, uniformed flagmen of average intelligence, good physical condition, including sight and hearing, having mental alertness. A courteous but firm manner, neat appearance and a sense of responsibility for safety of the public. Traffic Directors shall wear an orange vest. This garment shall be reflectorized for nighttime operations. When controlling traffic, traffic directors shall follow the procedures

stipulated for flagmen in the manual on Uniform Traffic Control Devices.

Traffic Directors (flagmen) shall be provided whenever the Contractor's operations require closing of a lane or a portion of a lane on a multiple lane roadway; whenever Contractor's equipment or vehicles are entering or leaving active roadways at other than normal street intersections; whenever a Contractor's operations will be contrary to or cause confusion regarding normal traffic control devices (traffic signals, signs, etc.) within a work area; and whenever else (in the opinion of the Engineer) the Contractor's operations occasion such hazards to require the use of Traffic Directors.

Traffic Directors shall be responsible and thoroughly familiar with their responsibilities, and, while in service as Traffic Directors, shall not be required to perform any other duties. Traffic Directors shall be provided with an orange or red flag; an orange or orange and white traffic safety vest; and white or orange hard hat or other appropriate head gear. The Contractor may be required, at his expense, secure the service of uniformed police officers having jurisdiction in the locality within which the project is located. Provision of such uniformed police officers will be deemed sufficient in meeting the requirements of this specification. Payment to the Contractor for Uniformed Police Officers shall be approved only when directed by the Engineer.

4. LIGHTING SPECIFICATIONS

4.01 General

Storage batteries or other bulk power sources not part of a monolithic flasher unit shall be located as far as practicable from the traveled way and at ground level. Single flasher and steady burning units with self-contained batteries shall weight nor more than 7 lbs. and when located on traffic control devices shall be securely fastened with the bottom tangent of the lens at 36" above the existing round level. Battery powered dual alternate flashers located on advance warning signs, shall have the battery power source located as far as practicable from the traveled way and at ground level.

4.02 Steady Burning Lights

Steady Burning Lights shall be installed on traffic control devices where specified elsewhere herein or where directed. Steady Burning Lights shall be low wattage yellow electric lamps having a minimum of 10 beam candlepower. They be self-contained units with batteries or may be operated with a portable electric generator or from available utility lines. When a circuit in excess of fifty volts is used and such circuits including the light units are within reach of a person who can make contact with the ground, they shall be equipped with an Underwriter's Laboratory approved groundfault circuit interrupter. Steady Burning Lights when used where specified or directed by the Engineer shall be kept lighted from one (1) hour before sunset until a one (1) hour after sunrise, and through all hours of fog, smog, and other adverse atmosphere conditions affording insufficient visibility for the safe operation of traffic.

4.03 Low Intensity Flashing Warning Lights

Low Intensity Flashing Lights shall be installed on traffic control devices where specified elsewhere herein or where directed low intensity lights shall be battery operated yellow flashing lights with a one piece lens not less than 7" in diameter. They shall flash at a rate of 55-75 flashes per minute and the flash duration shall be 10 percent of each flash cycle. Light intensity shall not drop below 10 candelas during the first 336 hours of continuous flashing as specified in ITE standard requirement 5.0, paragraph 5.10, Section 1 of the ITE standard for flashing and Steady Burn Barricade Warning Lights. The lens shall be externally illuminated by reflex elements built into headlights of oncoming automotive traffic. Intensity when acting as a reflex-reflector shall be as specified in Subsection 916.07 of the Standard Specifications. If designed with a reflex-reflector right, the ring shall be not less than 1/2" in width round the periphery of the lens. Manufacturing design requirements shall conform to the ITE standards as specified in the following requirements:

Lens Requirements.....6.00
Head and Housing.....7.00
Photoelectric Controls.....8.00
Testing, Quality and Marking.....9.00

Low Intensity Flashing Warning Lights when used where specified or directed by the Engineer shall be kept lighted from dusk to dawn.

4.04 High Intensity Flashing Warning Lights

High Intensity Flashing Warning Lights shall be installed on traffic control devices where specified elsewhere herein or where directed. High intensity lights shall be yellow flashing lights with a one piece lens not less than 7" in diameter. Power may be from self-contained batteries, portable generator or available electric utility line. When 110-volt circuits are used and are located so that they are within reach of a person who can make contact with the ground, they shall be equipped with Underwriters Laboratory approved ground fault circuit interrupters. The lights shall flash at a rate of 55-75 flashes per minute and the flash duration shall be 8% of each flash cycle. Light intensity shall not drop below 100' candles within an elliptical pattern, 9 degrees on either side of the vertical axis and 5 degrees above and below the horizontal axis. Manufacturing design requirements shall conform to the ITE standard for flashing and steady burn barricade warning lights as specified in the following requirements:

Lens Requirements.....6.00
Head and Housing.....7.00
Testing, Quality and Marking.....9.00

High Intensity Flashing Warning Lights when used where specified or directed by the Engineer shall be kept lighted 24 hours a day.

5. TRAFFIC CONTROL DEVICE SCHEDULE

Schedule of Traffic Control Devices

Type of Devices*	Minimum Number
Drums	10
Traffic Cones	20
Breakaway Barricades	5
Traffic Directors	1
Low Intensity Flashing Warning Lights	5

*Devices in accordance with Part VI of current "Manual on Uniformed Traffic Control Devices for Streets and Highways".

During the work on this project, the Contractor shall provide and/or be prepared to provide traffic protection devices in accordance with the above Schedule of Traffic Control Devices. The minimum numbers set forth in the Schedule shall be on hand on the project site prior to the commencement of any work (or phase of work) and shall be maintained available on the project site throughout the period of the project (or phase). Failure to provide and maintain the minimum number of devices specified shall be sufficient cause for the Owner to order cessation of work.

When lack of any required safety devices presents an immediate hazard, such devices may be provided by the Owner or by other contractors, deducting the cost thereof from any monies due or becoming due the Contractor in accordance with the provisions of Article GC.27.4 of the General Conditions.

Additional devices up to the maximum number set forth in the Schedule shall be provided by the Contractor as required or directed prior to the commencement of any operation requiring such devices.

Should the Contractor be unable to complete paving of any trench work, it shall be the Contractor's responsibility to see that the trench is backfilled with stone and maintained. Any unpaved trench openings shall be protected with flashing barricades.

6. Detours

Where a detour is necessary for the construction work, the Contractor shall submit a detour plan showing the routing of traffic and the type and location of all traffic signs for the approval of the Engineer, the Police and the County, and shall obtain the consent of all appropriate authorities at least three days prior to the start of work in the detoured area.

END OF SECTION

SECTION 2140

DEWATERING, REMOVAL OF WATER AND PROTECTION FROM FLOODING

1. GENERAL

The Contractor shall construct and maintain, at no additional expense to the Owner, all pumps, drains, well points, and other facilities required for the control and collection of groundwater and/or surface water and shall provide all pumps and piping for the removal of water from the trenches and excavations so work may be performed in the dry. Any damage resulting from the failure of the dewatering operations of the Contractor and any damage resulting from the failure of the Contractor to maintain the areas of the work in a suitable dry condition shall be repaired by the Contractor as directed by the Engineer at no additional expense to the Owner.

The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to existing structures and utilities and the contract work, and so that no loss of ground will result from these operations. The Contractor shall at its own expense, repair any damage to existing utilities in accordance with the instructions of the applicable utility company; and any damage to existing structures and/or contract work in accordance with the instructions of the Owner. Precautions shall be taken to protect new and existing work from flooding during storms and from other causes.

Pumping shall be continuous where required to protect the work and/or maintain satisfactory progress. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations, and drainage operations shall be disposed of in such a manner as will neither cause public nuisance, nor cause injury to public health, nor to public or private property, nor to the work completed, nor to the work in progress.

END OF SECTION

SECTION 2161

TEMPORARY SHEETING AND BRACING

1. GENERAL

1.01 Work Included

The Contractor shall furnish, put in place, and maintain such excavation support as necessary to support the sides of the excavation and to not only provide safe protection for workmen, but to prevent damage to adjacent property and structures from slippage, shifting and settling of earth outside of the excavation lines, maintain stability of soil outside of excavation lines, and full dimensions of structural work.

Temporary sheeting and bracing shall be used whenever the Contractor fails to maintain the necessary stable slope configuration required in Federal, State and local regulations or whenever it is necessary to protect adjacent structures.

The site shall be protected against caving and movement of soil at all times. This shall be accomplished by the use of interlocking steel piling, for supporting the sides of excavations.

Excavation support shall be constructed as necessary for the protection of the work and for the safety of personnel and shall comply with the safety precautions outlined in the Federal Register as required by the Federal Occupational and Safety Health Act of 1970 (OSHA). The Contractor shall be responsible for the adequacy of all trench support used on the work.

The Contractor is to provide support for all excavations in excess of 5' in depth, or as required, all in accordance with OSHA requirements.

Sheeting shall consist of timber, steel sheet pilings or other interlocking materials. Whether left in place or removed, all voids which may occur behind the sheeting must be carefully refilled with suitable materials, which shall be thoroughly compacted in accordance with backfilling requirements specified herein. The Contractor will be held responsible for any damage due to the failure or insufficiency of the sheeting or bracing.

Prior to any construction, the Contractor shall submit a complete design, including details and computations of sheeting to be used in excavation, signed and sealed by a NJ Licensed Professional Engineer. The sheeting design engineer shall provide a signed and
sealed certification stating that the design of the sheeting and bracing conforms to all applicable requirements of the Occupational Safety and Health Act (OSHA). The Contractor shall strictly adhere to this plan. Any deviation from the original plan must be preceded by the submission of a revised plan signed and sealed by the same engineer who prepared the original submission. The sheeting plan shall in no way relieve the Contractor of his responsibility to provide safe and adequate sheeting.

The design shall be in accordance with the provisions of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", Eight Edition, of the American Institute for Steel Construction, except that field welding will be permitted. Welding shall be performed in accordance with the "Code for Welding in the Building Construction", AWS D1., 6f the American Welding Society. Lateral pressures used in the design shall take into account the soil conditions at that location, the construction procedure, temporary and permanent groundwater levels and any surcharge loadings or slopes.

The work shall not proceed until the Contractor has submitted a complete design including details and computations of sheeting to be used in trenches signed by said Professional Engineer practicing in the State of New Jersey. These drawings will in no way relieve the Contractor of full responsibility for the successful performance of the bracing system and protection of adjoining property. Any failure, damage, subsidence, upheaval or cave-ins will be the sole responsibility of the Contractor and he shall bear the entire cost of correcting any such occurrence.

Trench shields (boxes) may be used in lieu of trench sheeting. The use of trench shields shall conform to all applicable requirements of OSHA. If the Contractor cannot maintain a trench width, that will adequately protect utilities, or for any other reason the trench shield is judged inadequate, the Engineer shall have the right to order sheeting be used at no additional cost to the Owner. Trench shields may not be used in those areas specifically designated on the plans for sheeting to be used or for sheeting to be left in place.

2. MATERIALS

Steel sheeting shall conform to the requirements of ASTM Specifications A328-75 and A36-77a. Timber sheeting shall be in accordance with the American Institute of Timber Construction latest specifications.

3. EXECUTION

3.01 Installation

Sheet piling shall be installed plumb and true to line and location, and to the tip elevations shown on the approved shop drawings. Sheet piling shall be driven with a suitable pile hammer.

Before the installation of any sheet piling, the Contractor shall accurately determine, by excavation, probing or other approved method, the location of all utilities below ground surface which may be within close proximity to the line of sheeting or soldier piles. The Contractor shall then accurately locate all piling clear of utilities and shall drive them so as to avoid damage thereto. Guide frames are to be used to align sheet piling during driving.

The bracing must be laid out to clear walls and other permanent work, and care shall be taken to set wales and braces accurately, in accordance with the approved shop drawings, to avoid unnecessary shifting of braces. Should it become necessary to move a brace, for any reason, a new brace shall be installed and wedged prior to the removal of the original brace, subject to the Engineer's review, and at no cost to the Owner.

When necessary, openings in walls shall be formed, with proper keys and waterstops, to permit braces to pass through the concrete. The closure and waterproofing of these openings shall be in accordance with the reviewed shop drawings.

To insure a tight installation, steel wedges, plates and/or shims shall be employed between sheet piling and wales. They shall be driven tight and welded to the pile and/or the wale.

All welding shall be done by welders holding a current certificate covering the types of welds to be performed, and issued by a recognized Testing Laboratory.

Care shall be taken in installation of bracing members to maintain proper alignment. All abutting ends of bracing shall be in full bearing across the entire section of the members. Rebracing, where required, shall be performed in the sequence called for on the reviewed shop drawings.

All bracing shall be posted and tied to prevent spreading or distortion of the braced frame and care shall be taken to properly support horizontal wales to prevent movement of overturning due to upward thrusts from the bracing.

All rakers and struts shall be prestressed immediately after their installation by employing steel wedges and shims to prevent movement of the soil behind the bracing system. Wedges shall be maintained and periodically redriven as required so that the bracing system will be properly stressed at all times.

Excavation within the Project Site shall proceed in stages to allow the installation of various tiers of bracing. The Contractor shall not excavate beyond the specified depths until each tier of bracing is completely installed. Excavation between the braces shall be carefully accomplished to avoid damage to any element of the bracing system.

All braces and supporting members of the bracing system that will extend through and be embedded in the foundation mat or perimeter walls shall have a steel diaphragm waterstop welded perpendicular to the centerline of the member. Subsequently, when removal of bracing is permitted, steel shall be cut back one inch inside the rough concrete face and the depression patched flush with mortar.

All bracing shall be maintained until replaced by other bracing or until the permanent construction is able to withstand the lateral earth and groundwater pressures; and until its removal is approved by the Engineer. The contractor may elect to use other types of bracing for the purpose subject to the approval of the Engineer.

The Contractor shall thoroughly clean wales, braces and all other items to be embedded and shall make all other provisions to ensure that the concrete is sound and free from air pockets or harmful inclusions. All soil, loose rust, oil or any material harmful to concrete shall be completely removed from steel sheet piling, or any other portions of the bracing system to be left in place.

The work shall include the cutting of holes in the webs and/or flanges of wale and bracing members.

All sheeting shall be pulled, except where plans indicate sheeting left in place, unless otherwise directed by the Engineer. Timber sheeting driven or placed below the spring line of the pipe CANNOT be removed once the pipe has been laid and alignment and grade have been established. No job conditions or circumstances will allow waiving of this requirement. The sheeting shall be cut off at the top of the pipe, unless otherwise ordered by the Engineer. All material cut off shall be removed and disposed of by the Contractor at a site approved by the Engineer.

Whenever possible, sheeting shall be driven ahead of the excavation to avoid loss of material from behind the sheeting. If it is necessary to excavate below the sheeting, care shall be taken to avoid trimming behind the face along which the sheeting will be driven. Care shall be taken to prevent voids outside the sheeting, and if voids are formed they shall be immediately filled with sand and compaction.

END OF SECTION

SECTION 2220

BORROW EXCAVATION

1. DESCRIPTION

This section includes furnishing, transporting, placing and compacting select material required in excess of that obtained from other excavation on this project. Borrow excavation shall be used for backfill in all areas where the excavated material is found to be unsuitable as determined by the Engineer.

2. MATERIALS

Borrow excavation material shall consist of bank run sand and gravel, commercial sand and gravel combined, or blast furnace slag. Material shall be free from stumps, brush, weeds, roots, sod, rubbish, garbage and other matter that may decay. The soil aggregate shall be graded as shown below.

Sieve Size	Percent Passing
4"	100%
2-1/2"	100%
No. 4	95% to 100%
No. 30	20% to 55%
No. 50	5% to 25%
No. 200	0% to 5%

*Percentage by weight passing square mesh sieves.

Sand, gravel and slag are defined as follows:

Sand: Sand shall be granular material resulting from disintegration, grinding or crushing of rock which will pass a No. 10 sieve and be retained on the No. 2 sieve.

Gravel: Gravel shall be rounded particles of rock, which will pass a No. 4 sieve and be retained on a No. 10 sieve.

Slag: Slag shall be blast furnace slag obtained as a by-product of the production of pig iron. It shall contain tough, durable, angular fragments reasonably uniform in density and quality, free from flux stone, dirt and other objectionable matter, and shall contain not more than 7%, by weight, of flat or elongated pieces.

The slag also shall conform to the following requirements:

Percentage of wear, Los Angeles Test, Maximum - 35 weight per cubic foot, dry loose measure,

Minimum - 65 lbs. coal, or coal and coke, percentage by weight, Maximum - 1 glassy particles, percentage by weight, Maximum 4.

The Los Angeles test shall be made in accordance with current AASHO Designation T96.

3. METHODS OF CONSTRUCTION

Methods of construction for borrow excavation shall be in accordance with applicable backfill requirements specified under other sections of these Specifications.

END OF SECTION

SECTION 2230

BEDDING

1. DESCRIPTION

This section includes furnishing and placing of Class I, II and III embedment materials for sanitary sewers, sanitary force mains, manholes, water mains, or other structures where shown on plans or directed by the Engineer.

2. MATERIALS

Bedding materials shall be NJDOT No. 57, Table 901-1, 3/4" clean stone (Class I).

3. METHODS OF CONSTRUCTION

Vitrified clay pipe (VCP), and ductile iron pipe (DIP) shall be constructed on Class "C" bedding. Polyvinyl chloride pipe (PVC) shall be constructed on Class "B" granular bedding as shown on the Standard Detail, "Pipe Bedding". Class “B” granular bedding referred to under this subsection is the shape and extent of embedment material as stipulated in NJDOT Standard Specification Section 207.05. The embedment material for PVC pipe as noted is Class I (NJDOT No. 57, Table 901-1, ¾” clean stone).

VCP and PVC shall use Class I embedment material. DIP may use Class III embedment material. Higher Class bedding shall be used only at the direction of the Engineer.

Bedding shall be placed to the limits and depths shown on the Standard Detail, or as designated by the Engineer. The embedment material shall be compacted in layers not exceeding 6" thickness (loose measure) with approved flat faced vibratory tampers. After compaction, the surface of the bedding shall be roughly shaped to receive the structure. Spaces shall be hollowed out to clear pipe bells so as to provide maximum bearing lengths.

END OF SECTION

SECTION 2600

WATER MAINS

1. DESCRIPTION

This section includes the construction of water mains and appurtenances at the locations shown on the plans and shall include performing all operations in connection with the installation of all pipe, fittings, adapters, gate valves, valve boxes, hydrants, connections to existing and new piping, thrust blocks, plastic and concrete encasement, bedding, trenching, backfilling, accessories, appurtenances, miscellaneous work, and the testing and disinfection of the entire new system.

2. MATERIALS

The quality of all materials, manufacturing procedures, and the finished pipe shall be subject to inspection and approval of the Engineer. Such inspection may be made at the place of manufacture and/or at the work site after delivery, and the pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements even though sample pipes may have been accepted as satisfactory at the place of manufacture.

2.01 Ductile Iron Pipe (DIP)

All ductile iron pipe shall be centrifugally cast pipe conforming to the American National Standard for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids, ANSI/AWWA Designation A21.51/C-151, latest revision. Pipe sizes shall be as shown on the contract drawings with a thickness class of 52. All pipe fittings shall have joints with body thickness and radii of curvature conforming to ANSI/AWWA Designation A21.10/C-110, latest edition.

Joints shall employ a single, elongated gasket of such size and shape as to provide an adequate compressive force against the spigot and socket after assembly to affect a positive seal under all combinations of joint and gasket tolerances. Joints shall be U.S. Pipe and Foundry Company's "Tyton" joint, Griffin Pipe Products Company's "Super Bell-Tite" joint, or approved equal conforming to American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings, ANSI/AWWA Designation A21.11/C.111, latest edition. Gaskets shall be vulcanized natural or vulcanized synthetic rubber, resistant to common ingredients of sewage, industrial wastes, including oils and groundwater. Gaskets shall be free of porous areas, foreign material, and visible defects. Joint lubricants shall be suitable for lubricating the joint assembly. Parts shall be nontoxic, shall not support the growth of bacteria and shall have no deteriorating effects on the gasket material.

All ductile iron pipe shall be externally coated with a uniform thickness (approximately 1 mm thick) of hot-applied coal tar coating. The finished coating shall be neither brittle when cold, nor sticky when exposed to the sun, and shall be strongly adherent to the pipe. The pipe interior shall have cement mortar lining and bituminous sealed coating in accordance with the latest ANSI/AWWA Designation A21.4/C-104 for Cement-Mortar Lining for Cast Iron and Ductile Iron Pipe and Fittings for Water.

2.02 Compression - Sleeve Coupling

Couplings shall be designed to couple plain end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects, and the design shall be such as to provide for confinement and compression of the gaskets. For cast gray and ductile iron piping the middle ring shall be of cast iron or steel and the follower rings shall be of malleable iron.

Cast iron shall conform to ASTM A48 and shall be not less than Class 25. Malleable iron shall conform to ASTM A47. Gaskets shall be designed for long life and resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in ANSI A21.11 (AWWA C111). Bolts shall be track-head type; bolts and nuts shall conform to the tensile requirements of ASTM A307, Grade A; or bolts shall be round head square neck type conforming to ANSI B18.5 with hex nuts conforming to ANSI/B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be as recommended by the manufacturer.

Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Sleeve type mechanical coupling shall not be used as an optional method of joining except where pipeline is adequately anchored to resist tension pull across the joint.

2.03 Cast/Ductile Iron Fittings

All cast/ductile iron fittings shall be Class 250 suitable for use with the pipe specified above conforming to the American National Standard for Gray Iron and Ductile Iron Fittings, 2" through 48" for Water and Other Liquids, ANSI Designation A21.10. Fittings shall be externally coated with a uniform thickness of hot applied coal tar coating and the inside shall be cement lined and only mechanical joint fittings shall be used. End plugs shall be setscrew type, as manufactured by the United States Pipe and Foundry Co., or approved equal. All fittings shall be installed with Mega-Lug retainer glands, or approved equal. Mega-Lugs shall not be installed on existing mains.

2.04 Gate Valves

Gate valves shall be AWWA non-rising stem type with valve box, as manufactured by Mueller Company or approved equal, conforming to the latest AWWA Standard for Gate Valves - 3" through 48" - for Water and Other Liquids, AWWA Designation C-509. Sizes up to and including 12" shall be 200 psi working pressure; sizes 14" and larger shall be 150 psi working pressure. Valves shall have dual "O" ring seals, inside screw, resilient wedge seats in accordance with AWWA designation C-550 and shall be constructed so as to provide unobstructed full port clearance when fully open and immediate complete closure when closed. The ends of the valves shall correspond in type and dimensions with those of the pipe. All valves shall be arranged to open in counter clockwise direction unless otherwise specifically indicated and operating nuts shall be 2" square. Valves shall be tested to a pressure of not less than two times the working pressure. All buried valves shall be furnished with standard weight cast iron valve boxes. Boxes shall be of the Bingham Taylor Company Telescope Screw type or approved equal with round or oval base and deep cover to prevent tipping and shall be suitably marked with the word "WATER." Sections shall not be less than 5-1/4" in diameter. Lengths shall be suitable for locations intended. Two 2" square nut-operating wrenches of suitable lengths shall be provided.

2.05 Fire Hydrants

All new fire hydrants shall be the approved AWWA type fire hydrants in conformance with the American Water Works Association Standard for Fire Hydrants for Ordinary Water Works Service, AWWA Designation C502-64, and shall have a 5-1/4" valve opening, a 6" mechanical joint inlet complete with an auxiliary gate valve (close coupled) and all appurtenances. The hydrant shall be fitted with one 5-inch Storz connection nozzle (factory installed) and two 2-1/2” hose nozzles with caps. Fire hydrants shall be Mueller Super Centurion 250 Model A-423. Hydrants shall be provided with two coats of paint matching existing hydrants in the municipality. Hydrants shall be provided with adequate thrust blocks and with at least one cubic foot of broken stone at the base as per the standard detail and Mega-Lug retainer gland. Install 3 cubic feet of ¾ inch clean stone around area of hydrant drain valve. Hydrant tees to be MJ x swivel tees with 6-inch gate valve connected directly to tee. Auxiliary gate valve shall be connected to the water main with a hydrant valve anchoring tee or a joint restraint system. Joint restraints shall be installed between the auxiliary gate valve and the hydrant as shown on the plans, as directed by the Engineer, or as otherwise required.

2.06 Tapping/Inserting Sleeves and Valves

Tapping/inserting sleeves shall be extra heavy pattern of the sizes suitable for use on the pipe on which the respective sleeve is to be installed and for use with the tapping/ inserting valves. They shall be designed for a working pressure of 200 psi and of the same manufacturer as the tapping/inserting valves. Sleeves shall be stainless steel and shall be as manufactured by Mueller Company or an approved equal. Straps and fasteners shall be stainless steel.

Tapping/inserting valves shall be of the same manufacturer as the tapping sleeves and meet all requirements for "Gate Valves" previously specified. Retaining gland must be used on first pipe segment from wet tap.

The pipe into which the tap is proposed shall be excavated (test pit) and inspected prior to ordering materials. Type of pipe (PCCP, RCP, etc.), outside diameter of pipe, mortar thickness

and exact working pressure of the pipe shall be verified. Contractor shall confirm if there is a steel cylinder, any rebar, etc.

A tapping sleeve suitable for the particular type of pipe (PCCP, RCP, etc.) will be installed on the pipe by a qualified tapping contractor. The qualified contractor's references for similar type of taps shall be provided for review and approval. If a steel cylinder is present in the pipe, the outer concrete coating shall be chipped removed to expose pre-stressing wires. The wires shall be cut to expose the steel cylinder. The inner nozzle of the tapping sleeve shall seal against the smooth surface of the steel cylinder.

The tapping valve is bolted onto the nozzle flange. Prior to tapping, the tapping assembly shall be pressure tested to 1.5 times the working pressure of the system at the point of testing or 150 psi, whichever is greater. The tapping machine shall be bolted onto the tapping valve, valve is opened and tapping operation started. After completion of the tapping operation, the valve shall be closed and the machine taken off the tapping valve.

2.07 Plastic Pipe Encasement

Plastic pipe encasement for use with ductile iron pipe shall be polyethylene 8 mil. thick either in tube or sheet form with 2" wide polyethylene adhesive tape used to secure the film to the pipe.

2.08 Concrete Pipe Encasement

Concrete encasement work shall include the construction of nonreinforced structures used for encasement or plugging purposes.

Concrete shall have a minimum twenty-eight (28) day compressive strength of 2,500 lbs. per square inch. All materials shall conform to the applicable provisions of the latest edition of the American Concrete Institute Standards (ACI Standard 318, Building Code Requirements for Reinforced Concrete).

2.09 Concrete Thrust Blocks

Concrete for thrust blocks shall be Class "C" concrete conforming to the Standard Specifications.

2.10 Crushed Stone

Unless otherwise approved by the Engineer, broken stone shall be installed as bedding for all valves and hydrants. Broken stone shall be nominal 3/4" size conforming to the requirements of "Bedding."

2.11 Meters

Meters shall be Hersey 400 11 S series.

3. METHODS OF CONSTRUCTION

3.01 Cutting and Removing Pavement

The line between the trench and the existing pavement to remain shall be cut with a saw, pneumatically operated spade, or approved equal, so as to leave a smooth, straight, and vertical edge. The existing pavement may be bituminous, brick, block, nonreinforced concrete, reinforced concrete, etc. The excavated pavement shall be broken up and removed to a site approved by the Engineer.

Where excavations are to be made on concrete roads, the existing concrete shall first be saw cut and removed. All protruding reinforcing rods shall be cut off and removed. Any loose or broken longitudinal portions of adjacent existing lanes shall be removed and replaced as directed by the Engineer.

3.02 Underground Utilities

It is the responsibility of the Contractor to verify the location of all existing utilities whether shown on the plans or not.

Whenever a utility line is crossed or in any way exposed during this construction, the Contractor shall brace the utility line in accordance with the Standard Detail "Support of Utilities" or to the satisfaction of the Owner of the utility. The utility line shall be supported as soon as the existing support is removed and until the trench is backfilled.

3.03 Excavation

The trench shall be excavated along the lines designated by the Engineer and to a depth sufficient to provide a cover over the mains of not less than four feet (4') except where approval of local water department is obtained where greater or lesser depths of cover are shown on the detailed plans or are necessary due to the existence of utilities or to connect to existing lines. The trench shall be not less than one foot and not more than two feet wider at the bottom than the outside diameter of the pipe. The bottom of the trench under each joint shall be so hollowed out to allow the body of the pipe to have bearing along the entire length of trench if and where the trench is excavated at any place below the proper grade, excepting at joints, it shall be refilled to grade with sand or loam and thoroughly compacted.

The Engineer shall have the right to limit (to 100' maximum) the amount of trench which shall be opened in advance of the completed pipe laying work and to limit (to 200' maximum) the amount of trench left unfilled, backfilled and unpaved.

The material excavated shall be laid compactly on the side of the trench and kept trimmed up so that it will be of as little inconvenience as possible to the traveling public and to adjoining tenants. Where the streets are paved, the paving material shall be kept separate from the other materials excavated. All streets shall be kept open for travel unless otherwise approved by the Engineer.

Unless otherwise requested by the Water Department all excavated material shall become the property of the developer to be properly removed and disposed.

All debris and unsuitable material shall be removed and deposited at a location provided by the Contractor and approved by the Engineer. The Engineer alone shall determine if excess material is clean or not.

If, in the opinion of the Engineer, the material at or below the grade to which excavation would normally be carried is unsuitable for foundation, or if the material from any other part of the trench is unsuitable for backfill, it shall be replaced with suitable surplus material excavated from other parts of the Contract as specified below.

If suitable surplus material is not available from other parts of the Contract, then the Contractor shall furnish suitable material if and where directed by the Engineer.

3.04 Sheeting

The Contractor shall furnish, install in place and maintain such sheeting and bracing, etc., as may be required to support the sides of the excavation and to prevent any movement of earth which could in any way diminish the width of the excavation below that necessary for proper construction, or otherwise injure or delay the work or endanger adjacent structures. If the Engineer is of the opinion that at any point, sufficient or proper supports have not been provided, he may order additional supports put in at the expense of the Contractor.

3.05 Dewatering of Trench

All pipes shall be laid on a solid, dry foundation. The Contractor shall furnish all equipment, materials and labor necessary to keep all trenches free from water that is above or below ground. Any pipe laid in water or wet trenches will be removed and reinstalled at the Contractor's expense.

The Contractor shall provide, maintain, and operate such drains, percolation stone, trenches, sumps, pumps, hoses, piping, well- pointing systems, and other approved methods and equipment as may be necessary to keep the excavations free from water during all stages of the construction operations and course of work. The Contractor shall provide such dikes, ditches, sumps and pumping that may also be required to prevent the flow of surface waters into excavated areas and into any and all areas where construction or installations are in progress. All water pumped from the excavation shall be discharged in such a manner as shall not cause injury to work completed, damage to property, health hazards or impediment to traffic.

Water shall be completely removed from all excavations promptly and continuously throughout the progress of the work, and the Contractor shall keep excavations absolutely dry at all times until the water mains have been properly joined and bedded and work completed. Precautions shall be taken to protect uncompleted work from flooding during storms or from other causes.

3.06 Installation

Care shall be taken not to injure the coating or lining in handling pipe, fittings, etc. and no smaller pieces or other materials of any kind shall be placed in the large pieces for transportation at any time. Any material found to have inherent defects upon delivery or to have been injured in transportation will be rejected.

All pipe, fittings, adapters, valves, and appurtenances shall be cleaned of foreign matter before being lowered into the trench and shall be kept clean during the laying operations by plugging or other approved means. Cutting of pipe shall be done in a neat and workmanlike manner with an approved type of mechanical cutter without damage to the pipe or lining so as to leave a smooth end at right angle to the axis of the pipe.

All joints of piping, couplings, fittings, valves, specials, and fire hydrants, whether push-on type or mechanical type, shall be made up in accordance with the manufacturer's printed recommendations.

Concrete thrust blocks shall be provided at all tees, bends, hydrants, and dead ends. Thrust block placement and size shall be as indicated on the Standard Detail "Thrust Blocks - Required Contract Bearing Areas" and/or on the Plans.

The installation of tapping sleeves and valves for making wet taps under full main pressure shall be done only by workmen thoroughly experienced in this type of work. The existing main shall be thoroughly cleaned of all rust, dirt, scale or other materials down to the clean metal just prior to the installation of the tapping sleeve. Tapping connections shall be installed exactly horizontal and at right angles to the center line of the pipe to be tapped.

Gate valves and valve boxes shall be set plumb with a 6" minimum base of broken stone or gravel. Valve boxes shall be centered on the gate valves and the box cover shall finish flush with the surface of the pavement or ground.

Hydrants shall be set plumb and to the established grade with hose nozzles at least 18 inches above the ground or as directed. A concrete thrust block shall be provided at each hydrant and one cubic foot of broken stone or gravel as indicated on the Detail Sheet.

Methods of Construction for concrete encasement work shall conform to all applicable requirements of the American Concrete Institute Standards, ACI Standard 318.

At all areas where ductile iron pipe is exposed to corrosive soil condition, runs parallel to cathodically protected gas lines on the same side of the road or crosses gas lines, the water main shall be protected by encasing the pipe with plastic. Polyethylene film shall be applied loosely but continuously to the pipe with joints in plastic made by polyethylene adhesive tape. Care shall be taken in the installation and backfilling operation to prevent tearing the plastic and exposing the bare metal pipe.

3.07 Backfilling

Unless otherwise approved by the Engineer, the Contractor shall backfill all trenches at the end of each working day with suitable material from the trench excavation or temporary stockpile. Backfill shall be brought to elevations which allow construction of temporary paving specified elsewhere in these specifications. If, in the opinion of the Engineer, the above material is unsuitable, select off-site material shall be provided as described in the item "Borrow Excavation." Backfill material shall be deposited and mechanically compacted to a minimum 95 percent Modified Proctor Density in layers not exceeding 6" in depth (loose measure) to a point 12" above the top of the pipe. From this point, all backfill shall be mechanically compacted in maximum 12" lifts, unless otherwise approved by the Engineer, to obtain a minimum 95 percent Modified Proctor

Density to a point 3 feet below the road surface. From this point, a minimum 95 percent Modified Proctor Density is required. Smaller lifts shall be required if this density is not obtained. The backfill material shall be wet or dried as required to obtain the required density.

The only methods of compacting the backfill material permitted shall be mechanical compaction in lifts as specified. Consolidation will not be acceptable as a method to achieve the soil densities specified.

The Engineer, at his discretion, may perform, or have performed soil density checks at randomly chosen lifts. Density testing will be performed at the completion of the compaction effort. Compaction requirements will be strictly enforced.

When the trench is not in or across a dedicated street, right-of-way, or any other place where pavement is to be constructed, backfill shall be compacted to obtain a minimum 95 percent Modified Proctor Density.

The densities referred to above shall be based upon the latest Standard Test Methods for Moisture-Density Relations of Soil and Soil Aggregate Mixtures Using 10 lb. Rammer and 18" Drop, ASTM Designation D-1557. Density control in the field shall be based on the latest, ASTM Designation D-1556. The Owner may retain and, except as otherwise specified, pay for the services of an independent testing laboratory to do such sampling and to make such tests as the Owner or Engineer may deem necessary to verify that work conforms to the requirements of the specifications.

3.08 Temporary Pavement Repairs

During the interval between the completion of backfill and the time of placement of permanent paving, all pavement and drives shall be maintained in a safe and satisfactory condition. The Contractor shall install all temporary pavement repair according to these specifications.

Temporary pavement repair shall be constructed within 24 hours of completion of backfill unless otherwise approved by the Engineer.

Temporary pavement repair shall consist of 4" minimum (compacted measure) of cold patch on all Township roads and 6" (compacted measure) of cold patch on County and State roads. Prior to placing of cold patch, the trench shall be thoroughly cleaned of all loose and foreign material. It shall not be applied when surface is wet or dusty. Application shall be made only when the condition of the surface is acceptable to the Engineer.

The Contractor shall continuously maintain temporary paving for the entire period it remains in place; shall inspect trenches at such intervals as may be necessary, including but not limited to, immediately following rainstorms, winter thaws, and similar occurrences which may cause settlement, erosion, or other problems; and shall promptly make necessary repairs to maintain trenches in a satisfactory condition. In the event the Contractor fails to make such repairs, the Owner may make such repairs as are deemed necessary and the Contractor shall pay for the cost of this work. The Contractor is required to repair all areas that are damaged by his actions during construction. If the damaged areas are outside the maximum trench width shown in the detail, additional costs of restoring the damaged areas shall be borne by the Contractor.

The Engineer, giving one week's notice, may direct the Contractor to remove the cold patch surface and replace it with the permanent base course (bituminous stabilized base).

If, at the time of the placement of temporary pavement, it is demonstrated that the Contractor's compaction method has achieved the specified soil densities within the 24-hour time limit for the placement of temporary pavement, the Engineer will approve the placement of the permanent base course in lieu of cold patch. If the specified soil densities are not achieved within this time limit, the Contractor will be required to place cold patch as specified. The placement of cold patch should not be construed as relieving the Contractor from any of the requirements of the backfilling specifications.

4. TESTING

The Contractor shall hire a lab to perform bacteriological testing. The lab shall be approved by the Borough Water Department in advance of testing work. All existing valves which must be opened or closed for testing shall be operated by the Water Department.

All pipe lines shall be pressure and leakage tested prior to construction of permanent pavement repair, a minimum of seven days after the last concrete thrust block has been cast if constructed with normal Portland cement. All materials and equipment required for testing shall be supplied by the Contractor.

Hydrostatic testing of ductile iron pipe shall conform to the latest edition of AWWA Standard C-600 and C-603.

The pressure test shall be performed by increasing the hydrostatic pressure to a specified value and maintaining that pressure for a period of two hours. Any pipe, fittings, or valves found defective shall be replaced. Prior to performing the test, all air pockets and bubbles must be eliminated. Hydrostatic test pressure for ductile iron pipe shall be 1.5 times the working pressure of the system at the point of testing or 150 psi, whichever is greater.

The leakage test shall be performed concurrently with the hydrostatic pressure test and shall be accomplished by increasing the hydrostatic pressure to a specified value and maintaining that pressure for a period of two hours. Leakage is the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure after the air in the pipeline has been expelled. The hydrostatic pressure for the leakage shall be as described above. The leakage from each portion of the pipeline being tested shall not exceed 11.65 gallons per inch of internal diameter per mile of pile per day. If any test of pipe laid discloses a greater leakage than specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

5. DISINFECTION

All pipelines shall be disinfected and tested for bacteria in conformance with AWWA Standard C-651 and C-601 for disinfecting water mains prior to being put into service. Hypochlorite and liquid chlorine for use in disinfection shall conform to AWWA Standards B-300 and B-301, respectively.

All existing valves which must be opened or closed for disinfecting shall be operated by the Water Department.

All pipelines shall be thoroughly flushed before introduction of chlorinating materials, which shall be done in an approved manner. The amount of chlorine applied shall be such as to provide a dosage of not less than 50 parts per million. The chlorinated water shall be retained in the main for at least 24 hours during which time all hydrants and valves in the section treated shall be operated in order to be disinfected. At the end of the 24-hour period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the system. The Contractor shall then have samples taken by an approved testing laboratory and bacteriological analyses made. All results to be submitted to the Water Company. Should the initial treatment prove ineffective, disinfection shall be repeated until satisfactory samples have been obtained.

6. APPROVALS

The Contractor shall furnish Shop Drawings, Catalogs, Specification Sheets and other Manufacturer's Literature for all equipment and materials he proposes to furnish. Such items should not be ordered until the Engineer's approval of the material submitted is obtained.

In addition, the Contractor shall submit to the Engineer, copies of purchase orders, delivery tickets, and/or invoice for all materials delivered and installed.

END OF SECTION

SECTION 2653

WATER SERVICE CONNECTIONS

1. DESCRIPTION

This section includes the construction of copper water service lines including corporation stop, service pipe, curb valve (stop), curb box fittings, adapters and appurtenances and locating existing utilities which will be crossed.

2. MATERIALS

Copper service pipe shall be equal to that as manufactured by Revere Copper and Brass, Inc. and shall be Type "K" in soft temper as commonly used for water services.

Corporation stops shall be equal to that as manufactured by Mueller Company, Series H-15000 and of the size required. Such corporation stops shall meet the requirements of AWWA Specification No. C800, latest edition.

Curb valves (stops) shall be equal to those as manufactured by Mueller Company, Mark II, Oriseal, Cat. No. H-15204 and shall conform to AWWA Specification No. C800, latest edition.

Curb boxes shall be equal to those as manufactured by Mueller Company, Figure H-10314 with one piece lid (for use with such stops in sizes 1/2" to 1", inclusive), improved extension curb box. Box length shall be appropriate to the intended location service and shall conform to AWWA Specification No. C800, latest edition.

3. METHODS OF CONSTRUCTION

The Contractor shall be responsible for installing complete new services, including corporation stops, service pipe, curb valves (stops), boxes and appurtenances, from the new main to individual house connections beyond property lines.

The Methods of Construction specified under piping specification shall apply to the construction of Water Service Connections, where appropriate.

The Contractor is responsible for verifying all utility locations that may affect his work. The Contractor shall verify the location and elevation of the utilities which are to be crossed by the water service connection.

END OF SECTION

Colliers Engineering & Design

Colliers Engineering & Design is a trusted provider of multi-discipline engineering, design and consulting services providing customized solutions for public and private clients through a network of offices nationwide.

For a full listing of our office locations, please visit colliersengineering.com

1 877 627 3772

Civil/Site • Traffic/Transportation • Governmental • Survey/Geospatial
Infrastructure • Geotechnical/Environmental • Telecommunications • Utilities/Energy