EXHIBIT "A"

STANDARD SPECIFICATIONS & DETAILS FOR WATER MAINS AND SANITARY SEWERS

SPECS & DETAILS ARE SUBJECT TO CHANGE

ALL PLANS MUST BE REVIEWED & RECOMMENDED FOR APPROVAL BY THE ENGINEERS & APPROVED BY THE BOARD.

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY CHESTER COUNTY, PENNSYLVANIA

September 8, 1999

Tatman & Lee Associates
A Division of URS Corporation
1200 Philadelphia Pike
Wilmington, Delaware 19809
302-791-0700

Issued to: _____ No: _____

SEE AMMENDMENT I(A)

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY
Chester County, Pennsylvania

RESOLUTION 99-7
Standard Specifications and Details For Water Mains and Sanitary Sewer

AND NOW, IT IS HEREBY RESOLVED, by the London Grove Township Municipal Authority to adopt the **Standard Specifications and Details for Water Mains and Sanitary Sewers** which are attached hereto and made a part hereof as Exhibit "A". These rules and regulations shall become effective immediately.

RESOLVED AND ADOPTED, this 8th day of September, 1999.

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

CHAIRMAN

VICE CHAIRMAN

MEMBER

MEMBER

MEMBER

SEAL OF
GOVERNING BODY

ATTEST

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY
STANDARD SPECIFICATIONS AND DETAILS
FOR WATER MAINS AND SANITARY SEWERS

DRAWINGS OF STANDARD WATER INSTALLATION DETAILS

DETAIL	TITLE
1	STANDARD TRENCH EXCAVATION DETAILS
2	PAVING DETAILS TYPICAL STREET SECTION
3	BUTTRESS FOR TEES
4	BUTTRESS FOR CROSSES
5	BUTTRESS FOR HORIZONTAL BENDS, 1/32 – 1/8
6	BUTTRESS FOR VERTICAL BENDS, 1/32 – 1/8
7	ANCHORAGE FOR VERTICAL BENDS, 1/32 – 1/8
8	BUTTRESS FOR CAPS
9	BUTTRESS FOR PLUGS
10	TYPICAL BLOWOFF ASSEMBLY
11	BLOWOFF VALVE INSTALLATION TYPE II
12	AIR RELEASE VALVE WATER MAIN
13	TYPICAL MANUAL AIR RELEASE
14	GATE VALVE INSTALLATION 3” THROUGH 12”
15	TYPICAL VALVE INSTALLATION ON EXISTING WATER MAIN
16	TYPICAL FIRE HYDRANT INSTALLATION
17	STANDARD SPECIFICATIONS CAST IRON METER BOX COVERS
18	STANDARD SPECIFICATIONS CAST IRON VALVE BOXES
19	CURB BOX BUFFALO STYLE CAST IRON

DRAWINGS OF STANDARD SANITARY SEWER INSTALLATION DETAILS

1	SANITARY SEWER TYPICAL TRENCH DETAIL
2	SANITARY SEWER BUILDING SEWER DETAIL
3	SANITARY SEWER CONNECTION
4	SANITARY SEWER CLEANOUT DETAIL
5	SANITARY SEWER CONNECTION
6	SANITARY SEWER 48” DIAMETER PRECAST MANHOLE DETAILS
7	SANITARY SEWER GREASE TRAP

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed products list.

D. Shop Drawings

E. Product data.

F. Samples.

G. Manufacturers' instructions.

H. Manufacturers' certificates.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Manufacturers' field services and reports.

1.03 SUBMITTAL PROCEDURES

A. Transmit each submittal with AIA Form G810.

B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and Specification Section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction
work, and coordination of information, is in accordance with the requirements of the work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Authority’s Engineer. Coordinate submission of related items.

F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed work.

G. Revise and resubmit submittals as required, identify all changes made since previous submittal.

H. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.04 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within 15 days after date of Notice to Proceed or prior to start of construction for Authority's Engineer review.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Indicate estimated percentage of completion for each item of Work at each submission.

1.05 PROPOSED PRODUCTS LIST

SEE ADDENDUM F PART 1 1.05 & 1.06

A. Within 15 days after date of Notice to Proceed, or prior to start of construction, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number or each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.06 SHOP DRAWINGS

A. Submit the number of opaque reproductions which Contractor requires, plus three 4 copies.

1.07 PRODUCT DATA

A. Submit the number of copies which the Contractor requires, plus four (4) copies.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to Project.

1.08 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

B. Submit samples of finishes from the full range of manufacturers' standard colors or in custom colors selected, textures, and patterns for Authority's selection.

C. Include identification on each sample, with full Project information.

D. Submit the number or samples specified in individual specification sections.

E. Reviewed samples which may be used in the work are indicated in individual specification sections.

1.09 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification sections, submit manufacturers' certificate to the Authority Engineer for review, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to the Authority Engineer.

END OF SECTION

SECTION 01400

QUALITY CONTROL/TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation.

B. References.

C. Field samples.

D. Mock-up.

E. Inspection and testing laboratory services.

F. Manufacturers' field services and reports.

1.02 RELATED SECTIONS

None

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Authority Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.04 REFERENCES

A. Conform to reference standard by date of issue current on date for receiving bids or the date of Owner-Contractor Agreement when there are no Bids.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification by Authority Engineer before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications Sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Authority Engineer.

1.06 MOCK-UP

A. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes.

B. Where mock-up is specified in individual Sections to be removed, clear area after mock-up has been accepted by Authority Engineer.

1.07 INSPECTION AND TESTING LABORATORY SERVICES

A. Contractor will employ services of an independent firm to perform inspection and testing. Contractor shall pay for services as part of bid price.

B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Authority Engineer.

C. Reports will be submitted by the independent firm to the Authority Engineer, in duplicate indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.

D. Retesting required because of nonconformance to specified requirements shall be performed by the same independent firm or a firm selected by the Authority Engineer. Payment for retesting will be charged to the Contractor by deducting inspection or

testing charges from the Contract Sum/Price if the tests show the work or product is not meeting the required limits.

1.08 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. Submit qualifications of observer to Authority Engineer 30 days in advance of required observations. Observer subject to approval of Authority Engineer.

B. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.

C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Submit report in duplicate within 30 days of observation to Authority Engineer for review.

PART 2 TEST REQUIREMENTS

2.01 MANHOLES

A. Each manhole may be tested immediately after assembly and prior to backfilling at option of Contract and as provided in Section 01430, Part IV.

B. All lift holes shall be plugged with an approved non-shrink grout.

C. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.

D. The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturers' recommendations.

E. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the time is greater than 60 seconds for 48" diameter, 75 seconds for 60", and 90 seconds for 72" diameter manholes.

F. If the manhole fails the initial test, necessary repairs shall be made with a nonshrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

2.02 PRESSURE PIPE

1. Test Restrictions

A. Test pressure shall not be less than 1.25 times the working pressure at the highest point along the test section.

B. Test pressure shall not exceed pipe or thrust-resistant design pressures.

C. The hydrostatic test shall be of at least 2-hour (h) duration.

D. Test pressure shall not vary by more than ±5 psi (35 Mpa or 0.35 bar) for the duration of the test.

E. Valves shall not be operated in either direction at differential pressure exceeding the rated valve working pressure. Use of a test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests at these pressures, the test setup should include provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or fully opened if desired.

2. Pressurization

A. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Each valved section of pipe shall be slowly filled with water, and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the owner. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure. It is good practice to allow the system to stabilize at the test pressure before conducting the leakage test.

3. Air Removal

A. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the

corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the owner.

4. Examination

A. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, hydrants, or joints that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated until it is satisfactory to the Owner and/or Authority Engineer.

5. Leakage defined

A. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi (35 MPa or 0.35 bar) of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

6. Allowable Leakage

A. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{133{,}200} \qquad \text{(Eq 1)}$$

Where:

L	=	Allowable leakage, in gallons per hour
S	=	length of pipe, in feet
D	=	nominal diameter of the pipe, in inches
P	=	average test pressure during the leakage test, in pounds per square inch (gauge)

This formula is based on an allowable leakage of 11.65 gpd/mi/in. of nominal diameter at a pressure of 150 psi.

B. Allowable leakage at various pressures is shown in Table 6.

TABLE 6 - ALLOWABLE LEAKAGE G.P.H. PER 1000 FT OF PIPELINE*

NOMINAL PIPE DIAMETER – IN.

Avg. Test Pressure Psi (bar)	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
450 (31)	0.48	0.64	0.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60
400 (28)	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11
350 (24)	0.42	0.56	0.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58
300 (21)	0.39	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02
275 (19)	0.37	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72
250 (17)	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41
225 (16)	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03
250 (14)	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73
275 (12)	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36
150 (10)	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97
125 (9)	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53
100 (7)	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in. (0.0012 L/h/mm) of nominal valve size shall be allowed.

When hydrants are in the test section, the test shall be made against closed hydrant valves.

7. Acceptance of Installation

A. Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified in Section 6 above the Contractor shall, at his own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.

B. All visible leaks are to be repaired, regardless of the amount of leakage.

2.03 SEWER PIPE

1. General

A. Includes gravity sewer lines and other pipes intended to be water tight but not under pressure.

B. The Contractor shall furnish all labor, tools, materials including water and equipment including mirrors, flashlights or other artificial lighting, weirs, pump, compressors, stopwatch, gauges, and meters, subject to the approval of the Authority Engineer for testing in accordance with these specifications.

C. All branch fittings and ends of lateral stubs shall be securely plugged to withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced when required.

D. Air shall be slowly supplied to the plugged pipe line until the internal air pressure reaches 5.0 pounds per square inch. At least two minutes shall be allowed for temperature stabilization before proceeding further.

E. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease by 1.0 pound per square inch.

F. The line shall be considered acceptable if the time, T, in minutes; required for the 1.0 psi pressure drop is not less than 10 minutes.

2. Deflection Test of PVC Pipe

A. Deflection testing shall be performed on all portions of the PVC sewer system. This test shall be performed in sections between manholes, not less than 30 days after final grading has been placed.

B. The maximum allowable deflection for all installed PVC sewer pipe shall not exceed 5% of the pipe's original internal diameter.

C. Deflection testing shall be performed with a "go, no-go" mandrel which shall have a diameter not less than 95% of the base inside diameter or average inside diameter of the pipe as specified in the ASTM Specification. The pipe shall be measured in compliance with ASTM D 2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings. The test shall be performed without mechanical pulling devices.

D. DEFLECTION TESTING PROCEDURE

1) Completely flush the line making sure the pipe is clean of any mud or debris that would hinder the passage of the mandrel.

2) During the final flushing of the line, attach a floating block or ball to the end of the mandrel pull rope and float the rope through the line. (A nylon ski rope is recommended.)

3) After the rope is threaded through the line, connect the pull rope to the mandrel and place the mandrel in the entrance of the pipe.

4) Connect a retrieval rope to the back of the mandrel to pull it back if necessary.

5) Remove all the slack in the pull rope and place a tape marker on the rope at the ends of the pipe.

6) Draw mandrel through the sewer line. If any irregularities or obstructions are encountered in the line, those areas shall be replaced or corrective action taken to correct the condition to the satisfaction of the Authority.

7) If a section of excessive deflection is found, that section of the pipe shall be replaced to the satisfaction of the Authority.

2.05 BUILDING SEWERS

A. Refer to Section 02732, Part I, 1.01, C.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01410

AS BUILT DRAWINGS

PART 1 GENERAL

1.01 GENERAL

A. The Contractor and/or Owner shall provide to the Authority'sEngineer completed as-built plan information for all work performed. The horizontal and vertical data submitted shall be based on the project benchmark. The as-built plans must be submitted and sealed by a Pennsylvania registered Professional Engineer.

B. Preliminary as-built plans based upon the Contractor's field notes must be submitted with any application for payment. These preliminary as-builts need not be sealed by a PA registered Professional Engineer, but should reflect the work completed during the period for which payment is requested.

C. The horizontal and vertical data shall be supplied for manholes, gravity lines, stream crossings, road crossings, sewer lateral locations, and encountered utilities. The Record Plan information shall be supplied prior to submission of the final request for payment or transfer to the Authority.

D. The as-built plans must include the submission of a Television Inspection and Sewer Line Cleaning Report. The format and requirements of this report is specified in Section 02058 of these Standards.

E. All plans must be supplied on 3-1/2 computer disk or CD ROM using AUTO CADD Version 14 or later and/or acceptable electronic format. Drawings must have the following layers as a minimum:

- Water Line
  - Services
  - Valves
- Sewer lines

- Manholes
- Laterals
- Streets/Roads
- Buildings
- Streams
- Contours

END OF SECTION

SECTION 01420

CONSTRUCTION REVIEW AND
ACCEPTANCE PROCESS
WATER SUPPLY

PART 1 PRE-CONSTRUCTION MEETING

A. Sequence

1. Prior to Shop Drawings

B. Prerequisites

1. Final Plan Approval
2. Escrow established
3. Clear Mylars Signed

C. Notification

1. Authority Engineer notifies all parties.

D. Participants

1. Authority Staff
2. Authority Engineer
3. Township Engineer
4. Owner
5. Owner's Engineer
6. Contractor(s)
7. Others as required

E. 1. Distribution of Stamped Plans – four (4) sets to Authority Engineer.

PART 2 SHOP DRAWINGS

A. Sequence

1. After Preconstruction Meeting

2. Prior to Construction

B. Prerequisites

1. Preconstruction Meeting

C. Notification

1. A minimum of four sets of shop drawings are to be submitted a minimum fifteen (15) days prior to start of work.

D. Responsible Parties

1. Contractor: Prepares shop drawings

2. Owner and/or Contractor: Approves and submits shop drawings to Authority Engineer

3. Authority Engineer: Reviews and acts on shop drawings with copies of action to Authority and Owner and/or Contractor (Five to seven-day turnaround expected)

4. Authority: Review and acts on any shop drawing variations from plans and Authority rules and regulations. (Seven to fourteen-day turnaround expected).

E. Process

1. All copies must be stamped by the Contractor performing the work. The stamp must include the Contractor's name, date and reference to the shop drawing covers (i.e., valves, curb stops, etc.).

2. A minimum of four (4) copies are to be submitted. Reviewed shop drawings will be distributed as follows:

One (1) copy to the Contractor
One (1) copy to the project Owner/Developer
One (1) copy for Authority Files
One (1) copy for Authority Engineer

If Owner wants more returned, please submit additional copies.

3. Work on a specific item may not begin until all appropriate shop drawings have been received and approved.

4. Any variations from approved drawing or Authority rules and regulations will need Design Engineer's and Authority's approval.

PART 3 PERIODIC CONSTRUCTION REVIEW

A. Sequence

1. Throughout Construction

B. Prerequisite

1. Shop Drawing Approval

C. Notification

1. Notify the following 72 hours in advance (minimum) before commencing construction.

a. Call Authority Engineer.
b. Notify Township Engineer as required.
c. Notify Authority to turn on water before making taps and construction services.

2. Contractor must not operate water system valves or hydrants of systems that are operating.

D. Process

1. Disinfectant must be applied to mains as they are constructed. AWWA C651-92 tablet method is to be used unless alternate is approved.

2. All taps should be made when mains are under pressure.

3. Hydrants shall be installed with the large (steamer) connection facing the street.

4. The Authority will be responsible for bagging of hydrants as required.

5. Authority Engineer shall make visits to the site at intervals appropriate to the various states of construction to observe as an experienced and qualified design professional the progress and quality of the executed work of Contractor(s) and to determine in general if such work is proceeding in accordance with the approved plans and Authority rules and regulations. Authority Engineer shall not be required to make exhaustive or continuous on-site inspections to check the quality or

quantity of such work. Authority Engineer shall not be responsible for the means, methods, techniques, sequences or procedures of construction selected by Contractor(s) or the safety precautions and programs incident to the work of Contractor(s). Authority Engineer's efforts will be directed toward providing a greater degree of confidence for Authority that the completed work of Contractor(s) will conform to the approved plans and Authority rules and regulations, but Authority Engineer shall not be responsible for the failure of Contractor(s) to perform the construction work in accordance with the approved plans and Authority rules and regulations.

6. During such visits and on the basis of his on-site observations, Authority Engineer shall keep Authority informed of the progress of the work, shall endeavor to guard Authority against defects and deficiencies in Contractor(s)' work and may disapprove or reject work failing to conform to the approved plans and Authority rules and regulations.

7. Authority Engineer will submit one copy of all site visit reports to the Authority weekly.

8. Authority may elect to inspect in conjunction with Authority Engineer and advise Authority Engineer of any deficiencies. Authority inspectors shall not make or approve field changes, but rather act in an advisory capacity to the Authority who shall have final say in all such matters.

PART 4 TESTING - PRESSURE

A. Sequence

1. Follow base paving

B. Prerequisite

1. All service to be installed. Testing will include service line (to curb stops).

2. Testing prior to minimum base paving is at the option of and convenience of Owner/Contractor.

C. Notification

1. Notify Authority 72 hours in advance.

2. Authority will notify Authority Engineer.

D. Process

1. With the Authority and/or Authority Engineer present, flush out all dirt and debris, after proper disinfecting, and blow off air in all mains and services before starting pressure test.

2. Pressure test in strict conformance with AWWA Standards as adopted. This will never be less than a two-hour test at not less than 150 psig at all times during test.

3. Test equipment shall consist of a pump, a water supply (such as a tank truck) and an accurate test gauge (minimum 4-inch, 2% accuracy, and pressure snubbed or liquid filled). A water meter or calibrated tank shall be used for measuring leakage.

4. If leakage test fails, test shall be repeated as often as necessary until all parts of the installed system passes. Leakage will be calculated from drawings using AWWA Standards as adopted.

5. A punch list will be developed following the testing. The punch list will be prepared by Authority Engineer and submitted to Authority for their concurrence.

PART 5 TESTING - BACTERIOLOGICAL

A. Sequence

1. Following pressure testing.

B. Prerequisite

1. Pressure testing completed.

2. Authority and/or Authority Engineer must be present during flushing lines of chlorine residual and debris. Owner/Contractor must assure adequate dechlorination and erosion control during flushing.

C. Notification and Process

1. Notify Authority and/or Authority Engineer at least 2 weeks in advance of application for occupancy permit. The Authority will collect samples.

2. The Owner, developer and/or Contractor will be required to disinfect water main again until satisfactory test is made. A satisfactory test shall be both 0 (zero) coliforms per 100 ml and a heterotrophic plat count of less than 500 per 100 ml.

3. The Authority will recommend to Township that no permanent or temporary Certificates of Occupancy be issued without full satisfactory test reports received by the Authority.

4. Authority will notify Owner, Developer and/or Contractor that test has been conducted and its results.

PART 6 APPROVAL FOR USE

A. Sequence

1. Following successful bacteriological test.

2. Following preparation and completion of punch list.

B. Prerequisite

1. Successful testing completed.

2. All upstream water lines have been accepted.

C. Notification

1. Owner, Developer and/or Contractor notifies Authority 14 days prior to request for occupancy permit.

2. Authority will notify Authority Engineer.

3. Authority Engineer will issue recommendation to Authority for acceptance by Authority following successful inspection and completion of all punch list items.

4. Authority will issue final acceptance letter.

D. Process

1. Final Inspection and Acceptance.

a. Streets must be paved with base and all lots at final grade near curb stops and valves.
b. Hydrants must be at the final elevation; in the right position; and in perfect operating condition.
c. Valves and valve boxes, including blow-offs and curb stops, shall be free of water and debris at final elevation. All valves must pass test for proper operation.
d. Elevation of water mains and services shall be measured from final grade and shall have a

minimum of 42 inches of cover to top of pipe from grade.

e. If final inspection is satisfactory, Owner/Contractor may request Authority to activate system using interconnecting valves.

PART 7 RECONSTRUCTION AND ADDITIONS

A. Pressure and bacteriological tests must be repeated if there are any additions or reconstruction after acceptance and prior to dedication.

PART 8 APPROVAL FOR DEDICATION

A. Sequence

1. Following acceptance of facilities for use.

2. Not more than two months prior to date of anticipated dedication.

B. Prerequisite

1. Acceptance for use.

2. Completion of punch list.

3. Final Paving is in place and all grades are final.

C. Notification

1. Owner to notify Authority 45 days prior to date of anticipated dedication or as otherwise provided by agreement.

2. Authority to notify:

a. Township
b. Township Engineer
c. Authority Engineer

D. Process

1. A prededication walk-through will be conducted as follows:

a. Coordinated by Authority Engineer.
b. Conducted after final paving.
c. All valves, hydrants and other appurtenances located and operated.

d. All valve boxes, curb boxes, hydrants shall be set at final grade with final paving in place.

2. Participants will be notified by Authority Engineer and include:

   a. Authority
   b. Township
   c. Contractor
   d. Owner/Developer

3. Punch List

   a. The Authority Engineer will generate a draft punch list within three days of the walk-through and distribute to all participants as well as Township Engineer. Comments on the draft list shall be received by Authority Engineer for five (5) subsequent days after which the punch list will be appropriately amended and issued to all participants. Punch list may be amended as deemed necessary by Authority Engineer.

4. Other Requirements

   a. Legal descriptions of all easements and land to be dedicated.
   b. As-built drawings signed and sealed by Owner's Engineer. (See Section 01410).

5. Dedication

   a. The Township Engineer will make a recommendation on dedication to the Authority detailing the punch list in order to comply with Section 510 of the PA Municipal Planning Code. Once all items are completed satisfactorily, Authority Engineer will so notify Authority and Township with copies to Owner, Contractor and Township Engineer.
   b. The Authority will make final determination on dedication.

END OF SECTION

SECTION 01430
CONSTRUCTION REVIEW AND
ACCEPTANCE PROCESS
WASTEWATER

PART I PRE-CONSTRUCTION MEETING

A. Sequence

1. Prior to Shop Drawings

B. Prerequisites

1. Final Plan Approval
2. Escrow established
3. Clear Mylars Signed

C. Notification

1. Authority notifies all parties.

D. Participants

1. Authority
2. Authority Engineer
3. Township Engineer
4. Owner
5. Owner's Engineer
6. Contractor(s)
7. Others as required

E. 1. Distribution of stamped plans – four (4) sets to Authority Engineer.

PART II SHOP DRAWINGS

A. Sequence

1. After Pre-construction Meeting
2. Prior to Construction

B. Prerequisites

1. Pre-construction Meeting

C. Notification

1. Shop drawings are to be submitted a minimum fifteen (15) days prior to start of work.

D. Responsible Parties

1. Contractor: Prepares shop drawings
2. Owner and/or Contractor: Approves and submits shop drawings to Authority Engineer.
3. Authority Engineer: Reviews and acts on shop drawings with copies of action to Authority and Owner and/or Contractor. (Five to seven-day turnaround expected)
4. Authority: Review and acts on any shop drawing variations from plans and Authority rules and regulations. (Seven to fourteen-day turnaround expected)

E Process

1. All copies must be stamped by the Contractor performing the work. The stamp must include the Contractor's name, date and reference to what the shop drawing covers (i.e., raw sewage pump controls, sewers, etc.).

2. A minimum of four (4) copies are to be submitted. Reviewed shop drawings will be distributed as follows:

   One (1) copy to the Contractor

   One (1) copy to the project Owner/Developer

   One (1) copy for Authority Files

   One (1) copy for Authority Engineer

   If Owner wants more returned, please submit additional copies.

3. Work on a specific item may not begin until all appropriate shop drawings have been received and approved.

4. Any variations from approved drawing or Authority rules and regulations will need Design Engineer's and Authority's approval.

PART III PERIODIC CONSTRUCTION REVIEW

A. Sequence

1. Throughout Construction

B. Prerequisite

1. Shop Drawing Approval

C. Notification

1. Notify the following 72 hours in advance (minimum) before commencing construction.

   a. Call Authority Engineer.
   b. Notify Township Engineer as required.

2. Notify Authority before connecting to any existing facilities so that a mechanical plug can be installed by Contractor under Authority observations. Storm water/infiltration or other fluids will not be permitted to enter the sanitary sewer system during or after construction. The plug can only be removed by Contractor in the presence of Authority personnel, and then only after final inspection and approval.

D. Process

1. Authority Engineer shall make visits to the site at intervals appropriate to the various states of construction to observe as an experienced and qualified design professional, the progress and quality of the executed work of Contractor(s) and to determine in general if such work is proceeding in accordance with the approved plans and Authority rules and regulations. Authority Engineer shall not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of such work. Authority Engineer shall not be responsible for the means, methods, techniques, sequences or procedures of construction selected by contractor(s) or the safety precautions and programs incident to the work of Contractor(s). Authority Engineer's efforts will be directed toward providing a greater degree of confidence for Authority that the completed work of Contractor(s) will conform to the approved plans and Authority rules and regulations, but Authority's Engineer shall not be responsible for the failure of Contractor(s) to perform the construction work

in accordance with the approved plans and Authority rules and regulations.

2. During such visits and on the basis of his on-site observations, Authority Engineer shall keep Authority informed of the progress of the work, shall endeavor to guard Authority against defects and deficiencies in Contractor(s)' work and may disapprove or reject work failing to conform to the approved plans and Authority rules and regulations.

3. Authority Engineer will submit one copy of all site visit reports to the Authority weekly.

4. Authority may elect to inspect in conjunction with Authority Engineer and advise Authority Engineer of any deficiencies. Authority inspectors shall not make or approve field changes, but rather act in an advisory capacity to the Authority who shall have final say in all such matters.

PART IV TESTING

A. Sequence

1. Follow base paving.

B. Prerequisite

1. All laterals to be installed.

2. Road paving (minimum base only) must be installed for final manhole testing and to all Township specifications.

3. Testing prior to minimum base paving is at the option of and convenience of Owner/Contractor.

C. Notification

1. Notify Authority 72 hours in advance.

2. Authority will notify Authority Engineer.

D Process

1. Sanitary sewers shall be plugged, and each section tested with five (5) psig air pressure for a ten (10) minute duration. A two minute stabilization time period shall proceed the test at test pressure. All laterals must be

connected and capped. A one psi drop is allowed. If leakage is greater, repairs must be done.

2. Manholes shall be plugged then tested with 10 inches of mercury vacuum as further described in Section 01400, Part 2.01.

3. Force mains shall be pressure tested with water for two hours at a minimum of 100 psi and shall meet all requirements and leakage of AWWA standards as adopted for water mains.

4. Deflection test of PVC pipe shall be performed with a mandrel which shall have a diameter not less than 95% of the base inside diameter.

5. Test equipment shall consist of a compressor or a vacuum pump, a water source for force main tests and an accurate test gauge (minimum 4-inch, 2% accuracy, and pressure snubbed or liquid filled). A water meter or a calibrated tank is needed for force main leakage tests.

6. A punch list will be developed following the testing. The punch list will be prepared by Authority Engineer and submitted to Authority for their concurrence.

PART V. APPROVAL FOR USE

A. Sequence

1. After testing.

2. Following preparation and completion of punch list.

B. Prerequisite

1. Successful testing of all gravity, pressure lines and manholes.

2. All downstream sewer lines, pumps and other facilities needed to provide service have been approved by Authority.

C. Notification and Process

1. Notify Authority and/or Authority Engineer at least 2 weeks in advance for occupancy permit.

2. The Authority will recommend to Township that no permanent or temporary Certificates of Occupancy be

issued without full satisfactory test reports received by the Authority.

3. Authority will notify Owner, Developer and/or Contractor that test has been conducted and its results.

4. Cleaning, Flushing and Patching

   a. After testing and before final inspection all sanitary manholes and sewers shall be cleaned of all debris, grit, and dirt.
   b. All manholes shall be patched so that the inverts are smooth and continuous without holes, gaps or protrusions that could accumulate organics, gritty or stringy material or impede flow. Manhole frames shall be patched to achieve a watertight seal where they join the structure.
   c. After cleaning and patching, all sewers shall be flushed with clean water at a flow rate of not less than 10 gpm for not less than five minutes after the stream flows clear at the last manhole.
   d. The Owner/Contractor shall dispose of water at his own expense and not in an existing sanitary sewer system.
   e. Water for flushing shall be obtained by the Owner/Contractor and might be obtained from the Authority, if available, with their express permission and supervision.

5. Final Inspection

   a. All tests and cleaning must be completed satisfactorily before final inspection. However, final inspection may be concurrent with flushing.
   b. Streets must be paved and manholes set in final position.
   c. Contractor shall make and furnish Authority two (2) copies of a VHS Format video recording of all sewers with comments digitally recorded on the screen, including the manhole run numbers.
   d. If final inspection is satisfactory, the Contractor may ask the Authority if he/she may remove the plug to the existing system in the presence of Authority Engineer.

PART VI. RECONSTRUCTION AND ADDITIONS

A. Pressure and/or vacuum tests must be repeated if there are any additions or reconstruction.

PART VII. APPROVAL FOR DEDICATION

A. Sequence

1. Following acceptance of facilities for use.

2. Not more than two months prior to date of anticipated dedication or as otherwise provided by state law.

B. Prerequisite

1. Acceptance for use.

2. Completion of punch list.

3. Final paving is in place and all grades are final to Township specifications.

C. Notification

1. Owner to notify Authority 45 days prior to date of anticipated dedication or as otherwise provided by state law.

2. Authority to notify:

a. Township
b. Township Engineer
c. Authority Engineer

D. Process

1. A prededication walk-through will be conducted as follows:

a. Coordinated by Authority Engineer.
b. Conducted after to final paving.
c. Owner will arrange for and have all lines pressure washed and videoed in presence of Authority Engineer.
d. Every manhole will be opened by the Owner and inspected by the Authority Engineer.
e. All manholes and clean-outs shall be located and set to finish grade.
f. Any manhole disturbed during final paving shall be realigned and vacuum tested again.
g. Any repair work to sewer line or appurtenances shall be retested once work is completed.

2. Participants will be notified by Authority Engineer and include:

    a. Authority
    b. Township
    c. Contractor
    d. Owner

3. Punch List

    a. The Authority Engineer will generate a draft punch list within three days of the walk-through and distribute to all participants as well as Township Engineer. Comments on the draft list shall be received by Authority Engineer for five (5) subsequent days after which the punch list will be appropriately amended and issued to all participants. Punch List may be amended as deemed necessary by Authority.

4. Other Requirements

    a. Legal descriptions of all easements and land to be dedicated.
    b. As-built drawings signed and sealed by Owner's Engineer (See Section 01410).

5. Dedication

    a. The Authority Engineer will make a recommendation on dedication to the Authority detailing the punch list in order to comply with Section 510 of the PA Municipal Planning Code. Once all items are completed satisfactorily, Authority Engineer will so notify Authority, with copies to Owner, Contractor and Township Engineer.
    b. The Authority will make final determination on dedication.

END OF SECTION

SECTION 02058

TELEVISION INSPECTION AND SEWER LINE CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Television inspection and recording of sanitary sewer lines.

B. High pressure cleaning of sanitary sewer lines.

C. Contractor shall provide all labor, material, equipment and incidentals as required for performance of the Work.

1.02 SUBMITTALS

SEE ADDENDUM N PART 1.02.A

A. Provide two copies of the completed videotape (VHS format).

1. Beginning of each video sequence between manhole runs shall include an audio and video overlay with the following information:

a. Date
b. Location (local town, development, street address, etc.)
c. Sewer line run (i.e., Manhole X to Manhole Y) with direction of run.
d. Pipe material and size
e. Comment section.

2. Audio and video overlay information to be included on videotape while in operation shall include the following information:

a. Continuous video stationing information shall be in the standard format (i.e., 1 + 23).
b. Intermittent audio information with quadrant location shall include, but not limited to, all laterals, clean-outs, pipe deflection, pipe defects, and infiltration.

3. Video image shall be free of any obstructions, including water vapor, allowing a clear 360° image of pipe interior.

B. Provide a field report on the observations during performance of the Work.

1. Field Report shall include the following information:

a. Date
b. Location (Local town, development, street address, etc.)
c. Sewer line run (i.e., Manhole X to Manhole Y) with direction
of run.
d. Pipe material and size.
e. Stationing in the standard format (i.e., 1 + 23) of all observed laterals, clean-outs, pipe deflection, pipe defects and infiltration, etc.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable local, State and Federal regulations and codes for safety of workers; noise, odor and runoff control; transport and disposal of debris.

B. Obtain all required permits and notices from authorities for all portions of the work.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct roadways without permits.

SEE ADDENDUM N PART 1.03.E

1.04 PROTECTION

A. Closing or obstruction of roadways, sidewalks, and driveways adjacent to the Work by the placement or storage of materials will not be permitted, and all operations shall be conducted with a minimum interference to traffic on these ways.

B. Repair damage to any property belonging to the Owner or adjacent landowners cause by the Work.

PART 2 PREPARATION

2.01 PREPARATION

A. Protect existing landscaped areas, appurtenances and other features.

2.02 CLEANING

A. Provide for collection of debris from cleaning operation.

1. All downstream manhole channels shall be screened to contain all flushed debris.

2. Contractor shall dispose of water at his own expense and not into an existing sanitary sewer system or pump station.

B. High pressure clean from upstream manhole to downstream manhole, collecting debris at each downstream manhole.

2.03 VIDEO TAPING

A. After cleaning operation, video tape each manhole run.

2.04 DISPOSAL

A. The Contractor is responsible for disposal of all debris.

B. Remove demolition debris as soon as possible.

END OF SECTION

SECTION 02202

ROCK REMOVAL

PART 1 GENERAL

1.01 WORK INCLUDED

A. Removal of discovered rock during excavation.

B. Use of explosives to assist rock removal.

1.02 RELATED WORK

A. Section 02205 - Excavation and Backfilling.

1.03 REFERENCES

A. NFPA 495 - Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials.

1.04 QUALITY ASSURANCE

A. Seismic Survey Firm: Company specializing in seismic surveys with five years documented experience.

B. Explosives Firm: Company specializing in explosives for disintegration of subsurface rock with five years documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to state, DEP and PA DOT codes for explosive disintegration of rock.

B. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

1.06 SUBMITTALS:

A. Submit four (4) copies of blaster's license to the Authority Engineer.

B. Provide a descriptive procedure of either mechanical or blasting methods to the Authority Engineer for review. Indicate all safety measures to be in effect during blasting operations.

C. Provide daily blasting reports to the Authority Engineer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rock (Definition): Solid mineral material with a volume in excess of 1/2 cu yd or rock that cannot be removed by a hydraulic excavator with a minimum manufacturer's operating weight of 41,000 pounds, 118 flywheel horsepower at 1800 rpm (Caterpillar E200 B EL equivalent or larger) and minimum 3 foot wide heavy duty bucket with rock teeth.

B. Explosives: Type recommended by explosives firm following seismic survey and required by authorities having jurisdiction.

C. Delay Devices: Type recommended by explosives firm.

D. Blasting Mat Materials: Type recommended by explosives firm.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify site conditions and note irregularities affecting work of this Section.

B. Beginning work of this Section means acceptance of existing condition.

3.02 ROCK REMOVAL - MECHANICAL METHOD

A. Excavate for and remove rock by the mechanical method.

B. Cut away rock at excavation bottom to form level bearing.

C. Remove shaled layers to provide sound and unshattered base for footings.

D. In utility trenches, excavate to 6 inches below invert elevation of pipe and to a width shown on the Contract Drawings or 24" total width if not specified.

E. Remove excavated material from site.

F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 02205.

3.03 ROCK REMOVAL - EXPLOSIVES METHODS

A. If rock is uncovered requiring the explosives method for rock disintegration, notify the Authority Engineer.

B. Advise owners of adjacent buildings or structures in writing prior to setting up seismographs. Describe blasting and seismic operations.

C. Obtain a seismic survey prior to rock excavation to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties.

D. Provide seismographic monitoring during progress of blasting operations.

E. Disintegrate rock and remove from excavation.

F. Cut away rock at excavation bottom to form level bearing.

G. Remove shaled layers to provide sound and unshattered base for footings.

H. Remove excavated material from site.

I. Correct unauthorized rock removal or overbreak in accordance with backfilling and compaction requirements of Section 02205.

PART 4 PAYMENT FOR ROCK EXCAVATION

A. The unit price bid shall include excavation and disposal of any material, except paving, which in the judgment of the Authority Engineer, cannot be excavated except by drilling and blasting; drilling and wedging; heating and spalling. All foundations of concrete or of brick or stone will be classified as rock, if the volume requiring the removal of any single location is more than one-half (1/2) cubic yard. This classification shall not be extended to include materials which can be removed by means other than drilling and blasting; drilling and wedging; or heating and spalling, but for reasons of economy in excavating, the Contractor prefers to remove by drilling and blasting. Soil and disintegrated rock, which can be removed by pick and shovel, boulders or foundations less than one-half (1/2) cubic yards in volume, or loose shaken or previously blasted rock, or broken stone in rock filling, or elsewhere, or rock exterior to the maximum limit measurement, which may have been loosened in previous excavation and which of such loosening may fall into the trench, will not be measured or allowed for as rock. Excavations of rock, as described above, will be paid as covered by lump sum or unit price.

B. Rock excavation for pipe trenches will be measured to the contract payment width, and to a depth not to exceed the bottom of the stone bedding required in rock.

C. Rock excavation, measured or provided above will be paid for at the stipulated unit price per cubic yard, which price shall be full compensation for furnishing all equipment, tools, labor and incidentals necessary to complete the work.

END OF SECTION

SECTION 02223

STRUCTURAL BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building perimeter backfilling to subgrade elevations.

B. Site filling and backfilling.

C. Consolidation and compaction.

D. Fill for over-excavation.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Testing Fill compaction.

B. Section 02225 - Trenching: Backfilling of utility trenches.

C. Section 03301 - Cast-in-Place Concrete: Concrete materials.

1.03 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Type 2RC Crushed stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits: Penn Dot Type 2RC aggregate.

B. Type 2B crushed stone; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following: Penn Dot 2B aggregate.

C. Type C - Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits: Penn Dot Type C Sand

D. Type B - Penn Dot Type B Fine Aggregate.

E. Subsoil: Reused, free of gravel larger than 3 inch size, and debris.

2.02 ACCESSORIES

A. Geotextile Fabric: Dupont Typar 3401 or approve equal.

B. Vapor Retardant: 6 mil thick, polyethylene.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify fill materials to be reused are acceptable.

3.02 PREPARATION

A. Generally, compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type 2RC fill and compact to density equal to or greater than requirements for subsequent backfill material.

C. Prior to placement of aggregate at paved areas, compact subsoil to 95 percent of its maximum dry density in accordance with ANSI/ASTM D698.

3.03 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Place geotextile fabric prior to placing 2RC aggregate.

D. Granular Fill: Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

E. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.

F. Employ a placement method that does not disturb or damage utilities in trenches.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

I. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

J. Slope grade away from building minimum 2 inches in 10 ft unless noted otherwise.

K. Make grade changes gradual. Blend slope into level areas.

L. Remove surplus backfill materials from site.

M. Leave fill material stockpile areas completely free of excess fill materials.

3.04 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus one inch from required elevations.

3.05 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 01400.

C. Compaction testing will be performed in accordance with ANSI/ASTM D698 and with Section 01400.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

E. Frequency of Tests: As directed by Engineer.

E. Proof roll compacted fill surfaces under slabs-on-grade and paving.

3.06 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01500.

B. Recompact fills subjected to vehicular traffic.

3.07 SCHEDULE

A. Interior Slab-On-Grade:
1. Type 2B fill, 4 inches thick.

B. Exterior Side of Foundation Walls.

1. Subsoil fill, to subgrade elevation, each lift, compacted to 90 percent.

C. Fill Under Grass Areas:

1. Subsoil fill, to 6 inches below finish grade.

D. Fill Under Concrete Paving:

1. Type 2B fill, to 8 inches below finish paving elevation, compacted to 95 percent.

E. Fill to Correct Over-excavation:

1. Lean concrete to minimum compressive strength of 1000 psi.

END OF SECTION

SECTION 02225
TRENCHING/BACKFILLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavate trenches for utilities from outside building to existing utilities.

B. Compacted bedding under pipe, and fill over utilities to subgrade elevations.

C. Backfilling and compaction.

1.02 RELATED SECTIONS

A. Section 01400- Quality Control: 01410 - Testing Laboratory Services: Testing fill compaction.

B. Section 02202 - Rock removal: Removal of rock during excavation.

C. Section 15400: Piping from building to existing utilities.

D. Section 03001 - Cast-in-Place Concrete: Concrete materials.

1.03 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

1.05 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Type 2RC Crushed Stone; free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits: Penn Dot Type 2RC aggregate.

B. Type 2B crushed stone; washed, free of clay, shale, organic mater; graded in accordance with ANSI/ASTM C136, to the following: Penn Dot 2B aggregate.

C. Type B- Penn Dot Type B Fine Aggregate.

D. Subsoil: Reused, free of gravel or stone larger than 3 inch size, and free of any debris.

E. All PennDot standards referenced shall be per those in effect at the time of construction.

2.02 ACCESSORIES

A. Geotextile Fabric: Dupont Typar 3401 or approved equal.

B. Vapor Retardant: 6 mil thick, polyethylene.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify fill materials to be reused, is acceptable.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Maintain and protect existing utilities remaining, which pass through work area.

C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

D. Protect bench marks, existing well, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

E. Protect above and below grade utilities which are to remain.

F. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with Type 2B fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATION

A. Excavate subsoil required for electric conduit to existing utilities.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.

C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

D. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd, measured by volume. Larger material will be removed under Section 02202.

E. Correct unauthorized excavation at no cost to Authority.

F. Correct areas over-excavated by error in accordance with Section 02222.

G. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.04 BEDDING

A. Support pipe and conduit during placement and compaction of bedding fill.

3.05 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen materials.

B. Do not backfill over porous, wet, frozen or spongy subgrade surfaces. Trench must be dewatered.

C. 2 RC Fill: To be used in all roadways, including easement areas of roadways, parking areas or other vehicle access areas. Place and compact materials in continuous layers not exceeding 6 inches compacted depth.

D. In other areas place and compact in continuous layers not exceeding 6” inches compacted 2RC Fill 12 inches above top of pipe and use Soil Fill or continue with 2RC Fill.

E. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.

F. Employ a placement method that does not disturb or damage conduit in trench.

G. Maintain optimum moisture content of backfill materials to attain required compaction density.

H. Remove surplus backfill materials from site.

I. Leave fill material stockpile areas completely free of excess fill materials.

3.06 TOLERANCES

A. Top Surface of Backfilling: Under Paved Areas: Plus or minus one inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus one inch from required elevations.

3.07 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Section 01400.

C. Compaction testing will be performed in accordance with ANSI/ASTM D698 and with Section 01400.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Authority.

E. Frequency of Tests: As directed by Authority Engineer.

3.08 PROTECTION OF FINISHED WORK

A. Recompact fills subjected to vehicular traffic.

3.09 SCHEDULE

A. Water Supply and Sanitary Piping:

1. Bedding Fill: Type 2B, 4 inches thick.
2. Cover with type 2B fill, in 6 inch lifts, compacted to 95 percent to 12 inches above top of pipe and either 2RC or acceptable soil in 6” lifts compacted to 95 percent depending on the location in the remaining trench. (See Section 3.05 above)

B. Power Ducts:

1. Bedding fill of Type B 6 inches thick, compacted to 90 percent.
2. Remaining fill of Type B, to 6” above conduit compacted to 90 percent.

C. Interior Slab-On-Grade:

1. Type 2B fill, 4 inches thick.

D. Exterior Side of Foundation Walls.

1. Subsoil fill, to subgrade elevation, each lift, compacted to 90 percent.

E. Fill Under Grass Areas:

1. Subsoil fill, to 6 inches below finish grade.

F. Fill Under Concrete Paving:

1. Type 2B fill, to 8 inches below finish paving elevation, compacted to 95 percent.

G. Fill Under Asphalt:

1. Type 2RC fill, to bottom of asphalt, compacted to 95 percent.

H. Fill to Correct Over-excavation:

1. Lean concrete to minimum compressive strength of 1000 psi.

END OF SECTION

SECTION 02730

SANITARY SEWAGE SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary drainage piping, sewers, fittings, and accessories.

B. Connection of building sanitary drainage system (sewer) to municipal sewers.

C. Manhole access

1.02 RELATED SECTIONS

A. Section 02225 - Trenching: Excavating subsoil for sewer system piping.

B. Section 02223 - Backfilling: Backfilling over piping up to subgrade elevation underside of fill under paving.

C. Section 02720 \\NOT USED

D. Section 03001 - Cast-in-Place Concrete: Concrete type for manhole base pad construction and stream crossings.

1.03 REFERENCES

A. ANSI/ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

B. ANSI/ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

C. ANSI/ASTM D2751 - Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.

D. ANSI/ASTM D2774 - Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.

E. ANSI/ASTM D3033 - Type PSP Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

F. ANSI/ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

G. ANSI A21.11 - Rubber Gasket Joints for Cast Iron and Ductile-Iron Pressure Pipe and Fittings.

1.04 REGULATORY REQUIREMENTS

A. Conform to applicable Authority, State Department of Environmental Protection and Department of Transportation code for materials and installation of the Work of this Section.

1.05 SUBMITTALS

A. Submit shop drawings under provisions of Section 01300.

B. Submit shop drawings indicating dimensions, layout of piping, gradient of slope between corners and intersections, locations and elevations of manholes, and laterals.

C. Submit product data under provisions of Section 01300.

D. Submit product data for pipe, pipe accessories, and manholes.

E. Submit manufacturer's installation instructions under provisions of Section 01300.

1.06 PROJECT RECORD DOCUMENTS

A. Submit documents under provisions of Section 01300.

B. Accurately record location of pipe runs, connections, manholes, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PVC Pipe; National, Certainteed, J-M.

B. PVC Fittings: Certainteed, Harco

C. Precast Manholes: A.C. Miller, Monarch, Modern

D. Manhole Steps: M.A. Industries, East Point, GA

E. Integrally Cast Manhole Gaskets: Fernco, A-Lok

F. Substitutions: Under provisions of Section 01600.

2.02 SEWER PIPE MATERIALS

A. Ductile Cast Iron Pipe (DCIP)

1. Ductile cast iron pipe shall conform to ANSI A21.51 and shall have an ANSI Class 50 thickness (pressure Class 350) unless otherwise specified.

2. All buried pipe shall receive an outside bituminous seal coat and cement interior lining. Above ground or exposed piping shall be uncoated and suitable for painting.

3. Above ground or exposed ductile cast iron pipe shall be flanged in accordance with ANSI A21.10. Buried ductile cast iron pipe shall have flanges (ANSI A21.10); push on joints (Griffin Tyton Joint or approved equal); or mechanical joints.

4. Ductile cast iron fittings shall conform with the "Standard Specifications for Ductile Cast Iron Pipe and Special Castings" for Class D fittings.

B. Plastic Pipe

1. Schedule 40 ANSI/ASTM D2729, polyvinyl chloride (PVC) material; inside nominal diameter of 2 inches 6 mm; bell and spigot style solvent sealed end joints.

2. SDR 35 ANSI/ASTM D3034, Type PSM, polyvinyl chloride (PVC) material; inside nominal diameter of 4 to 24 inches; bell and spigot style.

2.03 PIPE ACCESSORIES

A. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required 'T', bends, elbows, clean-outs, reducers, traps, and other configurations required.

2.04 MANHOLES

A. Pre-cast Sections

1. All pre-cast manhole wall sections and manhole top sections shall be manufactured in compliance with the requirements of Tentative specifications for Pre-cast Reinforced Concrete Manhole Sections, ASTM Designation C-478. Riser sections shall have tongue and groove ends and a minimum wall thickness as shown in the standard details. Eccentric cones shall have the same minimum wall thickness and area of circumferential steel reinforcement as the round riser section. Top sections shall have a top width of such design and dimensions as to properly support the required manhole frame and cover and the lower joint shall be of tongue and groove design.

B. Joints

1. Joints between all pre-cast manhole sections shall be formed entirely of concrete employing a flexible sealant and when assembled, shall be self-centering and make a uniform watertight joint. The flexible sealant shall be an O-ring type rubber gasket or a one (1) inch diameter, Kent Seal No. 2 Joint Sealant as manufactured by Hamilton-Kent Manufacturing Company, Box 178, Kent, Ohio 44240 or approved equal. The remaining exterior part of the joint not filled by the sealant shall be filled with Five Star, Non-Metallic, Non-Shrink Grout as manufactured by U.S. Grout Corporation, Old Greenwich, Conn. 06879 or approved equal. (The

interior joint not filled by the sealant shall be left open). Openings for lifting shall be filled with non-shrink grout or flexible plugs and non-shrink grout.

C. Flow Channels

1. Invert flow channels shall be formed in a grout or concrete fill as shown in the standard details. Changes in size and grade shall be made gradually and evenly. Changes in the direction of the sewer and entering branches shall have a smooth curve of as large a radius as the size of the manhole will permit. The channel in the manhole shall be filled completely between the pipe ends and the precast channels.

2. All channel fills and the exterior concrete encasement shall be constructed of waterproof concrete complying with the following special requirements:

   a. No air-entraining agents are to be added to the concrete mix.

   b. Concrete shall be designed for a 3 inch slump and, if ready-mix, delivered to the job at a 3 inch slump.

   c. The pre-cast manhole base shall be carefully cleaned to remove all loose material and saturated with water.

   d. Concrete shall be placed as specified and the flow channels cut and trowelled preferably using "swimming pool" type (round end) trowels into the fill concrete.

D. Sewer Connections

1. Opening for sewer connections shall be fitted with integrally cast rubber gasket compatible with the pipe being used.

E. Frames and Castings

1. The top of the walls of pre-cast manholes shall be properly contoured to the street surface so as to form a flat surface upon which the cast iron manhole ring is to rest. If pre-cast sections do not conform to the required grade, concrete leveling rings, set in a full mortar bed, shall be used to bring the frame to proper grade and shall be laid to line in header courses in full and close joints of mortar which, at the inside face, shall not exceed one-quarter (1/4) of an inch in width. Rings shall be neatly

plastered and trowelled smoothly inside with cement mortar.

2. Cast iron manhole frames and covers shall conform to ASTM Designation A48 and be as listed below or approved equals:

Manufacturer	**Watertight** (Required where cover is subject to overland flow of water)	**Standard**
Neenah	R- 1915G	R-1733A w/Solid Lid
Campbell	N/A	#1104B
Jordan	Prod. # 104509	Prod.#104510

3. Where located in streets or subject to traffic loads, castings shall be capable of safely supporting an "H-S" loading with due allowance for impact included in the design. The American Association of State Highway Officials (A.A.S.H.O.) Specifications designate "H-S" loadings as designated for a tractor-truck-and trailer for loaded lengths up to 40 feet more (H 20 - S 16 and H 15 - S 12). All covers placed in a pavement area shall be placed to the grade and elevation of the roadway surface.

4. Castings shall be true to pattern in form and thickness, free from cracks, gas holes, flaws, excessive shrinkage, sound cleaned by means of sand blast and neatly finished. Runners, fins, risers, and other cast-on pieces shall be removed. All castings shall be tough and of even grain. All parts of castings shall be thoroughly coated at the factory with one (1) coat of black asphaltum paint.

5. Castings shall be commercially machinable with the metal bearing areas machine ground, finished to insure satisfactory seating so that it will be impossible to rock the cover after it has been sealed in the proper position in the frame.

6. All manhole covers shall have "SANITARY SEWER" cast in minimum 2" x 2" raised letters.

F. Manhole Steps

1. Manhole Steps shall be Grade 80 #4 deformed steel bar coated with polypropylene plastic cast into the walls of the riser and conical top sections at the place of manufacture. Steps shall be aligned vertically and spaced so as to be on equal centers in the assembled manhole at a maximum of 6 inches from the ends of riser and top sections. The adjoining riser and conical top

sections shall be fitted together in such manner as to assure true vertical alignment of manhole steps.

G. Outside Waterproofing

1. The entire exterior surface of all manholes shall be coated with one (1) coat, producing a dry film thickness of .016 inches (16 mils) of Bitumastic Super Service Black, as manufactured by Koppers Co., Inc., or approved equal.

H. Special Conditions

1. In all junction manholes where the grade of one sewer is considerably higher than that of the other, a drop connection shall be made. The drop piping shall be encased in Class B Concrete for the full dimensions.

2.05 FILL MATERIAL

A. Aggregate: Type specified in Section 02225.

B. Lean Concrete: Portland cement, sand, and water mixed lean.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive work, and excavations, dimensions, and elevations are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fill material of coarse aggregate.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.03 INSTALLATION – PIPE

A. Install pipe, fittings, and accessories in accordance with ANSI/ASTM C12, ANSI/ASTM D2321, ANSI/ASTM D2774, and manufacturer's instructions. Seal joints watertight.

B. Place pipe on minimum 4 inch deep bed of coarse filter aggregate.

C. Lay pipe to slope gradient noted on shop drawings with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install coarse aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inches.

E. Place remaining fill per Section 02225 aggregate in maximum 6 inch lifts, consolidating each lift.

F. Increase compaction of each successive lift. Refer to Section 02225 for compaction requirements. Do not displace or damage pipe when compacting.

3.04 INSTALLATION - MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation, compact as directed by Engineer.

B. Place 8" of 2B Aggregate in bottom of excavation.

C. Establish elevations and pipe inverted for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.05 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400.

B. Request inspection by Authority Engineer prior to placing filter aggregate cover over pipe.

3.06 PROTECTION

\\NOT USED.

3.07 SCHEDULE

\\ NOT USED.

END OF SECTION

SECTION 02731

RAW SEWAGE PUMP STATIONS

PART 1 GENERAL

A. All sewage pump stations shall be individually designed and equipped to meet the Authority's specifications. Special site or system conditions precluding the use of the specified system shall be brought to the Authority's Engineer's attention as soon as possible.

B. All requirements of the Department of Environmental Protection Sewerage Manual shall be met except where they are exceeded by the Township's standards.

C. A building meeting the minimum requirements contained herein shall be provided to enclose the generator and associated control cabinetry. Fencing requirements will be determined on a case by case basis.

1.01 LOCATION

A. All sewage pump stations shall be located as far as possible from any existing or proposed dwellings to avoid potential odor, noise and lighting problems.

B. Safety of the public should be considered in selecting the location.

C. The station shall be visually screened from residence by the use of appropriate landscaping.

1.02 SIZING

A. The wet well shall be sized to minimize the time sewage is normally held to avoid septic conditions. Capacity shall, however, be provided to allow for at least one hour of holding capacity after the high-water alarm is actuated. (Not including storage in the collection system.)

1.03 ACCESS

A. All pump stations shall be accessible by a service truck. Sufficient space for parking next to the station shall be provided and access drive and parking area shall be paved.

SEE ADDENDUM L PART 1.04

PART 2 EQUIPMENT

A. Pumps shall be non-clog submersible duplex electrical units equipped with sensors for heat and seal failure. They shall be capable of 10 starts per hour and continuous operation.

B. Pumps shall be manufactured by Flygt or Gorman-Rupp. Pumps over 7-1/2 HP shall be equipped with a flush valve system.

C. Check valves shall be non-clog ball type coated with nitrite rubber. It shall be accessible or removable with the pumps. All check valves shall be supplied by the pump manufacturer or approved equal. All valves shall be in a separate vault and operable from grade level.

D. Controls shall be supplied by the pump manufacturer or approved equal. They shall be housed in a stainless steel NEMA 4 enclosure equipped with a heater and 24" overhang or equivalent to protect operator and controls from weather. Three phase power shall be supplied where accessible. The controls shall include the following accessories.

1. Main Circuit Breaker
2. Swing Dead Front Panel
3. Lightning Suppressor
4. Elapsed Time Meters, volt meters and amp meters
5. 24-Hour Time Clock
6. Phase Failure Protection
7. Time Delay Lag Pump
8. Lead Pump Selector Switch
9. Manual Reset Heat Sensor
10. Pump Failure Indicator
11. Low Water Telemetry/Redundant Off -
12. High Water Telemetry and High Water Alarm
13. Seal Failure Contacts
14. Alarm Light
15. Raco Verbatim Auto phone dialer, completely wired and connected as directed by Township.
16. Power Failure Contacts
17. Anti-Condensation Heater
18. Convenience Outlet
19. Intrinsically Safe Panels
20. Phase loss protection with auto reset (if three phase pumps are provided)

E. An Emergency Portable Pump shall be supplied with each pump station. Each pump shall be gasoline driven mounted on skids or wheels depending upon the weight. Each pump shall have a self priming capability. A suction hose with trash strainer shall be provided with each pump. A discharge hose and fittings to connect to three inch threaded pipe or quick connect as directed by Authority in the pump stations shall also be provided. Both the discharge hose and the suction hose shall be wire reinforced. All needed fittings for connections shall be brass and extend to grade

level. Pumps shall be of high quality materials and easily started and capable of continuous operation and meet the flow and head conditions of the pump station.

F. Access door shall be Type K as manufactured by the Bilco Company, New Haven, Connecticut or an approved equal. Door leaf shall be ¼" aluminum diamond pattern plate to withstand a live load of 300 pounds per square foot. Channel frame shall be ¼" aluminum with an anchor flange around the perimeter. Door(s) shall be equipped with heavy forged brass hinges, stainless steel pins, spring operators for easy operation, and an automatic hold-open are with release handle. A snap lock with removable handle shall be provided. A 1-1/2" drainage coupling shall be located in the front right corner of the channel frame. Hardware shall be stainless steel with bituminous coating applied to exterior of the frame. Installation shall be in accordance with manufacturer's instructions and be integrally cast with the concrete top slab. Manufacturer shall guarantee against defects in material or workmanship for a period of five years. They shall be equipped with hasps and locks.

G. A pump mounting system for each pump station which allows the pumps to be lowered into position easily without entering the wet well shall be provided. The mounting system shall consist of stainless steel rails to guide the pumps into position. They shall be secured to the concrete pump chamber at the bottom, top and braced every 15 feet. The support system shall be supplied by the pump manufacturer. A portable hoist capable of being operated by a single individual and have capacity to lift the pump clear of the wet well shall be supplied.

H. At discretion of Authority, station shall be equipped with either on site emergency generator and all associated hardware, transfer switch, etc. to make fully operable or Authority specified transfer switch and outlet compatible with Authority's portable generator.

I. Wet well level sensor shall be multi-trode 2.2 or equivalent with all ancillary controls and equipment to sequence pump operation as instructed by Authority Engineer.

J. Where appropriate, the London Grove Township Municipal Authority may elect to require a building at a pumping station to conceal the generator and control cabinetry. The intent is to provide a building that conforms to the character of the surrounding development so that the pumping station is less conspicuous to the residents of the Township. In addition, the LGTMA requires a structurally sound, low maintenance building. The following describes minimum standards of the building construction. During the course of the design review, additional details may be further defined.

- Walls are to be constructed of CMU and brick or CMU with stone veneer
- A concrete footing is to be provided at a depth of 42”
- Walls are to be insulated with core inserts
- Dur-O-Wall reinforcing is to be provided on every other block course.
- #4 rebar is to be placed at 48” on center within wall section from foundation to bond beam
- Concrete bond beam is required with two continuous #5 reinforcing bars
- 18” anchor bolts embedded in concrete are to be supplied for top plate at 48” on center
- Separate concrete floor including foam insulation 3’ from edge of wall and to a depth of 3 feet along inside of wall
- A separate, concrete reinforced, vibration isolating pad is to be provided for the generator
- A 4’ clearance is to be provided around the generator
- Generator exhaust discharge is to be pointed away from houses in the community
- Generator is to have a silencer
- Inside walls will be painted with an epoxy coating suitable for concrete
- Inside ceiling shall be non vented white aluminum soffit panel
- Roof will be comprised of ¾” tongue and groove plywood, 30 pound felt and fiberglass shingles with a 40 year warranty transferable to the LGTMA
- Wood trusses will be spaced a maximum of 24” on center, pitch of 6/12 and be secured w/ hurricane clips at bearing points

Design Loading: Top Chord Live Load – 30 PSF

Dead Load – 10 PSF

Bottom Chord Dead Load – 10 PSF

Point Load for Eye Hooks/Bracing – 1,000 LBS

- Non-corrosive double doors with a wood exterior finish and stainless steel hardware
- Building shall have electric, lighting and HVAC designed to national standards
- Building is to be heated to 50-degree minimum in the winter
- Ceiling insulation shall be R-30 fiberglass batt insulation
- A visual alarm indicator shall be provided on building exterior
- Landscaping around the pump station site shall be of similar appearance to the surrounding development. It should contain a mix of different types of vegetation and shall be reviewed by the Authority prior to final approval
- Developer is to provide architectural elevations for review

PART 3 PUMP STATION CONSTRUCTION

A. All pump stations shall be constructed of concrete per Section 03002.

B. All pump stations shall be constructed with a separate valve chamber and be laid out using the drawings in these rules and regulations.

C. All pump stations shall be designed to prevent flotation when empty and with the water table at the ground surface.

PART 4 TELEPHONE DIALER

A. A RACO Verbatim auto phone dialer unit shall be provided which will automatically call predetermined telephone numbers when any alarm condition is indicated at the alarm annunciation panel. The unit shall transmit a programmed message stating nature of the alarm condition. If the called number is busy, does not answer or if an incorrect number is reached, the unit shall hang up and call up to eight back-up numbers. Once the call is received, the person receiving it can acknowledge the unit from his telephone so that it will hang up and not place any more calls.

B. The unit shall monitor up to eight sets of normally open contacts which can activate telephone numbers and voice message. Channel shall have built in AC monitoring circuitry so that if the AC power is lost to the station, the unit will automatically call out.

There shall be a bypass switch so that this function can be bypassed and Channel used for other external alarms.

C. The unit shall have an adjustable (0-90 seconds) time delay to allow time for the operator to respond to the alarm. Also, a rechargeable battery unit shall be included to notify of AC power loss. The battery shall have sufficient capacity to supply six hours of calling after AC power failure.

D. Electrical:

1. Power Requirement 105-135 VAC, 15 watts maximum.
2. Standby Battery: Gel Cell 6V, 2.6 A.H. Standby time 6 hours.
3. Battery Charging: Precision voltage controlled, including automatic rapid recharge after drain.
4. Input Sensing: Alarm on open contacts is standard, but each channel may be independently keyboard programmed for alarm on closed contacts or no alarm.
5. Surge Protection: Heavy duty gas tubes followed by solid state surge/transient protection on all inputs.

E. Dialing Format

1. Standard rotary pulse. FCC registered. Dials up to 8 different numbers.
2. Done by pressing a Touch Tone "9" during alarm call, or by calling dialer back after alarm call is completed.

F. Program and Diagnostic Readout

1. Pressing a Touch Tone "O" during any call causes user entered keyboard programming to be spoken over the phone.

G. Talk Through

1. If SPEAKER/MIC switch is left in MIC position, sounds picked up by the built-in microphone will be transmitted over the phone.

H. Keyboard Programming

1. The user enters up to 8 alarm dial-out phone numbers, local or long distance.

I. Acknowledged Alarm Conditions

1. Upon acknowledging any alarm condition by touch tone or by callback (call-in following an alarm call-out), a time-out period (called "Alarm Reset Time") begins counting down. If the input circuit condition for that channel has

not returned to normal before this time-out, the alarm will be reactivated and the dialer will begin placing alarm calls again. This "Alarm Reset Time" is normally one hour. However, the user may program any other "Alarm Reset Time" on the keyboard, up to 99 hours, or he may program "No Alarm Reset". The same "Alarm Reset Time" is common to all channels and also to Power Failure Alarm.

J. The Unit shall be factory wired and tested and be enclosed in a suitable steel enclosure within the panel. The unit shall be a Raco Chatterbox CS8 or approved equal.

END OF SECTION

SECTION 02732

BUILDING SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavate placement of pipe and backfilling of sewer from dwelling or building to the sewer right-of-way.

B. A building sewer permit is required from the Authority prior to constructing any building sewer.

C. Prior to covering any portion of the Building Sewer, it must be inspected by the Authority. All lines must be air tested to 5 PSI for 10 minutes in the presence of the Authority and/or Authority Engineer. No work will be accepted unless it has been inspected and tested. All testing shall be per the pipe manufacturer's specifications and Section01400-2.03 of LGTMA Standard Specifications.

SEE ADDENDUM J PART 1.01.D
SEE ADDENDUM O PART 1.01.E

PART 2 BACKFILL PROCEDURES

2.01 DUCTILE IRON PIPE

A. The procedure for backfilling ductile iron sewer pipe shall be as follows: After the sewers have been installed, the material directly around the pipe shall be hand tamped. Then, in such manner as not to disturb the pipe, backfill to a height of eight (8) inches above the top of the pipe, and compact with a mechanical tamper. The remainder of the trench shall be backfilled by one of the following methods:

1. When the building sewer is located within a State Highway, and/or Township road, including easement, parking lot or other roadway area, the trench shall be backfilled in layers not exceeding six (6) inches in thickness and mechanically tamped.

2. When the building sewer is located beneath an unpaved area, or area not subject to vehicular traffic, backfilling may be accomplished by filling to the ground surface in one operation and compacting by trench roller or special heavy-duty tamping machine. The backfill material may be deposited in the trench by the excavating equipment or a front end loader from the end of the trench. Excavated material free of large stones, (stones greater than three (3) inches in any direction) may be used for this backfill.

B. Backfilling material, placed within two (2) feet of manholes and other structures, shall be deposited uniformly around the sides in layers not exceeding eight (8) inches in depth, and solidly tamped in such a manner as to avoid impairing the structures or producing unequal pressure on them.

2.02 PVC PIPE

SEE ADDENDUM B

A. The procedure for backfilling PVC sewer pipe shall be as follows: After the building sewers have been installed on a firm bedding as shown on the standard detail, haunching material shall be carefully placed and consolidated under the pipe haunch to provide adequate side support. The haunching material shall be placed in four (4) inch compacted layers to the top of the pipe. The material shall be placed in such a manner as not to disturb the pipe. The haunch material shall be 2B stone.

B. An eight (8) inch layer of 2B or 2RC stone backfill shall be placed above the spring line of the building sewer to provide a protective cushion.

C. The remainder of the trench shall be backfilled by one of the following methods:

1. When the building sewer is located within a State Highway, and/or Township road, including easements, parking lot or other roadway area, the trench shall be backfilled in layers of 2RC stone not exceeding six (6) inches in thickness and mechanically tamped.

2. When the building sewer is located beneath an unpaved area, or area not subject to vehicular traffic, backfilling may be accomplished by filling to the ground surface in

one operation and compacting by trench roller or special heavy-duty tamping machine. The backfill material may be deposited in the trench by the excavating equipment or a front end loader from the end of the trench. Excavated material free of large stones (stones greater than three (3) inches in any direction) may be used for this backfill.

D. Backfilling material, placed within two (2) feet of manholes and other structures, shall be deposited uniformly around the sides in layers not exceeding eight (8) inches in depth, and solidly tamped in such a manner as to avoid impairing the structures or producing unequal pressures on them.

2.03 EXISTING SEPTIC SYSTEM ABANDONMENT

A. All existing septic tanks, grease traps, cisterns, manholes or any other on-site treatment system component shall be abandoned after connection to the sewage system. All underground tanks including septic, pump, cisterns, seepage pits and cesspools shall have all liquid and sludge removed from them. After these tanks have been cleaned they shall be filled with soil, stone or other suitable material. The drain field piping does not have to be removed or filled unless the property owner wishes to do so.

2.04 GREASE TRAPS

A. Grease, oil and sand interceptors shall be provided when, in the opinion of the Authority, they are necessary for the proper handling of liquid wastes containing floatable grease in excessive amounts, sand, or other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Authority, and shall be located as to be readily and easily accessible for cleaning and inspection. In the maintaining of these interceptors the owner(s) shall be responsible for the proper removal and disposal by appropriate means of the captured material and shall maintain records of the dates, and means of disposal which are subject to review by the Authority. Any removal and hauling of the collected materials must be performed by currently licensed waste disposal firms.

B. Generally, only restaurants or other food handling facilities require grease traps. Since the type and size of grease traps will vary based on the volume of grease expected, the proposed grease trap design must be submitted to the Authority for approval at the time the application is made for connection to the sewer system.

END OF SECTION

SECTION 02733

WASTEWATER TREATMENT FACILITIES
(Greater than 10,000 gallons per day)

PART 1 GENERAL

A. All wastewater treatment facilities to be owned and/or operated by Authority shall be individually designed and equipped to meet the Authority's standards, rules and regulations. Special site or system conditions precluding the use of the specified system or equipment shall be brought to the Authority Engineer's attention as soon as possible.

B. All requirements of the Department of Environmental Protection Sewerage Manual shall be met except where they are exceeded by the Authority's standards, rules and regulations.

1.01 LOCATION

A. All wastewater treatment facilities shall be located as far as possible from any existing or proposed dwellings to avoid potential odor problems.

B. Safety of the public should be considered in selecting the location.

C. The facility shall be visually screened from residences by the use of wooden fencing and/or landscaping it if is a mechanical treatment plant.

1.02 SIZING

A. The treatment facility and all of its components shall be sized based on an average daily flow of 500 gallons per day per dwelling unit. Peak daily flows shall be one and a half (1.5) times the average.

1.03 ACCESS

A. All treatment facilities shall be accessible by a tandem axle truck. Sufficient space for parking shall be provided and access drive and parking area shall be paved.

B. Chain Link fencing of all mechanical treatment plants shall be required to protect it and the public. Fencing requirements shall be per Section 02831.

PART 2 EQUIPMENT

A. Aeration, Settling, Sludge Holding, Chlorine Contact, Equalization and other treatment tanks.

1. All tanks shall be constructed of reinforced concrete under the provisions of Section 03001 or 03002 of these specifications.

2. The tanks shall be protected from floatation and flooding.

3. They shall be designed with sufficient freeboard to prevent over-topping.

4. If the tanks are set within 0-3' of ground level, they shall be covered with grates or surrounded with railing (Section 05520 or 05530.)

5. All tanks shall be accessible by operating personnel for equipment maintenance.

6. Sumps shall be provided in all sludge tanks, chlorine contact tanks and other tanks that require periodic cleaning or sludge removal.

B. Aeration Equipment

1. Blowers shall be of the rotary lobe, positive displacement type and shall be redundant.

2. They shall include intake filters with silencer, discharge silencer, vibration isolator, pressure gauge and pressure release valve.

3. The blowers shall not exceed 85dBA decibels within the room they are located.

4. The blowers shall be housed in a separate portion of the operations building away from the normal work area for the operator. The blower room shall be ventilated to reduce the heat buildup.

5. The blowers shall be manufactured by Dresser Industries, Roots Division or approved equal.

6. The blowers shall be driven by three phase electric motors when possible and controlled by a 24 hour timer and normal operating switches. Blowers shall be equipped with variable frequency controls as approved by Authority Engineer.

7. Diffusers shall be fine-bubble or as otherwise directed by Engineer and be removable without dewatering the tanks. They shall be equipped with double check valves and be manufactured by Wyss (Parkinson Corp.) or approved equal. Spare diffusers shall be provided (110% of total needed).

8. All piping for submerged air distribution shall be 316 stainless steel.

C. Pumps

1. Influent lift pump stations shall meet the requirements of Section 02731.

2. All other pumps shall be sized and selected to meet the requirements of the material to be pumped and shall be selected to avoid clogging, be easily accessible, and have provisions for backup operations if critical to the day to day operation of the plant.

3. Acceptable manufacturers shall include Flygt, or approved equal.

4. Nonsubmersible pumps shall be provided with drains for packing boxes, if required.

5. Authority reserves right to require variable frequency motor controls or other suitable flow matching equipment.

D. Emergency Power

1. An emergency electrical generator capable of operating all essential plant equipment on a temporary basis shall be provided. Equipment to be operated included influent pumps, disinfection equipment, blowers, lights, and other pumps required to prevent the discharge of untreated wastewater.

2. The emergency generator shall be capable of all weather starts and housed in a weather-proof enclosure.

3. It shall be manufactured by Caterpillar or Kohler.

4. It shall be equipped with automatic starting controls, a residential type silencer on the exhaust, jacket water heater and be provided with automatic shut-offs for high temperature, low oil pressure, overspeed and engine overcrank.

E. Filtration Equipment

1. Sand filters shall be required either as an integral part of any mechanical treatment process or as a safety measure to prevent unacceptable discharges to the stream in the event of plant upsets or equipment failures.

2. The filters shall be of the intermittent sand type or continuous flow automatic backwash.

3. Acceptable manufacturers include Parkson Corporation (Dyna Sand), and Aqua Aerobics or approved equals.

4. The filters shall be weatherized to allow for year-round operation.

F. Lagoons

1. General

The purpose and scope of these specifications is to cover the construction of wastewater lagoons with a soil-bentonite liner having a permeability of 1×10^{-8} cm/sec or less.

a. Wastewater treatment lagoons used prior to land application shall be of the aerated/facultative type.

b. The aerated pond shall be designed with a K value of 0.06 (22 days retention time).

c. The facultative pond shall be designed with a loading rate of 20 lbs of BOD per acre per day.

d. Depending upon the spray irrigation system, a minimum of 72 days storage shall be provided.

e. If soil conditions permit, a bentonite clay liner shall be used and covered with a geotextile and PA #4 stone to protect it and minimize maintenance.

f. Because of varying soil conditions, extreme caution is needed in preliminary site testing, design, and construction. A pre-design conference with the Authority's Engineer is required to review site conditions and the proposed design concept.

g. The Contractor shall furnish all material and labor, and perform all work necessary to construct sewage treatment lagoons as required by the design engineer.

h. The Contractor shall submit evidence to the Authority Engineer that he is competent to construct a soil-bentonite liner or a bentonite GLC liner. This evidence shall insure that the Contractor or his subcontractor has sufficient competent personnel to carry out the specified operations.

i. If the specifications are based on using a mix-in-place method for the soil-bentonite liner. The Engineer may require that the mixing of the soil and bentonite be done by the batch plant method, if there are any problems with the mix-in-place method.

j. Immediately upon completion of the lagoon liner and acceptance the Authority Engineer, the Contractor shall fill the lagoons with fresh water to allow the soil-bentonite liner to swell and seal.

k. The bentonite shall be covered by the manufacturer's warranty against defects in material or workmanship. It shall have a usefull life of 30 years under normal weathering and normal use conditions.

G. Operations Manual

1. The Contractor shall provide three (3) sets of instruction booklets for all equipment including but not limited to the motors, pumps, flow meter, activated sludge equipment, sprinklers, control equipment, electrical equipment and chlorinators.

2. These instruction booklets shall be in durable binding and shall include the following:

a. Summary sheet of maintenance required including lubrication schedule.

b. Technical data and parts list for all components

c. Schematic drawing of electrical service

d. Approved shop drawings

e. Section for "Notes"

f. Operations Instructions and Procedures

g. As built drawings.

h. Any special safety concerns.

3. These booklets are to be delivered prior to any operation of the equipment.

H. Start-up

1. Prior to accepting wastewater, all components of the plant shall be tested with water. All pumps, blowers, alarms and emergency equipment shall be run and tested to determine if it meets the specifications.

2. Piping shall be tested per Section 15400.

I. Disinfection

1. Disinfection equipment shall be of the Ultraviolet disinfection type.

J. Control Building

1. A building shall be provided to house the controls, blowers and other necessary equipment.

2. It shall be provided with a separate operator room which may also contain the electrical controls but no major mechanical equipment. The operator's room must contain at least 20 square feet of chemical resistant counter space, a lab sink and a bench for working on mechanical equipment.

3. It shall provide enough storage space in cabinets for all laboratory equipment and supplies and all tools.

4. The building shall be insulated to current standards and provided with an automatic heating system.

5. Control buildings for treatment facilities with flows above 50,000 gallons per day may require additional facilities such as rest rooms and more laboratory and equipment storage space.

K. Sludge Processing

1. All sludge shall be processed to allow for its disposal at a licensed sanitary landfill. The processing equipment must be able to dry the sludge consistently to above 20 percent solids.

2. Sufficient storage space shall be provided to store the sludge in either a liquid or processed state to allow for cost effective processing or transportation of the material.

3. Those facilities with flows under 75,000 gallons per day shall be reviewed to determine if the sludge should be transported to another facility for processing. A cash contribution in lieu of constructing sludge processing facilities at the smaller plant may be an acceptable alternative.

L. Miscellaneous Equipment

1. Laboratory supplies shall include all necessary automatic samplers, glassware, oxygen and pH meters, ovens, incubators, test kits and miscellaneous hardware and chemicals to perform all permit sampling and analyses required of the specific treatment system and plant.

2. Fire Fighting Equipment

The fire extinguishers shall be of the following type:

a. ABC Dry Chemical: 20 lbs capacity, enameled steel container with pressure-indicating gauge, for Classes A, B, and C fires.

b. The fire extinguishers shall be as manufactured by W.D. Allen Co., Casco Products Corp., General Fire Extinguisher Corp., or approved equal.

c. An extinguisher shall be located in each room of the control building.

M. Flow Equalization

Flow equalization shall be provided for in all treatment facilities.

END OF SECTION

SECTION 02831

FENCING

PART 1 FARM FENCE

A. The fence specified herein shall be used to enclose the proposed wastewater treatment pond. The fence shall be fabricated and installed according to the manufacturer's recommendations.

B. The fence fabric is to be Forbes Steel Farm Fence design 936-6-11 or approved equal. The fabric is to be a minimum of 48 inches high, higher if conditions dictate.

C. Two strands of barbed wire six inches on center shall be placed above the fence fabric and shall conform to the Federal Specification RR-F-221, U.S.S. Co. "American Wankegan Four Point" or approved equal.

D. Line posts are to be pressure treated wood, 4" x 4" or equal and are to be at least 8 feet long with at least 2 feet 6 inches placed in the ground at time of installation.

E. The end and corner posts are to be 6" x 6" pressure treated and posts or equal and are to be at least 10 feet long with 4'-6" set in ground. The end posts are to be set and braced with 4" x 4" braces.

F. Suitable double gates of the same construction as the fence shall be provided and installed. The gates shall have a twelve foot wide opening without center post or with removable center post.

G. The gates shall be equipped with heavy duty hardware with padlocks, keyed to match locks on the door of the control house.

PART 2 CHAIN LINK FENCE

A. The 6' fence specified herein shall be used to enclose the pump station as shown on the plans.

B. The chain link fence fabric shall be vinyl coated steel. It shall be of a 2 inch mesh and be a #9 gauge. The color of the PVC coating shall be dark "woodland green".

C. Intermediate posts shall be 2 inch O.D. and have a pipe weight of 2.73 pounds per foot and terminal posts shall be 2-1/2 inch O.D. Posts spacing shall be no further apart than 10 feet on center. They shall be of sufficient length to extend 36 inches into concrete footings and shall be plumb with tops properly aligned. Top rails shall be 1-5/8 inch O.D. and have a pipe weight of 1.35 pounds per foot. Braces shall be 1-5/8 inch O.D. and have a pipe weight of 1.35 pounds per foot. They shall be located midway between the top rail and the ground.

D. Presses steel extension arms shall be provided to accommodate three strands of barbed wire. The extension arms shall extend at a

45-degree angle away from the enclosure. They shall be located on each post.

E. The gate shall be provided as specified and as shown on the drawings. They shall be of the same construction as the fence. One (1) double gate shall be provided. The gate post shall be 4 inch O.D. Schedule 40. The gates shall be equipped with heavy duty hardware and padlock common keyed with pump station locks. The gates shall be equipped with a drop bar and gate hold back. The double gate shall have a 20 foot opening.

PART 3 INSTALLATION

A. The fences, gates and accessories shall be installed in strict accordance with the manufacturer's plans and specifications and the contract drawings.

END OF SECTION

SECTION 03001
CAST-IN-PLACE CONCRETE

PART 1 DESCRIPTION

1.01 WORK SPECIFIED HEREIN: CAST-IN-PLACE CONCRETE:

A. Products:

1. Water
2. Cement
3. Sand
4. Aggregates
5. Reinforcing steel
6. Welded wire fabric
7. Admixtures
8. Forms
9. Preformed bituminous joint
10. Curing materials
11. Expansion bolts
12. Vapor barrier
13. Grout
14. Anchor bolts
15. Concrete strengths

B. Execution:

1. Proportioning
2. Reinforcement
3. Forms
4. Concrete
5. Finishes
6. Slabs
7. Protection and curing

1.02 DESCRIPTION OF WORK

A. Except as specified otherwise herein, concrete work shall conform to all requirements of the American Concrete Institute's Specifications for Structural Concrete for Buildings (ACI 301-72, Revised 1975).

B. Concrete shall be normal weight concrete and weigh in place not more than 150 pounds per cubic foot.

C. Contractor shall schedule his work and notify all trades in ample time so that provision for their work can be made without delaying the progress of the project.

D. It is the intention of the Drawings and Specifications to produce concrete which will present an acceptable finish appearance. Imperfection of materials or workmanship shall be corrected as the Engineer directs at the Contractor's expense.

E. It will be the Contractor's responsibility to ensure that all concrete surfaces are completely free of any conditions which will adversely affect its finished appearance or the application of a specified finish.

F. Submittals (Paragraph E, below) and Testing (Paragraph F, below) not required for concrete encasement or buttresses.

1.03 DEFINITIONS

A. ACI - American Concrete Institute, P.O. Box 19150, Detroit, MI 43219

B. ASTM - American Society for Testing Materials, 1916 Race Street, Philadelphia, PA 19103

C. CRSI - Concrete Reinforcing Steel Institute, 228 N. LaSalle Street, Chicago, IL 60601

1.04 QUALITY ASSURANCE

A. Testing Agency:

1. An independent testing agency selected by the Contractor, in accordance with ACI 301-72 Paragraph 16.2.3 and subject to the approval of the Engineer.
2. Cost of Testing: Borne by Contractor.
3. Tolerances:

a. Formwork, General: ACI 301-72, Chapter 4
b. Reinforcement: ACI 301-72, Chapter 5
c. Finishes:
i. All tolerances for finishes shall be as follows:
(1) Walls - ACI 302-72 Paragraph 10.4
(2) Slabs - ACI 302-72 Paragraph 11.8

1.05 SUBMITTALS

A. General: Make submittals in accordance with the requirements of Section 01300 of the Supplementary Conditions.

B. Certification: ASTM C94-74, Section 15.

C. Test Reports: Tests specified in Paragraph F, below

D. Manufacturer's Data: Grout, expansion bolts, and admixture.

E. Concrete reinforcement: ACI 301-72 Paragraph 5.1.

F. Mix design: ACI 301-72 Paragraph 16.7.

1.06 FIELD QUALITY CONCRETE

A. Concrete shall be sampled and tested for quality control during the placement of concrete in accordance with ACI 301-72 Paragraph 16.3.4.

1. Test required: Compressive strength, air content and slump.
2. Sampling fresh concrete: ASTM C172, except modified for slump to comply with ASTM C94.
3. Slump: ASTM C143 one test for each concrete load at point of discharge and one for each set of compressive strength test specimens.
4. Air content: ASTM C231 pressure method; one for each set of compressive strength test specimens.

5. Compression test specimens: ASTM C31 one set of 3 standard cylinders for each compressive strength test.
6. Compressive strength tests: ASTM C39, one set for each 100 cubic years for fraction thereof of each mix design of concrete placed in any one day; one cylinder tested at seven days and balance at 28 days.

B. Testing agency: See Paragraph 1D, above.

C. Cost of testing: Borne by Contractor.

D. Report test results in writing to the Authority Engineer. All reports shall contain project identification name and number, date of concrete placement, location of test, name of Contractor, name of concrete supplier, name of concrete testing service, test results and be in accordance with Section 01300 of the Supplementary Conditions.

E. Evaluation of Test Reports:

1. Evaluation of test reports: ACI 301-72, Chapter 17.

2. Tests showing non-conformance to Specifications:

a. Authority Engineer may order boring or load tests to be made in accordance with ACI 301-72 Paragraph 17.3.

b. Cost of additional tests for evaluation of non-conforming materials: Borne by Contractor.

F. Acceptance of Structure: ACI 301-72, Chapter 18.

G. Codes and Standards:

1. Except as modified by the requirements specified herein and/or the details on the Drawings, all work included in this section shall conform to the applicable provisions of the following codes and standards:

a. ACI-211.1 - Recommended Practice for Selecting Proportions for Normal and Heavy Weight Concrete.

b. ACI-301 - Specifications for Structural Concrete for Buildings.

c. ACI-304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

d. ACI-305 - Recommended Practice for Hot Weather Concreting

e. ACI-306 - Recommended Practice for Cold Weather Concreting

f. ACI-311 - Manual of Concrete Inspection

g. ACI-315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.

h. ACI-318 - Building Code Requirements for Reinforced Concrete

i. ASTM C 94 - Standard Specifications for Ready Mixed Concrete

j. C 330 - Standard specifications for Lightweight Aggregates for Structural Concrete

k. ASTM Standards C143, C31, C173, C231, C172, and C39

H. Environmental Conditions:

1. Cold weather requirements shall conform to ACI 301 and 306 and as follows:

a. Concrete temperature shall be maintained when deposited at not less than 60 degrees F. In cold weather, the reinforcement, forms, and ground which concrete will contact must be completely free of frost.

2. Hot weather requirements shall conform to ACI 301 and 305 and as follows:

a. The maximum placing temperature of the concrete, when deposited, shall be 80 degrees F. If the weather causes the placing temperature to exceed 80 degrees F, the mix shall be cooled by wetting the aggregate or other appropriate method if approved by the Engineer.

PART 2. PRODUCTS

2.01 MATERIALS

A. Water (for mixing and curing): Clean, potable and free or organic materials, strong acids or alkalis, oils, salt and other substances in amount deleterious to concrete.

B. Portland Cement ASTM-C150, Type I, American manufacture. One (1) brand used throughout project.

C. Sand: (Fine aggregate) shall be clean, sharp, coarse, (minimum fines) hard, natural sand free from salt, loam, clay and other deleterious materials and shall conform to ASTM Specification C33 or C330.

D. Coarse Aggregate: Shall be well graded, washed gravel or crushed stone and shall conform to ASTM Specification C33 for normal weight aggregate. Maximum size aggregate ¾" in all slabs.

E. Reinforcing steel: Reinforcing bars shall be deformed high strength bars conforming to ASTM A615, Grade 60.

F. Welded Wire Fabric: Shall conform to ASTM A185-73 Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement.

G. Admixtures: No admixture shall be used without written approval of the Engineer, except that air entraining admixture shall be used in concrete exposed to atmospheric conditions as indicated on the Design Drawings. Air entraining admixtures shall meet requirements of ASTM C260 and shall follow ACI "Guide for Use of Admixtures in Concrete" (Title No. 68-56). Air entrainment admixture content shall not exceed 0.05 percent of active ingredient by weight of cement.

H. Forms: Wood, metal, or fiber type as required for specified finish.

I. Curing Materials: Waterproof paper, mats, burlap or polyethylene film or other approved material which will keep the concrete continuously moist.

J. Preformed Bituminous Joint: Shall conform to ASTM D994.

K. Expansion Bolts: Shall be as follows (bolts shall be made of ASTM A36 steel unless noted otherwise):

Trade Designation	Manufacturer
Star Slugin	Star Expansion Co. Mountainville, NY 10953
Rawl Multi-Calk	The Rawlplug Co. 224 Peterson Road New Rochelle, NY 1080
Kwik-Bolt	Hilti Fastening Systems One Cummings Point Road Stamford, CT 06904
Expansive Screw Anchor	Ackerman-Johnson Co. 99 Commercial Drive Addison, IL 60101
Philips Red Head Self Drilling Concrete Anchor	Philips Drill Co. U.S. 12 and Liberty Trail Michigan City, IN 46360
Wej-It	Wej-It Corporation 500 Alter Street Broomfield, CO 80020
Cinch Expansion Anchor	Anchor Alloys, Inc. 966 Meeker Avenue Brooklyn, NY 11222

L. Vapor barrier: Polyethylene film .006" thick, lapped 12" at laps.

M. Grout: Shall be nonshrink grout; Embeco No. 636 or Masterflow No. 713 as manufactured by Master Builders or an approved equal.

N. Anchor Bolts: Shall conform to ASTM A 307.

O. Concrete Strengths: Minimum ultimate compressive strength of the concrete at age 28 days shall be 3000 pounds per square inch and the slump shall not exceed 3".

PART 3 EXECUTION

3.01 PROPORTIONING (ACI 301-72 Chapter 3)

A. All concrete shall be proportioned to resist destructive exposure. All concrete structures shall be watertight.

3.02 REINFORCEMENT (ACI 301-72 Chapter 5)

A. Reinforcement shall be fabricated and detailed to shapes and dimensions indicated on Drawings. Before placing, clean rust, mill scale or other coatings, including ice that would destroy or reduce bonding.

B. Reinforcement shall not be bent or straightened in a manner injurious to the material.

C. Splices at maximum stress locations are not permitted. Laps and splices shall be of adequate length to transmit stresses. Splices in adjacent bars shall be staggered.

D. Plain bars not permitted.

E. Welding of reinforcing steel not permitted.

F. Wire reinforcement shall be cut and supported at proper elevations by standard accessories.

G. Dovetail anchors, bolts, bars, pipes and dowels shall be accurately and securely tied.

H. Reinforcement shall be secured in position and reviewed by the Engineer before pouring of concrete.

3.03 FORMS (ACI 301-74 Chapter 4)

A. Forms shall be constructed to conform to shape, form, line and elevation required and shall be sufficiently rigid to prevent deformation under load. Forms and supports shall not be removed until members, walls, etc. have acquired sufficient strength to safely support their weight and any load thereon.

B. Forms shall be sufficiently tight to prevent leakage of the concrete.

3.04 CONCRETE (ACI 301-72 Chapters 7 and 8)

A. If requested by Authority Engineer, certificates shall be furnished to the Authority Engineer showing that the concrete and reinforcement complies with tests and samples of applicable specifications.

B. Care shall be exercised to prevent honey-combing or segregation of the ingredients of the concrete.

3.05 FINISHES (ACI 301-72 Chapters 9, 10, and 11)

A. All surface defects including tie holes shall be repaired immediately after from removal.

B. Proprietary material for adhesion or as patching ingredients shall not be used.

C. Formed Surfaces: All surfaces shall be finished as follows:

1. Walls - Act 302-72 Paragraph 10.4
2. Slabs - Act 302-72 Paragraph 11.8
3. Repair all defects in accordance with ACI 301-72 Chapter 9.

3.06 SLABS (ACI 301-72 Chapter 11)

A. All slabs shall be in accordance with ACI 301-72 Chapter 11 and these specifications.

3.07 PROTECTION AND CURING (ACI 301-72 Chapter 12)

A. The protection used for curing shall remain in place at least 24 hours or for sufficient time to ensure development of specified strength.

B. Protect exposed concrete from damage for duration of construction (ACI 301-72 Paragraph 12.4).

END OF SECTION

SECTION 03002

PRE-CAST CONCRETE

PART 1 GENERAL

1.01 DESCRIPTION

A. Work specified herein: Pre-cast concrete structures.

1. Products:

a. Water
b. Cement
c. Aggregates
d. Reinforcing
e. Welded Wire Fabric
f. Gaskets/Sealants
g. Pre-cast Manhole Steps
h. Seals

B. Definitions:

1. ASTM - American Society for Testing Materials.

2. AASHO - American Association of State Highway Officials.

C. Quality Assurance:

1. Testing:

a. Certification from independent testing agency supplied by the manufacturer.

b. Cost of Testing: Borne by Contractor.

D. Submittals:

1. General: Make submittals in accordance with the requirements of Section 01300 of the Technical Specifications including design data and engineering calculations.

2. Included, but not limited to, the following: gaskets, seals, manhole steps, manholes, pump stations, meter pits, valve chambers, and air release chambers.

E. Codes and Standards:

1. Except as modified by the requirements specified herein and/or the details shown on the drawings, all work included in this section shall conform to the applicable provisions of the following codes and standards:

a. ACI 211.1 - Recommended Practice for Selecting Proportions for Normal and Heavy Weight Concrete.

b. ACI-304 - Recommended Practice for Measuring, Mixing and Placing Concrete.

c. ASTM Standards C33, C150, CA615.

PART 2 PRODUCTS

2.01 MATERIALS

SEE ADDENDUM T PART 2.01

A. Water: Clean and free of organic materials, strong acids or alkalis, oils and salt.

B. Portland Cement ASTM-C150, Type I. American Manufacture. One (1) brand used throughout project.

C. Sand: (Fine aggregate) shall be clean, sharp, coarse, (minimum fines) hard, natural sand free from salt, loam, clay and other deleterious materials and shall conform to ASTM Specification C33 or C330.

D. Coarse Aggregate: Shall be well graded, washed gravel or crushed stone and shall conform to ASTM Specification C33 for normal weight aggregate.

E. Reinforcing Steel: Reinforcing bars shall be deformed high strength bars conforming to ASTM A615, Grade 40 and Grade 60.

F. Welded Wire Fabric: Shall conform to ASTM A-185-73 Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement.

G. Admixtures: No admixture shall be used without written approval of the Engineer.

H. Forms: Wood, metal, or fiber type.

I. Curing Materials: Waterproof paper, mats, burlap or polyethylene film.

J. Gaskets/Sealants: Rubber or neoprene and caulk or grout.

K. Manhole Steps: Grade 60-#3 deformed steel bar coated-polypropylene plastic as manufactured by M.A. Industries, Inc. of East Point, Georgia or approved equal.

L. Seals: Rubber or neoprene.

PART 3 CONCRETE STRENGTH

A. Minimum ultimate compressive strength of the concrete at age 28 days shall be 4000 pounds per square inch. Slump shall not exceed 4".

PART 4 EXECUTION

4.01 REINFORCEMENT

A. Before placing, clean rust mill scale or coating, including ice, that would destroy or reduce bond, from surface.

B. Reinforcement shall not be bent or straightened in a manner injurious to the material.

C. Splices at maximum stress not permitted. Laps and splices shall be of adequate length to transmit stresses. Splices in adjacent bars shall be staggered.

D. Wire reinforcement shall be cut and supported at proper elevations by standard accessories.

PART 5 CONCRETE

A. If requested by the Authority Engineer, certificates shall be furnished to the Authority Engineer showing that the concrete and reinforcement complies with tests and samples of applicable specifications.

B. Forms used shall be clean and free from shavings, debris and frost, and thoroughly wetted except in freezing weather, or oiled before placing concrete.

C. Care shall be exercised to prevent honey-combing or segregation of the ingredients of the concrete.

D. All surface defects including tie holes shall be repaired immediately after form removal as per ACI 301-72 Chapter 9.

PART 6 CURING

A. For purposes of early re-use of forms, the concrete may be steam cured after an initial set has taken place. The steam temperature shall not exceed 160 degrees and the temperature shall be raised from normal ambient temperature at a rate that does not exceed 40 degrees per hour.

B. The steam cured units shall not be removed from the forms until the units are able to withstand sufficient strength and any structural strain that might be applied during the form stripping process.

C. After the stripping for forms, further curing by means of water spraying or membrane curing compound may be used. The compound shall conform to ASTM C309.

PART 7 GASKETS/SEALANTS

A. All pre-cast concrete structures are to be constructed so as to be totally watertight through the use of rubber or neoprene gaskets and approved caulking or non-shrink grout.

The exterior of all below grade pre-cast concrete shall be coated in accordance with the paint specification.

PART 8 PRE-CAST CONCRETE MANHOLES AND METER PITS, ETC.

A. The pre-cast concrete manholes, meter pits, etc. shall be as manufactured by Atlantic Pre-cast Corporation, Monarch Pre-cast Concrete Corp., or Terre Hill Concrete Products.

PART 9 SEALS

A. Pre-cast manholes or meter pits shall have integrally cast rubber or neoprene seals at the points where pipe enters and/or exits the pre-cast structure. These gaskets shall meet ASTM C-443 and shall be A-Lok as manufactured by Atlantic Pre-cast or an approved equal.

END OF SECTION

SECTION 05520

ALUMINUM RAILING

PART 1 GENERAL

A. Contractor Shall:

1. Fabricate pipe railings to dimensions and details shown, with smooth bends and welded joints ground smooth and flush. Where details are not shown, use 1-1/4" aluminum pipe with top of top rail 42" above floor, or 34" above stair treads measured vertically at the stair riser line. The railing shall be as manufactured by Tubular Products, Inc. or approved equal.

2. Material:

a. Pipe size to satisfy load requirements. In all cases, O.D. and wall thickness shall be noted. Pipe shall conform to ASTM B-241, AA 6061 or 6063 as selected.

b. Connections and toeboard material shall conform to ASTM B-221, AA 6061 and/or A 6063, as selected.

c. Expansion bolts for concrete installation shall conform to stainless steel MT-304 or MT-316.

d. Bolts for installation on structural steel shall conform to ASTM A-193B8.

e. The railing shall be finished with a mill finish (as fabricated).

f. Toeboards shall be of aluminum construction and meet OSHA Standards.

3. Construction:

a. Bends shall be made without the use of fittings, where practical. Railing sections should be as long as practical, but shall not exceed 20'-0". All shop made structural joints shall be welded.

b. Intersections of rails and posts shall be made by coping the pipe, and continuously welding. All welds shall conform to AWS D1.1 for carbon steel and stainless steel, and shall be by the tungsten-inert gas (TIG) method and/or the metal-inert gas (MIG) method for aluminum. In all cases, top rail shall be continuous over posts, and posts continuous from base to top rail. Welds shall be either ground smooth or as welded without splatter or rough surfaces.

c. All railings shall meet the following OSHA requirements:

1. Every stairway floor opening shall be guarded by a railing on all exposed sides except at entrance to stairway.

2. Every wall opening, open sided floor, platform or runway from which there is a drop of more than four feet shall be guarded by a rail or equivalent.

3. Railing shall be provided with a toeboard wherever, beneath the open sides, a person can pass, there is moving machinery, or there is equipment with which falling material could create a hazard.

4. Regardless of height, open sided floors, walkways, platforms or runways above dangerous equipment shall be guarded with standard railing and toeboards.

5. Every flight of stairs with four or more risers shall be equipped with standard railings or standard handrails.

- Stairways less than 44" wide, both sides enclosed, at least one handrail, preferably on right side descending.

- Stairways less than 44" wide having one open side, at least one railing on open side.

- Stairways less than 44" wide having both sides open, one stair railing on both sides.

- Stairways more than 44" wide, but less than 88" wide one handrail on each enclosed side and one stair railing on each open side.

- Stairways 88" or more wide, one handrail on each enclosed side, one stair railing on each open side and one intermediate stair railing located approximately midway of the width.

6. A "Standard Railing" shall consist of a top rail, intermediate rail, and posts and shall have a minimum vertical height of 42" nominal from the upper surface of the top rail to floor. The top rail shall be smooth surfaced throughout its length. The intermediate rail shall be about halfway between the top rail and the floor. The ends of the rails shall not overhand the terminal posts to the extent of causing a projection hazard.

7. A "Stair Railing" shall be of similar construction to standard railing, but the vertical height shall be not more than 34" nor less than 30" from the upper surface of the top rail to the surface of the tread in line with the face of the riser at the forward edge of the tread.

8. Anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied at any direction at any point on the top rail.

9. A "Standard Toeboard" shall be 4" nominal in vertical height from its top edge to the level of the floor. The toeboard shall be securely fastened in place with not more than 1/4" clearance above floor level. Where material is piled to such a height that a standard toeboard does not provide protection, paneling from floor to

intermediate rail, or to top rail shall be provided.

4. Installation

a. Adjust railings prior to anchoring to ensure matching alignment at butting joints. Space posts not more than 8' on centers, unless otherwise shown. Plumb posts in each direction.

b. Railing shall be secured to supporting structures as follows:

1. For removable handrail, post shall be secured by aluminum socket as shown on the drawings.

2. For stationary railing, anchor posts to steel or aluminum by bolting mechanical fasteners or by welding posts to supporting members. Anchor posts to concrete by insertion into preset sleeves with grout or mounted with socket expansion bolt system.

END OF SECTION

SECTION 05530

ALUMINUM PLANK GRATING

PART 1 GENERAL

A. The Contractor shall furnish and install aluminum plank grading and removable fastens as indicated in the plans. Design live load shall be 150 pounds per square foot.

PART 2 MATERIAL

A. Grating to be aluminum plank extruded from aluminum alloy 6063-T6. Plank to be 1-3/4" deep and 2-1/4" deep made from sections up to 3' wide (in 6" increments) and have a length as shown on the plans. Removable fastening devices shall be aluminum.

B. Top surfaces shall be provided with 3" x 19/32" rectangular openings and have continuous raised longitudinal ridges for skid resistance. In addition, the connecting webs between punchouts shall each have two raised ribs oriented perpendicular to the longitudinal ridges for additional transverse stiffness and skid resistance. Grating shall have mill finish.

C. The grating shall be Irving grating as manufactured by IKG Industries or approved equal.

PART 3 INSTALLATION

The Contractor shall neatly cut, align and otherwise modify the grating as shown on the plans. Cut outs shall be cleanly done with cut surfaces sanded smooth. The grating shall be installed according to the manufacturer's recommendations.

END OF SECTION

SECTION 15400

WATER SUPPLY PIPING AND VALVING

PART 1 GENERAL

1.01 Section includes piping, fittings, anchors, buttresses, valves, and related appurtenances for potable water supply lines.

1.02 Testing of Water Supply Lines.

1.03 Hydrants should be provided at each street intersection and at intermediate points between intersections as recommended by the state Insurance Service Office. Generally, hydrants spacing should range about 600 feet depending on the area being served.

1.04 At high points in water mains where air can accumulate, provisions shall be made to remove the air by means of hydrants or air relief valves.

1.05 Backflow prevention devices of the type specified in PA DEP's regulations shall be installed where water supply mains are connected to residential, commercial, and industrial customers

which present a potential contamination hazard to the public water supply system.

1.06 It is the policy of the distribution system to be cement lined ductile iron.

1.07 The Authority will approve the location and size or all pipe, valves, fittings and other accessories necessary to provide for proper functioning of the water system.

1.08 All water piping shall be installed at a minimum depth of 42 inches below finished grade to top of pipe.

SEE ADDENDUM K PART 1.09

PART 2 DUCTILE CAST IRON PIPE (DCIP)

2.01 Ductile cast iron pipe shall conform to ANSI A21.51 and shall have an ANSI Class 52 thickness unless otherwise specified. All pipe must be AWWA approved (C-100).

2.02 All buried pipe shall receive an outside bituminous seal coat and cement interior lining. Above ground or exposed piping shall be uncoated and suitable for painting.

2.03 Above ground or exposed ductile cast iron pipe shall be flanged in accordance with ANSI A21.10. Buried ductile cast iron pipe shall have flanges (Ansi A21.10); push on joints (Clow Super Bell-Tite or approved equal; or mechanical joints).

2.04 Ductile cast iron fittings shall conform with the "Standard Specifications for Ductile Cast Iron Pipe and Special Castings" for Class D fittings.

PART 3 WALL SLEEVES

3.01 All pipe passing through walls or other structural members shall utilize sleeves or wall pipes.

3.02 Wall sleeves shall be caulked type cast iron or steel wall sleeves with intermediate waterstop flange as manufactured by James B. Clow & Sons, Inc. F-1430 or F-1413 or approved equal.

3.03 Intermediate wall collars as manufactured by James B. Clow & Sons, Inc., F-1428 (flanged both ends), F-1426 (flanged and plain end) or approved equal.

3.04 Space between pipe and sleeves shall be caulked or filled with non-shrink grout.

PART 4 FITTINGS

4.01 Fittings shall in general be of the same material, weight, and class and shall have the same lining and coating as the pipe lines in which they are installed.

4.02 Unless otherwise shown on the Contract Drawings, cast iron flanged fittings and blind flanges shall meet ASA B16.1 standards for Class 125 fittings. AWWA C110 fittings, where shown on the Drawings, shall be Class D. Base fittings shall be provided where shown or required. Where indicated, fittings or specials shall be provided with AWWA Standard lugs.

PART 5 COPPER PIPE

5.01 Material:

A. 1-1/2" and smaller: Type "L" hard.

B. 2" and Larger: Type "K" hard.

C. Underground: Type "K" soft.

5.02 Standards: ASTM B-88

5.03 Fittings: Wrought copper, ANSI B16.22; dielectric fittings between copper and steel pipe as manufactured by EPCO or equal.

5.04 Joint material: Silver-solder shall be used on all copper piping.

PART 6 AIR RELEASE VALVE

A. Air release valve assembly and vault shall be:

1. Crispen Model- Manufactured by Multiplex Manufacturing Company or approved equal

2. 8” double strap saddle Smith Blair - or approved equal

3. Coupling Mueller H-15428 - or approved equal

4. 10” of 1” rigid copper-Bronze or brass as shown in detail

5. 48” Diameter reinforced concrete manhole

6. Fitted cast iron cover (traffic grade)

PART 7 GATE VALVES

7.01 Gate valves shall be furnished and installed where indicated on the Drawings. Each gate valve shall conform to AWWA C-509 94 resilient seat valves. Valve bodies, bonnets, discs, and handwheels shall be cast iron. Bodies shall be furnished with ASA B16.1 125# flanged ends above ground and M.J. below ground. Accurately machined bronze seating rings shall be secured in the valve bodies. Valves shall be provided with bronze seating rings, machined, and scraped, if necessary, to seat truly flat against body seating rings. All gate valves shall be supplied with nonrising stems. Valve stems shall rotate freely in the valve bonnet recess. Stuffing box glands shall be bronze, gland followers shall be cast iron. Gate valves shall be MJRS complete with slide type valve boxes. Valve Box Cover to read Water.

PART 8 CHECK VALVES

8.0l Swing Check Valves

A. Swing Check Valves shall be constructed with heavy cast iron body with a bronze or stainless steel seat ring, a non-corrosive shaft or attachment of weight and lever, complete non-corrosive shockless chamber.

B. They shall absolutely prevent the return of water back through the valve when the inlet pressure decreases below the delivery pressure. Valves must be tight seating, and must be shockless in operation. The seat ring must be renewable.

C. The cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The shock absorption shall be by air, and the cushion chamber shall be so arranged that the closing speed will be adjustable to meet the service requirements.

D. The valve disc shall be of cast iron and shall be suspended from a non-corrosive shaft which will pass through a stuffing box and be connected to the cushion chamber on the outside of the valve.

E. All material and workmanship shall be first-class throughout and the purchaser reserves the right to inspect this valve before shipment.

F. The valve shall be manufactured by the GA Industries, Inc. Mars, PA or approved equal conforming to AWWA C508.

8.02 Water Service Backflow Preventor

A. A water service backflow preventor assembly shall be installed on all non-residential water supply lines and fire services as they enter the building and on all residential connections as required by the BOCA Plumbing Code. All backflow preventors shall meet the BOCA Code.

PART 9 PIPE SUPPORT

9.01 Pipe Support

A. Piping shall be firmly and properly supported by malleable or wrought iron hangers, guides, saddles, clamps, etc., as necessary. Concrete pedestals or piers shall be provided where indicated or required. Where drilling of anchor bolt holes becomes necessary, the Contractor shall secure permission from the Authority Engineer prior to stating the drilling. The Contractor shall furnish and install all necessary supports, hangers, guides, saddles, clamps, etc. required to provide a complete operational facility. The type of hangers, guides, etc. shall be reviewed with the Engineer and meet with his approval.

9.02 During construction, all ends of pipes or conduits, and all equipment connections shall be left closed with caps, plugs, or wooden flange covers, so as to prevent entrance of dirt, building materials, or other foreign matter.

PART 10 TESTING

See Section 01400 Part 2.02.

PART 11 BUTTRESSES AT FITTINGS

11.01 Buttresses at Fittings

A. Buttresses shall be used in all pressure lines at all valves, bends, tees, and at reducers or other fittings where changes in direction or pipe size occur. The buttresses shall be as shown on the Drawings and is referenced in the Standard Water Installation Details.

PART 12 FIRE HYDRANTS

12.01 Fire Hydrants

A. Fire hydrants shall be A-423 Mueller or approved equal.

B. The hydrant standpipe below grade together with all buried metal tie-rods and internal ferrous surfaces shall be given two coats of black asphaltum varnish. The exposed surfaces above grade including nozzle caps and bonnet shall be given two coats of a good quality oil base paint color to be selected by the Township.

12.02 Setting Fire Hydrants

A. Fire hydrants shall be installed at locations shown and such elevations as shown on approved plans. They shall be set on a bed of Type of Stone 2B extending full width of trench from center of hydrant to end of trench, and from bottom of trench to a point six inches above drip opening. All gravel shall be of such size as will remain on 3/4-inch sieve and pass a two-inch sieve. They shall be supported on blocking and shall be protected against trench sides or end.

B. All hydrant assemblies shall be provided with min. 4 square feet concrete blocks both at the tee and at the hydrant.

SEE ADDENDUM K PART 12.02.C

C The hydrant should be located 2'-6" from the face of the curb and the center of the break off flange should be set approximately 3-1/4" above the top of the curb.

SEE ADDENDUM M PART 12.02.D

PART 13 DISINFECTION

13.01 Disinfection

A. All piping, fittings, and related equipment shall be disinfected, as herein specified before water is used for domestic consumption. The procedure to be used shall be in accordance with the latest edition of AWWA C651 tablet method.

13.02 Water for Disinfection

A. Water for disinfection shall be furnished by the Contractor from an approved source; the Contractor shall furnish and install all bulkheads, pipes, valves, taps, plugs, labor and other equipment required to sterilize the facilities.

13.03 Keeping Pipe Clean and Dry

A. Precautions shall be taken to protect the interiors of pipes, fittings, and valves against contamination. Pipe delivered for construction shall be strung so as to minimize entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used where it is determined that watertight plugs are not practicable and where thorough cleaning will be performed by flushing or other means.

13.04 Cleaning and Swabbing

A. If dirt enters the pipe, and in the opinion of the owner's engineer or job superintendent the dirt will not be removed by the flushing operation, the interior of the pipe shall be cleaned by mechanical means and then shall be swabbed with a 1-percent hypochlorite disinfection solution. Cleaning with the use of a pig, swab, or "go-devil" should be undertaken only when the owner's engineer or job superintendent has determined that such operation will not force mud or debris into pipe-joint spaces.

13.05 Wet-Trench Construction

A. If it is not possible to keep the pipe and fittings dry during installation, every effort shall be made to assure that any of the water that may enter the pipe-joint spaces contains an available-chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench, or by treating the trench water with hypochlorite tablets.

13.06 Flooding by Storm or Accident During Construction

A. If the main is flooded during construction, it shall be cleared of the flood water by draining and flushing with potable water until the main is clean. The section exposed to the flood water shall then be filled with a chlorinated potable water that, at the end of a 24-h holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected using the continuous-feed or slug method.

13.07 Tablet Method

A. The tablet method consists of placing calcium hypochlorite granules and tablets in the water main as it is being installed and filling the main with potable water when installation is completed.

B. This method may be used only if the pipes and appurtenances are kept clean and dry during construction.

Placing of calcium hypochlorite tablets - During construction 5g calcium hypochlorite tablets shall be placed in each section of pipe and also one such tablet shall be placed in each hydrant, hydrant branch, and other appurtenance. The number of 5g tablets required for each pipe section shall be $.0024d^2 L$ rounded to the next higher integer, where d is the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. Table 15400-2 shows the number of tablets required for commonly used sizes of pipe. The tablets shall be attached by an adhesive such as

permatex No. 1[1] or equal. There shall be no adhesive on the tablet except on the broad side attached to the surface of the pipe. Attach all the tablets inside and at the top of the main, with approximately equal numbers of tablets at each end of a given pipe length. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the section so it can be readily determined that the pipe is installed with the tablets at the top.

Filling and Contact - When installation has been completed, the main shall be filled with water at a rate such that water within the main will flow at a velocity no greater than 1 ft/s. Precautions shall be taken to assure that air pockets are eliminated. This water shall remain in the pipe for at least 24h. Valves shall be position so that the strong chlorine solution in the treated main will not flow into water mains in active service.

[1] A product of the Permatex Co., Brooklyn, NY and Kansas City, KS

Table 15400-2

Number of 5g Calcium Hypochlorite Tables Required for Dose of 25 mg/L

Pipe Diameter in.	Length of Pipe Section Ft				
	13 or less	18	20	30	40
	Number of 5-g Calcium Hypochlorite Tablets				
4	1	1	1	1	1
6	1	2	2	3	3
8	2	3	3	5	6
10	3	4	5	7	10
12	4	6	7	10	14
16	8	11	12	18	18

PART 14 SERVICE CONNECTION

SEE ADDENDUM E PART 14.01 & 14.02

14.01 Corporation Stops

A. Corporation stops shall be Mueller Company No. H-15000 (flared) and Mueller Company No. 15008 (compression).

14.02 Curb Stops

A. Curb stops shall be:

1. ¾" curb stop for K Copper, flared, Mueller #H-15204

14.03 Curb Boxes

A. Curb boxes shall be of cast iron of sufficient length to reach the surface of the ground, but shall not extend above the surface. The boxes shall be the word "WATER" cast in the lid. Curb boxes shall be Tyler 903D.

14.04 Service Pipe

SEE ADDENDUM A

SEE ADDENDUM S 14.04.A

A. Service pipe shall be:

1. ¾" K Copper

SEE ADDENDUM P PART 14.04.B

14.05 Water line inside basement for water meter

A. See standard detail

PART 15 BLOWOFFS

A. Blowoffs past the last service connection shall be provided at all dead ends of 4" diameter or less pipe. They shall be 2-inch diameter galvanized steel with 2" curb stop and valve boxes as shown in LGTMA Standard details.

PART 16 POLY-VINYL CHLORIDE (PVC) POTABLE WATER PIPE

16.01 General

A. It is the policy of the Authority that all additions to the existing distribution system be Ductile Iron Pipe (DCIP). However, since there might be occasions from time to time when the use of PVC is practical. THE USE OF PVC SHALL BE GRANTED ONLY BY WRITTEN AUTHORIZATION BY THE AUTHORITY BEFORE THE PLACEMENT OF ORDERS FOR MATERIALS AND/OR THE START OF CONSTRUCTION.

16.02 Materials

A. Pipe

1. PVC pipe 4" through 12" diameter sizes shall be 150 pressure class with cast iron pipe equivalent O.D. for potable water service. The pipe shall be furnished with rubber-gasketed separate couplings or with one bell-type end designed for joint assembly using elastomeric seals. Pipe and couplings shall be in accordance with AWWA C900 latest revision. Rubber gasket rings shall have the manufacturer's markings for water service.

2. Pipe and fittings for 2" and 3" diameter sizes shall be Class 200 (SDR 21) in conformance to ASTM D2241, latest revision, with joints having rubber type gaskets conforming to ASTM D1869.

B. Fittings for 4" through 12"

1. Fittings for pipe 4" through 12" diameter sizes shall be ductile iron with push-on or mechanical joints described herein under Section 4A-1.1-B.

C. Lubricant

1. Lubricant for jointing of push-on joint pipe shall only be that specified and supplied by the manufacturer.

16.03 Inspection

A. Each pipe shipment shall be inspected as recommended by the manufacturer.

16.04 Handling, Stockpiling and Stringing

A. It is very important that the PVC pipe be handled and unloaded as recommended by the manufacturer and as specified herein under Section 4A-1.4. During the removal and handling, be sure that the pipe or pipe shipment units do not strike anything as severe impact could cause damage particularly during cold weather. As the temperature approaches and drops below freezing, the flexibility and impact resistance of PVC pipe is reduced. Therefore, extra care should be used in handling during cold weather.

B. PVC pipe shall be stockpiled and protected as recommended by the manufacturer. When PVC pipe is exposed to sunlight for long periods of time, a slow discoloration of the pipe may occur. This discoloration is an indication of a possible reduction in impact strength.

C. PVC pipe shall be distributed along the trench as recommended by the manufacturer.

16.05 Curves in the Trench

A. The trench may be curved to change direction or avoid obstruction within the limits of the curvature of the pipe as specified by the manufacturer. Please note that offsets are calculated assuming no deflection at the joint and that the pipe is joined uniformly throughout its length to form a true arc. Assuming a maximum allowable longitudinal bending strain of 2.23% for PVC pipe, the minimum allowable radius of curvature (in feet) is reasonably calculated by multiplying 22.45 times the outside diameter of the pipe in inches. For example, the minimum radius for 8" PVC pipe is: 22.45 x 9.05" = 203 feet. Johns-Manville specifies 200 feet for its Blue Brute PVC class water pipe.

16.06 Installation

A. All requirements for the installation of PVC pipe, with special attention given to pipe embedment, shall be in accordance with the manufacturer's instruction, the latest revisions of the appropriate ASTM specifications and as appropriately required herein.

B. All fittings, valves, hydrants, etc., shall be supported by concrete independently of the pipe.

C. Concrete thrust blocks are required wherever the pipeline: 1) changes direction as at tees, bends and crosses; 2) changes size, as at reducers; 3) stops, as at dead-ends and hydrants; and 4) has valves installed. Do not machine dig at these fitting areas because the excavator will usually dig too far and damage the bearing surface of the trench wall. Hand dig a small amount just behind the fitting location.

16.07 Service Connections

A. Service connections shall be generally specified in Part 15 herein and in accordance with the pipe manufacturer's recommendations and requirements. The method of connecting the service line to the main shall be done strictly in accordance with the pipe manufacturer's recommendations and requirements.

B. Tap the main only with a clean, sharp shell cutter having internal teeth as this tool will minimize PVC shavings, retain the coupon and reduce stresses during tapping. Do not tap an area of the pipe which shows discoloration (sunburning). Do not tap on the outside of the curve on a pipe that has been bent (deflected) beyond the recommended radius of curvature. Do not create ovality or otherwise distort the pipe by over-tightening the tapping machine or the saddle.

C. Tapping in cold weather (below 40 degrees F) requires additional care because the pipe loses some of its resiliency and becomes more brittle and subject to damage if the pipe has been abused during handling. Damage done prior to tapping can show up when the pipe is tapped.

D. Stainless steel service clamps or stainless steel saddles should (1) provide full support around the circumference of the pipe and (2) have a bearing area of sufficient width along the axis of the pipe so that the pipe will not be distorted when the saddle is tightened.

E. The largest corporation stop which can be tapped directly into the PVC pipe is 1" while the largest outlet size recommended with service clamps or saddles is 2".

16.08 Pressure and Leakage Tests

A. Pressure and leakage testing shall be done per Section 01400 Part 2.02

END OF SECTION

SECTION 15404

POTABLE WATER SUPPLY METERS

PART 1 GENERAL

A. This specification is for potable water service metering in London Grove Township. All meters shall be Neptune T-10 meters as manufactured by Schlumberger. Center line of meters shall be between 4 and 4.5 feet above the basement floor. Non-residential establishments requiring larger meters shall use meters supplied by Schlumberger. The size of the meter shall be approved by the Township.

SEE ADDENDUM D PART 1B

SEE ADDENDUM R PART 1B

PART 2 EQUIPMENT

SEE ADDENDUM R PART 2.A

A. The following equipment shall be provided by the developer and installed in accordance with all manufacturer's instructions. All meters shall be equipped with an ECR four-wheel high resolution 100 gallon register. Equipment is further described as follows:

1. Type

   Magnetic drive, sealed register, positive displacement type oscillating piston only.

2. Size

   Must conform to American Water Works Standard C-700 as most currently revised.

3. Length

Must conform to American Water Works Standards C-700 as most currently revised.

4. Cases

All meters shall have a non-corrosive water works bronze (minimum 75% content outer case with a separate measuring chamber which can easily be removed from the case. All meters shall have cast on them, in raised characters, the size and direction of water flow through the meter. Case iron front bottoms, or bronze bottoms shall be provided on ¾" size meters. The manufacturer's serial number must be permanently affixed to the main case to aid in identification and must be visible so that it can be read from directly above the water meter.

B. External Bolts and Washers

All external bolts and washers shall be of corrosion resistant material and be easily removed from the main case. All threaded main case bolt holes must be covered, to aid in removal of the bolts for repair.

B. Touch Read ECR/AMR Register

SEE ADDENDUM D PART 2C

SEE ADDENDUM Q PART 2C

The register, for both residential and non-residential meters, must be of the straight reading type and have a full test dial on the face of the register. It shall read in gallons and be capable of direct visual reading both at the meter and by remote reading utilizing a visual interrogation device which connects through to the water meter via a Touch Pad located external to the meter. All reduction gearing shall be contained in a permanently hermetically sealed, tamper-proof enclosure made of a corrosion resistant material.

For basement installations, the register is to be of a one piece configuration secured to the main case with a locking ring as part of the register. The register shall be secured to the main case by means of a tamper-resistant locking screw so that the register cannot be removed by non-utility personnel. The register must be field replaceable by utility personnel with the use of a manufacturer supplied field tool. The field tool must not be commercially available. Seal wiring or a frangible head seal screw is not acceptable.

The meter register shall be provided with three terminal connections. The connection between the meter register and the Touch Pad shall be accomplished with the use of only two

terminal connections. The register shall transmit the meter reading and the register identification number directly to the interrogation device through the Touch Pad.

When the meter is to be installed in a vault or pit set installation, the terminal connections shall be permanently factory sealed to three wire interconnecting cables with an environmentally approved epoxy to prevent moisture penetration and eliminate the need for field sealing requirements.

The register output data format shall be 7-bit ASCII (American Standard Code for Information Interchange) digital, plus an even parity bit. Upon interrogation with a Touch Pad, the register will transmit a 4-digit odometer reading and an 8-digit register identification number. The 4-digit meter reading is to be interrogated from the register by direct contact of the register's odometer wheels to a circuit board which encodes the meter reading to the interrogation device. Data is to be positive true. The register's ASCII digital output is to be capable of interfacing directly to an AMR transponder to transmit data via cable TV, telephone or power lines to a central location.

D. Outside Touch Pad

The outside Touch Pad shall be of a sturdy and tamper-proof construction. The Touch Pad shall be compatible with the ProRead ARB remote read device. The remote Touch Pad shall be protected from the environment with watertight seals. The remote Touch Pad shall not require a plug-in or metal to metal contact to complete a connection with the interrogator's Touch Probe. The Touch Pad shall be mounted four (4) feet above grade easily accessible and in the same vicinity as other utility meters. Wiring connection to meter to be per manufacturer's specification.

The meter identification number and meter reading data will be transmitted to the interrogation device by touching the interfacing gun or probe to the external cover of the remote Touch Pad. The Touch Pad will be provided with two terminal connections to accept the two-conductor cable which connects it with the meter register. The remote Touch Pad will have positions to cover and seal the mounting screws to prevent tampering.

E. Measuring Chamber

The measuring chamber shall be a suitable synthetic polymer and shall not be cast as part of the main case. All piston assemblies shall be interchangeable in all measuring chamber assemblies of the same size. The measuring chamber piston shall operate against a replaceable control roller, allowing for

repair to AWWA standards. The control roller shall rotate on a stainless measuring chamber steel pin, to provide added strength, wear resistance and corrosion resistance. There shall be an elastomeric seal or seals between measured and unmeasured water, preventing leakage around the measuring element.

F. Magnetic Coupling

The motion of the piston will be transmitted to the sealed register through the use of a magnetic coupling.

G. Strainers

All meters must be provided with a corrosion resistant strainer, with an effective straining area at least twice the bore diameter which can be easily removed from the meter without the meter itself being disconnected from the pipeline.

H. Change Gears

Change gears will not be allowed to calibrate the meter. All registers of a particular registration and meter size shall be identical and completely interchangeable.

I. Accuracy and Head Loss Tests

Meters shall conform to current AWWA C-700, current revision, test flows, head loss and accuracy standards.

J. Pressure Capability

Meters shall operate up to a working pressure of 100 pounds per square inch (psi) without leakage or damage to any parts. The accuracy shall not be affected when operating at this pressure due to possible distortion. Accuracy shall not be affected by variations in pressure up to 150 psi.

K. Performance Warranties

Manufacturer shall guarantee accuracy of all meters for 15 years.

L. Residential Meter Installation

SEE ADDENDUM 1L

All meters shall be installed per the standard residential meter connection detail in the structure's basement.

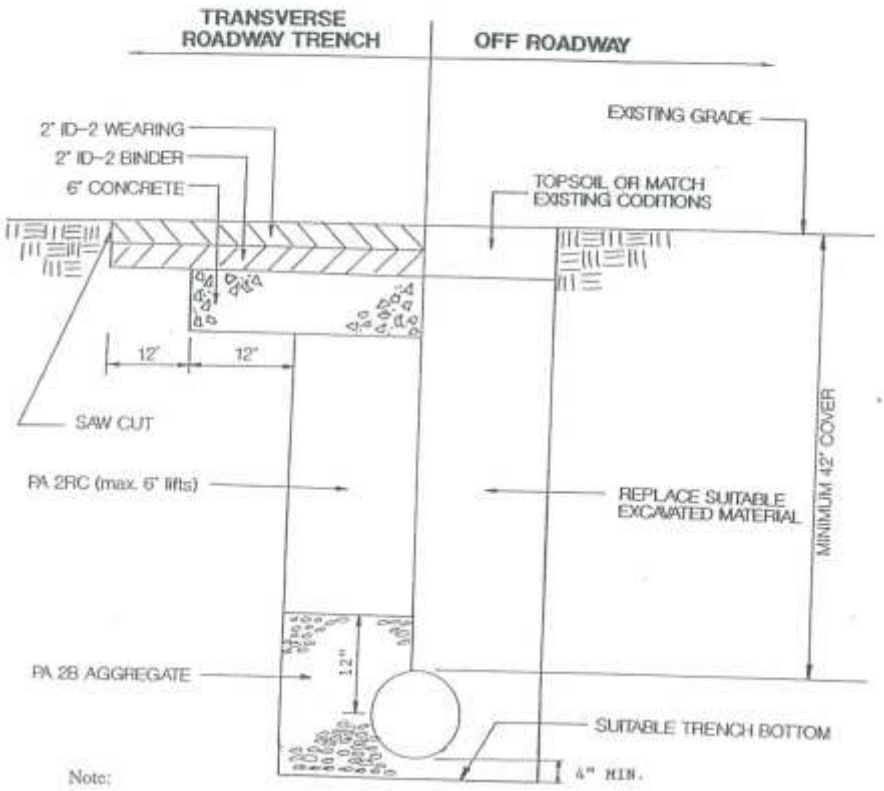
M. Commercial Meter Installation

SEE ADDENDUM R 1.M

All meters shall be installed per the commercial meter connection detail as approved by the Authority Engineer.

END OF SECTION

DRAWINGS OF STANDARD WATER INSTALLATION DETAILS



Note:

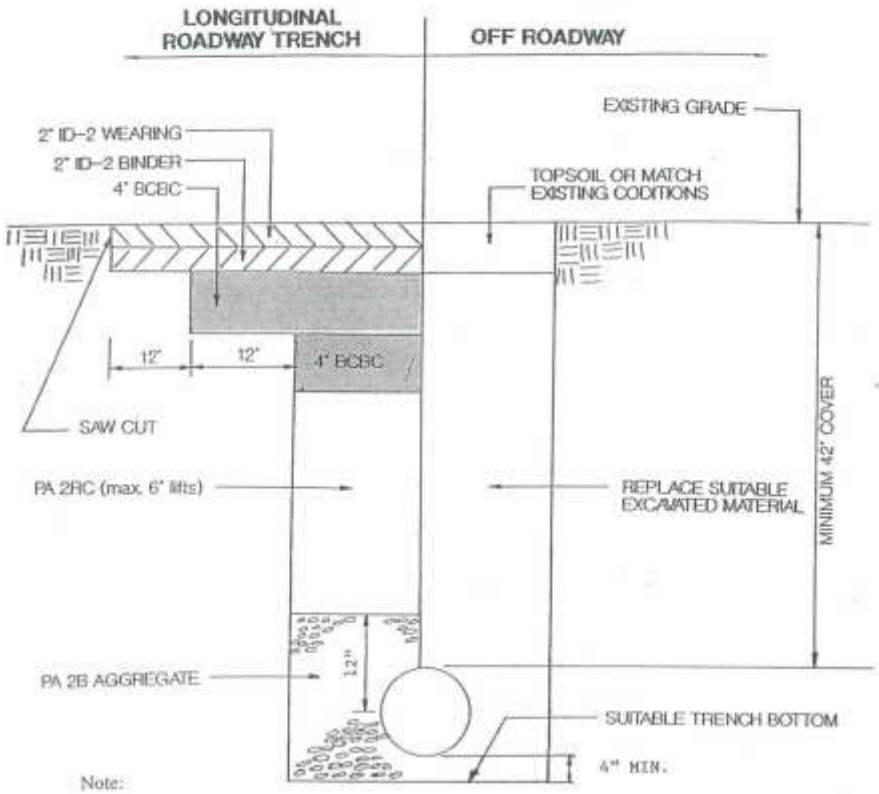
1. Compact all backfill to 95% Standard Proctor.
2. All construction in roadways shall meet Penn DOT requirements at a minimum.
3. All water main distribution pipe to be Class 52 ductile iron.
4. All water piping shall be installed at a minimum depth of 42" below finish grade to top of pipe.

WATER MAIN
TYPICAL TRENCH DETAIL

American Consulting Engineers Council
Member
Supporting Excellence in Engineering

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	1
SCALE	NONE
DESIGNED	
DRAWN	JND
CHECKED	CTD
DATE	July 1999



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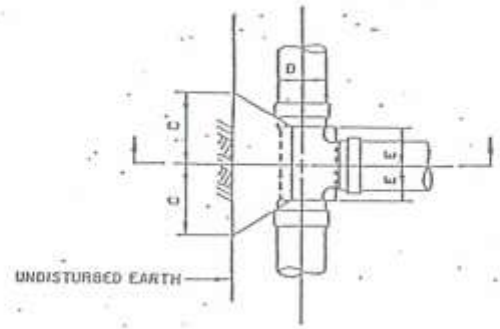
4. All water piping shall be installed at a minimum depth of 42" below finish grade to top of pipe.

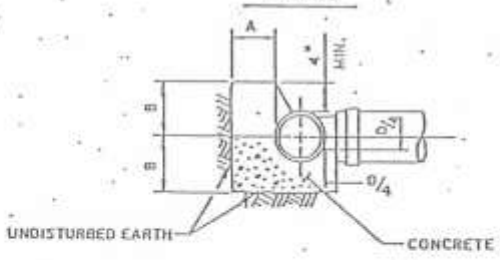
WATER MAIN
TYPICAL TRENCH DETAIL

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	2
SCALE	NONE
DESIGNED	
DRAWN	JND
CHECKED	CTD
DATE	L.D. 1/10/05



PLAN



SECTION

BUTTRESS FOR TEES				
DIM.	DIAMETER			
	6"	8"	10"	12"
A	9"	9"	10"	1'-0"
B	8"	10"	1'-0"	1'-3"
C	9"	1'-0"	1'-3"	1'-5"
E	6"	8"	8"	8"

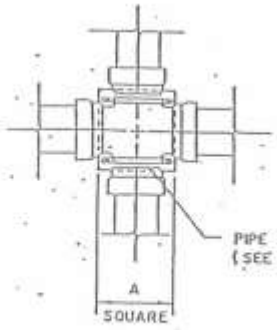
BUTTRESS FOR TEES

WATER MAIN

American Consulting Engineers Council Member
Supporting Excellence in Engineering

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	3
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	5 AUG 1999



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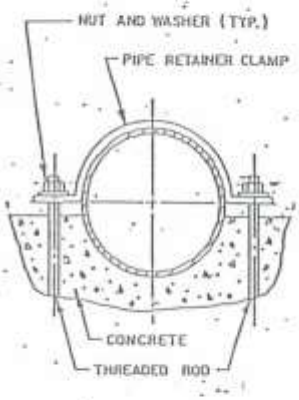
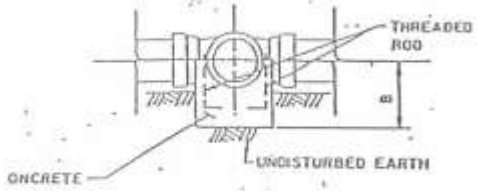


RETAINER CLAMP



ELEVATION

NOTES:
1. PAINT EXPOSED SURFACES WHICH ARE BELOW GROUND WITH TWO COATS OF A WATERPROOF BITUMINOUS COMPOUND.

BUTTRESS FOR CROSSES				
DIM.	RUN DIAMETER			
	6"	8"	10"	12"
A	1'-0"	1'-2"	1'-6"	1'-8"
B	1'-0"	1'-2"	1'-4"	1'-6"

BUTTRESS FOR CROSSES

WATER MAIN

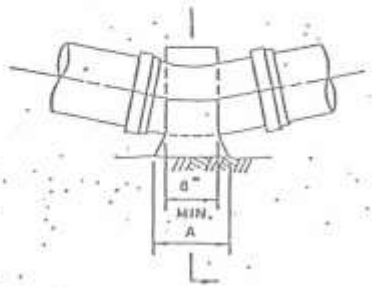
LONDON GROVE TOWNSHIP

MUNICIPAL AUTHORITY

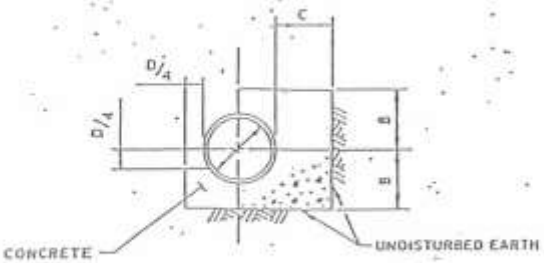
CHESTER COUNTY, PENNSYLVANIA

American Consulting Engineers Council Member
Supporting Excellence in Engineering

SHT	4
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	Mar 1989



PLAN



SECTION

BUTTRESS FOR HORIZONTAL BENDS
1/32 THROUGH 1/8

WATER MAIN

BUTTRESS FOR HORIZONTAL BENDS					
BEND		DIAMETER			
		6"	8"	10"	12"
1/32	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	7"	8"	9"	10"
	C	9"	9"	9"	9"
1/16	A	1'-0"	1'-0"	1'-6"	1'-9"
	B	7"	8"	9"	10"
	C	9"	9"	10"	11"
1/8	A	1'-3"	2'-0"	2'-6"	2'-11"
	B	7"	8"	9"	11"
	C	9"	9"	11"	1'-2"

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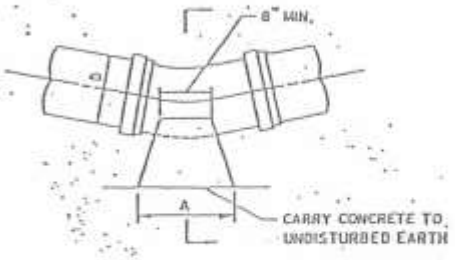
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	5
NONE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	July 1993

SECTION



ELEVATION

BUTTRESS FOR VERTICAL BENDS					
BEND		DIAMETER			
		6"	8"	10"	12"
1/32	A	1'-0"	1'-0"	1'-0"	1'-0"
	B	7"	8"	9"	10"
	C	7"	7"	8"	9"
1/16	A	1'-0"	1'-0"	1'-6"	1'-9"
	B	7"	7"	8"	10"
	C	7"	7"	8"	8"
1/8	A	1'-3"	1'-8"	2'-1"	2'-6"
	B	7"	8"	9"	11"
	C	7"	8"	10"	11"

BUTTRESS FOR VERTICAL BENDS
1/32 THROUGH 1/8

WATER MAIN

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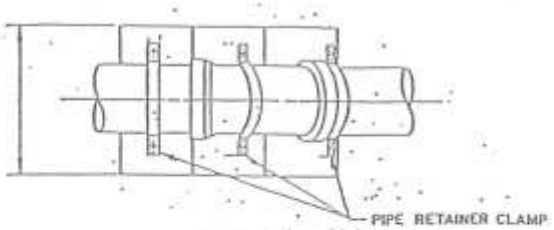
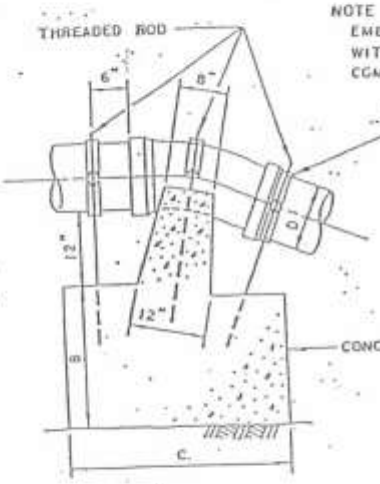
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	6
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	L.L. 10/00



PLAN



NOTE
EMBED BAR 30 DIAMETERS. PAINT EXPOSED BARS WITH TWO COATS OF A WATERPROOF BITUMINOUS COMPOUND.

SECTION

ANCHORAGE FOR VERTICAL BENDS
1/32 THROUGH 1/8

ANCHORAGES FOR VERTICAL BENDS					
BEND		DIAMETER			
		6"	8"	10"	12"
1/32	A	1'-6"	1'-6"	2'-0"	3'-0"
	B	1'-3"	1'-9"	1'-9"	2'-0"
	C	2'-0"	2'-6"	2'-9"	3'-0"
1/16	A	2'-0"	3'-4"	3'-8"	4'-0"
	B	1'-10"	2'-3"	2'-6"	2'-6"
	C	2'-6"	2'-8"	3'-10"	4'-0"
1/8	A	2'-6"	3'-3"	4'-0"	4'-6"
	B	2'-6"	3'-0"	3'-3"	3'-8"
	C	3'-0"	4'-6"	4'-9"	5'-0"

WATER MAIN

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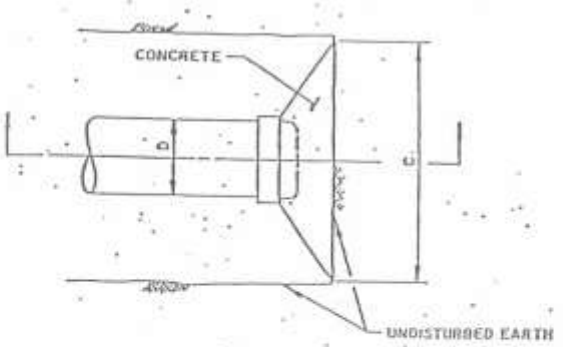
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	7
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTO
DATE	July 1993



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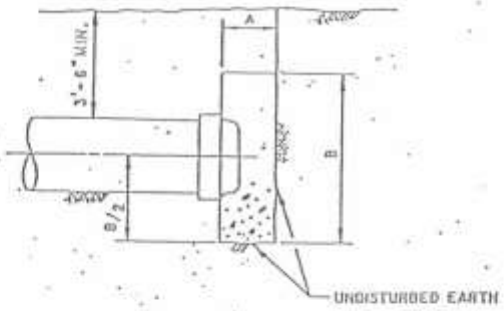

SECTION

BUTTRESS FOR CAPS				
DIM.	DIAMETER			
	6"	8"	10"	12"
A	6"	8"	8"	10"
B	1'-2"	1'-6"	2'-0"	2'-4"
C	1'-6"	2'-3"	2'-6"	3'-3"

BUTTRESS FOR CAPS

WATER MAIN

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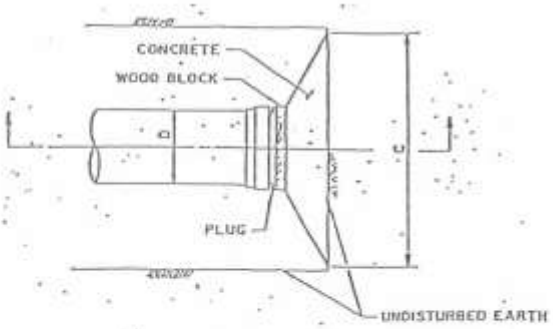
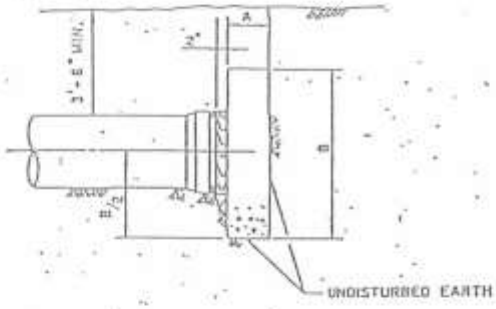
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	8
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	MAY 1988



PLAN



SECTION

BUTTRESS FOR PLUGS				
DIM.	DIAMETER			
	4" & 6"	8"	10"	12"
A	6"	8"	8"	10"
B	1'-2"	1'-6"	2'-0"	2'-4"
C	1'-6"	2'-3"	2'-6"	3'-3"

BUTTRESS FOR PLUGS

WATER MAIN

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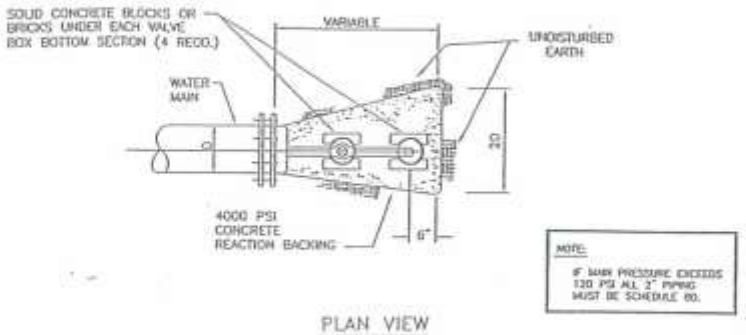
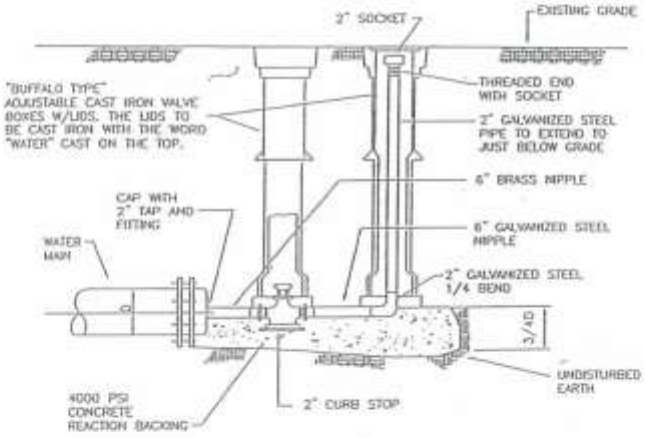
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	9
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	July 1989



PLAN VIEW



TYPICAL
BLOWOFF ASSEMBLY

WATER MAIN

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LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	10
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CJD
DATE	[illegible]

AIR RELEASE VALVE
WATER MAIN

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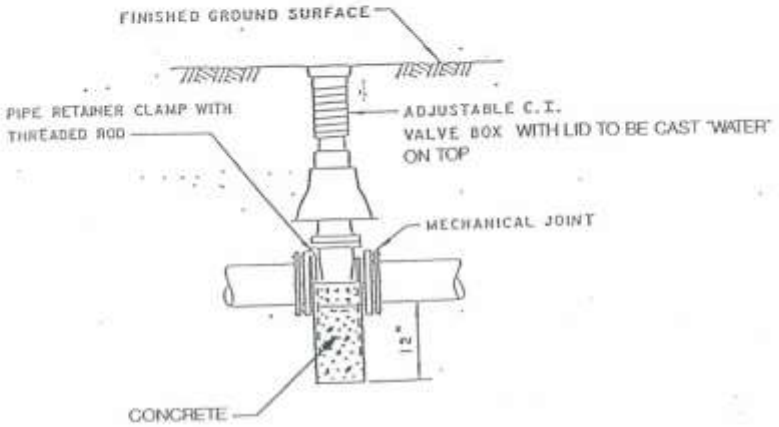
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	11
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD



GATE VALVE INSTALLATION
3" THROUGH 12 INCHES

WATER MAIN

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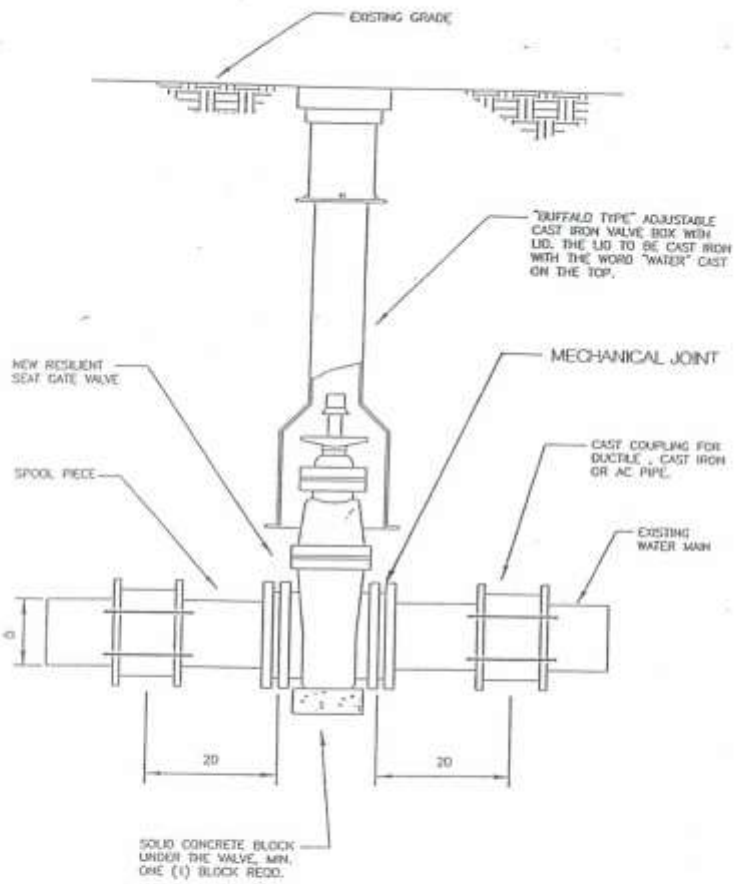
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	12
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	July 1994



TYPICAL VALVE INSTALLATION
ON EXISTING WATER MAIN

WATER MAIN

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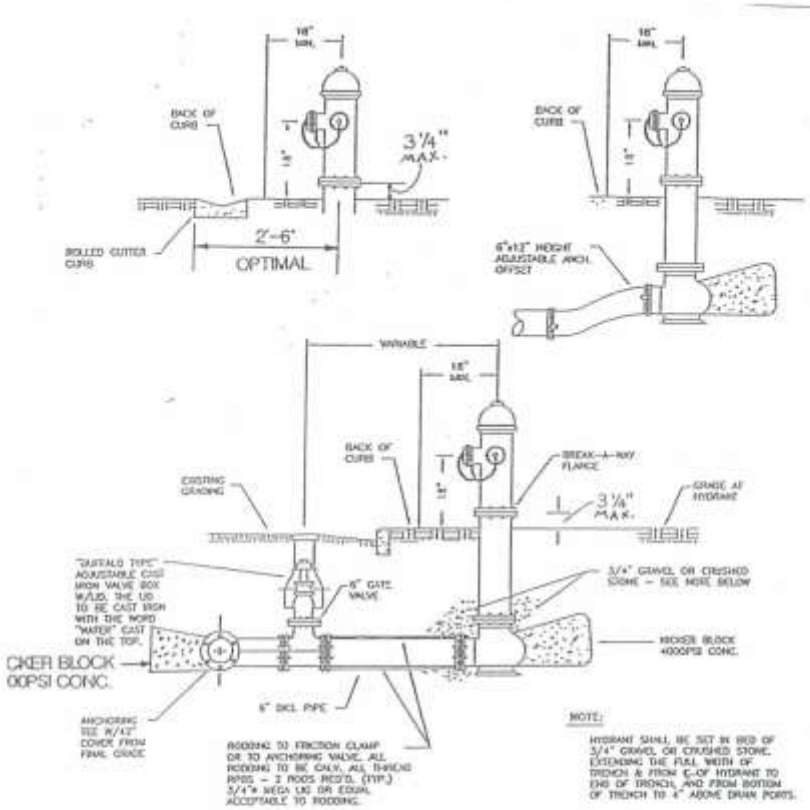
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	13
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CED
DATE	July 1999



NOTE:

IF HYDRANT REQUIRES HEIGHT ADJUSTABLE TO OBTAIN THE 3 ¼" MAXIMUM ABOVE GRADE RELATIVE TO THE REQ'D. 42" OF COVER ON WATER MAIN, OFFSETS AND/OR RISERS WILL BE REQ'D. ON THE HYDRANT LATERAL.

TYPICAL
FIRE HYDRANT
INSTALLATION

WATER MAIN

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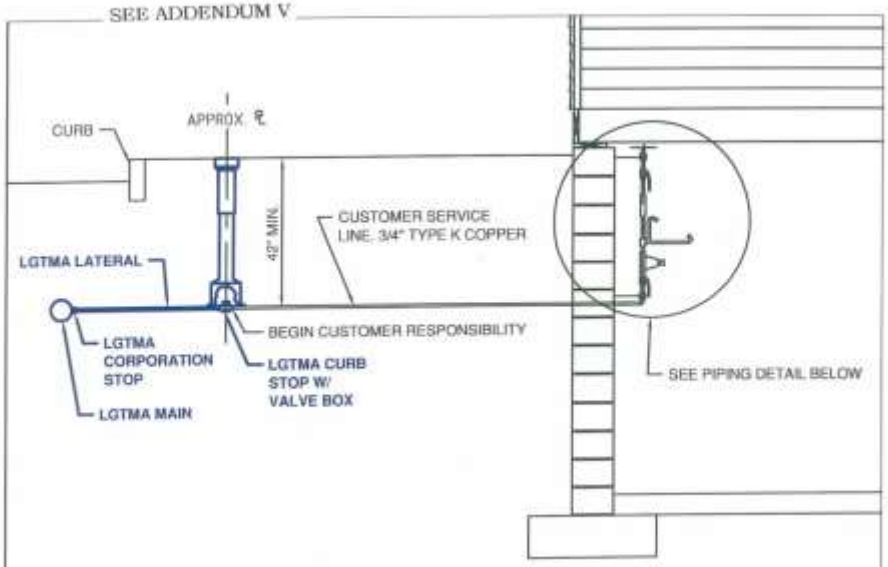
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	14
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	July 1999

SEE ADDENDUM V

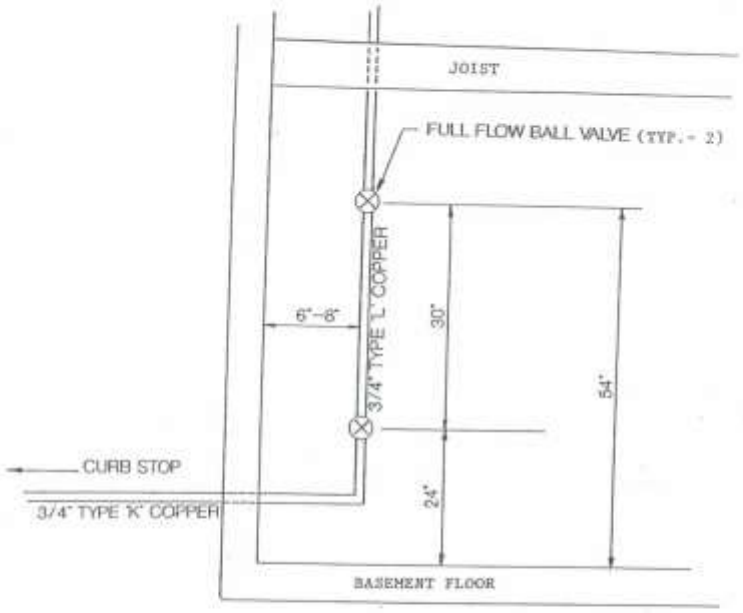


NOTE: CUSTOMER OWNS AND MAINTAINS ALL THE EQUIPMENT SHOWN IN BLACK. LGTMA TO SUPPLY AND INSTALL THE METER, AND MAINTAIN ALL THE EQUIPMENT SHOWN IN BLUE.

ACEC

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY CHESTER COUNTY, PENNSYLVANIA

SHEET	13
SCALE	NONE
DESIGNED	———
DRAWN	———
CHECKED	TEC
DATE	10/30/08



EH-93

SPECIFICATION AND CONFIGURATION FOR INSTALLATION OF WATER LINE INSIDE BASEMENT FOR THE WATER METER

3/4" K COPPER FROM CURB BOX INTO THE BASEMENT
3/4" L COPPER FROM THE BOTTOM OF THE JOIST

THE K COPPER LINE SHOULD BE 6-8" FROM THE WALL

1 FULL FLOW BALL VALVE LOCATED 24" FROM THE BASEMENT FLOOR

1 FULL FLOW BALL VALVE LOCATED 54" FROM THE BASEMENT FLOOR

THERE SHOULD BE A MINIMUM OF 30" BETWEEN THE BALL VALVES

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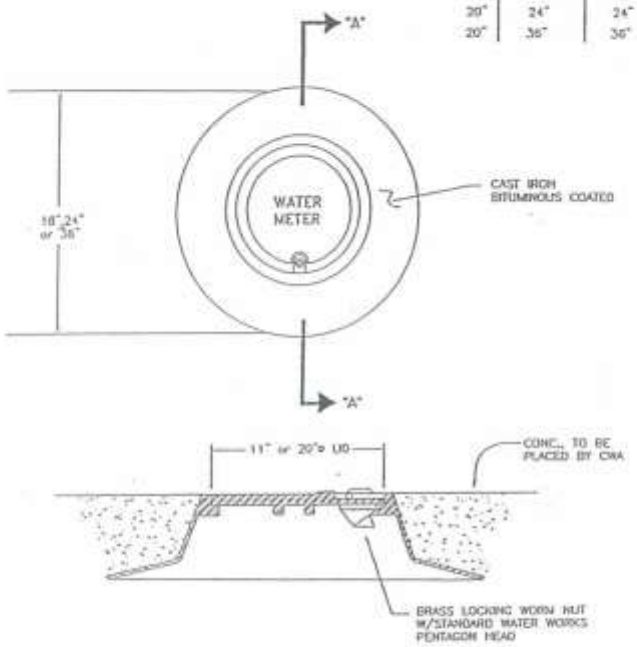
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	15
SCALE	NONE
DESIGNED	
DRAWN	
CHECKED	CTD

I.D.	TOP O.D.	PIT O.D.
11"	18"	18"
20"	24"	24"
20"	36"	36"



SECTION "A-A"

STANDARD SPECIFICATIONS
CAST IRON METER BOX COVERS

WATER MAIN

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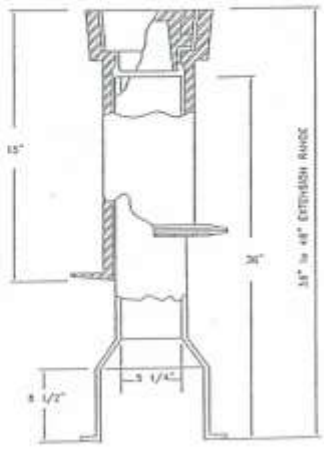
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	16
SCALE	NONE
DESIGNED	JCD
DRAWN	JED
CHECKED	CTD
DATE	July 1999



ACCEPTABLE MANUFACTURERS

BINGHAM & TAYLOR NO.5564-S
TYLER

STANDARD SPECIFICATIONS
CAST IRON VALVE BOXES

WATER MAIN

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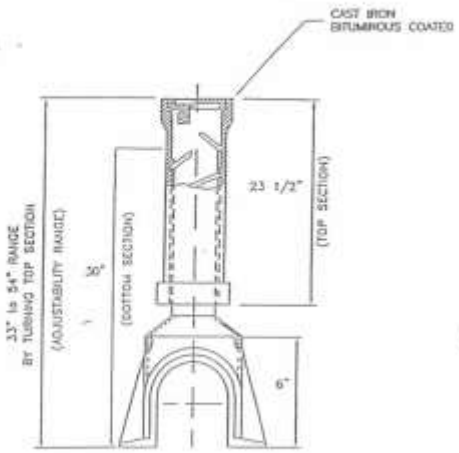
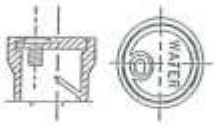
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

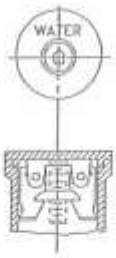
SHT	17
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	July 1995



CURB BOX



NOTE: A COMPLETE CURB BOX CONSISTS OF LID WITH BRASS PENTAGON HEAD BOLT, TOP SECTION AND BOTTOM SECTION.



CURB BOX REPAIR LID

BENCHAN & TAYLOR #4901-NSR FOR NEW STYLE 2-1/2" CURB BOXES

WEIGHT OF COMPLETE CURB BOX ASSEMBLY APPROX. 30 lbs.

CURB BOX
BUFFALO STYLE
CAST IRON

WATER MAIN

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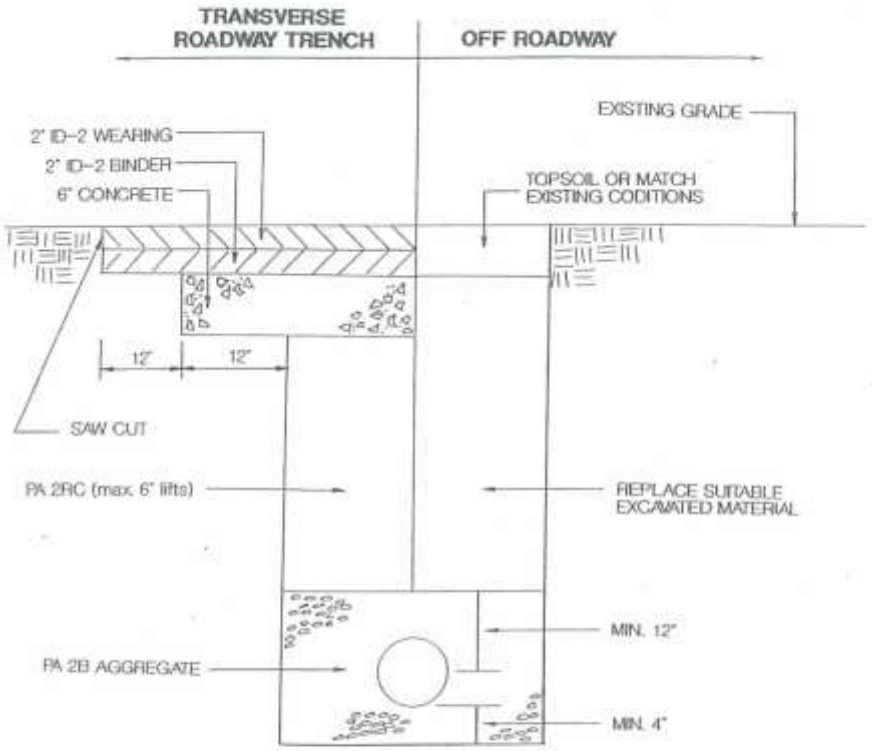
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	18
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	8 Apr 1985

DRAWINGS OF STANDARD SANITARY SEWER INSTALLATION DETAILS

July 1999



Note:

1. Compact all backfill to 95% Standard Proctor.
2. All construction in roadways shall meet PennDOT requirements at a minimum.
3. Groundwater will move rapidly through PA 2B aggregate. Place clay "dams" in stone bedding at 200 ft. intervals.

SANITARY SEWER
TYPICAL TRENCH DETAIL

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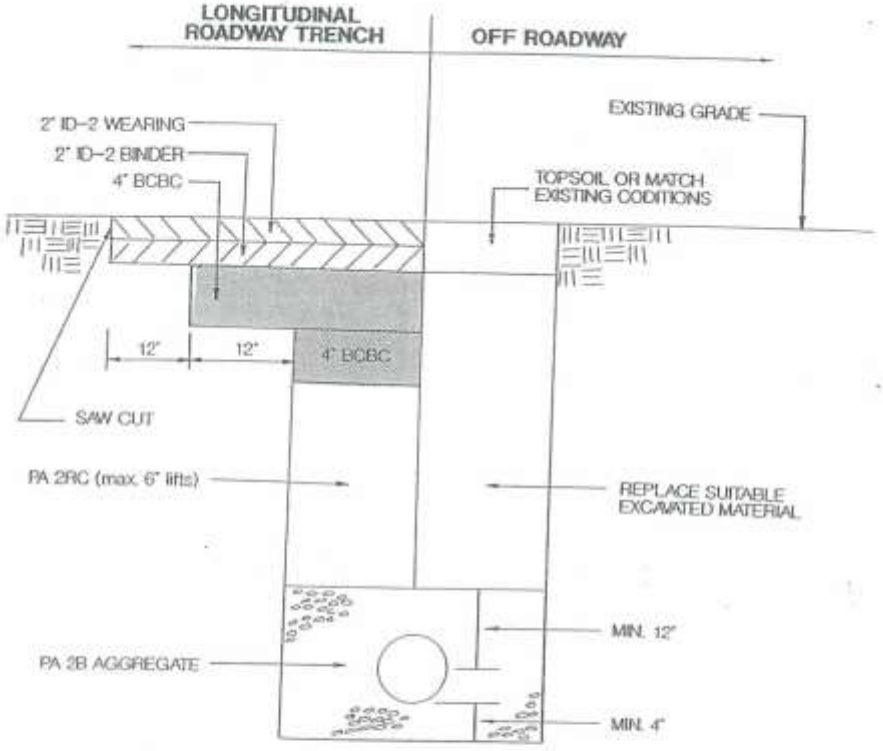
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	1
SCALE	NONE
DESIGNED	
DRAWN	JNO
CHECKED	CTD
DATE	



Note:

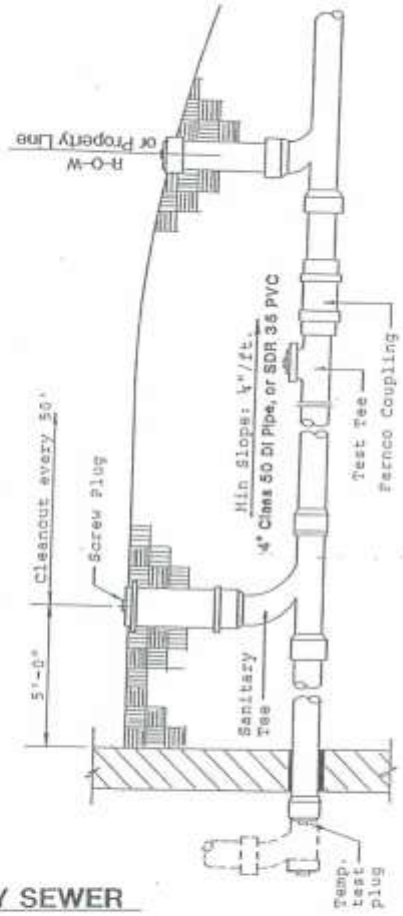
1. Compact all backfill to 95% Standard Proctor.
2. All construction in roadways shall meet PennDOT requirements at a minimum.
3. Groundwater will move rapidly through PA 2B aggregate. Place clay "dams" in stone bedding at 200 ft. intervals.

SANITARY SEWER
TYPICAL TRENCH DETAIL

American Consulting Engineers Council Member
Supporting Excellence in Engineering

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	2
SCALE	NONE
DESIGNED	
DRAWN	JND
CHECKED	CTD



NOTES:
1. Install pipe according to typical trench detail.
2. If there is a concern about the sewer backing up into the dwelling, outside vented traps or backwater valves may be installed.

SANITARY SEWER

BUILDING SEWER DETAIL

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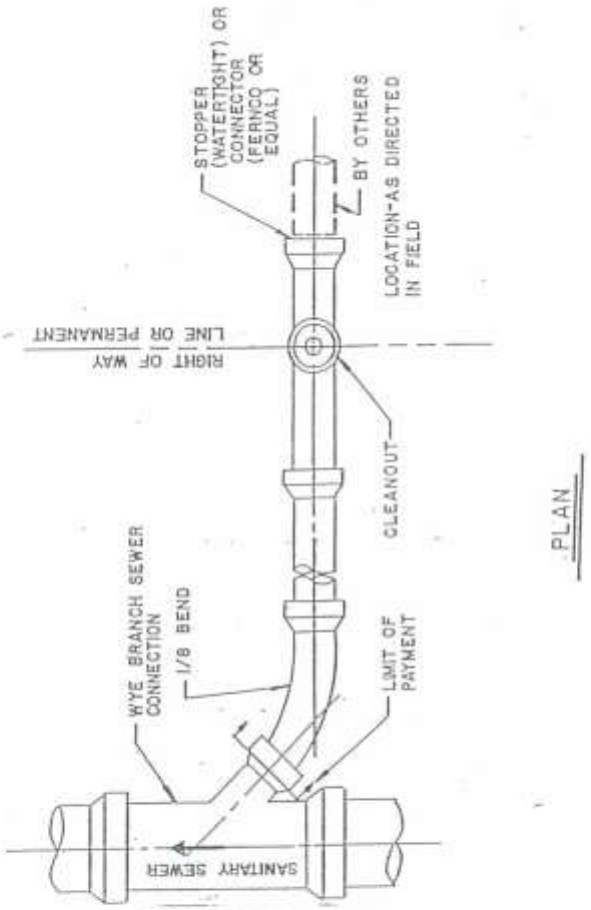
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	3
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CJD
DATE	[illegible]



SANITARY SEWER CONNECTION

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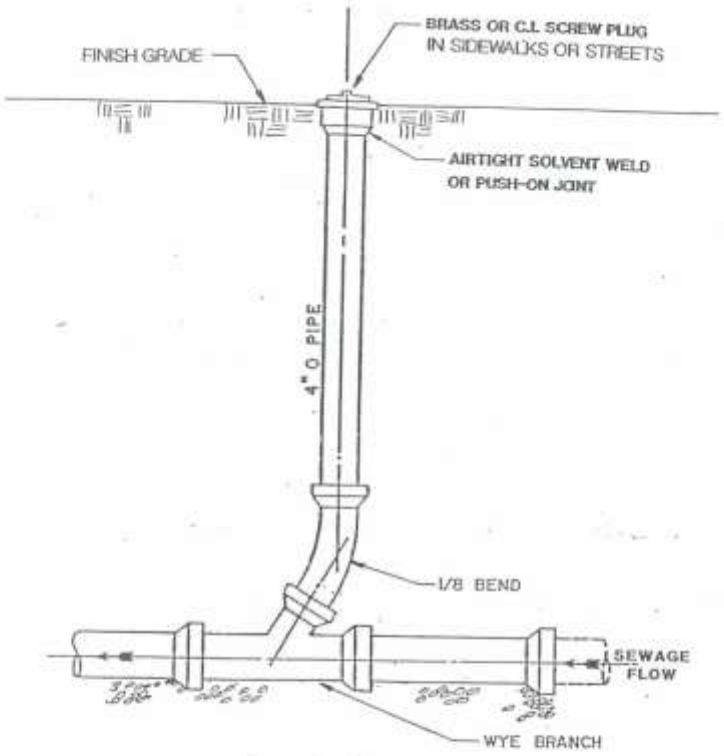
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	4
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTB
DATE	July 1999



SEE ADDENDUM U

NOTE:

1. Cleanouts in sidewalks or streets shall be brought to Finished Grade with 12"x12"x6" concrete pad at surface.

SANITARY SEWER
CLEANOUT DETAIL

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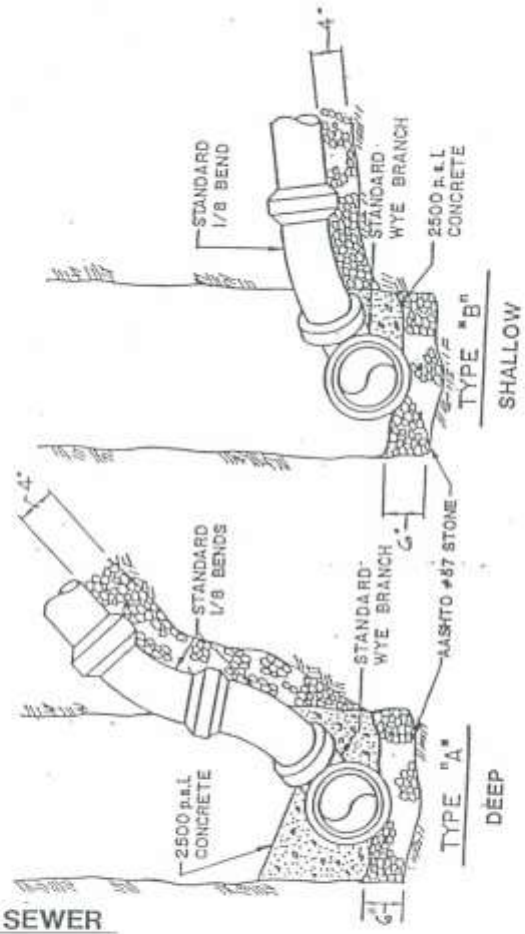
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	5
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	[illegible]



ELEVATIONS

SANITARY SEWER CONNECTION

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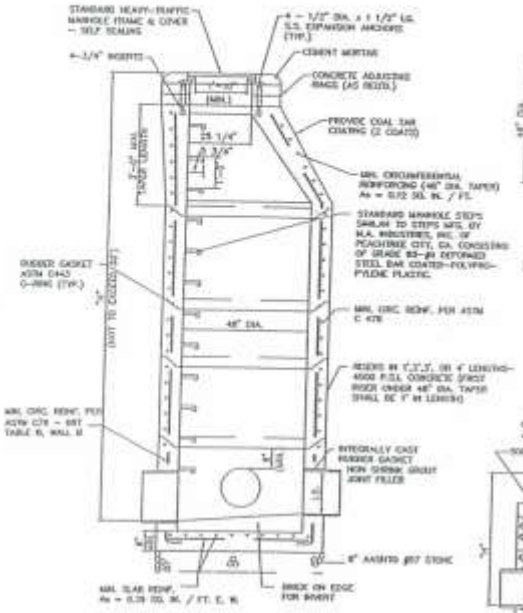
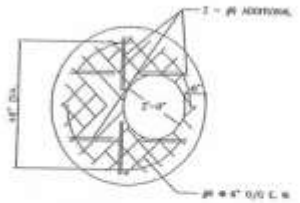
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

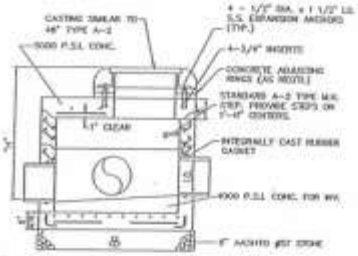
SHT	6
LOAZ	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD
DATE	July 1999



48" PRECAST MANHOLE
TYPE A–2



SLAB REINFORCING
FOR SHALLOW
PRECAST MANHOLE TYPE A–3



48" SHALLOW PRECAST MANHOLE
TYPE A–3

PIPE SIZE	MIN. M.H. BASE LENGTH	MIN. H FOR A–2 MAX. H FOR A–3
10" TO 12" DIA.	3'	6.5'
15" TO 24" DIA.	4'	7.0'
27" TO 36" DIA.	5'	8.0'

NOTES:
1. UNLESS OTHERWISE NOTED, MANHOLE TAPERS, RISERS, AND BASES SHALL BE FURNISHED IN STRICT ACCORDANCE WITH ASTM DESIGNATION C478 (LATEST) FOR PRECAST REINFORCED CONCRETE MANHOLES.
2. MANHOLE BASES SHALL BE OF 4,000 P.S.I. PRECAST CONCRETE.
3. REINFORCING FOR TYPE A–3 MANHOLE SAME AS TYPE A–2 MANHOLE, EXCEPT AS NOTED.
4. MANHOLE STEPS SHALL BE SPACED AS SHOWN IN A SINGLE VERTICAL ALIGNMENT. THE STEPS SHALL NOT BE STAGGERED.
5. WHERE MANHOLE IS TO BE LOCATED IN STREET, ROADWAY OR AREA SUBJECT TO VEHICULAR TRAFFIC, PRECAST UNIT SHALL BE CAPABLE OF SUPPORTING HIGHWAY LIVE LOADS (H–20, ETC.) AS DEFINED BY AASHTO.

SANITARY SEWER
48" DIA. PRECAST MANHOLE DETAILS

NO SCALE

American Consulting Engineers Council Member
Supporting Excellence in Engineering

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHEET	7
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTO
DATE	JULY 1999

ADDENDUM A

Adopted 5/1/00

ADDENDUM TO LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY
STANDARD SPECIFICATIONS AND DETAILS
FOR WATER MAINS AND SANITARY SEWERS
DATED AUGUST 1999

(Replaces Section 15400 – Part 14.04)

Section 15400 – Part 14.04 Service Pipe

A. Service pipe shall be ¾" Type "K" copper.

B. Service pipe shall be bed and covered with sand. Minimum pipe cover is 42".

C. Service pipe shall have a minimum horizontal separation of ten feet (10') from any sanitary sewer lateral.

D. The London Grove Township Municipal Authority shall receive and approve a submittal of the of water service line proposed alignment prior to any construction of water service lines. This submittal must be submitted as part of planning review process and approved by the Municipal Authority. The submittal shall comply with the terms of Section 01300 and show a typical alignment, materials, and trench details of the proposed water tie-in.

ADDENDUM B
Adopted 5/1/00

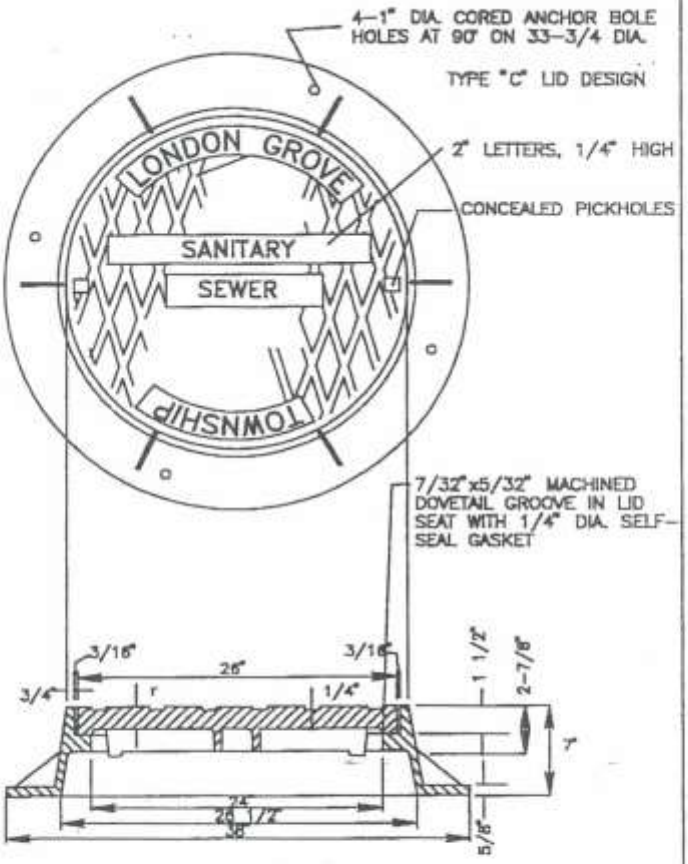
ADDENDUM TO LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY
STANDARD SPECIFICATIONS AND DETAILS
FOR WATER MAINS AND SANITARY SEWERS
DATED AUGUST 1999

(Added to Section 02732 – Part 2.02)

Section 02732 – Part 2.02 PVC PIPE

E. Building sewer laterals shall have a minimum horizontal separation of ten feet (10') from any water main or water service.

F. The London Grove Township Municipal Authority shall receive and approve a submittal of the building sewer lateral proposed alignment prior to any construction of sanitary sewer building lateral. This submittal must be submitted as part of the planning review process and approved by the Municipal Authority. The submittal shall comply with the terms of Section 01300 and show a typical alignment, materials, and trench details of the proposed water and sewer tie-in.



STANDARD MANHOLE FRAME & LID

NOT TO SCALE

NEENAH FOUNDARY CO. R-1542 OR EQUAL
(TYPE C LID SELF-SEALING)

American Consulting Engineers Council Member
Supporting Excellence in Engineering

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	8
SCALE	NONE
DESIGNED	
DRAWN	JND
CHECKED	CTD
Revised March 2001	

ADDENDUM "D"
Adopted July 2, 2001

ADDENDUM TO SECTION 15404
POTABLE WATER SUPPLY METERS

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR WATER MAINS AND SANITARY SEWERS

Add: Section 15404 – Part 1B

B. Compliance with this section of the Municipal Authority's Standard Specifications is required of any residential or non-residential users making application for building permits effective August 1, 2001.

Modify: Section 15404 – Part 2C should read:

C. AMR Register

The register, for both residential and non-residential meters, must be of the straight reading type and have a full test dial on the face of the register. It shall read in gallons and be capable of direct visual reading both at the meter and by remote reading utilizing a Schlumberger MAPS Mobile Walk-By or Drive-By Data Collection System device which connects through to the water meter via a wall mounted meter interface unit (MIU) located external to the meter. All reduction gearing shall be contained in a permanently hermetically sealed, tamper-proof enclosure made of a corrosion resistant material.

For basement installations, the register is to be of a one piece configuration secured to the main case with a case by means of a tamper-resistant locking screw so that the register cannot be removed by non-utility personnel. The register must be field replaceable by utility personnel with the use of a manufacturer supplied field tool. The field tool must not be commercially available. Seal wiring or a frangible head seal screw is not acceptable.

The meter register shall be provided with three terminal connections. The connection between the meter register and the MIU shall be accomplished with the use of three terminal connections. The register shall transmit the meter reading and the register identification number directly to the data collection system through the MIU.

When the meter is to be installed in a vault or pit set installation, the terminal connections shall be permanently factory sealed to three wire interconnecting cables with an environmentally approved epoxy to prevent moisture penetration and eliminate the need for field sealing requirements.

The MIU shall be the Model MAPS Mobile R900 Water RF Wall Meter Interface Unit as manufactured by Schlumberger.

Delete: Section 15404 – Part 2D

End of Addendum "D"

ADDENDUM E to the London Grove Township Municipal Authority's Standard Specifications & Details for Water Mains and Sanitary Sewers,
Dated September 8, 1999
Addendum E adopted September 9, 2002

This addendum shall serve to replace Section 15400 WATER SUPPLY PIPING AND VALVING – Part 14, Paragraphs 14.01 and 14.02 of the above referenced Specifications & Details.

PART 14 SERVICE CONNECTIONS

14.01 Corporation Stops

A. Corporation stops shall be size ¾" Mueller Company Model H-15000 with a flared outlet connection, size ¾" Mueller Company Model H-15008 with a compression outlet connection, or a product approved "as equal" by the London Grove Township Municipal Authority. Requests for substitution of a product "as equal" should be submitted in advance to the Municipal Authority and should meet the criteria described within ADDENDUM F adopted September 9, 2002.

14.02 Curb Stops

A. Curb stops shall be size ¾" Mueller Company Model H-15204 with copper flared fitting at both ends, size ¾" Mueller Company Model H-1504-2 with compression connection at both ends, or a product approved "as equal" by the London Grove Township Municipal Authority. Requests for substitution of a product "as equal" should be submitted in advance to the Municipal Authority and should meet the criteria described within ADDENDUM F adopted September 9, 2002

END OF ADDENDUM E

URS

Memorandum

Date: September 4, 2002

To: Karen Crossan, London Grove Township Municipal Authority Manager

From: Jim D'Orazio

Subject: **Municipal Authority Specification Addendum**

Below is a DRAFT VERSION of our recommended Addendum related to the water service curb and corporation stops.

ADDENDUM E to the London Grove Township Municipal Authority's Standard Specifications & Details for Water Mains and Sanitary Sewers, Dated September 8, 1999
Addendum ______ adopted September 9, 2002

This addendum shall serve to replace Section 15400 WATER SUPPLY PIPING AND VALVING – Part 14, Paragraphs 14.01 and 14.02 of the above referenced Specifications & Details.

PART 14 SERVICE CONNECTIONS

14.01 Corporation Stops

A. Corporation stops shall be size ¾" Mueller Company Model H-15000 with a flared outlet connection, size ¾" Mueller Company Model H-15008 with a compression outlet connection, or a product approved "as equal" by the London Grove Township Municipal Authority. Requests for substitution of a product "as equal" should be submitted in advance to the Municipal Authority and should meet the criteria described within ADDENDUM _____ adopted September___, 2002.

14.02 Curb Stops

A. Curb stops shall be size ¾" Mueller Company Model H-15204 with copper flared fitting at both ends, size ¾" Mueller Company Model H-1504-2 with

URS Corporation
1200 Philadelphia Pike
Wilmington, DE 19809
Tel: 302.791.0700
Fax: 302.791.0708

compression connection at both ends, or a product approved "as equal" by the London Grove Township Municipal Authority. Requests for substitution of a product "as equal" should be submitted in advance to the Municipal Authority and should meet the criteria described within ADDENDUM _____ adopted September ____, 2002

END OF ADDENDUM ____

CC. Larry Walker, P.E., URS Corp.
Tom deLorimier, P.E., URS Corp.

Mueller Co.

1/2" - 2" GROUND KEY DESIGN CORPORATION VALVES

H-15000

Ground Key Corporation Stop
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: Copper flare straight connection

1/2"	1/2" x 3/4"	5/8" x 3/4"	3/4"	3/4" x 1"
1"	[illegible]	1-1/8"	1-1/2"	2"

H-15025

Ground Key Corporation Stop
Inlet: AWWA iron pipe thread
Outlet: Copper flare straight connection

1/2"	3/4"	1"	1-1/4"	1-1/2"	2"

H-15010

Ground Key Corporation Stop
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: Copper flare eighth bend connection

3/4"	1"	1-1/2"	2"

H-15035

Ground Key Corporation Stop
Inlet: AWWA iron pipe thread
Outlet: Copper flare eighth bend connection

3/4"	1"	1-1/2"	2"

H-15020

Ground Key Corporation Stop
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: Copper flare quarter bend connection

5/8" x 3/4"	3/4"	1"	1-1/2"	2"

H-15045

Ground Key Corporation Stop
Inlet: AWWA iron pipe thread
Outlet: Copper flare quarter bend connection

3/4"	1"	1-1/2"	2"

H-10045

Ground Key Corporation Valve
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: F.I.P. thread

1/2"	3/4"	1"	1-1/4"	1-1/2"	2"

H-10046

Ground Key Corporation Valve
Inlet: AWWA I.P. thread
Outlet: F.I.P. thread

1/2"	3/4"	1"	1-1/4"	1-1/2"	2"

H-15002

Ground Key Corporation Stop
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: I.P. thread copper flare connection - this connection thread is one size larger than the copper tubing to be flared

3/4"	1"

NOTE: Sizes shown above represent nominal size of inlet and outlet connections. When two sizes are given, the first is size of inlet and the second is size of outlet.
‡ Requires minimum ordering quantity. Contact MUELLER Customer Service Center for minimum ordering requirements and availability.

MUELLER® Corporation Stops and Valves are manufactured and tested in accordance with ANSI/AWWA C800.

- 1" GROUND KEY DESIGN
RPORATION VALVES

Mueller Co.

REV. 4-09

H-15008

Ground Key Corporation Valve
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: MUELLER® 110® Conductive Compression Connection for CTS O.D. tubing*

[illegible]	3/4"	3/4" x 1"	1"

H-15028

Ground Key Corporation Valve
Inlet: AWWA I.P. thread
Outlet: MUELLER® 110® Conductive Compression Connection for CTS O.D. tubing*

1/2"	3/4"	1"

H-15009

Ground Key Corporation Valve
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: MUELLER 110 Compression Connection for IPS plastic pipe*

3/4"	1"

H-15029

Ground Key Corporation Valve
Inlet: AWWA I.P. thread
Outlet: MUELLER 110 Compression Connection for IPS plastic pipe*

3/4"	1"

P-15008

Ground Key Corporation Valve
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: MUELLER Pack Joint Connection for CTS O.D. tubing*

3/4"	1"

P-15028

Ground Key Corporation Valve
Inlet: AWWA I.P. thread
Outlet: MUELLER Pack Joint Connection for CTS O.D. tubing*

3/4"	1"

H-15006

Ground Key Corporation Valve
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: MUELLER® INSTA-TITE® Connection for CTS PE plastic tubing*

3/8"	3/4" x 1" ‡	1"

H-15024

Ground Key Corporation Valve
Inlet: AWWA I.P. thread
Outlet: MUELLER® INSTA-TITE® Connection for CTS PE plastic tubing*

3/4"	1"

H-15005

Ground Key Corporation Valve
Inlet: AWWA taper (MUELLER "CC") thread
Outlet: MUELLER INSTA-TITE Connection for IPS PE plastic pipe*

3/4"	3/4" x 1" ‡	1"

H-15026

Ground Key Corporation Valve
Inlet: AWWA I.P. thread
Outlet: MUELLER INSTA-TITE Connection for IPS PE plastic pipe*

3/4"	1"

* See chart on page 5.9 for tubing and pipe that may be used with these connections.
‡ Requires minimum ordering quantity. Contact MUELLER Customer Service Center for minimum order requirements and availability.
NOTE: Sizes shown above represent nominal size of inlet and outlet connections. When two sizes are given, the first is size of inlet and the second is size of outlet.
For identification purposes MUELLER INSTA-TITE Connections for CTS O.D. PE plastic tubing have red gripper rings, and the connections for IPS PE pipe have white gripper rings.

MUELLER® Corporation Stops and Valves are [illegible]

...LLER® MARK II ORISEAL® CURB VALVES ...TH COPPER FLARE CONNECTIONS

Mueller Co.

MUELLER® MARK II ORISEAL® Curb Valve
Copper flare nut - **both ends**
Quarter turn check

H-15204

3/4"	1"	1-1/4"	1-1/2"	2"

NOTE: 3/4" and 1" sizes are bi-directional and can be installed with flow from either direction. Sizes larger than 1" are one way flow and must be installed with flow as indicated by arrow and in/out lettering cast on valve body.

MUELLER® MARK II ORISEAL® Curb Valve
Copper flare nut - **both ends**
Quarter turn check and drain

H-15214

3/4"	1"	1-1/4"	1-1/2"	2"

NOTE: 3/4" and 1" sizes are bi-directional and can be installed with flow from either direction. Sizes larger than 1" are one way flow and must be installed with flow as indicated by arrow and in/out lettering cast on valve body.

MUELLER MARK II ORISEAL Curb Valve Copper flare nut - **both ends**
Quarter turn check and Minneapolis thread top

H-15154

3/4"	1"	1-1/4"	1-1/2"	2"

NOTE: 3/4" and 1" sizes are bi-directional and can be installed with flow from either direction. Sizes larger than 1" are one way flow and must be installed with flow as indicated by arrow and in/out lettering cast on valve body.

MUELLER MARK II ORISEAL Curb Valve
Copper flare nut - **both ends**
Quarter turn check, Minneapolis thread top and drain

H-15164

3/4"	1"	1-1/4" ‡	1-1/2"	2" ‡

NOTE: 3/4" and 1" sizes are bi-directional and can be installed with flow from either direction. Sizes larger than 1" are one way flow and must be installed with flow as indicated by arrow and in/out lettering cast on valve body.

MUELLER MARK II ORISEAL Curb Valve
Inlet: Copper flare nut
Outlet: F.I.P. thread
Quarter turn check

H-15174

3/4"	1"	1-1/4"	1-1/2"	2"

NOTE: 3/4" and 1" sizes are bi-directional and can be installed with flow from either direction. Sizes larger than 1" are one way flow and must be installed with flow as indicated by arrow and in/out lettering cast on valve body.

MUELLER MARK II ORISEAL Curb Valve
Inlet: Copper flare nut
Outlet: F.I.P. thread
Quarter turn check with drain

H-15184

3/4"	1"	1-1/2" ‡	2" ‡

MUELLER MARK II ORISEAL Curb Valve
Inlet: Copper flare nut
Outlet: F.I.P. thread
Quarter turn check and Minneapolis top thread

H-15124

3/4"	1" ‡

‡ Requires minimum ordering quantity. Contact MUELLER Customer Service Center for minimum ordering requirements and availability.
NOTE: Sizes shown above represent nominal size of valve.

H-1504-1

MUELLER® ORISEAL III®
Curb Valve
MUELLER 110® Conductive Compression Connection for CTS O.D.* tubing-**both ends**
Checkless--360° turn

3/4"	1"

P-1504-1

MUELLER® ORISEAL III®
Curb Valve
MUELLER® Pack Joint Connection for CTS O.D.* tubing-**both ends**
Checkless--360° turn

3/4"	1"

H-1504-2

MUELLER ORISEAL III
Curb Valve
MUELLER 110 Conductive Compression Connection for CTS O.D.* tubing-**both ends**
Quarter turn check

3/4"	1"

P-1504-2

MUELLER ORISEAL III
Curb Valve
MUELLER Pack Joint Connection for CTS O.D.* tubing-**both ends**
Quarter turn check

3/4"	1"

H-1503-1

MUELLER ORISEAL III
Curb Valve
Inlet: MUELLER 110 Conductive Compression Connection for CTS O.D.* tubing
Outlet: F.I.P. thread
Checkless-360° turn

3/4"	1"

P-1503-1

MUELLER ORISEAL III
Curb Valve
Inlet: MUELLER Pack Joint Compression Connection for CTS O.D.* tubing
Outlet: F.I.P. thread
Checkless-360° turn

3/4"	1"

H-1503-2

MUELLER ORISEAL III
Curb Valve
Inlet: MUELLER 110 Conductive Compression Connection for CTS O.D.* tubing
Outlet: F.I.P. thread
Quarter turn check

3/4"	1"

P-1503-2

MUELLER ORISEAL III
Curb Valve
Inlet: MUELLER Pack Joint Compression Connection for CTS O.D.* tubing
Outlet: F.I.P. thread
Quarter turn check

3/4"	1"

H-1502-1

MUELLER ORISEAL III
Curb Valve
Copper flare nut - **both ends**
Checkless-360° turn

3/4"	1"

H-1500-1

MUELLER ORISEAL III
Curb Valve
F.I.P. thread - **both ends**
Checkless - 360° turn

3/4"	1"

H-1502-2

MUELLER ORISEAL III
Curb Valve
Copper flare nut - **both ends**
Quarter turn check

3/4"	1"

H-1500-2

MUELLER ORISEAL III
Curb Valve
F.I.P. thread - **both ends**
Quarter turn check

3/4"	1"

*See page 7.12 for tubing that can be used with this connection.
NOTE: Sizes shown above represent nominal size of valve. Unless otherwise noted, checks on MUELLER MARK II ORISEAL valves allow 90 degree turn.

ADDENDUM F to the London Grove Township Municipal Authority's Standard Specifications & Details for Water Mains and Sanitary Sewers,
Dated September 8, 1999
Addendum F adopted September 9, 2002

This addendum shall serve to replace Section 01300 SUBMITTALS – Part 1, Paragraphs 1.05 and 1.06 of the above referenced Specifications & Details.

PART 1 SUBMITTALS

1.05 Proposed Products List

A. Within 15 days after the date of the Notice to Proceed, or prior to the start of construction, submit complete list of major products proposed for use, with the name of manufacturer, trade name, and model number of each product.
B. For products specified by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
C. For products specified by the naming of one or more manufacturer, give manufacturer, trade name, model or catalog designation, and reference standards. No options or substitutions will be allowed.
D. For products specified by the naming of one or more manufacturer with a provision for substitutions of approved equal, give manufacturer, trade name, model or catalog designation, and reference standards. Submit a request for substitution for any manufacturer not named.
E. Submit the number of opaque reproductions which the Contractor requires plus four (4) copies.

1.06 Substitutions

A. Substitutions of products may be considered when a specified product becomes unavailable through no fault of the Contractor, or when an approved equal is allowed within these Specifications & Details.
B. Document each request for a substitution with complete data substantiating compliance of the proposed substitution with the Contract Documents.

C. A request for substitution represents that the Contractor:
   1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the Substitution as for the specified product.
   3. Will coordinate installation and make changes to other work which may be required for the Work to be completed.

D. Substitutions will not be considered when they are indicated or implied on product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:

1. Submit four (4) copies of the Request for Substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, certified test results, and any other information which the Municipal Authority may require to attest to the proposed product equivalence.
3. The Municipal Authority will notify the Contractor, in writing, of the decision to accept or reject the request within fifteen (15) days of receipt of the Request for Substitution.

END OF ADDENDUM F

URS

Memorandum

Date: September 4, 2002

To: Karen Crossan, London Grove Township Municipal Authority Manager

From: Jim D'Orazio

Subject: **Municipal Authority Specification Addendum**

Below is a DRAFT VERSION of our recommended Addendum related to the request for substitution of a product "as equal" to the product specified.

ADDENDUM _F_ to the London Grove Township Municipal Authority's Standard Specifications & Details for Water Mains and Sanitary Sewers, Dated September 8, 1999
Addendum____ adopted September _9_, 2002

This addendum shall serve to replace Section 01300 SUBMITTALS – Part 1, Paragraphs 1.05 and 1.06 of the above referenced Specifications & Details.

PART 1 SUBMITTALS

1.05 Proposed Products List

A. Within 15 days after the date of the Notice to Proceed, or prior to the start of construction, submit complete list of major products proposed for use, with the name of manufacturer, trade name, and model number of each product.
B. For products specified by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
C. For products specified by the naming of one or more manufacturer, give manufacturer, trade name, model or catalog designation, and reference standards. No options or substitutions will be allowed.
D. For products specified by the naming of one or more manufacturer with a provision for substitutions of approved equal, give manufacturer, trade name, model or catalog designation, and reference

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1200 Philadelphia Pike
Wilmington, DE 19809
Tel: 302.791.0700
Fax: 302.791.0708

standards. Submit a request for substitution for any manufacturer not named.

E. Submit the number of opaque reproductions which the Contractor requires plus four (4) copies.

1.06 Substitutions

A. Substitutions of products may be considered when a specified product becomes unavailable through no fault of the Contractor, or when an approved equal is allowed within these Specifications & Details.
B. Document each request for a substitution with complete data substantiating compliance of the proposed substitution with the Contract Documents.
C. A request for substitution represents that the Contractor:
    1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product.
    2. Will provide the same warranty for the Substitution as for the specified product.
    3. Will coordinate installation and make changes to other work which may be required for the Work to be completed.
D. Substitutions will not be considered when they are indicated or implied on product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
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    1. Submit four (4) copies of the Request for Substitution for consideration. Limit each request to one proposed substitution.
    2. Submit shop drawings, product data, certified test results, and any other information which the Municipal Authority may require to attest to the proposed product equivalence.
    3. The Municipal Authority will notify the Contractor, in writing, of the decision to accept or reject the request within fifteen (15) days of receipt of the Request for Substitution.

END OF ADDENDUM____

SECTION 11250

INDIVIDUAL GRINDER PUMP STATIONS
(CENTRIFUGAL)

PART 1 GENERAL

1.01 WORK INCLUDED

A. The London Grove Township Municipal Authority (Authority) prefers the use of a gravity collection system with central pump stations. The Authority will, however, consider the use of grinder pumps where the area to be served cannot be effectively served by a gravity collection system and/or the use of a central pump station is not viable due to a small number of users. The use of grinder pumps shall be at the sole discretion of the Authority. Where grinder pumps are permitted, they shall be constructed in accordance with these specifications and the operation and maintenance thereof, shall be the responsibility of the property owner. Where grinder pumps are being provided to serve individual detached dwellings, the developer shall provide one additional pump within the dwelling as a condition of issuance of the Occupancy Permit.

B. The Contractor shall furnish factory built and tested grinder pump station(s), each consisting of grinder pump(s) suitably mounted in a basin constructed of Fiberglass, electrical quick disconnect and pump removal system.

C. The principal items of equipment shall include simplex or duplex grinder pumps, valves (shut off, anti-siphon and check), internal piping, control panel with automatic pump controller, alarm system, all internal wiring and controls. Duplex systems shall use two pumps that are identical to the simplex system to ensure interchangeability. Basins and appurtenances will be different to meet the requirements of a duplex system.

1.02 SUBMITTALS

A. Submit under the provisions of **Section 01340**.

B. Shop Drawings: Indicate in large scale detail, fabricated equipment showing construction methods, dimensional data, materials of construction, locations in plan and in cross section, mounting requirements and clearances, and utility requirements as to types, sizes and locations. For control system, indicate service connections, characteristics and wiring diagrams.

C. Product Data: Provide equipment dimensions and construction, equipment capacities, characteristics and limitations, materials, finishes, utility requirements and locations.

D. Manufacturer's Installation Instructions: Indicate installation requirements and special procedures.

1.03 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of **Section 01700**.

B. Operation Data: Provide operating data for specified equipment.

C. Maintenance Data: Provide lubrication and periodic maintenance requirements and schedules.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with **Section 01400.**

B. Design and construct the pumps in accordance with standards of the Hydraulic Institute. The efficiency of the pumps, when operating under conditions of the specified capacities and heads, shall be as near peak efficiency as practicable.

C. Obtain all grinder pumps, equipment, motors, drives, pump controls and appurtenances from one supplier to maintain common equipment.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle equipment under the provisions of **Section 01600.**

1.06 SCHEDULING AND COORDINATION

A. Schedule Work under the provisions of **Section 01340**.

B. Coordinate the delivery and installation of the Work of this Section with the Work of other Sections.

1.07 WARRANTY

A. The manufacturer shall provide a warranty on any defective part(s) and labor for a period of twenty-four (24) months after installation but no greater than twenty-seven (27) months after receipt of shipment.

B. A written manufacturer's warranty shall be supplied to the owner of the grinder pump.

1.08 PROJECT RECORD DOCUMENTS

A. Submit under provisions of **Section 01700.**

B. Record actual locations of pipes, utilities, equipment and accessories.

1.09 MANUFACTURER'S REPRESENTATIVE

A. Furnish the services of a qualified equipment manufacturer's representative as described under Part 3, Execution, of this Section.

PART 2 PRODUCTS

2.01 GRINDER PUMPS

A. Pump(s) shall be manufactured in the United States and suitable for long term submergence in sewage. Grinder pump(s) shall be U.L. Listed to Standard 778 and CSA Listed to Standard 108. The volute, seal plates and motor housing shall be constructed of high quality ASTM class 30 minimum cast iron. The pump(s) shall be painted with air dry enamel. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 or 2 inches NPT in the vertical position.

B. The pump impeller shall be of the recessed, vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of 85-5-5-5 bronze construction and machined for threading to the motor shaft. The impeller shall be capable of being trimmed to meet specific performance characteristics.

C. The pump shall be a three bearing design consisting of an upper ball bearing, an intermediate ball bearing restrained for the purpose of carrying the thrust loads, and an oil lubricated lower bronze sleeve bearing to carry radial loads and prevent shaft deflection imposed by the pump impeller and grinder operation. The oil lubricated sleeve bearing shall be located between two mechanical seals. Lip type seals are not acceptable. Designs reducing the number of bearings or substituting sleeve bearings for ball bearings will not be considered equal. The stator design must be such that it allows for easy removal from its housing for replacement. Shrink or press fits shall not be considered acceptable for stator assembly or replacement. The motor shaft shall be of 416 stainless steel.

D. In order to insure proper operation in all conditions, pump(s) must provide, without overheating in continuous operation, the maximum head required by the system. Pump(s) must also be capable of operating at zero or negative heads without damage to the pump(s).

2.02 GRINDER

A. The grinder mechanism shall be specifically designed for use in a grinder pump. Garbage disposal cutting mechanisms are not acceptable. The mechanism shall consist of a radial cutter threaded and locked on the motor shaft by a counter sunk washer in conjunction with a flat head cap screw, and a shredding ring containing a maximum of fifteen flow passages with cutting edges. Grinding shall be accomplished by a slicing action as opposed to a chopping action. Chopping-type cutter mechanisms will not be allowed. Grinder design shall be able to alternately engage cutters at start. Each cutter shall exert a minimum force of 30 pounds, thus eliminating the need for excessive motors. The shredding ring shall be reversible to provide twice the cutting life. All grinding mechanism components, including both the shredding ring and radial cutter and its impeller (if required), shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground for a fine cutting edge. Two stage cutter mechanisms and/or those requiring external adjustment for proper clearance shall not be acceptable.

B. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall be balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

C. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter discharge piping. The grinding mechanism must be capable of handling reasonable amounts of grit, often found in domestic sewage systems.

2.03 ELECTRIC MOTOR

A. Single phase motors shall be of the capacitor start, capacitor run design, 230 volt, and single phase, 2, 3, or 5 HP. The motor shall meet the performance requirements of a NEMA L speed-torque curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable.

B. An automatically resetting, heat sensing thermal device that interrupts current flow if excessive temperature is detected shall provide protection against excessive temperature. Such device shall be a part of the U.L. Listing.

C. The 2 HP pumps shall be equipped with type SOW power cable. The power cable and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug assembly shall be guaranteed by the manufacturer to be suitable for submersion up to fifty feet. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cable entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between terminal block and the motor housing. A moisture sensor and cable shall be included for detection of moisture in the seal cavity and operate a warning light in the control panel indicating a failed seal.

D. The 3 and 5 HP pump shall be equipped with 25 ft. of type SOW power cable. Heat shrink tubes shall be used to connect power cord leads with motor leads. A master heat shrink tube shall be provided and filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. A secondary rubber pressure grommet shall be provided as an additional

sealing point and strain relief at the point of cable entry. Cable entry designs utilizing terminal boards to connect power cord leads with motor leads shall not be acceptable. A moisture sensor and cable shall be included for detection of moisture in the seal cavity and operate a warning light in the control panel indicating a failed seal.

2.04 MECHANICAL SEAL

A. Motors shall be equipped with double floating, self-aligning rotary shaft seals (2 required) to prevent leakage between the motor and pump. The materials of construction shall be carbon for the rotating face and ceramic for the stationary face, lapped and polished to a tolerance of one light band, with 300 stainless steel hardware, with all elastomer parts of Buna-N.

2.05 CHECK VALVE

A. The pump discharge shall be equipped with factory installed, gravity-operated, ball-type integral check valve built into the discharge pipe. This valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Working parts will be made of a 300 series stainless steel, PVC, or a fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. The valve operation shall provide maximum seating capability, even at a very low back pressure. The valve body shall be cast iron.

B. Supplied loose with each grinder pump station shall be one, PVC flapper type check valve for installation in the 1.25" service lateral between the grinder pump station and the sewer main, preferably next to the curb stop .

2.06 RUN DRY PROTECTION

A. In order to guarantee that the pump will not be continuously run in a dry condition, each station shall be equipped with a separate low level detection device that will interrupt the operation of the pump in the event that the water level falls below the normal "OFF" level. Pump operation shall be automatically restored when the water level is raised above the normal "ON" setting. Low level detection device must be an integral part of and be removed from ground level with the normal level detection mechanism described in Paragraph 2.07 below and shall not require the removal of the pump.

2.07 STATION CONFIGURATION

Basins shall be supplied in a wet well configuration. Wet well must have minimum storage volumes above alarm level according to the following table:

Overall Station Height	Minimum Reserve Storage Above Alarm Level
48"	35.7 gallons
60"	59.2 gallons
72"	82.7 gallons
84"	106.2 gallons
96"	129.7 gallons
108"	153.2 gallons
120"	176.7 gallons

2.08 LEVEL DETECTION

A. Level detection for controlling pump and alarm operation shall be accomplished by use of a detection mechanism specifically designed for use in a sewage grinder pump basin and shall be removable without the need to remove the pump. Switches utilized in the system shall be *hermetically sealed* in a submersible, watertight protective casing. Level detection mechanism shall be a Barnes "UltraSWITCH™" type designed to provide switch protection from solids, greases, oils, and fats. Level detection mechanism shall not require any regular, preventive maintenance. The level detection mechanism shall consist of five switches, one for each function (HIGH WATER ALARM, LEAD PUMP ON, LAG PUMP ON, OFF, and REDUNDANT OFF functions). Switch assembly shall be 100% tested prior to shipment. The control assembly shall be part of the U.L.1951 listing. The level controls shall be serviceable without the need for a confined space entry as defined by OSHA or the need to remove the pump. Duplex stations shall utilize the following colors: Red, White, Black, Orange, Blue, Red with Black stripe, Green and White with Black stripe.) Conventional suspending of mercury floats, mechanical, or swing arm floats will not be acceptable.

2.09 SHUT-OFF VALVE

A. The pump discharge shall be equipped with a factory installed, true union, manual ball valve. Ball valves shall be full ported, constructed of PVC, with a minimum rated pressure of 150 PSI. All valves shall be operable from ground level. Shut off valve must be replaceable without excavating basin exterior. Duplex station shall utilize two shut off valves, each equal to the size of the pump discharge.

2.10 ANTI-SIPHON FUNCTION

A. The pump shall be constructed with a positively primed flooded suction configuration. As added assurance that the pump cannot lose prime even under negative pressure conditions in the discharge piping system, the discharge piping system must include an anti-siphon capability.

2.11 BASIN CONSTRUCTION AND ASSEMBLY

A. The basin shall be fiberglass reinforced polyester resin with a 3" ballast support

flange. The basin shall be furnished with one flexible inlet flange (shipped loose to facilitate field location) to accept a 4.50" OD DWV pipe. Inlet location can vary to accommodate ease of installation. Basin capacities and dimensions shall be as shown on the contract drawings or as specified herein. The basin FRP wall laminate thickness shall vary with the wet well depth to provide the aggregate strength to meet the tensile and flexural physical property requirements. The basin FRP wall laminate must be designed to withstand wall collapse or buckling based on a hydrostatic pressure of pounds per square foot, a saturated soil weight of 120 pounds per cubic foot, a soil modulus of 700 pounds per square foot. Basin must comply with the pipe stiffness values as specified in ASTM D 3753. The basin laminate must be constructed to withstand or exceed 150% of the assumed loading on any depth. The finished FRP laminate will have a Barcol hardness of at least 90% of the resin manufactures specified hardness for the fully cured resin. The Barcol Hardness shall be the same for both interior and exterior surfaces. Manufacture must submit documentation including calculation and production certification that basin (s) on the project are in compliance with the above requirements.

B. **Ballast (anti-floatation) collar shall be designed in accordance with Section 03400.**

C. All piping inside the basin silhouette shall be at a level in the station that is lower than the frost depth or depth of bury specified for the low pressure sewer piping, whichever is lowest. The basin package shall be furnished with junction box. Incase of groundwater flooding around grinder station location, the junction box shall be protected from such ground water.

D. Cover shall be a painted steel cover with a hinged access opening to accommodate removal of pumps. Junction box shall be NEMA 6 rated and mounted on the upper rail system cross-member beneath the access opening.

E. Basin shall be UL Listed to Standard 1951.

F. All discharge piping shall be constructed of 300 Series Stainless Steel and terminate outside the bulkhead with a stainless steel, female NPT fitting. The manufacturer shall guarantee that all bulkhead penetrations watertight.

2.12 PUMP REMOVAL SYSTEM

A. Each basin shall be equipped with two 300 series stainless steel "C" channel rail assemblies, one for each pump to facilitate removal of the pump(s) from ground level. A 1/2" diameter polypropylene rope shall be supplied for each pump. Pump removal system must not require the loosening of fasteners to facilitate pump removal and shall provide for automatic alignment and re-connection of discharge piping for the replacement pump. Pump replacement shall be accomplished while the basin is full of sewage without the need to de-water the basin.

2.13 CONTROL PANEL

A. General: A wall mounted control panel shall be supplied with each station. All

control panels shall be UL Listed to meet Standard 508. Each panel shall be constructed with a padlock-able NEMA 4X fiberglass enclosure and utilize stainless steel hardware.

B. Duplex Control Panels: The control panel shall include as a minimum: circuit breakers, fuses, terminal strip, ground lug, capacitors when required, IEC rated motor starters, relays, alarm silence button mounted on enclosure, pump alternator, and internal push to run button for each pump. Controls for both pumps must be located in the same enclosure.

C. High Water Alarm Device(s): Each control panel shall include a visual and audible, with silence, high water alarm device. Alarm circuit shall be separately fused from motor control circuit. The visual alarm shall be a red fluted lens mounted to the top of the enclosure in such a manner as to maintain rain-proof integrity. The minimum 90db audible device shall be capable of being de-activated by means of a NEMA 4X silence button mounted on the exterior of the enclosure. Visual alarm will remain on as long as a high water condition exists in the basin. Both visual and audio alarms will automatically reset when the high water condition subsides.

D. Moisture Sensor Indicator: An indicator light shall be mounted inside the control panel that is activated when the moisture sensor device located in the pump seal chamber closes the circuit. In addition, the external alarm device(s) shall be actuated.

2.14 CORROSION PROTECTION

A. All materials exposed to wastewater shall have inherent corrosion protection: i.e., cast iron, fiberglass, stainless steel, PVC.

2.15 SAFETY

A. The Grinder Pump Station shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station assembly shall be (NRTL) Nationally Recognized Testing Laboratory approved to U.L. 778, U.L. 1951, and certified to CSA Std. 108. Such third party approval must include regular inspection of manufacturing facilities and methods. The grinder pump station must also display the NRTL logo and nameplate that states the grinder pump station meets the above standards. Manufacturer must submit the NRTL file number(s) to the Township Representative to be considered for pre-approval. Grinder pump stations without such documentation and approval will not be acceptable.

2.16 SPARE PARTS

A. For low pressure sewer systems with multiple grinder pumps, the manufacturer will supply one (1) spare grinder pump for each horsepower supplied, or one (1) spare for every (15) grinder pump stations installed, whichever is greater. This does not apply in the case of separately installed and individually owned grinder pump stations. Manufacturer will also supply one (1) spare set of control panel components for each horsepower supplied, or one (1) spare for every (15) grinder

pump stations installed, whichever is greater. This does not apply in the case of separately installed and individually owned grinder pump stations.

2.17 ACCEPTABLE MANUFACTURER(S)

A. Acceptable grinder pump station manufacturer(s) are Barnes Pumps Inc., or pre-approved equal.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Each grinder pump shall be submerged, operated, and tested for performance compliance to its respective curve. All control panels shall be factory performance tested by running a pump of like type and verifying proper operation of all functions prior to shipment.

3.02 DELIVERY

A. All Grinder Pumps will be delivered to the job site, completely assembled, including testing, ready for installation. Each grinder pump basin will be suitable for lifting by lifting strap.

3.03 START-UP AND FIELD TESTING

A. The services of a factory authorized technician shall be provided for a minimum of 1 day (2 days when more than 5 grinder pumps are installed in a single project). Technician shall instruct and train installation and maintenance personnel in the proper procedures necessary to facilitate installation, start up, and operation in accordance with manufacturer's instructions. All equipment and materials necessary to perform testing shall be the responsibility of the installing contractor. This will include, as a minimum, a portable generator (if temporary power is required) and water in each basin. A minimum of one (1) day will be spent of training of operation and maintenance personnel.

B. Upon completion of the start-up and testing, the contractor shall file the manufacturers start-up/warranty authorization form describing the results of the tests performed for each Grinder Pump Station with the owner and the Authority.

PART 4 OPERATION AND MAINTENANCE

4.01 MANUALS

A. The manufacturer shall supply Operation and Maintenance Manuals in accordance with **Section 01700**.

END OF SECTION

SECTION 11260

INDIVIDUAL GRINDER PUMP STATIONS (POSITIVE DISPLACEMENT)

PART I GENERAL

1.01 WORK INCLUDED

A. The London Grove Township Municipal Authority (Authority) prefers the use of a gravity collection system with central pump stations. The Authority will, however, consider the use of grinder pumps where the area to be served cannot be effectively served by a gravity collection system and/or the use of a central pump station is not viable due to a small number of users. The use of grinder pumps shall be at the sole discretion of the Authority. Where grinder pumps are permitted, they shall be constructed in accordance with these specifications and the operation and maintenance thereof, shall be the responsibility of the property owner. Where grinder pumps are being provided to serve individual detached dwellings, the developer shall provide one additional pump within the dwelling as a condition of issuance of the Occupancy Permit.

B. The Contractor shall furnish complete factory built and tested grinder pump stations, each consisting of grinder pumps suitably mounted in a basin constructed of HDPE, electrical quick disconnect and pump removal system.

1. For ease of serviceability, all pumps, motor/grinder units, shall be of like type and horsepower through the system.

C. The principal items of equipment shall include simplex or duplex grinder pumps, valves (shut off, anti-siphon and check), internal piping, control panel with automatic pump controller, alarm system, all internal wiring and controls. Duplex systems shall use two pumps that are identical to the simplex system to ensure interchangeability. Basins and appurtenances will be different to meet the requirements of a duplex system.

1.02 SUBMITTALS

A. Submit under the provisions of **Section 01340**.

B. Shop Drawings: Indicate in large scale detail, fabricated equipment showing construction methods, dimensional data, materials of construction, locations in plan and in cross section, mounting requirements and clearances, and utility requirements as to types, sizes and locations. For control system, indicate service connections, characteristics and wiring diagrams.

C. Product Data: Provide equipment dimensions and construction, equipment capacities, characteristics and limitations, materials, finishes, utility requirements

and locations.

D. Manufacturer's Installation Instructions: Indicate installation requirements and special procedures.

1.03 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of **Section 01700**.

B. Operation Data: Provide operating data for specified equipment.

C. Maintenance Data: Provide lubrication and periodic maintenance requirements and schedules.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with **Section 01400**.

B. Design and construct the pumps in accordance with standards of the Hydraulic Institute. The efficiency of the pumps, when operating under conditions of the specified capacities and heads, shall be as near peak efficiency as practicable.

C. Obtain all grinder pumps, equipment, motors, drives, pump controls and appurtenances from one supplier to maintain common equipment.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle equipment under the provisions of **Section 01600**.

1.06 SCHEDULING AND COORDINATION

A. Schedule Work under the provisions of **Section 01340.**

B. Coordinate the delivery and installation of the Work of this Section with the Work of other Sections.

1.07 WARRANTY

A. The manufacturer shall provide a warranty on any defective part(s) and labor for a period of twenty-four (24) months after installation but no greater than twenty-seven (27) months after receipt of shipment.

B. A written manufacturer's warranty shall be supplied to the owner of the grinder pump.

1.08 PROJECT RECORD DOCUMENTS

A. Submit under provisions of **Section 01700**.

B. Record actual locations of pipes, utilities, equipment and accessories.

1.09 MANUFACTURER'S REPRESENTATIVE

A. Furnish the services of a qualified equipment manufacturer's representative as described under Part 3, Execution, of this Section.

PART 2 PRODUCTS

2.01 PUMP

A. The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with mechanical seal. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. Buna N is not acceptable as a stator material. The material shall be suited for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, good aging properties, and outstanding wear resistance.

2.02 GRINDER

A. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece stainless steel motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft. The grinder will be of the rotating type with a stationary hardened and ground chrome steel shredding ring spaced in accurate close annular alignment with the driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars.

B. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting.

C. Sufficient vortex action shall be created to scour tank free of deposits or sludge banks that would impair the operation of the pump.

D. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects", such as paper, wood, plastic, glass, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter s/s discharge piping.

2.03 ELECTRIC MOTOR

A. The motor shall be a 1 HP, 1725 RPM, 240 or 120 Volt 60 Hertz, 1 Phase, capacitor start, thermally protected induction motor capable of developing more than 8.4 foot pounds of torque.

2.04 TANK: HIGH DENSITY POLYETHYLENE CONSTRUCTION

A. The tank shall be made of high density polyethylene of a grade selected for environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. Corrugations of outside wall are to be of a minimum amplitude of 1-1/2" to provide necessary transverse stiffness.

B. Any incidental sections of a single wall construction are to be a minimum .500 inch thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. Tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to maximum external soil and hydrostatic pressure.

C. The tank shall be furnished with PVC inlet flange to accept a 4.50" OD DWV pipe. Tank capacities shall be as shown on the contract drawings.

D. The tank shall include a HDPE tamper proof cover assembly providing low profile mounting. Accessway design and construction shall facilitate field adjustment of station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

E. The station shall have all necessary penetrations factory sealed and tested. No field penetrations shall be acceptable.

F. All discharge piping shall be constructed of 304 stainless steel and terminate outside the accessway bulkhead with a stainless steel 1-1/4" female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 200 psi WOG. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

G. The accessway shall include a single NEMA 6 electrical quick disconnect (EQD) for all power and control functions, factory installed with accessway penetrations warranted by the manufacturer to be watertight. The accessway shall also be vented to prevent sewage gases from accumulating in the tank.

H. Anti-floatation collar flange shall be designed in accordance with Section 03400.

2.05 CHECK VALVE

A. The pump discharge shall be equipped with a factory installed, gravity operated,

flapper-type integral check valve built into the stainless steel discharge pipe. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Working parts will be made of a 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A non-metallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back pressure. The valve body shall be an injection molded part made of glass filled PVC.

B. Each grinder pump station shall also include one separate check valve for installation in the 1-1/4" service lateral between the grinder pump station and the sewer main, preferably next to the curb stop.

2.06 CORE UNIT

A. The Grinder Pump Station shall have an easily removable core assembly containing pump, motor, grinder, all motor controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. The watertight integrity of the core unit, shall be established by 100% factory test at a minimum of 5 PSIG.

2.07 CONTROLS

A. All necessary controls shall be located in the top housing of the core unit. The top housing will be attached with stainless steel fasteners. Non-fouling wastewater level detection for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air-bell level sensor connected to a pressure switch. The level detection device shall have no moving parts in direct contact with the wastewater. High-level sensing will be accomplished in the manner detailed above by a separate air-bell sensor and pressure switch of the same type.

B. To assure reliable operation of the pressure sensitive switches, each core shall be equipped with a breather assembly, complete with a suitable means to prevent accidental entry of water into the motor compartment.

C. The grinder pump will be furnished with a length of 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements.

2.08 ALARM/DISCONNECT PANEL

A. Each grinder pump station shall include a NEMA 4X, UL listed ALARM/DISCONNECT PANEL suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to assure corrosion resistance. The enclosure shall include a hinged, pad lockable cover, secured dead front and component knockouts. The enclosure shall not exceed 7.5"W x 8.75"H x 3.75"D.

B. For each core, the panel shall contain one (1) – 15 amp, double pole circuit breaker for the power circuit and one (1) 15 amp single pole circuit breaker for the alarm

circuit. The panel shall contain terminal blocks, integral power bus, push to run feature and a complete alarm circuit.

C. The Alarm/Disconnect Panel shall include the following features: audio & visual alarm, push to run switch, and high level (redundant) pump starting control. The alarm sequence is to be as follows:

1. When liquid level in the sewage wet-well rises above the alarm level, visual and audio alarms will be activated. The contacts on the alarm pressure switch will close. The redundant pump starting system will be energized.

2. The audio alarm may be silenced by means of the externally mounted, push-to-silence button.

3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

D. The visual alarm lamp shall be inside a red fluted lens at least 2-5/8" in diameter and 1-11/16" in height. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. For duplex units, in addition to the above, two high level indicator lights shall be mounted behind the access cover. During a high level alarm condition, the appropriate light will illuminate to indicate which pump core requires servicing.

E. The audio alarm shall be a printed circuit board in conjunction with an 86 dB buzzer with quick mounting terminal strip mounted in the interior of the enclosure. The audio alarm shall be capable of being de-activated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure.

F. The entire Alarm/Disconnect Panel, as manufactured, shall be listed by Underwriters Laboratories, Inc.

2.09 SERVICEABILITY

A. The grinder pump core unit shall have two lifting hooks complete with polypropylene lift-out harness connected to its top housing to facilitate easy core removal when necessary. All mechanical and electrical connections must provide easy disconnect accessibility for core unit removal and installation. A push to run feature will be provided for field trouble shooting. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

2.10 SPARE PARTS

A. For low pressure sewer systems with multiple grinder pumps, the manufacturer will supply one (1) spare pump for each horsepower supplied, or one (1) spare for every (15) grinder pump stations installed, whichever is greater. This does not apply in

the case of separately installed and individually owned grinder pump stations. Manufacturer will also supply one (1) spare set of control panel components for each horsepower supplied, or one (1) spare for every (15) grinder pump stations installed, whichever is greater. This does not apply in the case of separately installed and individually owned grinder pump stations.

2.11 MANUFACTURER

A. Pumps, tanks and appurtenances shall be as manufactured by Environment One Corporation or an approved equal.

PART 3 EXECUTION

3.01 FACTORY TEST

A. **Each grinder pump shall be submerged and operated for 5 minutes (minimum). Actual appurtenances and controls that will be installed in the field, shall be 100% factory tested. Certified test results shall be supplied showing the operation of each grinder pump at two (2) different points on its curve, with the maximum pressure no less than required by the system design. The Township Representative reserves the right to inspect such testing procedures with representatives of owner at the grinder pump manufacturer's facility.**

3.02 DELIVERY

A. All grinder pumps shall be delivered to the job site, 100% completely assembled, including testing, ready for installation. Each grinder pump basin shall have a minimum of four (4) lifting eyes to facilitate unloading if not suitable for lifting by lifting strap.

3.03 START-UP AND FIELD TESTING

A. Prior to the contractor proceeding with any grinder pump installation, manufacturer's authorized technician(s) shall instruct the contractor and any electrical subcontractor on the installation procedures. The manufacturer shall also provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each grinder pump station, perform field tests as specified herein, and instruct the owner in the operation and maintenance of the equipment before the pump station(s) are accepted. All equipment and materials required to perform testing shall be the responsibility of the Contractor. This will include, as a minimum, a portable generator (if temporary power is required), water in each basin and temporary facilities to receive pumpage.

B. **The services of a factory trained technician(s) shall be provided at a rate of one (1) - four (4) day week for each 100 grinder pump stations supplied. Each day shall be ten (10) man hours in duration. If less than 5 units are installed, a**

factor trained technician shall be provided for one ten (10) hour day.

C. Upon completion of the installation, the factory trained technician(s) will perform the following test on each grinder pump station:

1. Make certain the discharge shut-off valve is fully open. In some installations, there may be a valve(s) at the street main that must also be open.

2. Turn ON the alarm power circuit.

3. Fill the wet well with water to a depth sufficient to verify the high level alarm is operating. Shut off water.

4. Turn ON pump power circuit. Initiate pump operation to verify automatic "on/off" controls are operative. Pump should immediately turn ON. Verify that alarm light will turn OFF as liquid level falls below alarm point. Verify pump shuts OFF at proper liquid level.

5. Starting current.

6. Running current.

D. Upon completion of the start-up and testing, the manufacturer's start-up representative shall submit to the owner the start-up authorization form describing the results of the tests performed for each grinder pump station and certifying, in writing, that each pumping station (including power supply and alarm) is working correctly and is installed according to the contract documents. Final acceptance of the system will not occur until authorization forms have been received for all pump stations installed.

PART 4 OPERATION AND MAINTENANCE

4.01 MANUALS

A. Operation and Maintenance Manuals in number and format as required under **Section 01700**.

END OF SECTION

AMENDMENT I (A)– LGTMA STD. SPECIFICATIONS

1. As-builts of all water and sewer facilities located adjacent to and/or within the road ROW for the length of the paving limits to be submitted to LGTMA with a written request to pave.

2. Authority Engineer to provide review within 5 business days.

3. Upon favorable review of as-built drawings, LGTMA to provide a written notice to proceed with paving. If errors are noted in the as-builts, revised as-builts must be resubmitted and the Authority Engineer will review within 3 business days.

4. Paving can occur upon receipt of notice to proceed with paving.

5. Paving installed prior to receipt of written notice to proceed will be deemed unacceptable and removed at the expense of the contractor within 30 days.

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY
Chester County, Pennsylvania

RESOLUTION #2009-05
AMENDMENT I (A)

AMENDMENT TO RESOLUTION 99-7 & 2003-06
Standard Specifications and Details
For Water Mains and Sanitary Sewer

A RESOLUTION ADOPTED TO AMEND THE STANDARD SPECIFICATIONS AND DETAILS FOR WATER MAINS AND SANITARY SEWER REGARDING AS-BUILT PLANS AND PAVING OF ROADS.

BE IT RESOLVED, by the London Grove Township Municipal Authority that the Standard Specifications and Details for Water Mains and Sanitary Sewer Amendment I (A) regarding as-built plans and paving requirements.

ADOPTED this 1st of June, 2009.

ATTEST:

Karen A. Cronin
Manager

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

By:

By:

By:

By:

By:

ADDENDUM J
Adopted May 3, 2004

ADDENDUM TO SECTION 02732
BUILDING SEWERS

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Section 02732 – Part 1.01.D

D. Where an individual property owner requests and receives approval to connect to the Authority's sewer system, the Authority will provide a service lateral to the property line upon receipt of payment of the connection fee and escrow. The cost of said installation will be billed to the property owner. The property owner is responsible for the connection of the on-site piping to the lateral. Billing for sewer service will commence 30 days after the Authority completes the lateral installation to the property line, regardless of the status of the on-site piping.

End of Addendum J

ADDENDUM K
Adopted May 3, 2004

ADDENDUM TO SECTION 15400
WATER SUPPLY PIPING AND VALVING

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Section 15400 – Part 1.09

1.09 Where an individual property owner requests and receives approval to connect to the Authority's water system, the Authority will provide a service lateral to the property line and a water meter upon receipt of payment for the connection fee and escrow. The cost of said installation will be billed to the property owner. The property owner is responsible for the connection of the on-site piping to the lateral. Billing for water service will commence 30 days after the Authority completes the lateral installation to the property line, regardless of the status of the on-site piping and meter installation.

1.10 Installation of new water main and connection to the Authority's water distribution system shall be made in accordance with the latest edition of AWWA C651. The physical connection of the new water main to the existing distribution system shall not be permitted until the new main has been pressure tested, chlorinated, flushed and passed bacteriological testing.

Delete: Section 15400 – Part 12.02.C

Add: Section 15400 – Part 12.02.C

12.02.C Where sidewalks are adjacent to the road, the hydrant should be located on the house side of the sidewalk. The isolation valve should be located as close to the hydrant as possible, but not in the sidewalk. In some cases, the isolation valve may be located on the road side of the sidewalk. The center of the break off flange should be set approximately 3-1/4" above the sidewalk elevation.

End of Addendum K

ADDENDUM "L"
Adopted May 3, 2004

ADDENDUM TO SECTION 02731
RAW SEWAGE PUMP STATIONS

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Section 02731 – Part 1.04

1.04 BUILDING

A. Where deemed appropriate by the London Grove Township Municipal Authority, the Authority will elect to require a building at a pumping station to conceal the generator and control cabinetry. The intent is to provide a building that conforms to the character of the surrounding development so that the pumping station is less conspicuous to the residents of the Township. In addition, the LGTMA requires a structurally sound, low maintenance building. The following describes minimum standards of the building construction. During the course of the design review, additional details may be further defined.

1. Walls are to be constructed of CMU with a brick veneer or CMU with stone veneer
2. A concrete footing is to be provided at a depth of 42"
3. Walls are to be insulated with core inserts
4. Wall cores are to include concrete and rebar at 4' on center
5. Dur-O-Wall reinforcing is to be provided on every other block course
6. #4 rebar is to be placed at 48" on center within wall section from foundation to bond beam
7. Concrete bond beam is required with two continuous #5 reinforcing bars
8. 18" anchor bolts are to be supplied for top plate at 48" on center
9. Separate concrete floor including foam insulation 3' from edge of wall and to a depth of 3 feet along inside of wall
10. A separate, concrete reinforced, vibration isolating pad is to be provided for the generator
11. A 4' clearance is to be provided around the generator
12. Generator exhaust discharge is to be pointed away from houses in the community
13. Generator is to have a silencer
14. Inside walls will be painted with an epoxy coating suitable for concrete
15. Inside ceiling shall be non vented white aluminum soffit panel
16. Roof will be comprised of ½" tongue and groove plywood, 30 pound felt and fiberglass shingles with a 40 year warranty transferable to the LGTMA
17. Wood trusses will be spaced a maximum of 24" on center, pitch of 6/12 and be secured w/ hurricane clips at bearing points

Design Loading:

Top Chord	Live Load – 30 PSF
	Dead Load – 10 PSF
Bottom Chord	Dead Load – 10 PSF
Point Load for Eye Hooks/Bracing	1,000 LBS (or as required)

18. Non-corrosive double doors with a wood exterior finish and stainless steel hardware
19. Building shall have electric, lighting and HVAC designed to national standards
20. Building is to be heated to 50-degree minimum in the winter
21. Ceiling insulation shall be R-30 fiberglass batt insulation
22. A visual alarm indicator shall be provided on building exterior
23. Landscaping around the pump station site shall be of similar appearance to the surrounding development. It should contain a mix of different types of vegetation and shall be reviewed by the Authority prior to final approval
24. Developer is to provide architectural elevations for review

End of Addendum "L"

ADDENDUM "M -1"
Adopted May 1, 2006
Revised March 3, 2014

ADDENDUM TO SECTION 15400
WATER SUPPLY PIPING AND VALVING

LONDON GROVE TOWNSIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Part 12.02.D

D. Each hydrant shall be supplied with a hydrant marker consisting of a high grade 3/8" fiberglass rod with built-in UV protection, heavy duty stainless steel springs and corrosion resistant polymer brackets for side mounting as manufactured by CY Plastics or approved equal.

END OF ADDENDUM "M-1"

ADDENDUM "N"
Adopted September 11, 2006

ADDENDUM TO SECTION 02058
TELEVISION INSPECTION AND SEWER LINE CLEANING

LONDON GROVE TOWNSIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Modify: Part 1.02 A should read:

A. Provide two copies of the completed television inspection on DVD

Add: Part 1.03 E

E. Television inspection and recording of sanitary sewer lines shall be completed after all homes are built, but prior to dedication to the Authority.

END OF ADDENDUM "N"

ADDENDUM "O"
Adopted September 11, 2006

ADDENDUM TO SECTION 02732
BUILDING SEWERS

LONDON GROVE TOWNSIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Part 1.01.E

E. Sewer laterals shall conform to the following materials:

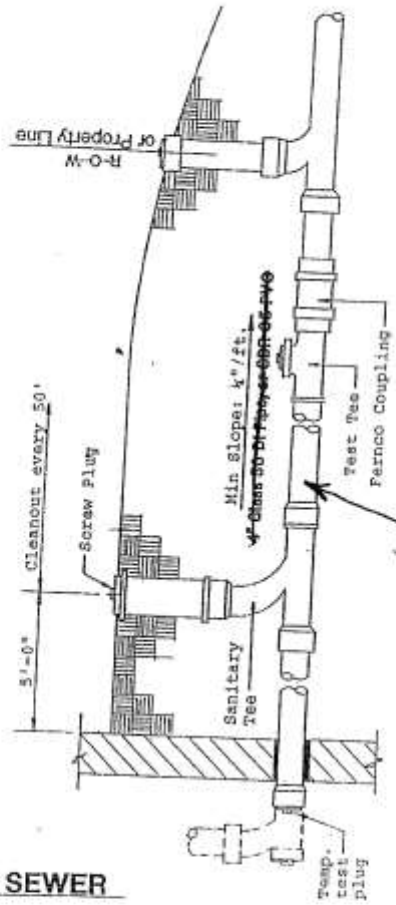
1. When the sewer lateral is located within a State Highway, and/or Township road, including easements, parking lots or other roadway area, pipe material shall be Schedule 80 PVC.

2. When the sewer lateral is located beneath an unpaved area or area not subject to vehicular traffic, pipe material shall be Schedule 40 PVC

Modify: Sheet 3, Sanitary Sewer Building Sewer Detail:

Modify acceptable piping materials on Sheet 3 to be 4" Class 50 DIP, or SCH 40 PVC (in paved areas), or SCH 80 PVC (in paved areas)

END OF ADDENDUM "O"



NOTE:
1. Install pipe according to typical trench detail.
2. If there is a concern about the sewer backing up into the dwelling, outside vented traps or backwater valves may be installed.

SANITARY SEWER

BUILDING SEWER DETAIL

American Consulting Engineers Council Member
Supporting Excellence in Engineering

LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA

SHT	3
SCALE	NONE
DESIGNED	JED
DRAWN	JED
CHECKED	CTD

ADDENDUM "P"
Adopted September 11, 2006

ADDENDUM TO SECTION 15400
WATER SUPPLY PIPING AND VALVING

LONDON GROVE TOWNSIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Part 14.04 B

B. Bedding material for all service pipes should be screenings in accordance with AASHTO No. 10 size aggregate

END OF ADDENDUM "P"

ADDENDUM "Q"
Adopted *April 7, 2008*

ADDENDUM TO SECTION 15404
POTABLE WATER SUPPLY METERS

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Add: Section 15404 – Part 1B

B Compliance with this section of the Municipal Authority's Standard Specifications is required of any residential or non-residential users making application for building permits effective **April 7, 2008**.

Modify: Section 15404 – Part 2C should read:

C. AMR Register

The register, for both residential and non-residential meters, must be of the straight reading type and have a full test dial on the face of the register. It shall read in gallons and be capable of direct visual reading both at the meter and by remote reading utilizing a Schlumberger MAPS Mobile Walk-By or Drive-By Data Collection System device. All reduction gearing shall be contained in a permanently hermetically sealed, tamper-proof enclosure made of a corrosion resistant material.

For basement installations, the register is to be of a one piece configuration secured to the main case with a case by means of a tamper-resistant locking screw so that the register cannot be removed by non-utility personnel. The register must be field replaceable by utility personnel with the use of a manufacturer supplied field tool. The field tool must not be commercially available. Seal wiring or a frangible bead seal screw is not acceptable.

The meter register shall be provided with three terminal connections. The connection between the meter register and the MIU shall be accomplished with the use of three terminal connections. The register shall transmit the meter reading and the register identification number directly to the data collection system through the MIU.

When the meter is to be installed in a vault or pit set installation, the terminal connections shall be permanently factory sealed to three wire interconnecting cables with an environmentally approved epoxy to prevent moisture penetration and eliminate the need for field sealing requirements.

The MIU shall be the Neptune E-Coder R900i Meter Interface Unit capable of operating in E-Coder Plus mode as manufactured by Schlumberger.

Delete: Section 15404 – Part 2D

End of Addendum "Q"

ADDENDUM "R"
Adopted *November 3, 2008*

ADDENDUM TO SECTION 15404
POTABLE WATER SUPPLY METERS

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Delete Section 15404 – Part 2 A
Add: Section 15404 – Part 2 A

A The following equipment shall be provided by the LGTMA and installed in accordance with all manufacturer's instructions Equipment is further described as follows:

1 Type
Magnetic drive, sealed register, positive displacement type oscillating piston only

2 Size
Must conform to American Water Works Standard C-7000 as most currently revised

3 Length
Must conform to American Wates Works Standards C-7000 as most currently revised

4 Cases
All meters shall have a non-corrosive water works bronze (minimum 75% content outer case with a separate measuring chamber which can easily be removed froemm the case All meteres shall have cast on them, in raised characters, the size and direction of water flow through the meter Case iron front bottoms, or bronze bottoms shall be provided on ¾" size meters The manufacturer's serial number must be permanently affixed to the main case to aid in identification and must be visible so that it can be read from directly above the water meter

Delete Section 15404 – Part 1 L
Add: Section 15404 – Part 1 L

L All meters shall be installed per the standard residential meter connection detail in the structure's basement Meters will be owned and maintained by the LGTMA All other required components shown on Detail S-15 will be owned and maintained by the property owner

Delete Section 15404 – Part 1 M
Add: Section 15404 – Part 1 M

M Commercial meter installations shall be reviewed and approved on a case by case basis Isolation valves, reduced pressure zone principal back flow prevention valves and pressure reducing valves shall be supplied Meters will be owned and maintained by the LGTMA All other required components shall be owned and maintained by the property owner

End of Addendum "R "

ADDENDUM "S"
Adopted *August 2, 2010*

ADDENDUM TO SECTION 15400
WATER SUPPLY PIPING AND VALVING
IRC FIRE SPRINKLER LAW

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Section 15400 – Part 14.04 Service Pipe

Add after 14.04 A.

1. When a fire service connection is required, the **minimum** size of the lateral shall be 1" and shall be of Type "K" copper. The developer and/or sprinkler designer is responsible for determining the lateral size and shall provide signed and sealed design calculations demonstrating that the lateral size is adequate with normal system pressure. Calculations are to be submitted to the LGTMA for review. In some instances, a booster pump may be required to increase pressure for adequate fire service supply. The booster pump will be the responsibility of the developer and/or property owner.
2. A single lateral will serve both the domestic supply and fire service supply lines between the main and the property line.
3. Immediately prior to the property line, the lateral shall be split into a fire service line and domestic supply line with a tee and 90 degree bend. Both lines are to have curb stops and valve boxes located on the property line and within 8" to 12" of each other.
4. The fire service line valve box shall be a 5-3/8" wide, injection molded water curb service box marked "FIRE" as manufactured by Pentek.
5. The domestic water service valve box shall be in accordance with the LGTMA standards.

End of Addendum "S"

ADDENDUM "T"
Adopted May *13, 2013*

ADDENDUM TO SECTION 03002
PRE-CAST CONCRETE

LONDON GROVE TOWNSHIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Section 03002 – Part 2.01 Materials

Add after 2.01 L.

K. Manhole Interior: All new sanitary sewer manholes shall include a coating or insert capable of protecting all concrete from hydrogen sulfide and/or sulfuric acid attack. Acceptable products include SprayShield Green II as manufactured by SPRAYROQ, Dura-Plate 100 as manufactured by ALOK Products or approved equal.

End of Addendum "T"

ADDENDUM "U"
Adopted August 3, 2015

LONDON GROVE TOWNSIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Modify: Sheet 5, Sanitary Sewer Cleanout Detail:

Delete "in Sidewalks or Streets" in reference to clean out screw plug Brass or cast iron clean out screw plugs are required in all clean outs

END OF ADDENDUM "U"

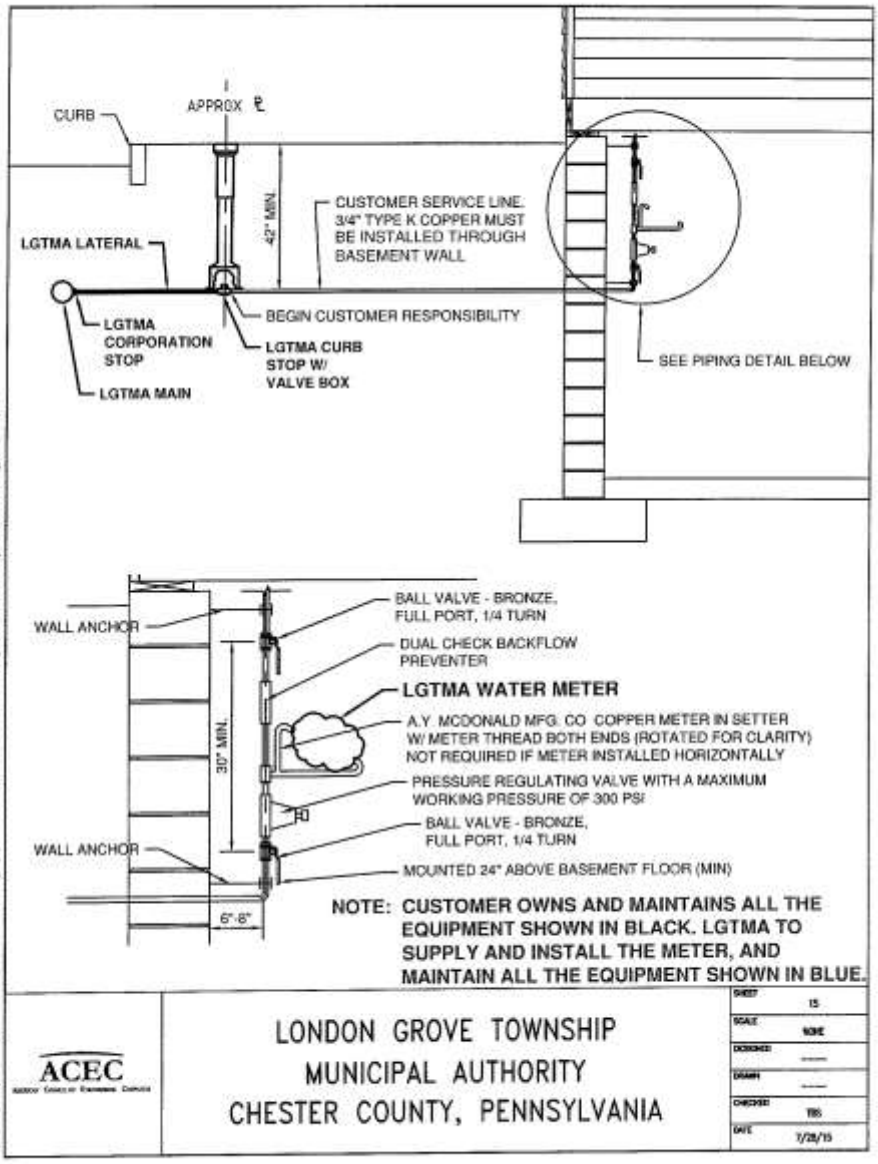
ADDENDUM "V"
Adopted August 3, 2015

LONDON GROVE TOWNSIP MUNICIPAL AUTHORITY

STANDARD SPECIFICATIONS AND DETAILS FOR
WATER MAINS AND SANITARY SEWERS

Delete Sheet 15 in its entirety and replace with new Sheet 15 attached.

END OF ADDENDUM "V"


CURB
APPROX ℄
42" MIN
CUSTOMER SERVICE LINE. 3/4" TYPE K COPPER MUST BE INSTALLED THROUGH BASEMENT WALL
LGTMA LATERAL
BEGIN CUSTOMER RESPONSIBILITY
LGTMA CORPORATION STOP
LGTMA CURB STOP W/ VALVE BOX
LGTMA MAIN
SEE PIPING DETAIL BELOW
WALL ANCHOR
BALL VALVE - BRONZE, FULL PORT, 1/4 TURN
DUAL CHECK BACKFLOW PREVENTER
LGTMA WATER METER
A.Y. MCDONALD MFG. CO. COPPER METER IN SETTER W/ METER THREAD BOTH ENDS (ROTATED FOR CLARITY) NOT REQUIRED IF METER INSTALLED HORIZONTALLY
30" MIN.
PRESSURE REGULATING VALVE WITH A MAXIMUM WORKING PRESSURE OF 300 PSI
WALL ANCHOR
BALL VALVE - BRONZE, FULL PORT, 1/4 TURN
MOUNTED 24" ABOVE BASEMENT FLOOR (MIN)
6"-8"
NOTE: CUSTOMER OWNS AND MAINTAINS ALL THE EQUIPMENT SHOWN IN BLACK. LGTMA TO SUPPLY AND INSTALL THE METER, AND MAINTAIN ALL THE EQUIPMENT SHOWN IN BLUE.
ACEC
LONDON GROVE TOWNSHIP
MUNICIPAL AUTHORITY
CHESTER COUNTY, PENNSYLVANIA
SHEET 15
SCALE NONE
DESIGNED ——
DRAWN ——
CHECKED TBS
DATE 7/28/15