Red Lion Municipal Authority

Part II

CONSTRUCTION AND MATERIALS STANDARDS

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SECTION 00100

TERMS AND ABBREVIATIONS

I. TERMS

Unless indicated otherwise, the meaning of terms used in these specifications shall be as follows:

Authority is defined as Red Lion Municipal Authority and its full-time employees and appointed representatives.

Contract is defined as the agreement between a developer and Contractor or Authority and Contractor performing the site improvements.

Contractor is defined as company performing the construction of site improvements.

Developer is defined as subdivider or potential buyer, property owner, equitable owner who has executed an agreement with Contractor performing site improvements.

Construction Drawings are defined as those land development and subdivision plans or construction documents approved by the Municipality and or Authority.

Engineer is defined as the appointed engineer of the Authority.

Municipality is defined by the geographical location in which the work is occurring. Municipality shall be defined as the Authority when the work performed is under direct contract with the Authority.

II. ABBREVIATIONS

The following abbreviations are used in the text of these specifications:

AASHTO	American Association of State Highway Transportation Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
BCBC	Bituminous Concrete Base Course
DI	Ductile Iron
ESAL	Equivalent Single Axle Load
FS	Federal Specifications
HES	High Early Strength
HMA	Hot Mix Asphalt
HDPE	High Density Polyethylene
IEEE	Institute of Electrical & Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IPCEA	Insulated Power Cable Engineers Association
MUTCD	Manual of Uniform Traffic Control Devices

ABBREVIATIONS (cont'd)

NEC	National Electric Code
NECS	National Electric Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
O.D.	Outside Diameter
OSHA	Occupational Safety & Health Administration
PA DEP	Pennsylvania Department of Environmental Protection
PE	Polyethylene
PennDOT	Pennsylvania Department of Transportation
psi	Pounds per square inch
PTM	Pennsylvania Test Method
PVC	Polyvinyl Chloride
SDR	Standard Dimension Ratio
SESPC	Soil Erosion and Sediment Pollution Control
UL	Underwriters' Laboratories, Inc.
WWF	Welded Wire Fabric

END OF SECTION

SECTION 00160

UTILITY CONFLICT STATEMENT

Any discrepancies between the requirements of these specifications and the requirements of any other authorized agency, such as public utilities and or municipalities must be resolved prior to commencement of construction activities in order to avoid delays.

END OF SECTION

SECTION 01725

DIGITAL AUDIO-VIDEO RECORDING

PART 1 GENERAL

1.01 DESCRIPTION

A. Digital audio-video recording is required along the project line route and areas of influence prior to the start of any construction activities. The recording equipment used must be of the professional grade as rated by the manufacturer, and meet the requirements listed below under equipment.

1.02 QUALITY ASSURANCE

A. Required taping shall be performed by an independent third party firm actively engaged, experienced, and knowledgeable in documenting existing conditions on utility and heavy construction projects. The ENGINEER reserves the right to request sample work and to investigate the qualifications of any firm chosen to perform this work.

1.03 SUBMITTALS

A. All pre-construction documentation is to be delivered to ENGINEER and OWNER a minimum of five days prior to start of any work within the zones of influence unless waived by the ENGINEER.

B. Each project/contract's index and DVD discs shall be contained in a three-ring, "D" ring type binder and labeled with the Project Name, Contract Number, Engineer and Contractor names.

PART 2 PRODUCTS

2.01 EQUIPMENT:

A. Audio-video digital tape shall be of the DV or mini-DV format and provided by a recognized manufacturer, (i.e. Sony, Panasonic, JVC, Maxell, TDK, Fuji, etc.). No used tape or "seconds" shall be allowed.

B. All digital video shall conform to NTSC standards, 720 x 480 and all tapes converted to DVD format discs (DVD-R) for playback on most recognized DVD set-top units and PC DVD players.

C. Audio portion of recording shall contain verbal information relevant to the conditions, items, locations, and direction of travel appearing in the video.

PART 3 EXECUTION

3.01 PROCEDURE

A. All digital recording shall be done during periods of good visibility and not during periods of visible precipitation, or while the ground is covered with snow.

B. Control direction of travel, panning rates, zoom in-out rates in a manner that produces clarity of subject during playback. When a conventional wheeled vehicle is used, an approximate nine feet, camera to ground, distance should be maintained. In areas not accessible by conventional wheeled vehicles, taping shall be conducted on foot along rights-of-way and areas of influence plus fifteen feet on either side and 100 foot intervals minimum between views.

C. Include in recorded coverage driveways, sidewalks, curbs, ditches, (to show drainage patterns), streets, (as full width as possible), landscaping, trees, shrubs, culverts, catch basins, retaining walls, head walls, fences, visible utilities, and building exteriors within the zones of influence. Houses and building should be identified both audibly and visibly when possible.

D. Properly identify all DVD discs by project name, contract number, disc number, date, Engineer and Contractor. Begin the audio narrative portion of each recording with the current date, project name, contract number, starting location and direction of travel.

E. Supply a typed index which identifies the contents of each DVD disc as to locations, station numbers, line numbers, manholes, streets, etc. Each index description line shall be referenced to the DVD's running time on the DVD's main program screen allowing the viewer to view designated reference points as needed. Proof of coverage by workmen's compensation insurance must also be provided.

END OF SECTION

SECTION 02100

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Clearing
2. Grubbing
3. Stripping and stockpiling topsoil
4 Debris disposal

B. Related Work Specified Elsewhere:

1. Trenching, Backfilling, and Compacting:.....Section 02221
2. Roadway Excavation, Fill, and Compaction.....Section 02230
3. Soil Erosion and Sedimentation Control: .....Section 02270
4. Finish Grading, Seeding, and Sodding: .....Section 02485

C. Definitions:

1. Clearing: The removal of trees, brush, down timber, rotten wood, rubbish, any above original ground elevation not designated to be saved. Clearing also includes removal of fences, walls, guard posts, guiderail, signs, and other obstructions interfering with the proposed work.

2. Grubbing: The removal from below the surface of the natural ground of stumps, roots and stubs, brush, organic materials and debris.

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE - Section not utilized

1.03 SUBMITTALS

A. Permits:

1. Submit two copies of each on-site burning permit if such permits are required.

2. For off-site disposal, submit two copies of the agreement with each property owner, releasing the Authority and Engineer from responsibility in connection with the disposal of the debris, and permits or approvals from regulatory agencies.

1.04 JOB CONDITIONS

A. The Contractor may clear all obstructions within the construction limits or permanent and construction rights-of-way except those specifically designated to be saved or restored on the Construction Drawings or Specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Temporary Fencing:

1. Orange plastic safety fence, 4 foot high minimum

2. Undamaged picket snow fence, 4' high, formed of wooden slats, tightly woven with wire cable.

3. Soil-set fence posts, studded "T" type, 6' high.

B. Tree Wound Dressing:

1. Antiseptic and waterproof, asphalt base.

PART 3 - EXECUTION

3.01 PREPARATION

A. Notify the Engineer and regulatory agencies at least 72 hours prior to beginning any clearing work.

B. Protect benchmarks, utilities, existing trees, shrubs and other landscape features designated for preservation with temporary fencing or barricades satisfactory to the Engineer. No material shall be stored or construction operation carried on within 4' of any tree to be saved or within the tree protection fence.

C. When a private enclosure fence encroaches on the work area, notify the property Owner at least 5 days in advance of the clearing/grubbing operations to permit the Owner to remove it, construct a supplemental fence, or make such other arrangements as may be necessary for security purposes. Upon failure of the property Owner to reasonably proceed with the work required to secure his property, carefully remove the fence, in whole or in part, and neatly pile the materials onto the Owner’s property.

3.02 UTILITY RELOCATIONS

A. Inform all companies, individuals and others owning or controlling facilities or structures within the limits of the work which have to be relocated, adjusted or reconstructed in sufficient time for the utility to organize and perform such work in conjunction with or in advance of the Contractor's operations.

B. Comply with the requirements of Pennsylvania Underground Utility Protection Law.

3.03 CLEARING

A. Confine clearing to within the construction limits.

B. Clear in a manner that will avoid damage to trees, shrubs, structures, and other installations which are to be retained.

C. Where stumps are not required to be grubbed, flushcut with ground elevation.

3.04 GRUBBING

A. Grub areas within the construction limits to remove roots and other objectionable material to a minimum depth of 24".

B. Remove all stumps within the cleared areas.

3.05 STRIPPING AND STOCKPILING TOPSOIL

A. Strip topsoil to whatever depth it may occur from areas to be excavated, filled, or graded and stockpile.

B. The topsoil shall not be used as backfill.

3.06 DEBRIS DISPOSAL

A. Trees, logs, branches, brush, stumps, and other debris resulting from clearing and grubbing operations shall become the property of the Contractor and shall be legally disposed of.

B. Do not deposit or bury on the site debris resulting from the clearing and grubbing work unless authorized in writing by the Authority.

C. Debris may be burned on-site if required permits are obtained, and if burning operations are conducted in compliance with all regulations.

D. Discarded materials within the right-of-way limits necessary to perform the work shall be removed and properly disposed of at the Contractor’s expense.

3.07 RESTORATION

A. Repair all injuries to bark, trunk, limbs, and roots or remaining plants by properly dressing, cutting, and painting, using approved arboricultural practices and materials.

B. Replace trees, shrubs and plants designated to be saved which are permanently injured or die during the work and warranty period as a result of construction operations with like species acceptable to the Authority.

C. Remove protective fences, enclosures and guards upon the completion of the project.

D. Restore guard posts, guiderail, signs and other interferences to the condition equal to that existing before construction operations.

E. Fences, mail boxes, and signs within the line of work shall be carefully removed, stored, and upon completion of backfill, reset or replaced to their original condition and location, at the Contractor’s expense.

END OF SECTION

SECTION 02150

BORING AND JACKING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Approach trench excavation

2. Installation of casing pipe

3. Installation of carrier pipe

B. Related Work Specified Elsewhere:

1. Trenching, Backfilling, and Compacting:.....Section 02221

C. Definitions: NONE

D. Applicable Standard Details:

02150-1 Casing Installation

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Comply with applicable federal, state and local ordinances, codes, statutes, rules and regulations, and affected jurisdictional bodies.

2. Pennsylvania Department of Transportation (PennDOT), latest revisions, Publication 408 Specifications.

3. American Railway Engineering Association, Manual for Railway Engineering.

B. Contractor Qualifications:

1. Construction operations shall be undertaken only by a Contractor well experienced with a minimum of five operations of similar magnitude and condition.

1.03 SUBMITTALS

A. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

B. Submit description of proposed construction methods, including methods to establish and maintain vertical and horizontal alignment.

C. Manufacturers' Literature:

1. Submit manufacturers' catalog information for each type of pipe, fittings, couplings, adapters, gaskets, casing spacers, and assembly of joints for approval of the Engineer. Include manufacturers' recommendations for deflection in pipe joints.

D. Certificates:

1. Submit certifications for each type of pipe, fittings, gaskets, lubricants or other joint materials from the manufacturers attesting that each of these meets or exceeds specifications requirements.

1.04 JOB CONDITIONS

A. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger the integrity of surface or subsurface structures or utilities, and landscape in the immediate or adjacent areas.

B. When boring or jacking under state highways and railroads, comply with applicable right-of-way occupancy permits.

C. If boring is obstructed, relocate or jack or tunnel crossing as approved by the Engineer.

PART 2 - PRODUCTS

2.01 STEEL CASING PIPE

A. ASTM A53; 35,000 psi minimum yield strength, new materials only.

B. Full circumference welded joints.

C. Diameter and wall thickness as shown on the Construction Drawings.

2.02 CASING SPACERS

A. Non-metallic:

1. High density polyethylene (HDPE) with no metal bolts or attachments. Spacers shall strap onto carrier pipe and slide easily into casing but shall not move during installation.

2. Spacers shall provide constant projections around entire circumference of carrier pipe. Projections must have minimum height to pipe bells, similar to RACI type spacers as manufactured by RACI Spacers of North America, Vernon, British Columbia, or approved equal.

B. Stainless Steel (bolt on):

1. Stainless steel shell with PVC liner, stainless steel hardware, and UHMW polymer runners. Centered Type as manufactured by Cascade Waterworks Manufacturing Company, Yorkville, Illinois, or equal.

C. Timber Skids:

1. Pressure treated, cut to a cross-sectional size to allow placement of the carrier pipe in the casing and to support the barrel of the carrier pipe. Provide with notches to accommodate fastening. Treat notches at time of pipe installation.

2.03 STEEL STRAPPING: ASTM A36

2.04 SAND (Fine aggregate)

A. Section 703.1, Publication 408 Specifications, Type A.

2.05 GROUT

A. One part Portland cement (ASTM C150), and 6 parts mortar sand mixed with water to a consistency applicable for pressure grouting.

2.06 FLOWABLE FILL - as specified in Section 02221.

2.07 BORED LATERAL PIPING

A. Gravity sewer pipe and fitting for 4" or 6" PVC bored laterals shall meet ASTM D3034, minimum SDR-21.

B. Solvent cemented joints shall meet ASTM D2855 specifications.

C. Solvent cement shall meet ASTM D2564 specifications.

D. Solid wall coupling shall be provided to make pipe transition from SDR-21 to SDR-35 or Schedule 40 piping.

E. All laterals shall be air tested with cleanouts in place.

PART 3 - EXECUTION

3.01 APPROACH TRENCH

A. Excavate approach trench using methods as site conditions require.

B. Ensure pipe entrance face as near perpendicular to alignment as conditions permit.

C. Establish a vertical entrance face at least 1 foot above top of casing or tunnel lining.

D. Install adequate excavation supports as specified in Section 02221.

3.02 CASING PIPE INSTALLATION METHODS

A. Boring:

1. Install casing pipe with the determined vertical and horizontal alignment prior to installation of the carrier pipe.

2. Push the pipe into the ground with a boring auger rotating within the pipe to remove the spoil. Do not advance the cutting head ahead of the casing pipe except for that distance necessary to permit the cutting teeth to cut clearance for the pipe. The machine bore and cutting head arrangement shall be removable from within the pipe. Arrange the face of the cutting head to provide a barrier to the free flow of soft material.

3. Do not overcut excavation by more than 1" greater than the outside diameter of the casing pipe.

4. If voids should develop greater than the outside diameter of the pipe by approximately one inch, grout to fill voids. Grouting to fill voids will be at the expense of the Contractor.

B. Jacking:

1. Construct adequate thrust wall normal to the proposed line of thrust.

2. Impart thrust load to the pipe through a suitable thrust ring that is sufficiently rigid to ensure distribution of the thrust load on the pipe.

C. Drilling and Jacking:

1. Use an oil field type rock roller bit or plate bit made up of individual roller cutter units solidly welded to the pipe which is turned and pushed for its entire length by the drilling machine to give the bit the necessary cutting action.

2. Inject a high-density slurry (oil field drilling mud) to the head as a cutter lubricant. Inject slurry at the rear of the cutter units to prevent jetting action ahead of the pipe.

D. Mining and Jacking:

1. Utilize manual hand-mining excavation from within the casing pipe as it is advanced with jacks, allowing minimum ground standup time ahead of the casing pipe.

3.03 CARRIER PIPE INSTALLATION WITHIN CASING PIPE

A. All provisions regarding cleaning, inspection and handling specified under pipe material sections apply to this work.

B. Place the carrier as shown on Standard Detail 02150-1. Exercise care to prevent damage to pipe joints when carrier pipe is placed in casing.

C. Support pipeline within casing so that no external loads are transmitted to carrier pipe. Attach casing spacers to barrel of carrier pipe at 6' on centers, minimum two (2) per pipe section.

D. Close ends of casing by sealing with brick masonry bulkheads, water-plug, or other approved hydraulic cement. The downstream bulkhead shall have a 2" diameter stainless steel weephole.

E. Completely fill annular space between carrier pipe and casing pipe with limestone screenings. If in a State highway right-of-way, fill annular space with flowable fill.

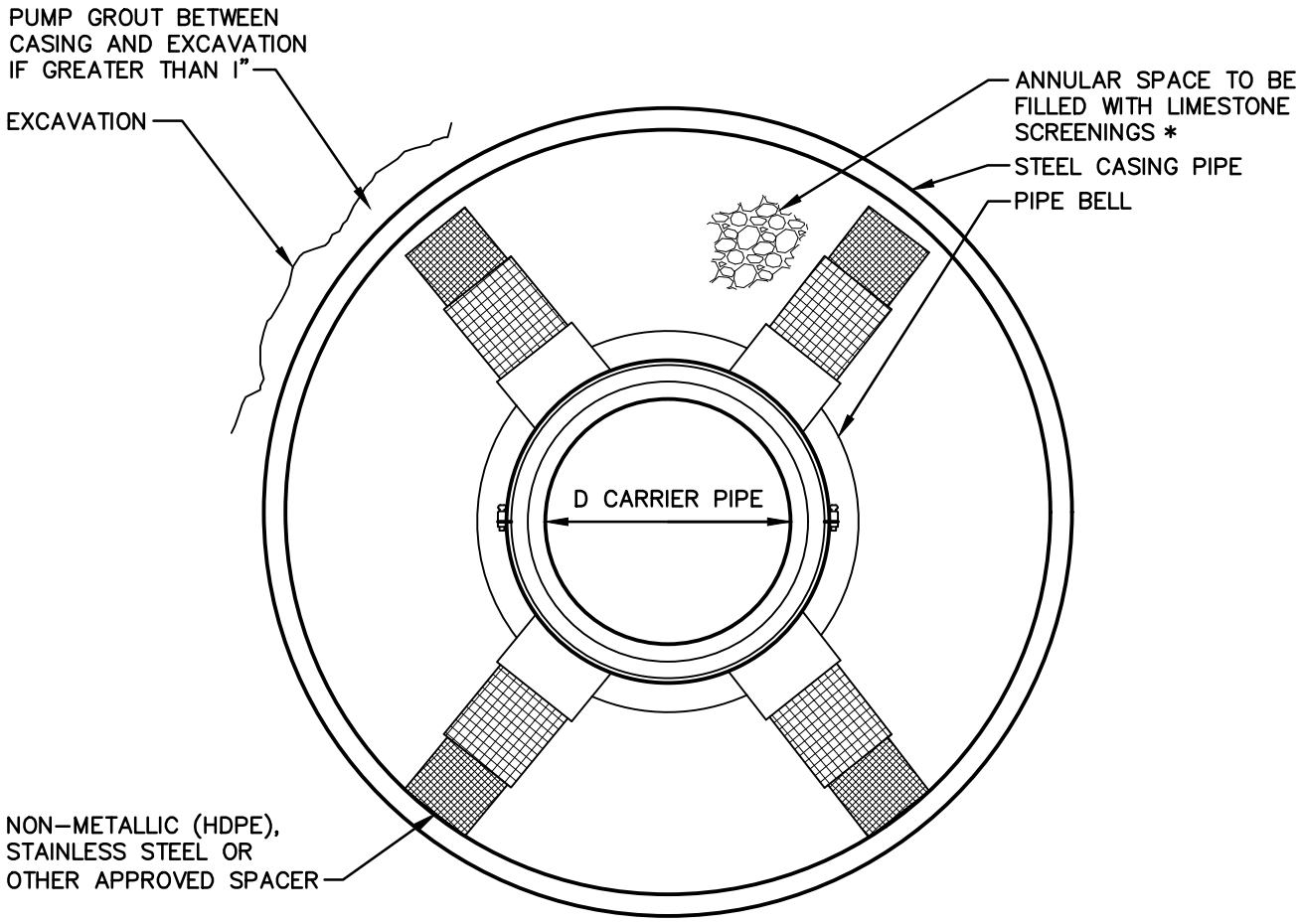
3.04 CARRIER PIPE INSTALLATION WITHOUT CASING PIPE

A. Bore the opening with a boring auger to the determined vertical and horizontal alignment.

B. Do not overcut boring excavation by more than 1" greater than the outside diameter of the lateral pipe.

C. Carefully guide the lateral pipe and joints through the opening, assembling joints prior to inserting into the boring.

END OF SECTION



NOTE:
DO NOT SUPPORT CARRIER PIPE ON BELLS

* IF IN STATE HIGHWAY RIGHT-OF-WAY, USE FLOWABLE FILL, TYPE D.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

CASING INSTALLATION

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02150-1
FILE NO.	1301.1.00.04

SECTION 02221

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Cutting paved surfaces
2. Blasting
3. Trench excavation, backfill and compaction
4. Support of excavation
5. Pipe bedding requirements
6. Control of excavated material
7. Rough grading
8. Restoration of unpaved surfaces

B. Related work specified elsewhere:

1. Clearing and Grubbing: .....Section 02100
2. Boring and Jacking: .....Section 02150
3. Soil Erosion and Sedimentation Control: .....Section 02270
4. Finish Grading, Seeding, and Sodding: .....Section 02485
5. Trench Paving and Restoration.....Section 02575

C. Definitions: NONE

D. Applicable Standard Details:

02221-1 Select Material Stone Backfill Pay Limits
02221-2 Payment Limits Pipe Payment by Depth
02221-3 Pipe Bedding Details
02221-4 Utility Line Stream Crossing (Flumed) Detail
02221-5 Utility Line Stream Crossing (Bypass) Detail
02221-6 Utility Line Wetland Crossing (Flumed) Detail
02221-5 Clay Dike Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
Publication 72M, Standards for Roadway Construction
Publication 19, Field Test Manual

- PTM No. 106 - Moisture-Density Relations of Soils (using 5.5 lb. Rammer and 12-inch drop)

- PTM No. 402 - Determining In-Place Density and Moisture Content of Construction Materials by Use of Nuclear Gauges

2. American Society for Testing and Materials (ASTM):

C33	Specifications for Concrete Aggregates
D698	Test Method of Laboratory Compaction Characteristics of Soil Using Standard Effort
D2922	Test for Density of Soil and Soil Aggregate in Place by Nuclear Methods

3. Pennsylvania Code

   Title 67, Transportation, Chapter 459, Occupancy of Highway by Utilities

B. Testing Agency:

1. Compaction testing shall be performed by a PennDOT approved Soils Testing Laboratory engaged and paid for by the Authority and approved by the Engineer.

C. Compaction Testing:

1. Conduct compaction tests as directed in the Construction Drawings at locations as directed by the Engineer during backfilling operations.

2. Determine compaction in state highways and shoulders by the testing procedure contained in PTM No. 106, Method B or PTM No. 402.

3. Determine compaction in areas other than state highways and shoulders by the testing procedure contained in ASTM D698 or ASTM D2922.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from aggregate suppliers attesting that the pipe bedding and select material stone backfill materials conform to the specifications herein.

B. Compaction Equipment List:

1. Submit a list of all equipment to be utilized for compacting, including manufacturers' lift thickness limitations.

1.04 JOB CONDITIONS

A. Classification of Excavation:

1. All excavation work performed under this contract is UNCLASSIFIED, and includes excavation and removal of all soil, shale, rock, boulders, fill, and all other materials encountered of whatever nature.

B. Compaction of Backfill:

1. The degree of compaction required at each location is indicated in the Backfill and Surface Restoration Requirements Table in Section 02575.

C. Control of Traffic:

1. Employ traffic control measures in accordance with Publication 203, Work Zone Traffic Control.

D. Protection of Existing Utilities and Structures:

1. Take all precautions and utilize all facilities required to protect existing utilities and structures. Comply with the requirements of the Pennsylvania Underground Utility Protection Law. Request cooperative steps of the Utility and suggestions for procedures to avoid damage to its lines.

2. Advise each person in physical control of powered equipment or explosives used in excavation or demolition work of the type and location of utility lines at the job site, the Utility assistance to expect, and procedures to follow to prevent damage.

3. Immediately report to the Utility and the Engineer any break, leak or other damage to the lines or protective coatings made or discovered during the work and immediately alert the occupants of premises of any emergency created or discovered.

4. Allow free access to Utility personnel at all times for purposes of maintenance, repair and inspection.

E. Site Inspection:

1. Prior to entering upon any private property, the Contractor shall have arranged for and completed a site inspection of each property with the Authority Representative, at which time the Authority Representative will advise the Contractor as to what area is available for work; as to the trees, planting, and improvements which may be removed or disturbed during the work; and as to any special condition or requirements which shall govern the work on each property.

PART 2 - PRODUCTS

2.01 PIPE BEDDING MATERIAL

A. Type III and Type IV Bedding Material:

1. AASHTO No. 8 coarse aggregate, Table C, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

B. Type V Bedding:

1. AASHTO No. 8 coarse aggregate conforming to Section 703, Publication 408. Do not use slag or cinders.

C. Select excavated material - inorganic material that can be compacted in 8" layers and have 35% or more pass the No. 200 sieve. Select excavated material shall be used as pipe bedding for all ductile iron pipe installations.

2.02 BACKFILL MATERIAL

A. Select Material Backfill:

1. Crushed stone or gravel aggregate conforming to Select Granular Material (2RC), Section 703.3, Publication 408 Specifications. Do not use slag or cinders.

B. Flowable Backfill Material:

1. Material conforming to PennDOT Special Provision S94 (S2060130), Type A or B as shown in Table 1.

C. Suitable Backfill Material (Highways, driveways, and shoulders):

1. From top of pipe bedding material to subgrade elevation:

a. Select Material Backfill

b. Flowable Backfill Material - Where directed or approved

D. Suitable Backfill Material (Other than highways, driveways, and shoulders):

1. From top of pipe bedding material to 24" over top of pipe:

a. Material excavated from the trench if free of stones larger than 6" in size and free of wet, frozen, or organic materials.

2. From 24" above pipe to subgrade elevation:

a. Material excavated from the trench if free of stones larger than 8" in size and free of wet, frozen, or organic materials.

TABLE 1 - FLOWABLE FILL

Properties and Criteria	Type A	Type B	Type C	Type D
Mix Design (per cy)				
• Cement (lbs)*	100	50	150-200	300-700
• Fly Ash (lbs)*	2000	300	300	100-400
• Bottom Ash (lbs)*	0	2600	2600	**
• or Coarse Aggregate				
• or Fine Aggregate				
Flow Cone (seconds) ASTM C939	30-60	–	–	30-60****
Slump (inches) PTM No. 600	–	7-11	7-11	7-11****
Density (pcf) PTM No. 613	95-110***	120-135***	125 min. ***	30-70 or as specified ***
Water Absorption of Aggregate, PTM No. 506	–	–	–	20 (max %)
Compressive Strength (psi) PTM No. 604				
• 3 days (minimum)	25	25	300	40
• 28 days (range)	50-125	50-125	800 min.	90-400

* Quantities may be varied or alternate designs submitted to adapt mix to meet density and strength requirements or to adapt to specific site conditions.

** Requires the use of suitable lightweight aggregate or air entraining admixture. Provide a mix design that achieves the specified strength and density requirements.

*** Approximate Value. Use of air entraining agent may reduce these values.

**** As appropriate depending on whether lightweight aggregate or air entraining admixture is used to obtain lightweight properties.

PART 3 - EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC

A. Maintain traffic in one or more unobstructed lanes and provide access to all streets and private drives.

B. Provide and maintain protective devices as required by state and local codes, permits, and regulations.

3.02 CUTTING PAVED SURFACES PRIOR TO TRENCHING

A. Where installation of pipelines, miscellaneous structures, and appurtenances necessitate breaking a paved surface, make cuts in a neat uniform fashion forming straight lines parallel with the centerline of the trench. Cut offsets at right angles to the centerline of the trench.

B. Protect edges of cut pavement during excavation to prevent raveling or breaking; square edges prior to pavement replacement.

C. The requirement for neat line cuts, in other than state highways, may be waived if the final paving restoration indicates overlay beyond the trench width.

3.03 BLASTING

A. Blasting is the sole responsibility of the Contractor and no duty is assumed or to be exercised by Authority or Engineer relative thereto.

B. Blasting work shall be supervised by licensed and experienced personnel and performed in conformance with applicable Federal, State, and local codes.

3.04 TRENCH EXCAVATION

A. Depth of Excavation:

1. Gravity Pipelines:

a. Excavate mainline trenches to the required depth and grade for the invert of the pipe plus that excavation necessary for placement of pipe bedding material.

b. Excavation for laterals shall provide a straight uniform grade from the main pipeline to the right-of-way line (in accordance with Section 02610), plus that excavation necessary for placement of pipe bedding material.

2. Pressure Pipelines:

    a. Excavate trenches to the minimum depth necessary to place required pipe bedding material and to provide a minimum of 42" from the top of the pipe to the finished ground elevation, except where specific depths are otherwise shown on the Construction Drawings. Depths in excess of this may be necessary to clear existing drainage structures or other existing utilities.

3. Where unsuitable bearing material is encountered in the trench bottom, continue excavation until the unsuitable material is removed, solid bearing is obtained or can be established, or concrete cradle can be placed. If no concrete cradle is to be installed, refill the trench to required pipeline grade with pipe bedding material.

4. Where the Contractor, by error or intent, excavates beyond the minimum required depth, backfill the trench to the required pipeline grade with pipe bedding material.

B. Width of Excavation:

1. Excavate trenches, including laterals, to a width necessary for placement and jointing of the pipe, and for placing and compacting pipe bedding and trench backfill around the pipe, but not less than 16" or more than 24" plus the pipe outside diameter from the bottom of the trench to a point 12" above the crown of the pipe.

2. Shape trench walls completely vertical from trench bottom to at least 2' above the top of the pipe. Trench walls from 2' above the top of the pipe to grade to be benched and sloped, or shaved, to comply with Federal and State laws and codes.

3. For pressure pipeline fittings, excavate trenches to a width that will permit placement of concrete thrust blocks. Provide earth surfaces for thrust blocks that are perpendicular to the direction of thrust and are free of loose or soft material.

3.05 SUPPORT OF EXCAVATION

A. The adequacy of the design of sheeting, shoring and bracing installations relative to the nature of the material to be encountered and retained is the sole responsibility of the Contractor and no duty is assumed or to be exercised by Authority or Engineer relative thereto.

B. Support excavations with sheeting, shoring, and bracing or a "trench box" as required to comply with Federal and State laws and codes.

C. Install adequate excavation supports to prevent ground movement or settlement of adjacent structures, pipelines or utilities. Damage due to settlement because of failure to provide support or through negligence or fault of the Contractor in any other manner, shall be repaired at the Contractor's expense.

D. Removal of sheeting, shoring and bracing as backfilling proceeds is the Contractor’s responsibility.

3.06 CONTROL OF EXCAVATED MATERIAL

A. Keep the ground surface on both sides of the excavation free of excavated material to comply with Federal and State laws and codes.

B. Provide temporary barricades to prevent excavated material from encroaching on private property, walks, gutters, and storm drains.

C. Maintain accessibility to all fire hydrants, valve pit covers, valve boxes, curb boxes, fire and police call boxes, and other utility controls at all times. Keep gutters clear or provide other satisfactory facilities for street drainage. Do not obstruct natural water courses. Where necessary, provide temporary channels to allow the flow of water either along or across the site of the work.

D. In areas where pipelines parallel or cross streams, ensure that no material slides, is washed, or is dumped into the stream course. Remove cofferdams immediately upon completion of pipeline construction.

E. Comply with Section 02270, Soil Erosion and Sedimentation Control.

3.07 DEWATERING

A. Keep excavations dry and free of water. Dispose of precipitation and subsurface water clear of the work.

B. Maintain pipe trenches dry until pipe has been jointed, inspected, and backfilled, and concrete work has been completed. Prevent trench water from entering pipelines under construction.

C. Intercept and divert surface drainage away from excavations. Design surface drainage systems so that they do not cause erosion on or off the site, or cause unwanted flow of water.

D. Comply with Federal and State requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.

3.08 PIPE BEDDING REQUIREMENTS

A. Type III Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail 02221-3.

2. Provide Type III bedding when installing reinforced concrete pipe as approved by the Authority.

B. Type IV Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail 02221-3.

2. Provide Type IV bedding when installing all other pipes larger than 2" diameter.

C. Type V Bedding:

1. Depth of pipe bedding aggregate as shown on Standard Detail 02221-3.

2. Provide Type V bedding when installing piping 2" diameter and smaller.

D. Shape recesses for the joints or bell of the pipe by hand. Assure that the pipe is supported on the lower quadrant (under “haunches”) and the pipe bottom for the entire length of the barrel. Fill all voids below the pipe.

E. Pipe embedment material shall be placed, worked by hand or compacted until a minimum density of 90% in yards and 95% under roadways and sidewalks is achieved (at optimum moisture content, ± 2%, standard proctor), unless otherwise specified in Construction Drawings.

3.09 PIPE LAYING

A. Provide required pipe bedding placed in accordance with the Standard Details.

B. Lay pipe as specified in the appropriate Section of these Specifications for pipeline construction.

3.10 THRUST RESTRAINT

A. Provide pressure pipe with concrete thrust blocking at all bends, tees, valves, and changes in direction, in accordance with the Construction Drawings.

3.11 BACKFILLING TRENCHES

A. After pipe installation and inspection, backfill trenches to 12" above the crown of the pipe with specified backfill material placed and carefully compact with approved compaction equipment in layers of suitable thickness to provide specified compaction. Backfill and compact the remainder of the trench with specified backfill material. Refer to the Construction Drawings for surface restoration requirements at each specific location.

B. Lift Thickness Limitations:

1. Submit a list of the compaction equipment to be utilized on the project, the recommendations of the equipment manufacturer as to the maximum lift thickness which can be placed, and the method of compaction to be used with this equipment to achieve the required compaction. In no case shall maximum lift thickness placed exceed the maximum limits specified by the manufacturer's recommendations. However, if the equipment manufacturer's lift thickness recommendation is followed and the specified compaction is not obtained, the Contractor shall, at his own expense, remove, replace, and retest as many times as is required to obtain the specified compaction.

2. Lift thickness limitations specified for state highways, shoulders, or embankments shall govern over the compaction equipment manufacturer's recommendations.

C. Jetting:

1. When approved by the Engineer in writing, jetting methods may be used to consolidate backfill. Quality assurance methods to verify adequate compaction will be a condition of the approval by the Engineer.

D. Uncompacted Backfill:

1. Where uncompacted backfill is indicated on the Construction Drawings, backfill the trench from one foot above the pipe to the top of the trench with material excavated from the trench, crowned over the trench to a sufficient height to allow for settlement to grade after consolidation, providing for surface water drainage.

E. Unsuitable Backfill Material:

1. Where the Engineer deems backfill material to be unsuitable and rejects all or part thereof due to conditions prevailing at the time of construction, remove the unsuitable material and replace with select material backfill.

3.12 DISPOSAL OF EXCAVATED MATERIAL

A. Excavated material remaining after completion of backfilling shall remain the property of the Contractor, removed from the construction area, and legally disposed of.

3.13 ROUGH GRADING

A. Rough subgrade areas disturbed by construction to a uniform finish. Form the bases for terraces, banks, and lawns.

B. Grade areas to be paved to depths required where placing subbase and paving materials.

C. Rough grade areas to be topsoiled and seeded to 4" below indicated finish contours.

3.14 RESTORATION OF UNPAVED SURFACES

A. Restore unpaved surfaces disturbed by construction to equal the surface condition prior to construction.

B. Restore grassed areas in accordance with Section 02485, Finish Grading, Seeding and Sodding.

3.15 LIMITS OF WORK

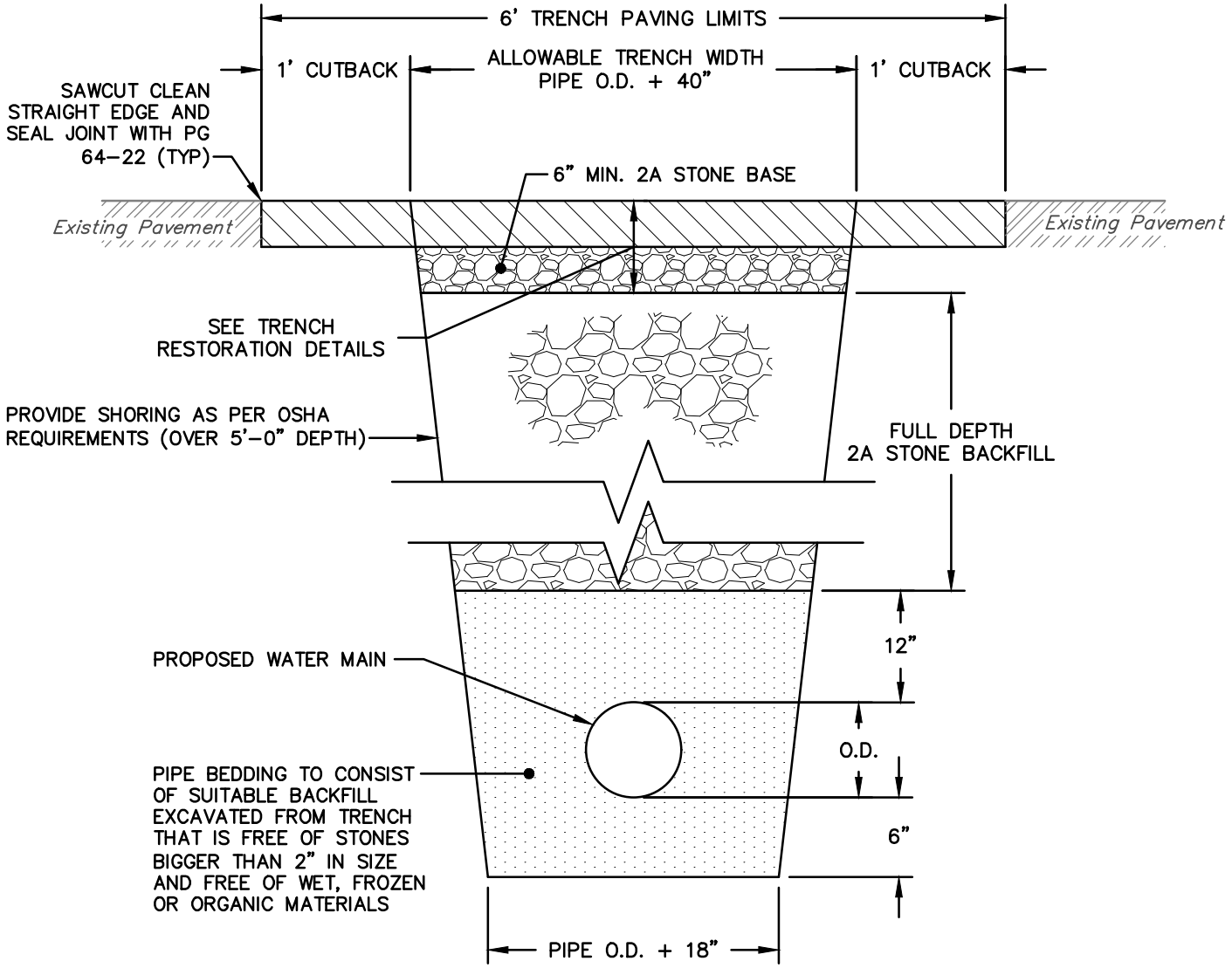
A. All disturbance shall be confined to the project site, street rights-of-way, permanent easements, and temporary construction easements shown on the Construction Drawings.

B. The Contractor shall not permit trucks and equipment to enter private driveways.

3.16 TEST PIT EXCAVATIONS

A. Contractor shall excavate temporary test pits for all proposed connections with existing facilities and in areas that present potential utility conflicts. Contractor is responsible to complete test pits to identity location of existing utilities and as necessary to protect existing facilities from damage or disruption of service.

END OF SECTION



NOTES:

1. NO ADDITIONAL PAYMENT WILL BE MADE FOR EXTRA WIDTH AT MANHOLES OR OTHER APPURTENANCES.
2. UNIT WEIGHT FOR PAYMENT IS 128 POUNDS PER CUBIC FOOT.

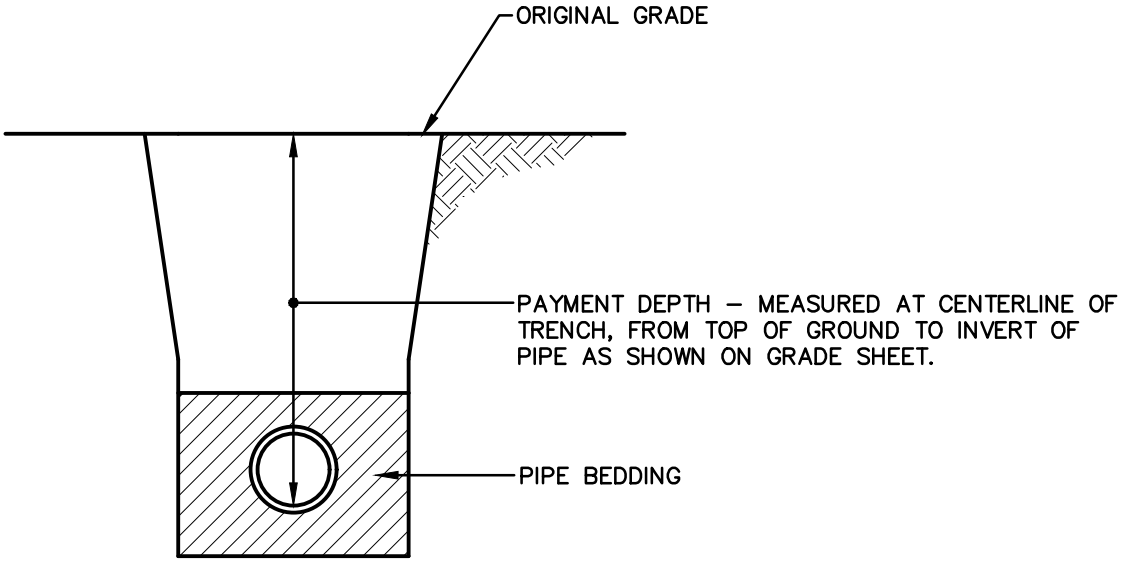
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

SELECT MATERIAL
STONE BACKFILL
PAY LIMITS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02221-1
FILE NO.	1301.1.00.04



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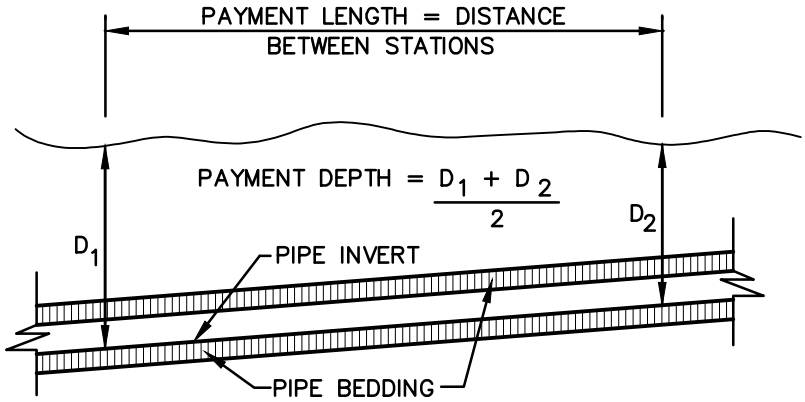

PROFILE

PAYMENT SHALL BE MADE AT UNIT COST PER LINEAR FOOT AT AVERAGE OF DEPTHS AT STATIONS SHOWN ON GRADE SHEETS.

PAYMENT LENGTH WILL BE MEASURED TO CENTERLINE OF MANHOLES OR TERMINATION.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
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TELEPHONE: (717)244-3475
www.redlionpa.org

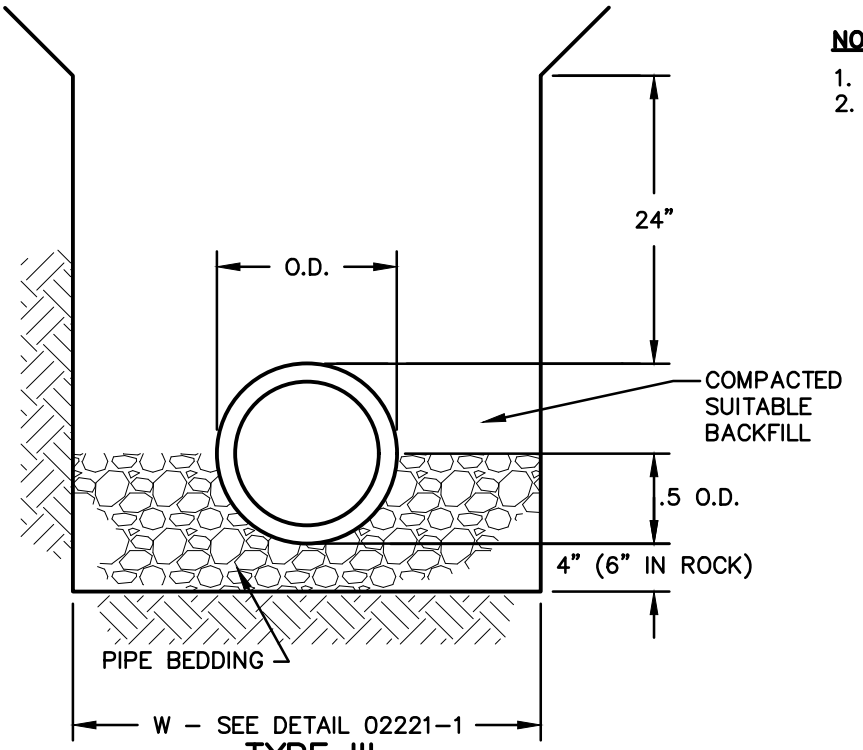
PAYMENT LIMITS
PIPE PAYMENT BY DEPTH

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

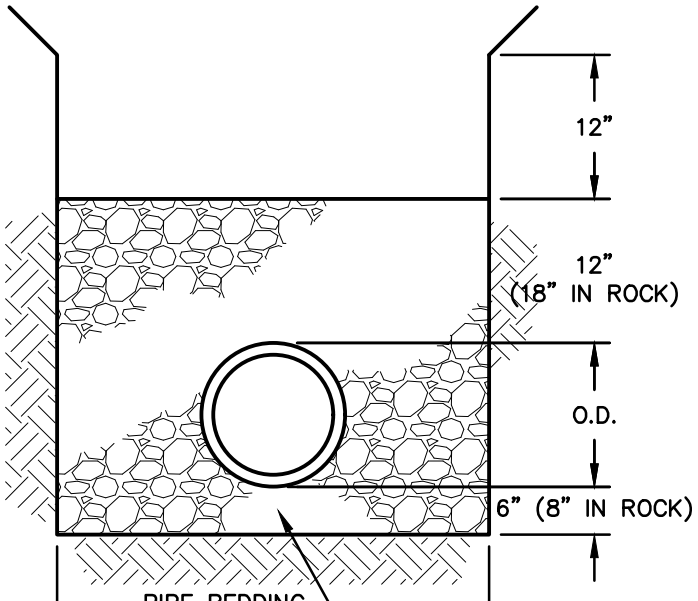
DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02221-2
FILE NO.	1301.1.00.04

NOTES:

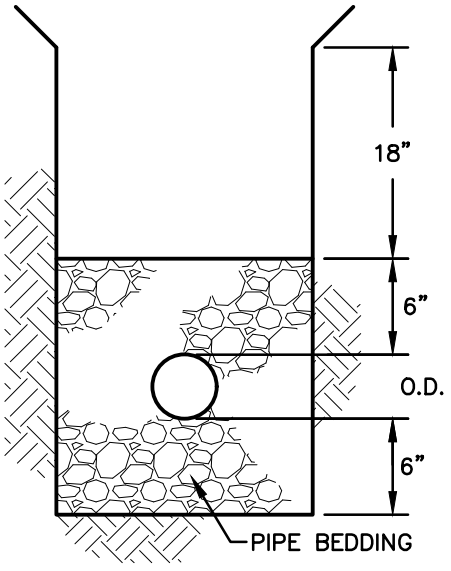
1. TYPE I AND II NOT PERMITTED.
2. PIPE BEDDING DETAILS SHALL BE MODIFIED TO PROVIDE SELECT EXCAVATED MATERIAL AS BEDDING FOR APPLICATIONS PROPOSING USE OF DUCTILE IRON WATER MAIN.



TYPE III
(RCP ONLY)



TYPE IV



TYPE V
(2" DIA. AND SMALLER)

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

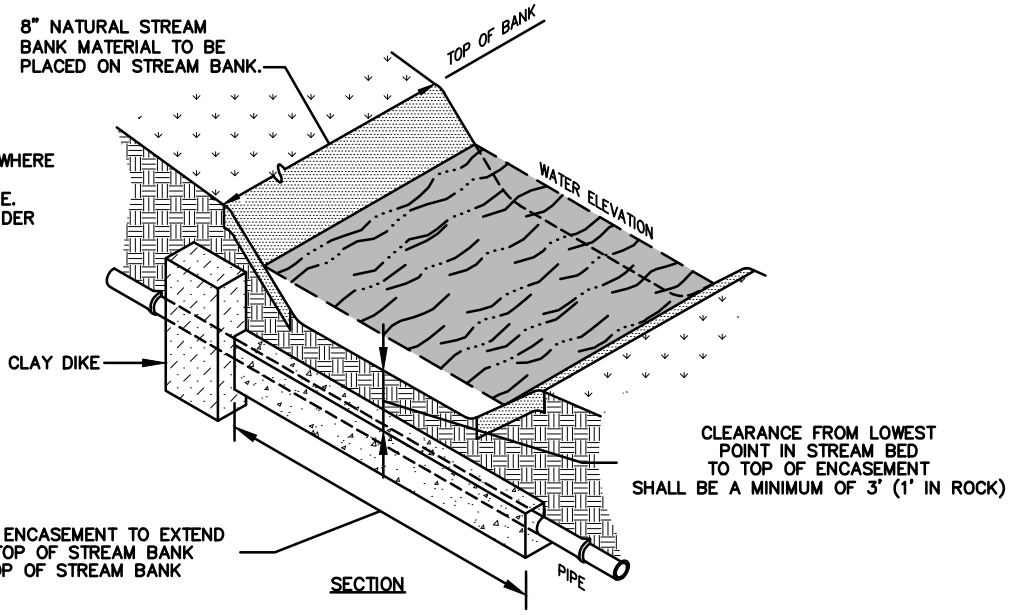
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

PIPE BEDDING DETAILS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02221-3
FILE NO.	1301.1.00.04

NOTES:
1. CONCRETE TO BE 3,000 PSI.
2. ENCASEMENT TO BE USED ONLY WHERE SPECIFIED ON PLANS.
3. PIPE SHALL BE DUCTILE IRON PIPE.
4. FILTER FABRIC TO BE PLACED UNDER RIP-RAP AND KEYED INTO EMBANKMENT.



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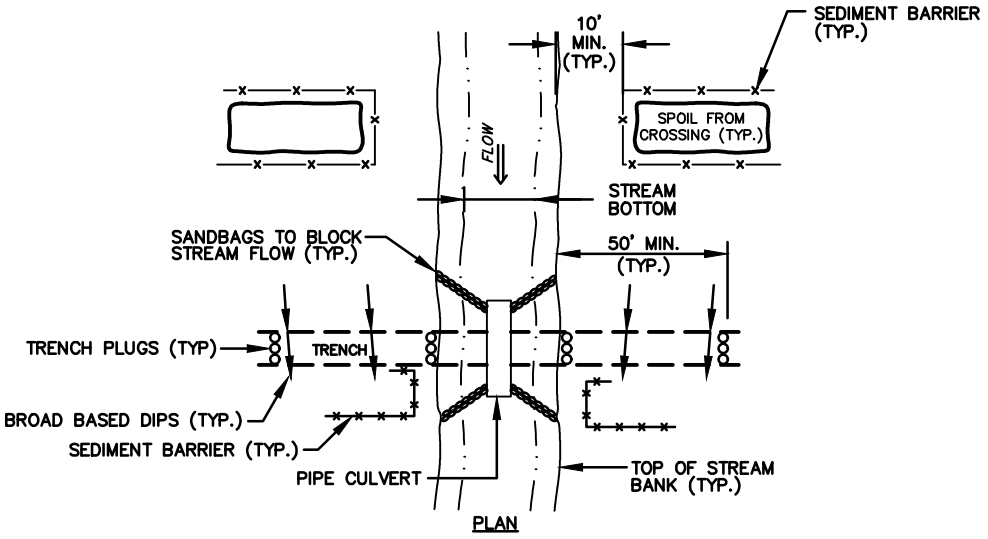


PLAN

NOTES:
1. ALL WORK WITHIN THE STREAM AREA MUST FOLLOW THE REQUIREMENTS FOR ALL APPLICABLE PERMITS OBTAINED FOR THIS PROJECT. ALL WORK WITHIN THE STREAM, INCLUDING THE TRENCH BACKFILLING, STABILIZATION OF THE STREAM BANKS MUST BE COMPLETED WITHIN 72 HOURS.
2. INSTALL BROAD BASED DIPS AT 50' FROM THE TOP OF BANK AND 10' FROM THE TOP OF BANK.
3. CONSTRUCT SEDIMENT BARRIERS AND DIRECT RUNOFF FROM THE BROAD BASED DIPS INTO THEM.
4. INSTALL TEMPORARY PIPE CULVERT IN THE STREAM. SIZE AND NUMBER OF CULVERTS TO BE DETERMINED ON SITE OR ADEQUATELY CONVEY BASEFLOW. MINIMUM CULVERT DIAMETER TO BE 12".
5. INSTALL PIPE WITH TRENCH PLUGS.
6. ONCE ENTIRE PIPE IS INSTALLED BETWEEN CORRESPONDING MANHOLES INSTALL CLAY DIKES AND CONCRETE ENCASEMENT.
7. REMOVE TRENCH PLUGS AND BACKFILL TRENCH. PLACE MINIMUM 8" OF NATURAL STREAM BED MATERIAL AT EXISTING GRADES.
8. REMOVE SANDBAGS AND TEMPORARY PIPE.
9. INSTALL SEDIMENT BARRIER AT TOP OF STREAM BANKS. GRADE OUT BROAD BASE DIPS AND ALL DISTURBED AREA IN ACCORDANCE WITH SEEDING RESTORATION TABLE.
10. STREAM CROSSING BID ITEM INCLUDES EXCAVATION, BACKFILL, TRENCH PLUGS, AND OTHER WORK INCIDENTAL TO THE STREAM CROSSING CONSTRUCTION AS SHOWN ON CONTRACT DRAWINGS.
11. PIPE, CONCRETE ENCASEMENT, CLAY DIKE ARE TO BE PAID UNDER THEIR RESPECTIVE BID ITEMS.
12. PROVIDE PINNING TO ANCHOR PIPE.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

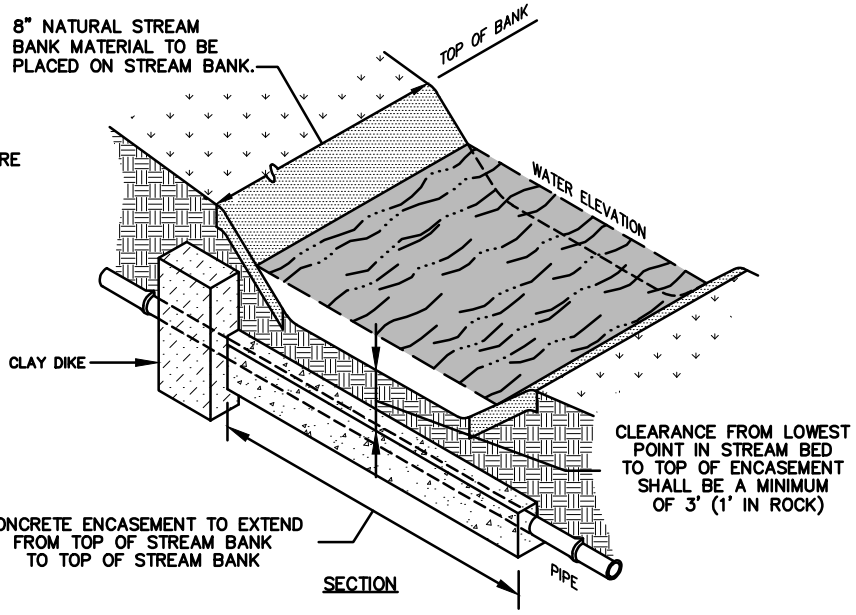
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

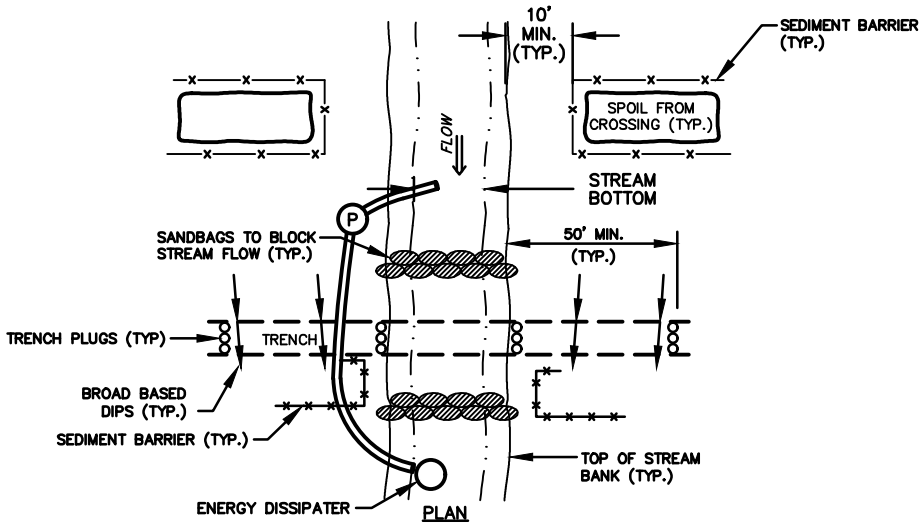
UTILITY LINE
STREAM CROSSING
(FLUMED) DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02221-4
FILE NO.	1301.1.00.04

NOTES:
1. CONCRETE TO BE 3,000 PSI.
2. ENCASEMENT TO BE USED ONLY WHERE SPECIFIED ON PLANS.
3. PIPE SHALL BE DUCTILE IRON PIPE.
4. FILTER FABRIC TO BE PLACED UNDER RIP-RAP AND KEYED INTO EMBANKMENT.





NOTES:
1. ALL WORK WITHIN THE STREAM AREA MUST FOLLOW THE REQUIREMENTS FOR ALL APPLICABLE PERMITS OBTAINED FOR THIS PROJECT. ALL WORK WITHIN THE STREAM, INCLUDING THE TRENCH BACKFILLING, STABILIZATION OF THE STREAM BANKS MUST BE COMPLETED WITHIN 72 HOURS.
2. INSTALL BROAD BASED DIPS AT 50' FROM THE TOP OF BANK AND 10' FROM THE TOP OF BANK.
3. CONSTRUCT SEDIMENT BARRIERS AND DIRECT RUNOFF FROM THE BROAD BASED DIPS INTO THEM.
4. INSTALL TEMPORARY PIPE CULVERT IN THE STREAM. SIZE AND NUMBER OF CULVERTS TO BE DETERMINED ON SITE OR ADEQUATELY CONVEY BASEFLOW. MINIMUM CULVERT DIAMETER TO BE 12".
5. INSTALL PIPE WITH TRENCH PLUGS.
6. ONCE ENTIRE PIPE IS INSTALLED BETWEEN CORRESPONDING MANHOLES INSTALL CLAY DIKES AND CONCRETE ENCASEMENT.
7. REMOVE TRENCH PLUGS AND BACKFILL TRENCH. PLACE MINIMUM 8" OF NATURAL STREAM BED MATERIAL AT EXISTING GRADES.
8. REMOVE SANDBAGS AND TEMPORARY PIPE.
9. INSTALL SEDIMENT BARRIER AT TOP OF STREAM BANKS. GRADE OUT BROAD BASE DIPS AND ALL DISTURBED AREA IN ACCORDANCE WITH SEEDING RESTORATION TABLE.
10. STREAM CROSSING BID ITEM INCLUDES EXCAVATION, BACKFILL, TRENCH PLUGS, AND OTHER WORK INCIDENTAL TO THE STREAM CROSSING CONSTRUCTION AS SHOWN ON CONTRACT DRAWINGS.
11. PIPE, CONCRETE ENCASEMENT, CLAY DIKE ARE TO BE PAID UNDER THEIR RESPECTIVE BID ITEMS.
12. PROVIDE PINNING TO ANCHOR PIPE.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

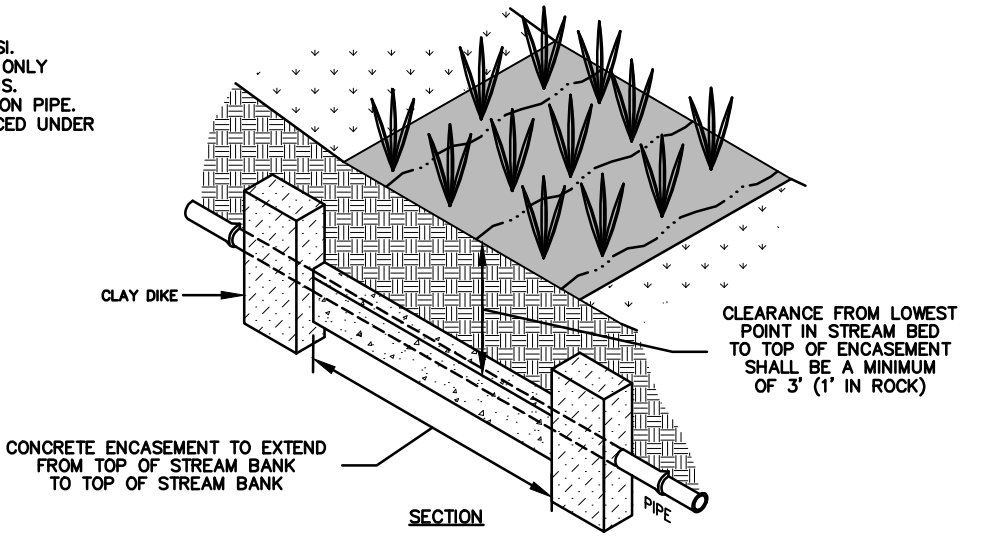
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

UTILITY LINE
STREAM CROSSING
(BYPASS) DETAIL

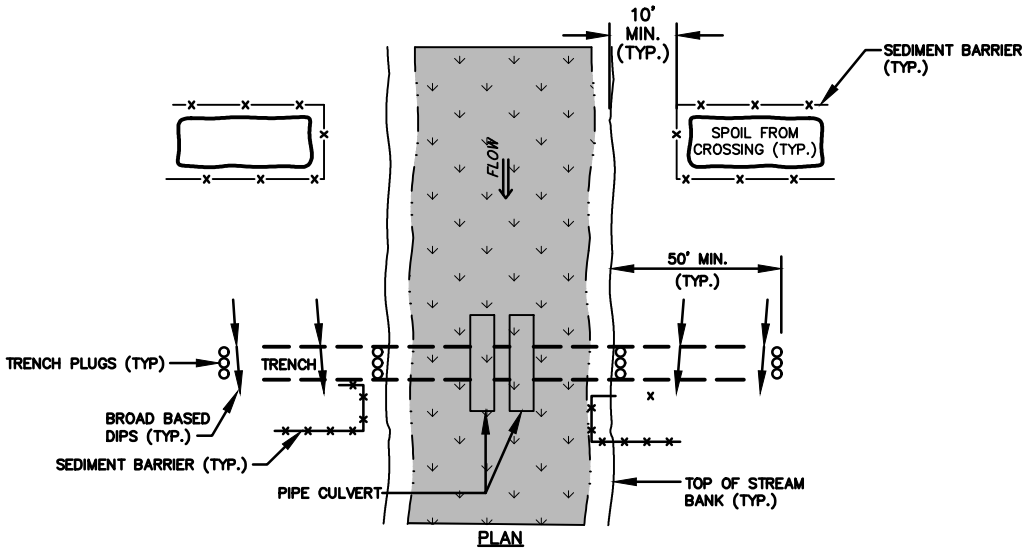
RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02221-5
FILE NO.	1301.1.00.04

NOTES:
1. CONCRETE TO BE 3,000 PSI.
2. ENCASEMENT TO BE USED ONLY WHERE SPECIFIED ON PLANS.
3. PIPE SHALL BE DUCTILE IRON PIPE.
4. FILTER FABRIC TO BE PLACED UNDER RIP-RAP AND KEYED INTO EMBANKMENT.



SECTION



PLAN

NOTES:
1. ALL WORK WITHIN THE WETLAND AREA MUST FOLLOW THE REQUIREMENTS FOR ALL APPLICABLE PERMITS OBTAINED FOR THIS PROJECT. ALL WORK WITHIN THE STREAM, INCLUDING THE TRENCH BACKFILLING, STABILIZATION OF THE STREAM BANKS MUST BE COMPLETED WITHIN 72 HOURS.
2. INSTALL BROAD BASED DIPS AT 50' FROM THE TOP OF BANK AND 10' FROM THE TOP OF BANK.
3. CONSTRUCT SEDIMENT BARRIERS AND DIRECT RUNOFF FROM THE BROAD BASED DIPS INTO THEM.
4. INSTALL TEMPORARY PIPE CULVERTS IN THE WETLAND. SIZE AND NUMBER OF CULVERTS TO BE DETERMINED ON SITE TO ADEQUATELY CONVEY BASEFLOW. (MATS, PADS, OR OTHER SIMILAR DEVICES SHALL BE INSTALLED WHERE CROSSING OF WETLAND AREAS BY CONSTRUCTION EQUIPMENT CANNOT BE AVOIDED.)
5. INSTALL PIPE WITH TRENCH PLUGS.
6. ONCE ENTIRE PIPE IS INSTALLED BETWEEN CORRESPONDING MANHOLES INSTALL CLAY DIKES AND CONCRETE ENCASEMENT.
7. REMOVE TRENCH PLUGS AND BACKFILL TRENCH WITH NATIVE WETLAND MATERIAL. ORIGINAL GRADES THROUGH WETLAND MUST BE RESTORED. ANY EXCESS MATERIAL MUST BE REMOVED FROM THE WETLAND. MOUNDING OF FILL MATERIAL TO ALLOW FOR SETTLEMENT IN THE TRENCH WILL BE PERMITTED IN ACCORDINANCE WITH BEST CONSTRUCTION METHODS.
8. REMOVE TEMPORARY PIPE.
9. WOODCHIPS FROM CLEARING AND GRUBBING OF WETLAND AREA SHOULD BE SPREAD OVER ALL DISTURBED AREAS. DO NOT RESEED THE DISTURBED AREAS OF THE WETLAND.
10. INSTALL SEDIMENT BARRIER AT TOP OF WETLAND BANKS. GRADE OUT BROAD BASE DIPS AND ALL DISTURBED AREAS IN ACCORDANCE WITH SEEDING RESTORATION TABLE.
11. WETLAND CROSSING BID ITEM INCLUDES EXCAVATION, BACKFILL, TRENCH PLUGS, AND OTHER WORK INCIDENTAL TO THE STREAM CROSSING CONSTRUCTION AS SHOWN ON CONTRACT DRAWINGS.
12. PIPE, CONCRETE ENCASEMENT, AND CLAY DIKE ARE TO BE PAID UNDER THEIR RESPECTIVE BID ITEMS.
13. PROVIDE PINNING TO ANCHOR PIPE.

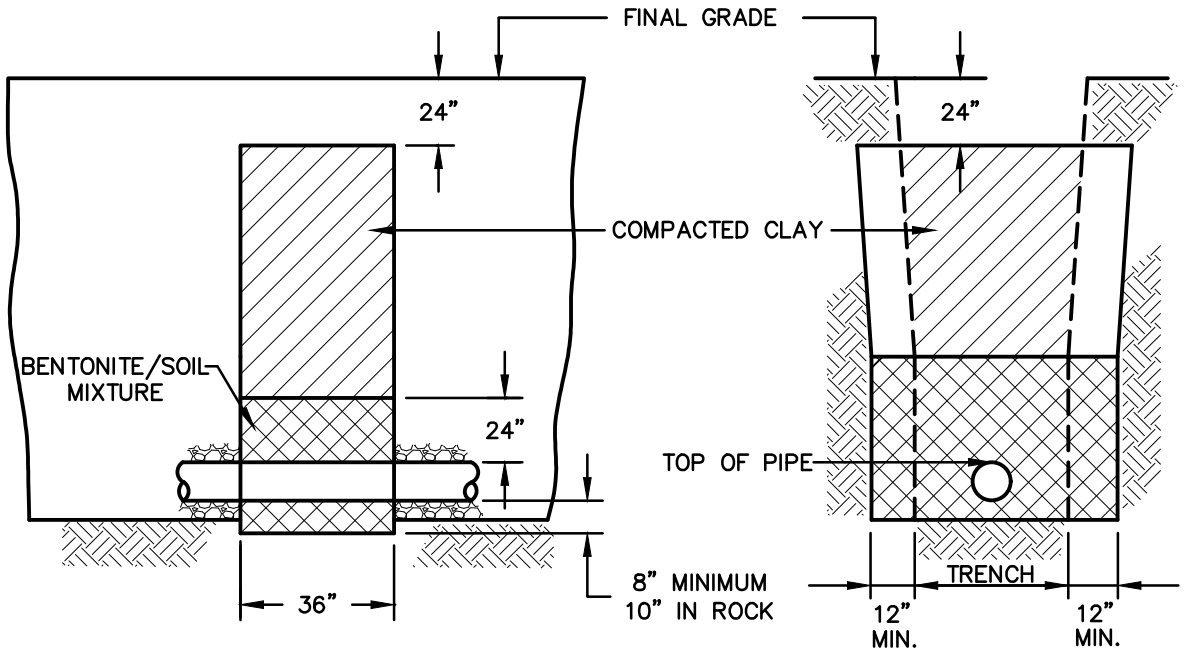
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

UTILITY LINE
WETLAND CROSSING
(FLUMED) DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	
DATE	04/05/2017
DWG. NO.	02221-6
FILE NO.	1301.1.00.04



NOTES:

1. COMPACTED CLAY DIKES SHALL EXTEND VERTICALLY FROM UNDISTURBED GROUND AT BOTTOM OF TRENCH TO WITHIN 24" OF FINAL GRADE, AND FROM UNDISTURBED GROUND ON TRENCH SIDES FOR WIDTH OF TRENCH AND 12" BEYOND EACH SIDE OF TRENCH.
2. CLAY BACKFILL TO A POINT 24" OVER THE PIPE SHALL CONSIST OF A BENTONITE/SOIL MIXTURE AT A 5:1 MIX.
3. REMAINING BACKFILL SHALL CONSIST OF CLAY CONTAINING NO MORE THAN 15% (BY VOLUME) STONE NOT LARGER THAN TWO (2") INCHES IN DIAMETER. CLAY SHALL BE PLACED IN SIX (6") INCH LIFTS AND COMPACTED BY MECHANICAL TAMPER TO NOT LESS THAN 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT.
4. THE DEPTH OF CLAY DIKE SHALL EXTEND A MINIMUM OF 2" DEEPER THAN ADJACENT STONE BEDDING ON CONCRETE ENCASEMENT.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

CLAY DIKE
DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02221-7
FILE NO.	1301.1.00.04

SECTION 02230

ROADWAY EXCAVATION, FILL AND COMPACTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this Section includes but is not limited to:

1. Excavation
2. Compaction
3. Fill
4. Subgrade Preparation
5. Base Preparation

B. Related work specified elsewhere:

1. Clearing and grubbing: .....Section 02100
2. Finish grading, seeding and sodding:.....Section 02485
3. Bituminous paving and surfacing: .....Section 02500
4. Soil erosion and sedimentation control:.....Section 02270

C. Definitions:

1. Roadway: Area under and within ten feet of the edge of paving.

2. Roadway Subgrade: The prepared earth surfaces on or over which additional roadway materials will be placed or work is to be performed.

D. Applicable Standard Details:

1. The "Backfill and Surface Restoration Requirements" Table in Section 02575 lists the specific paving requirements.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):

T99 Moisture-Density Relations of Soils, Using a 5.5-lb. Rammer and a 12-in. Drop
T191 Standard Method of Test for Density of Soil In-Place by the Sand Cone Method.

2. American Society for Testing and Materials (ASTM):

D2167 Test Method for Density and Unit Weight of Soil in Place by the Rubber-Balloon Method.
D2922 Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

3. Pennsylvania Department of Transportation (PennDOT), latest revision:

   Publication 408, Specifications

B. Inspections:

1. Inspection by the Authority will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from aggregate suppliers attesting that materials conform to specifications herein. Certification shall be provided with each load of crushed aggregate delivered to the job site.

B. One copy of the approved SESPC plan, including approval letter.

1.04 JOB CONDITIONS

A. As specified in Section 02210.

B. Control of Traffic:

1. Reasonable access must be maintained for adjacent property OWNERs and commercial properties.

2. All excavations in access drive, driveways, and state highway rights-of-way shall be backfilled or plated at the end of each work day.

C. Owner, all appropriate emergency services (police, fire and ambulance), school buses, postal service, waste collection companies, and the ENGINEER shall be notified by the Contractor a minimum of forty-eight (48) hours in advance for all street closures.

D. Contractor shall provide, place, and maintain “No Parking” signs, where needed.

E. For traffic control coordination, work shall be completed in an organized fashion. If road closures are necessary, Contractor must provide the Authority and Engineer and all other regulatory agencies detour plan prior to closure.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MATERIALS

A. Roadway Fill Areas: As specified previously under Site Excavation and Placement of Fill Material, Section 02210.

B. Embankment Fill Areas: As specified previously under Site Excavation and Placement of Fill Material, Section 02210.

C. Excavated Areas: Suitability of material for subgrade purposes shall be determined by non-movement of the material under compaction equipment.

D. Course Aggregate: Hard, tough, durable and uncoated inert particles reasonably free from clay, silt, vegetation other deleterious substances. Course aggregate shall be obtained from an approved source.

PART 3 - EXECUTION

3.01 SUBGRADE

A. Perform soil erosion control work in accordance with the approved soil erosion plan.

B. Roadway Excavation: Excavate or otherwise remove and satisfactorily dispose of materials located within the limits indicated on the drawings for roadways.

1. Excavate to roadway subgrade depths required, and cut drainage channels and waterways as detailed on the drawings. Proof roll subgrade to the satisfaction of the Authority.

2. Remove rock encountered in roadway excavation to a depth six inches below finished subgrade elevation.

3. Excavate unsuitable subgrade material. Refill such areas to required elevation with acceptable materials.

C. Roadway Grading: Shape subgrade of roadways, intersections, approaches, entrances and adjoining pedestrian walkways to no more than 0.10 foot above or below the design elevations.

D. Roadway Fill: Construction requirements for roadway fill shall be as follows:

1. Form the roadway fill with acceptable materials.

2. Compact material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2%. Proof roll roadway fill to the satisfaction of the Authority.

E. Roadway Embankment: Construction requirements for roadway embankment shall be as follows:

1. Break up shale and other rock-like materials formed by natural consolidation of mud, clay, silt and fine sand into a maximum size that can be readily placed and compacted in loose eight-inch layers.

2. Place rock to form the base of roadway embankments. Place in uniform loose layers not exceeding in depth the approximate average size of the larger rock, but not exceeding 8 inches deep.

3. Smooth and level each layer adding soil or granular material in sufficient quantity to supplement the smaller rock pieces, filling the voids and pockets.

4. Form the top 18 inches of roadway embankments with soil or granular material.

5. Compact embankment material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2%. Proof roll embankments to the satisfaction of the Authority.

6. During foreign borrow excavation operations, keep the borrow area graded to ensure free water drainage. Following completion of work in the borrow area, grade the area to present a uniformly trim appearance merging into the surrounding terrain and to prevent erosion.

3.02 BASE COURSES

A. Subbase Course

1. Compact subgrade material to a minimum final density of not less than 95% of the maximum dry weight density at its optimum moisture content plus or minus 2%. Perform finish rolling on roadway subgrade just prior to installation of aggregate subbase or base course.

2. When indicated on the drawings, construct subbase in accordance with Publication 408 Specifications, Section 350.

B. Crushed Aggregate Base Course - Standard

1. Compaction shall be achieved by means of approved static or vibratory equipment as specified in Publication 408, Section 108.05(c)3. If static roller is used, base course of more than 8 inches shall be constructed in two lifts. If approved vibratory roller is used, base course up to 10 inches in compacted thickness may be constructed in one course.

2. On prepared subgrade (or subbase if required), spread limestone screenings (AASHTO No. 10) to a depth of one inch and compact.

3. Construct stone base of AASHTO No. 1 aggregate to the compacted depth specified in the standard details.

4. Spreading Coarse Material: The coarse material shall be spread uniformly on the initial layer of fine material by approved mechanical stone spreaders to the full width of the base unless otherwise specified for part-width construction. Spreaders shall be adjusted to spread the loose material to obtain a layer of the required depth after compaction. In areas inaccessible to spreading equipment, the material may be spread directly from trucks provided the distribution is equivalent to that achieved by the spreader. All segregated material shall be removed and replaced with well graded material. The coarse material shall not be spread for a distance of more than an average day's work ahead of choking and compacting.

5. Compacting Coarse Material: Immediately after surface corrections have been made to the spread coarse material, it shall be thoroughly compacted. The rolling shall begin at the sides and progress to the center, except on super elevated curves where the rolling shall begin on the low side and progress to the high side. The rolling shall be parallel with the centerline of the roadway, uniformly lapping each preceding track, covering the entire surface with the rear wheels ahead of the roller wheels. After each layer of material has been spread and compacted, it shall be checked with approved templates and straightedges, and all irregularities shall be satisfactorily corrected. Red flags shall be placed at the limits of satisfactorily compacted coarse material. The flags shall be moved ahead as additional material is compacted, and no filler shall be applied to the coarse material in advance of the flag-marked sections.

6. Application of Fine Material: After the coarse material has been set and keyed by compaction, dry limestone screenings (AASHTO No. 10), in an amount equal to approximately 50% of that required to fill the voids in the coarse material, shall be spread uniformly over the surface. The vibratory compaction equipment shall then be operated over the surface to cause the screenings to settle into the voids. The remaining screenings shall be spread and vibrated in one or more applications to satisfactorily fill the voids; however, the quantity of screenings used and the operation of filling shall not cause floatation of the coarse aggregate. Areas not completely filled, in the foregoing operations, shall be filled by manual methods and need not be further vibrated.

7. Compacting and Bonding: After completing the vibration of the fine material, the surface of single-layer construction, or the surface of each layer of multi-layer construction, shall be sprinkled with water and rolled. All excess screenings forming in piles or cakes upon the surface shall be loosened and scattered by sweeping, exercising care that the fine material is not removed below the top of the coarse aggregate. On the surface of single-layer construction or the top layer of multi-layer construction, the sprinkling and rolling shall be continued and additional screenings applied where necessary until all voids are filled and until a slight wave of grout forms in front of the roller wheels. Brooms attached to the roller, and hand brooms, shall be used to distribute the grout uniformly into the unfilled voids. After the wave of grout has been produced over the entire section of the base course, this portion shall be left to dry. The surface shall be sprinkled and re-rolled as required to bond it thoroughly and to secure a satisfactory surface. The quantity of screenings and water used shall be sufficient to produce a smooth, hard monolithic surface.

8. Maintenance and Traffic: The Contractor shall maintain the completed base course until the placement of the surface course. No traffic shall be allowed on the base course other than necessary local traffic and that developing from the operation of essential construction equipment. Any defects which may develop in the construction of the base course or any damage caused by the operation of local or job traffic is the responsibility of the Contractor and shall be immediately repaired or replaced at no expense to the Authority.

C. Crushed Aggregate Base Course – Type B

1. Compaction shall be achieved by means of approved static or vibratory equipment. If static roller is used, base course of more than 8 inches shall be constructed in two lifts. If approved vibratory roller is used, base course up to 10 inches compacted thickness may be constructed in one course.
2. On prepared subgrade (or subbase if required), construct stone base of PennDOT 2A coarse aggregate to the compacted depth specified in the "Backfill and Surface Restoration Requirement" Table in Section 02575. Material substitutions shall be approved by the Engineer.

3. Spreading Coarse Material: The aggregate material shall be spread uniformly by approved mechanical stone spreaders to the full width of the base unless otherwise specified for part-width construction. Spreaders shall be adjusted to spread the loose material to obtain a layer of the required depth after compaction. In areas inaccessible to spreading equipment, the material may be spread directly from trucks provided the distribution is equivalent to that achieved by the spreader. All segregated material shall be removed and replaced with well graded material. The aggregate material shall not be spread for a distance of more than an average day's work ahead of compacting.

4. Compacting Coarse Material: Immediately after surface corrections have been made to the spread material, it shall be compacted. The rolling shall begin at the sides and progress to the center, except on super-elevated curves where the rolling shall begin on the low side and progress to the high side. The rolling shall be parallel with the centerline of the roadway, uniformly lapping each preceding track, covering the entire surface with the rear wheels and continuing until the material does not creep or wave ahead of the roller wheels. After each layer of material has been spread and compacted, it shall be checked with approved templates and straightedges, and all irregularities shall be satisfactorily corrected. Red flags shall be placed at the limits of satisfactorily compacted material. The flags shall be moved ahead as additional material is compacted.

5. Maintenance and Traffic: The Contractor shall maintain the completed base course until the placement of the surface course. No traffic shall be allowed on the base course other than necessary local traffic and that developing from the operation of essential construction equipment. Any defects which may develop in the construction of the base course or any damage caused by the operation of local or job traffic is the responsibility of the Contractor and shall be immediately repaired or replaced at no expense to the Authority.

D. Crushed Aggregate Shoulders

1. As specified in Section 02230, Paragraph 3.02.C.

E. Pavement Base Drain - See Section 02618.

3.03 FIELD QUALITY CONTROL

A. Surface Tolerance.

After the base course has been completed as specified, the surface smoothness shall be checked with approved templates, string lines, or straightedges.

1. Templates: The Contractor shall furnish and use approved templates of required length and cut to the required crown of the finished surface of the base course, for checking the crown and contour thereof. The templates shall be equipped with metal or other approved vertical extensions attached to each end, so that the bottom of the template will at the elevation of the top of the aggregate. At least 3 such templates shall be furnished, and used at intervals of not more than 25 feet.

2. String Lines: String lines, for controlling the finished elevation of the proposed base course, shall be furnished with ample supports and offset along each side of the base course, and shall be maintained until all irregularities have been satisfactorily corrected.

3. Straightedges: Approved straightedges 10 feet in length shall also be furnished and used for testing longitudinal irregularities in the surface of the base course. Any surface irregularities that exceed ½ inch shall be remedied by loosening the surface and removing or adding material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

B. Tests for Depth of Finished Base Course: During the progress of the work, the depth of the base course will be measured by the Authority and unsatisfactory work shall be repaired, corrected, or replaced. The Authority will not be liable for payment for any excess depth of base course. The initial layer of fine material placed as a bed and filler will be measured and considered as part of the base course in determining the compacted depth of the finished base course.

1. The depth will be determined by cutting or digging holes to the full depth of the completed base course. One depth measurement shall be made for each 1500 square yards, or less, of completed base course. Any section in which the depth is ½ inch or more deficient in specified depth, shall be satisfactorily corrected at no expense to the Authority.

2. All test holes shall be backfilled with similar material and satisfactorily compacted by and at the expense of the Contractor. This operation shall be performed under the observation of the Authority who will check the depth for record purposes.

C. Field Moisture-Density Tests: Conduct such tests as specified under Site Excavation and Placement of Fill Material: Section 02210.

END OF SECTION

SECTION 02270

SOIL EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Installation of soil erosion and sedimentation control (SESC) measures as per approved plan.

2. Maintenance of SESC measures.

3. Restoration of area and removal of any interim SESC measures placed to protect areas from erosion during stabilization period.

B. Related work specified elsewhere:

1. Clearing and Grubbing: .....Section 02100
2. Finish Grading, Seeding, and Sodding: .....Section 02485
3. Storm Drain Pipe: .....Section 02618

C. Applicable Standard Details:

02270-1 General Soil Erosion Control for Residential Sites
02270-2 Stabilized Rock Construction Entrance
02270-3 Silt Barrier Fence Detail
02270-4 Super Filter Fabric Fence & Silt Sock Detail
02270-5 Rock Filter Outlet
02270-6 Straw Bale Barrier
02270-7 Pumped Water Filter Bag
02270-8 Rock Barrier Detail
02270-9 Rock Basin Detail

In the event of a conflict between these details and PADEP/York County Conservation District details, current PADEP and York County Conservation District details shall govern work.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 72M, Roadway Construction Standards (RC 0-99)

2. Pennsylvania Department of Environmental Protection (PA DEP):

Erosion and Sediment Pollution Control Program Manual Document No. 363-2134-008, Effective April 15, 2000 or latest revisions thereof as released in accordance with PA Code 25 Chapter 102.

3. Asphalt Institute Specifications

1.03 SUBMITTALS

A. A Soil Erosion and Sedimentation Control plan should be included in the Construction Drawings. The Contractor shall regard this plan as a minimum standard. This plan may not be adjusted by the Contractor without prior approval of the County Conservation District and other regulatory agencies as applicable.

1.04 JOB CONDITIONS: Section Not Utilized.

PART 2 - MATERIALS

2.01 STONE FOR RIPRAP

A. Stone used shall be the type and size of riprap shown on the Construction Drawings and shall meet the requirement of Publication 408, Section 850.

2.02 MATTING FOR EROSION CONTROL

A. The Contractor shall furnish a certification from the manufacturer that the matting conforms to the requirements prescribed hereinafter.

B. Jute Matting for Erosion Control:

1. As specified in Publication 408, Section 806.2(a).

C. Excelsior Matting:

1. As specified in Publication 408, Section 806.2(b).

D. Nylon Matting:

1. As specified in Publication 408, Section 806.2(d).

2.03 EROSION CONTROL DEVICES

A. Silt Barrier Fence:

1. Geotextiles, Class 3: As specified in Publication 408, Section 735.1 (a) (b) (c) (d) and Section 865.2 (a).

2. Mesh Support: As specified in Publication 408, Section 865.2(b).

3. Post:

a. Wood or steel or acceptable plastic with equivalent section and sufficient length for height of fence required.

b. As specified in Publication 408, Section 865.2 (c).

4. Fasteners: As specified in Publication 408, Section 865.2(d).

5. Ground Anchors, Guy Wires: As specified in Publication 408, Section 865.2 (e) (f).

2.04 TEMPORARY COVER

A. Seed: As specified in Section 02485.

B. Seed Mixtures: As specified in Section 02485.

C. Inoculant: As specified in Section 02485.

2.05 SOIL SUPPLEMENT MATERIALS

A. Fertilizer: As specified in Section 02485.

B. Agricultural Lime: As specified in Section 02485.

2.06 MULCHING MATERIALS

A. Straw: As specified in Section 02485.

B. Wood Cellulose Fiber: As specified in Section 02485.

C. Mulching Binder:

1. Emulsified Asphalt: SS-1, CSS-1, CMS-1, MS-2, RS-1, RS-2, CRS-1, or CRS-2. Designations from Asphalt Institute Specifications.

D. Wood Chips: Wood chips, recovered from clearing and grubbing operation will be acceptable as mulch for seeding and shall be used at a rate of 35 cubic yards per acre.

2.07 STORM DRAIN PIPE

A. As specified on the Construction Drawings.

2.08 PUMPED SEDIMENT CONTROL DEVICE

A. Nonwoven geotextile fabric bag that collects silt from pumped water, such as Dirtbag manufactured by ACF Environmental, Inc., Richmond, VA, or approved equal.

B. Bag must be sized to accommodate flow rates and maintained as recommended by the manufacturer.

2.09 INLET SEDIMENT CONTROL DEVICE

A. Woven polypropylene fabric bag such as Siltsack, as manufactured by ACF Environmental, Inc., Richmond, VA, or approved equal, sized to fit inlet.

PART 3 - EXECUTION

3.01 Notify County Conservation District a minimum of 72 hours prior to initiating earthmoving.

3.02 A copy of the SESC Plan must be available at the site of earthmoving activity during construction and until the site is stabilized.

3.03 SESC measures shall be implemented by the Contractor before earthmoving activities are started. The plan shall be strictly adhered to, and the Contractor shall maintain all SESC measures until permanent soil cover has been established.

3.04 The following minimum control measures shall be employed by the Contractor:

A. Reduce by the greatest extent practicable the area and duration of exposure of readily erodible soils;

B. Protect soils by use of temporary vegetation, or by seeding and mulching, or by accelerating the establishment of permanent vegetation and completing disturbed areas of work as rapidly as is consistent with construction schedules;

C. Retard the rate of runoff from the construction site and control the disposal thereof;

D. Trap sediment from the construction site in silt basins, including pump discharges from dewatering operations;

E. Sprinkle or apply dust suppressors to keep dust within tolerable air quality limits on haul roads and at the construction site;

F. Utilize temporary measures to control soil erosion on construction operations suspended for more than 20 calendar days;

G. Provide protection against discharge of pollutants such as chemicals, fuel, lubricants, sewage, etc. into streams or storm water facilities;

H. Keep all construction debris, excavated material, rocks, and refuse incidental to the work out of any stream channel, gutter lines and drainage channels.

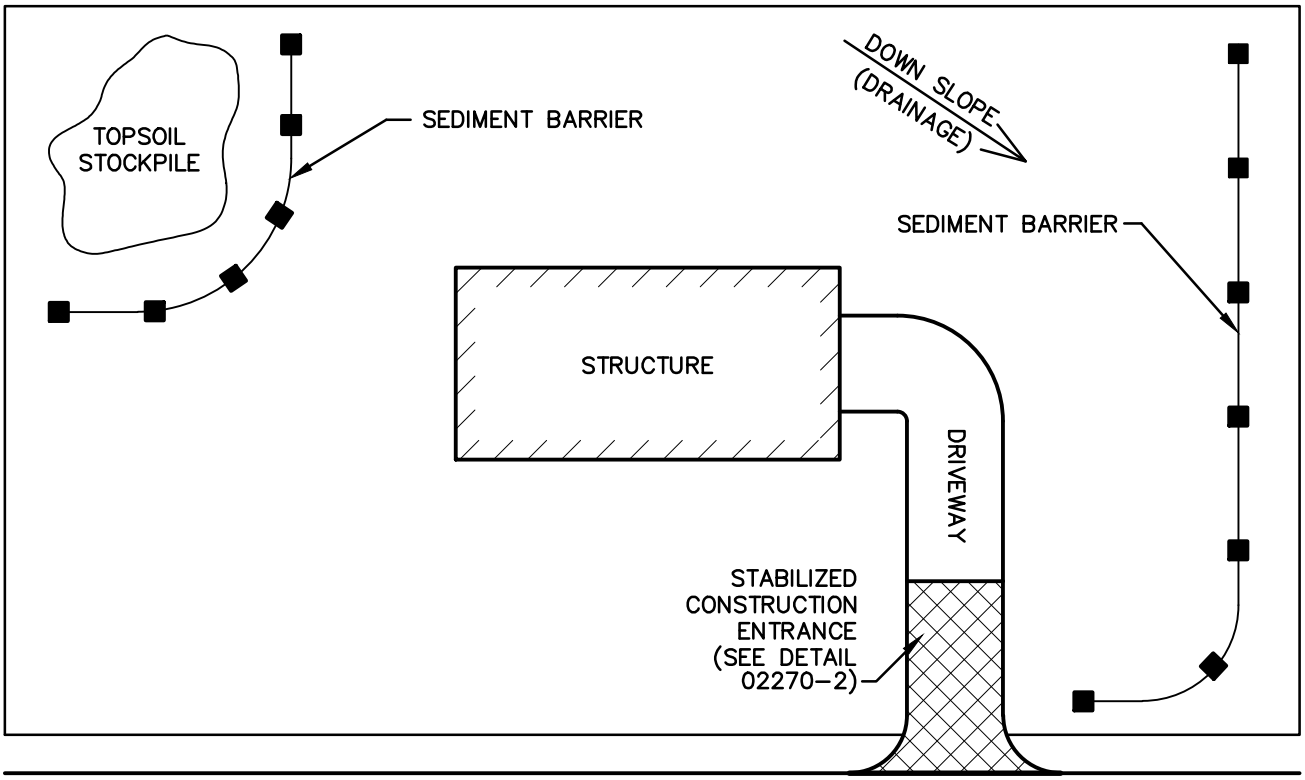
I. Instruct the drivers of all vehicles to remove soil and loose material from their wheels and undercarriages when leaving the work area. Remove all soils, miscellaneous debris, or other materials spilled, dumped, or otherwise deposited on public streets, highways, or other public thoroughfares by vehicles in transit to and from the work area. Street areas adjacent to construction shall be swept at the end of each workday.

3.05 The Contractor shall not permit mud or silt-laden water to leave the construction site, and is responsible for any and all damages to downstream properties as a result of his failure to prevent such damages.

3.06 At such time permanent soil cover has been established, the Contractor shall remove all temporary SESC measures.

3.07 Temporary control measures must be maintained, including disposal and replacement of damaged or filled devices.

END OF SECTION



TYPICAL CONSTRUCTION SEQUENCE

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE.
2. INSTALL ACCEPTABLE SEDIMENT BARRIERS ALONG THE DOWNSLOPE EDGE OF THE PROPERTY.
3. STRIP TOPSOIL AND STOCKPILE ON UPSLOPE PORTIONS OF THE AREA.
4. ROUGH GRADE THE AREA.
5. SEED AND MULCH ALL DISTURBED AREAS. TEMPORARY COVER SHALL BE ANNUAL RYE GRASS APPLIED AT A SEEDING RATE OF 10 POUNDS PER 1000 SQUARE YARDS.
6. INSPECT AND MAINTAIN EROSION AND SEDIMENTATION CONTROLS ON A REGULAR BASIS. EROSION AND SEDIMENTATION CONTROLS SHALL NOT BE REMOVED UNTIL THE DISTURBED AREAS ARE STABILIZED.
7. ENSURE ALL VEHICLES LEAVING THE SITE HAVE MUD REMOVED FROM TIRES AND UNDERCARRIAGES.

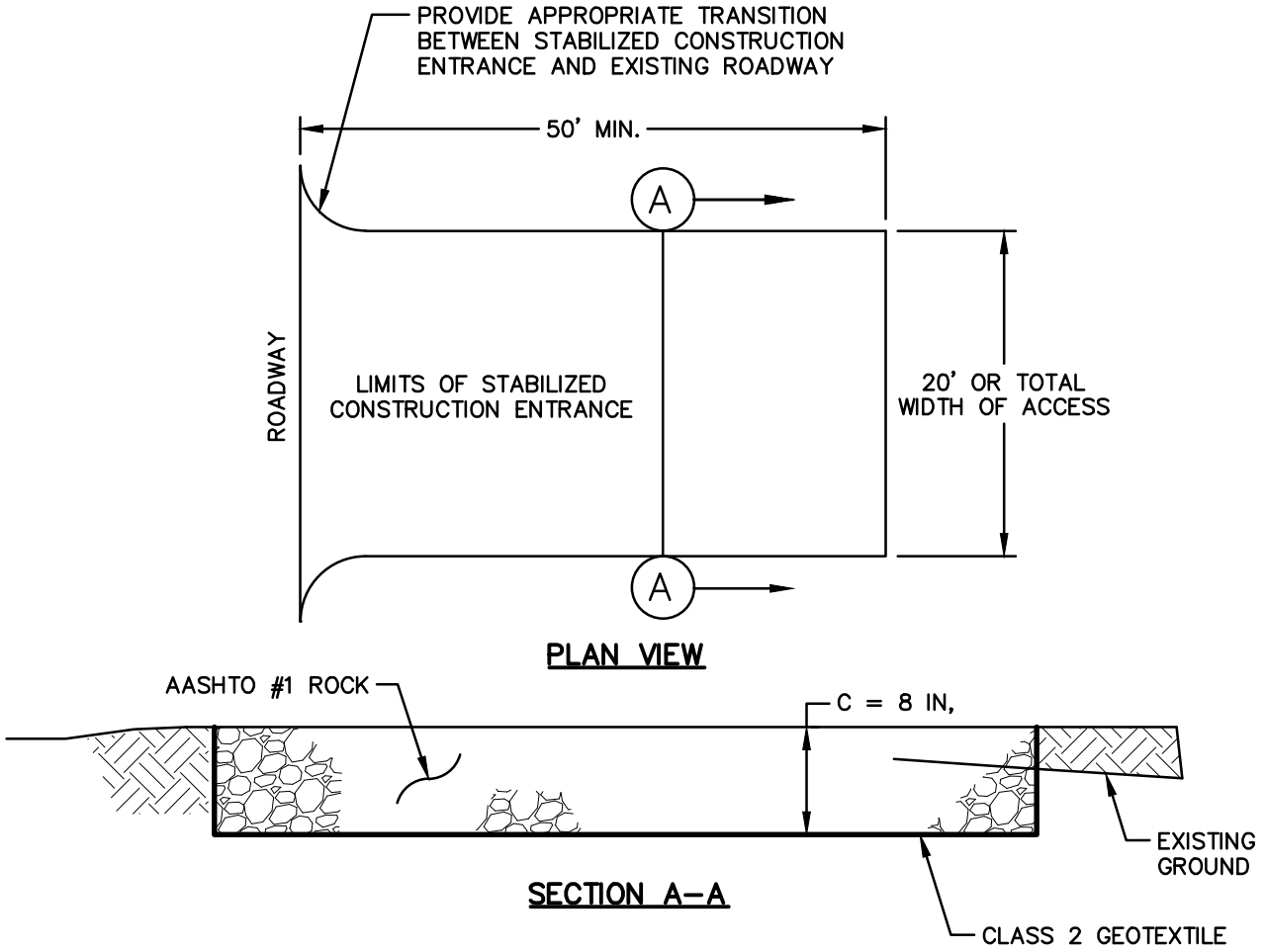
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

GENERAL SOIL EROSION CONTROL FOR RESIDENTIAL SITES

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-1
FILE NO.	1301.1.00.04



1. STONE SIZE – AASHTO #1.
2. LENGTH – AS REQUIRED TO BE EFFECTIVE, BUT NOT LESS THAN 50'
3. THICKNESS – NOT LESS THAN 8".
4. WIDTH – FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS, BUT NOT LESS THAN 20'.
5. WASHING – WHEELS SHALL BE CLEAN PRIOR TO ENTRANCE ONTO EXISTING ROADWAY. WHEN WASHING IS REQUIRED IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH, OR WATERCOURSE THROUGH USE OF SAND BAGS, GRAVEL, BOARDS, OR OTHER APPROVED METHODS.
6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO EXISTING ROADWAY: THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO EXISTING ROADWAYS MUST BE REMOVED IMMEDIATELY.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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11 E. BROADWAY, P.O. BOX 190
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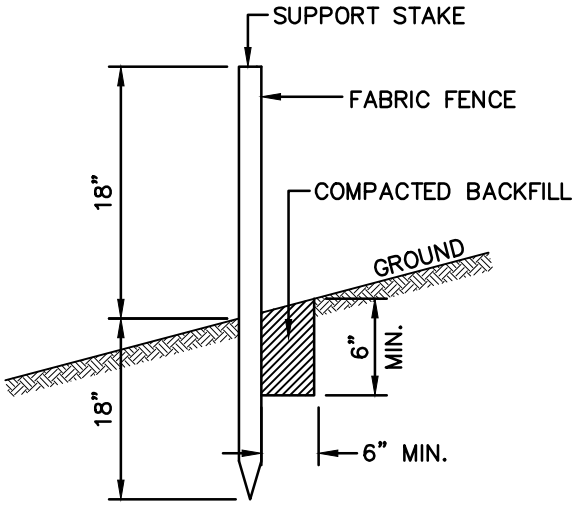
TELEPHONE: (717)244-3475
www.redlionpa.org

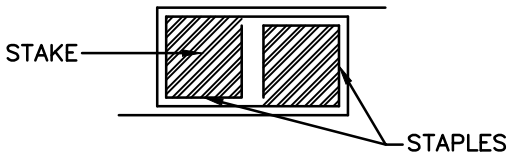
STABILIZED ROCK
CONSTRUCTION
ENTRANCE

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

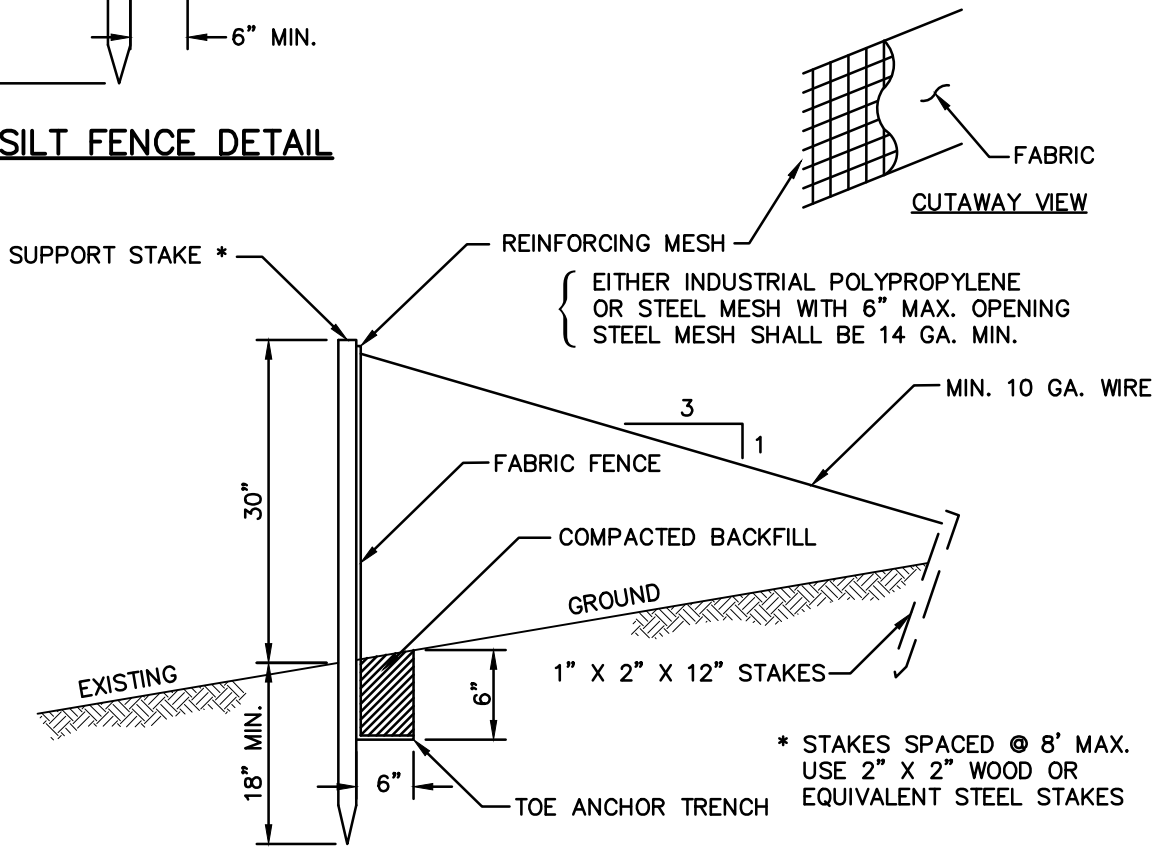
DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-2
FILE NO.	1301.1.00.04



18" SILT FENCE DETAIL



JOINING FENCE SECTIONS



30" SILT FENCE DETAIL

1. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE. BOTH ENDS OF EACH FENCE SECTION MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE
2. ALIGNMENT.SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
3. ANY FENCE SECTION WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET. STANDARD DETAIL, 02270–5.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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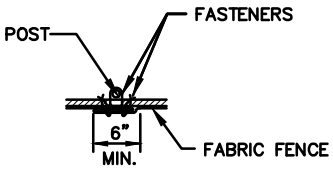
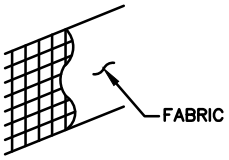
SILT BARRIER
FENCE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

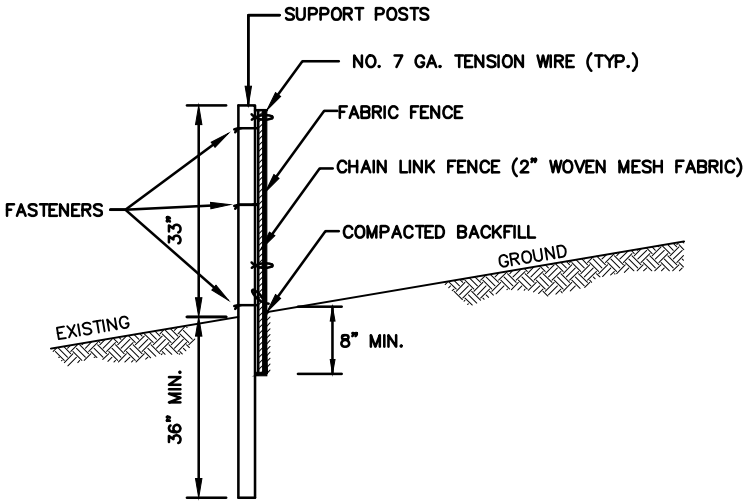
DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-3
FILE NO.	1301.1.00.04



JOINING FENCE SECTIONS



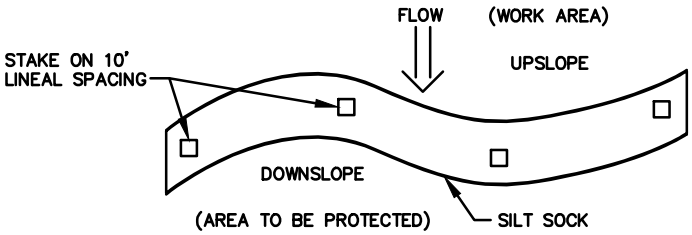
CUTAWAY VIEW



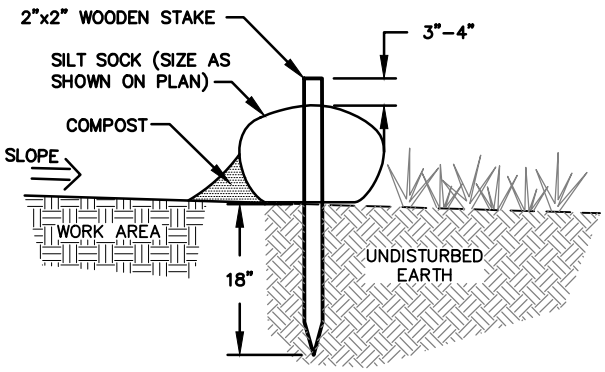
NOTES:

1. POSTS SPACED @ 10' MAX. USE 2 1/2" DIA. GALVANIZED OR ALUMINUM POSTS. CHAIN LINK TO POST FASTENERS SPACED @ 14" MAX. USE NO. 6 GA. ALUMINUM WIRE OR NO. 9 GALVANIZED STEEL PRE-FORMED CLIPS.
2. CHAIN LINK TO TENSION WIRE FASTENERS SPACED @ 60" MAX. USE NO. 10 GA. GALVANIZED STEEL WIRE. FABRIC TO CHAIN FASTENERS SPACED @ 24" MAX. C TO C.
3. NO. 7 GA. TENSION WIRE INSTALLED HORIZONTALLY AT TOP AND BOTTOM OF CHAIN-LINK FENCE.
4. FILTER FABRIC FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER MUST BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.
5. SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.

SUPER FILTER FABRIC FENCE DETAIL



PLAN VIEW



SECTION VIEW

NOTES:

1. SILT SOCK IS TO BE INSTALLED ON UNDISTURBED GROUND.
2. THE CONTRACTOR SHALL MAINTAIN THE COMPOST SILT SOCK IN A FUNCTIONAL CONDITION AT ALL TIMES AND IT SHALL BE ROUTINELY INSPECTED.
3. WHERE SILT SOCK REQUIRES REPAIR, IT WILL BE ROUTINELY REPAIRED.
4. THE CONTRACTOR SHALL REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE SILT SOCK WHEN THEY REACH 1/3 OF THE EXPOSED HEIGHT OF THE SOCK, OR AS DIRECTED BY THE ENGINEER.
5. THE COMPOST SILT SOCK WILL BE DISPERSED ON SITE WHEN NO LONGER REQUIRED, AS DETERMINED BY THE ENGINEER.
6. IN INSTANCES WHERE SILT SOCK INSTALLATION IS ON GROUND SLOPED ALONG THE LENGTH OF THE SOCK, AN EIGHT (8) FOOT "TURN OUT" SHALL BE INSTALLED FOR EVERY ONE VERTICAL FOOT OF ELEVATION DIFFERENCE.
7. AS SITE GRADING CHANGES FROM EXISTING TO PROPOSED CONDITIONS, IT IS THE CONTRACTOR'S RESPONSIBILITY TO RELOCATE AND/OR REPLACE THE SILT SOCK AS REQUIRED TO ENSURE THAT THE SILT SOCK IS PARALLEL TO SITE CONTOURS AND ALL SEDIMENT LADEN WATER IS PREVENTED FROM LEAVING THE SITE.
8. SOCK SIZE BASED ON MEASURED WIDTH AFTER FILLED WITH MATERIAL.

SILT SOCK DETAIL

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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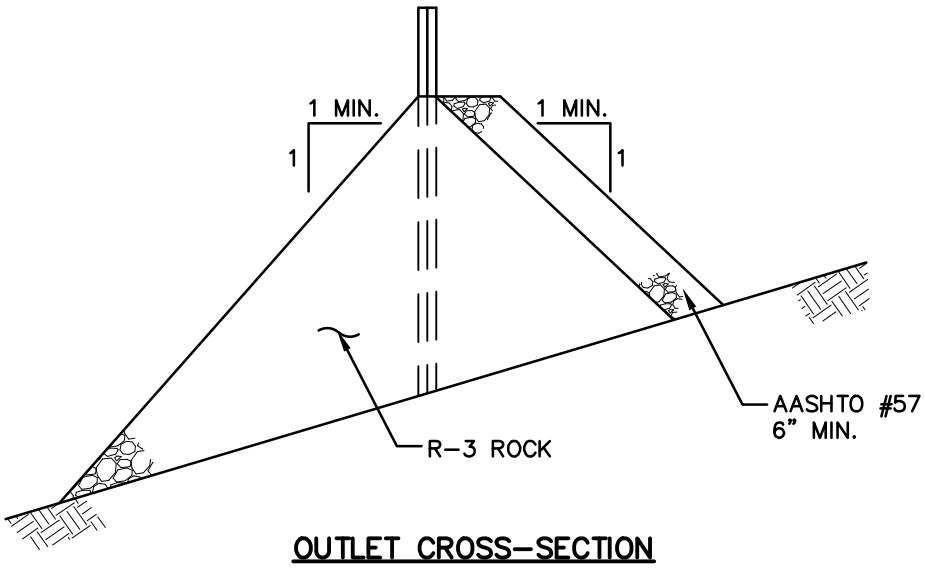
TELEPHONE: (717)244-3475
www.redlionpa.org

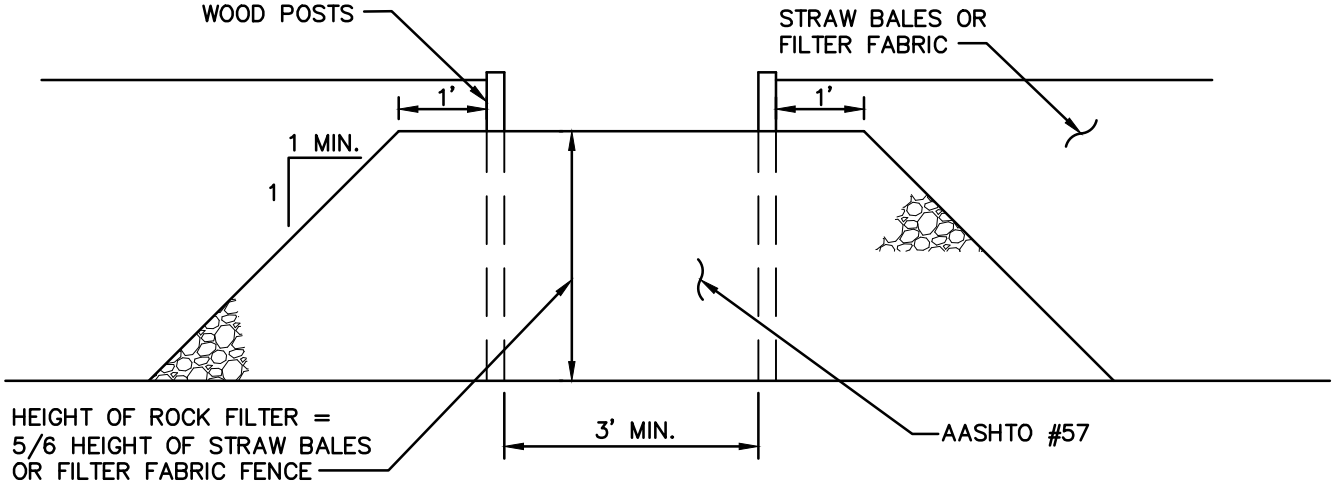
SUPER FILTER FABRIC FENCE & SILT SOCK DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-4
FILE NO.	1301.1.00.04



OUTLET CROSS-SECTION



UP-SLOPE FACE

NOTE;
SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE HEIGHT OF THE OUTLET.

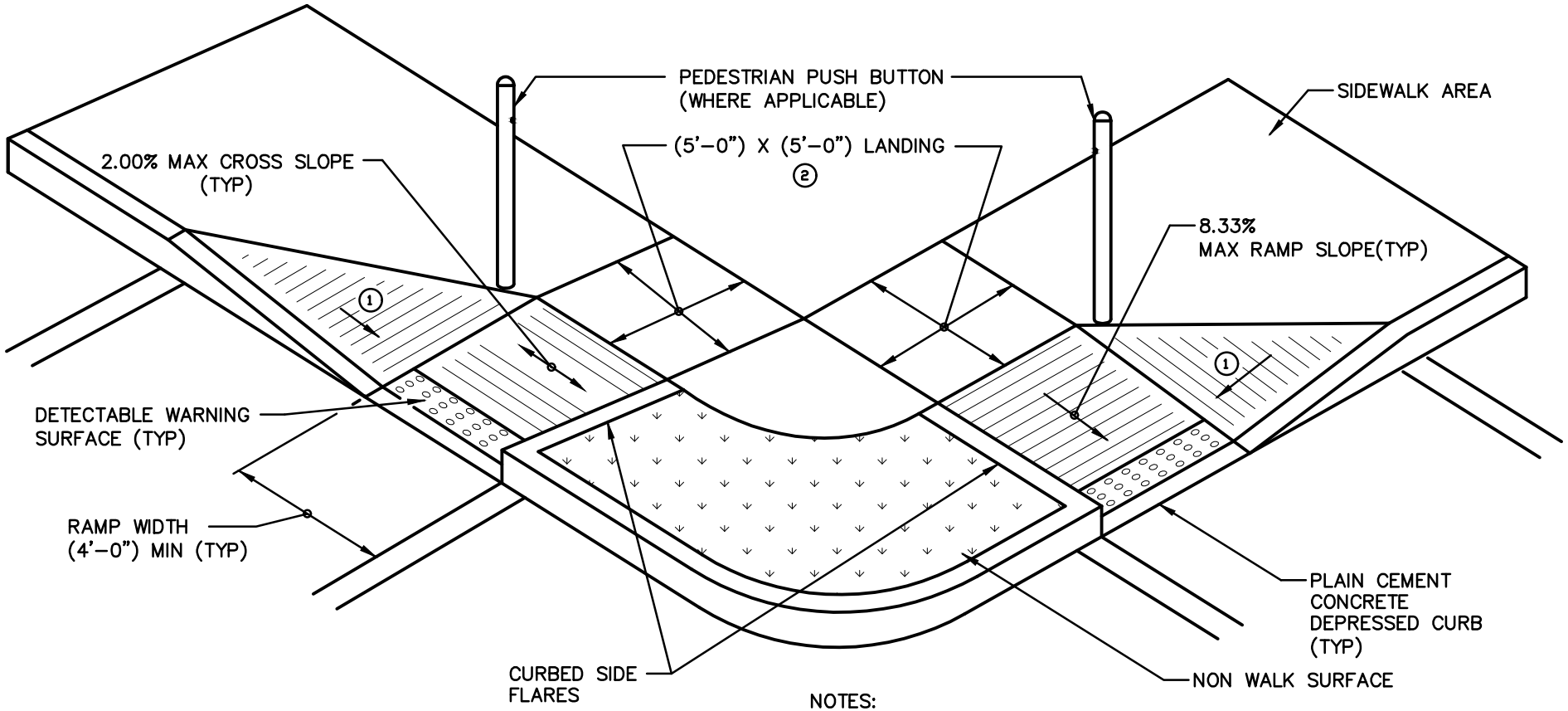
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

ROCK FILTER OUTLET

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-5
FILE NO.	1301.1.00.04



NOTES:

1. LANDING AREAS SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.

① SIDE FLARES 10.00% MAX SLOPE.

② 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-6
FILE NO.	1301.1.00.04

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
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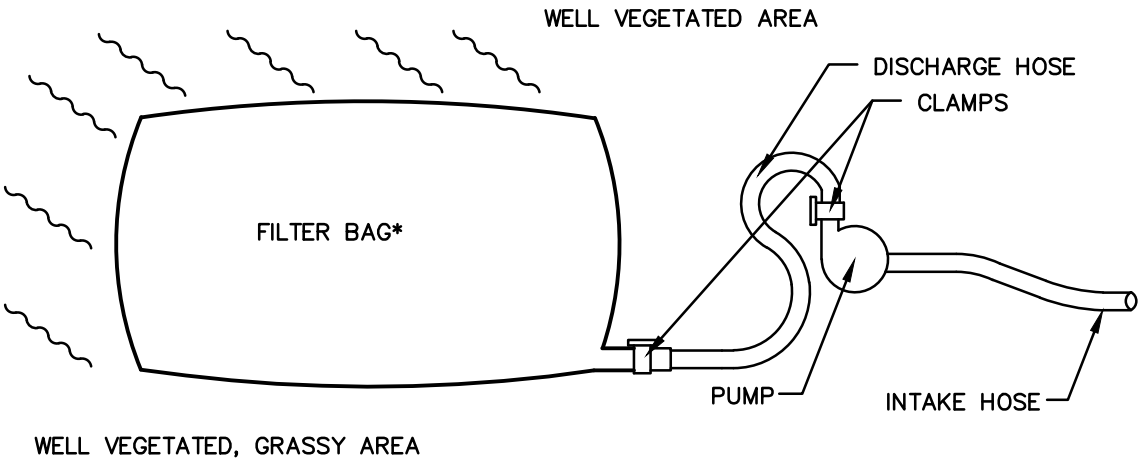
TYPE 1 DOUBLE CURB

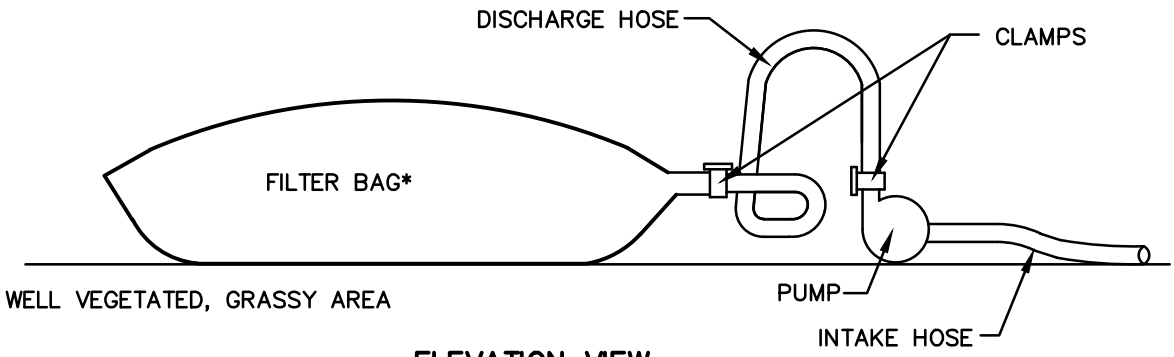
RAMP DETAIL (ALTERNATE)

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



PLAN VIEW



ELEVATION VIEW

NOTES:

1. FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
2. A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED.
3. BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED.
4. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED. MAXIMUM PUMP SIZE SHALL BE A 6"ø PUMP.
5. DISCHARGE FROM PUMP SHALL BE LOCATED A MINIMUM OF 50 FEET FROM ANY STREAM OR STABLE WATER COURSE. DISCHARGE SHALL BE ONTO GRAVEL OR STONE BEDDING WHERE POSSIBLE, OR A MINIMUM OF PERMANENTLY STABILIZED GRASS.
6. SILT FENCE SHALL BE PLACED DOWNSLOPE OF DISCHARGE PRIOR TO REACHING ANY STREAM OR WATER COURSE.

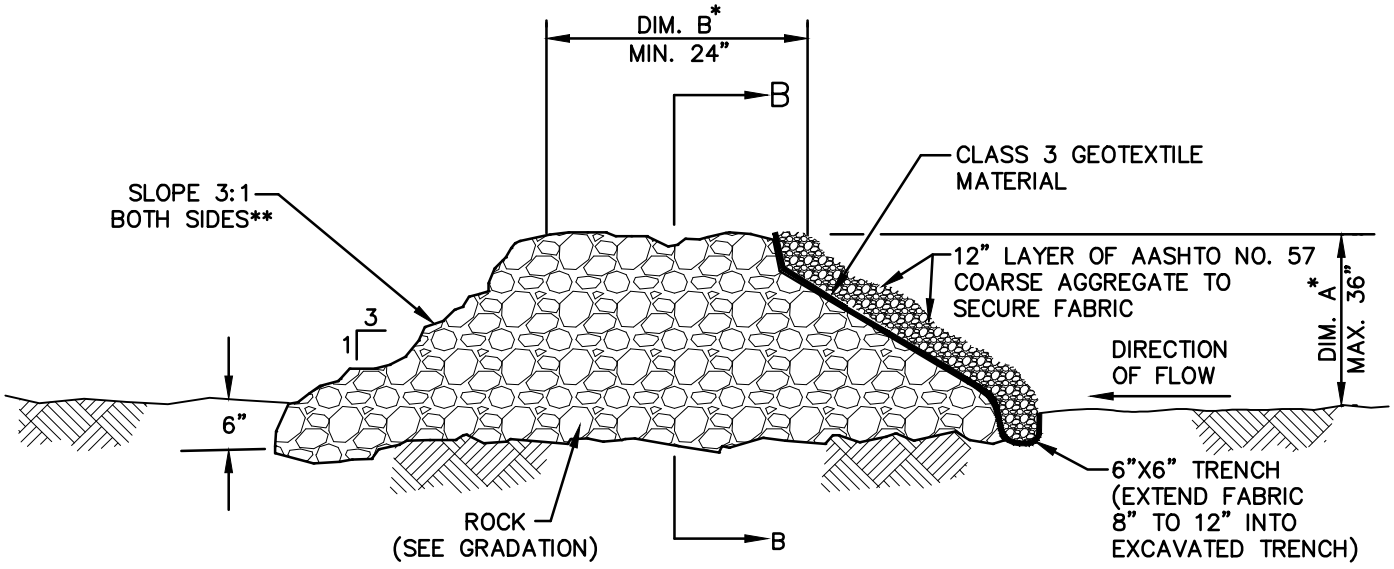
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

PUMPED WATER
FILTER BAG

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-7
FILE NO.	1301.1.00.04



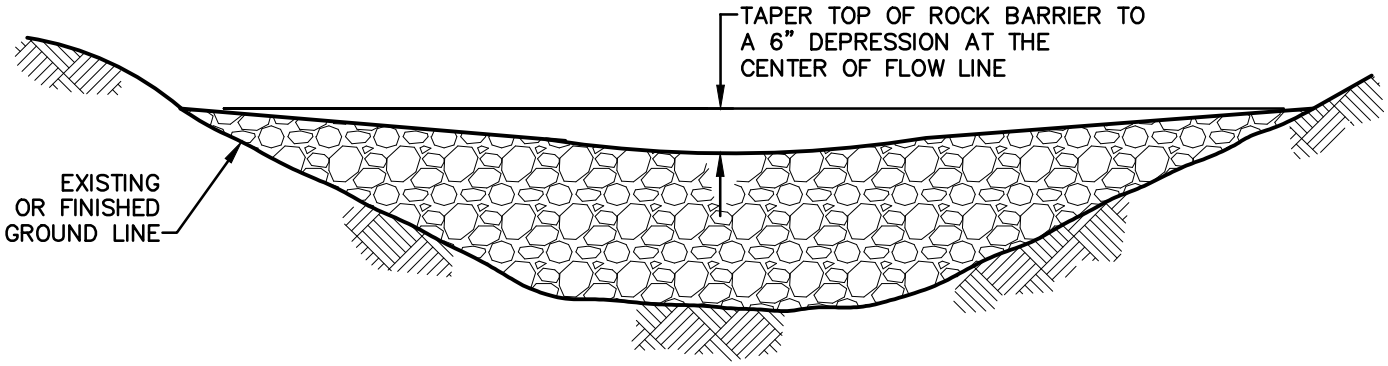
TYPICAL SECTION

* REFER TO CONTRACT DRAWINGS FOR INDIVIDUAL BARRIER DIMENSIONS AND LOCATIONS.

** SLOPE SHALL BE 1:1 WHEN USED AS ROCK FILTER OUTLET

DIM. A = 5/6 HEIGHT OF SILT BARRIER FENCE WHEN USED AS ROCK FILTER OUTLET.

NOTE: SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 HEIGHT OF ROCK BARRIER.



SECTION B–B

HEIGHT (DIM. A)	ROCK
3' OR LESS	R–4
2'–3'	R–3
1'–2'	R–2

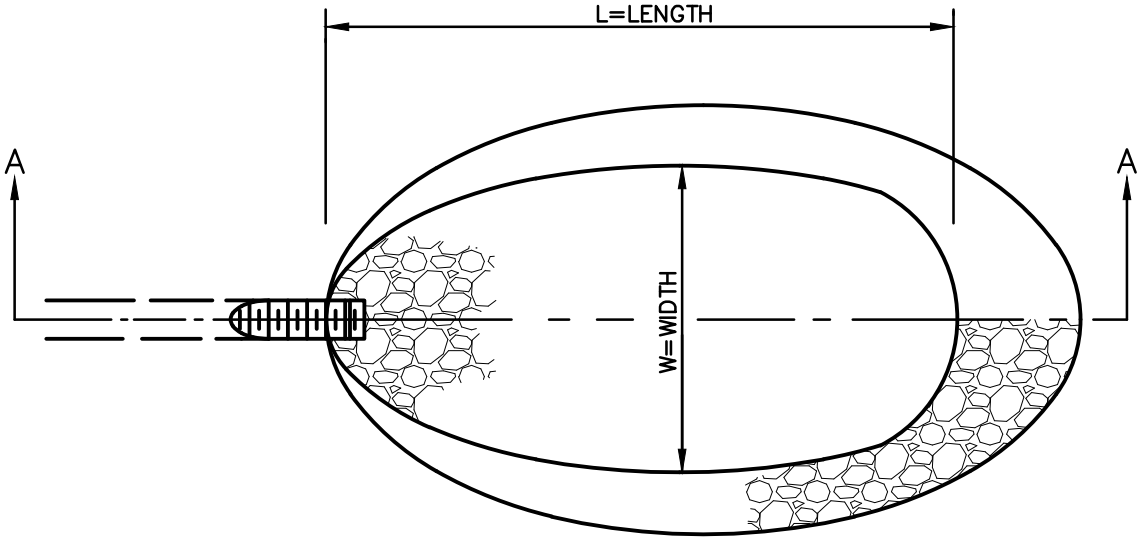
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

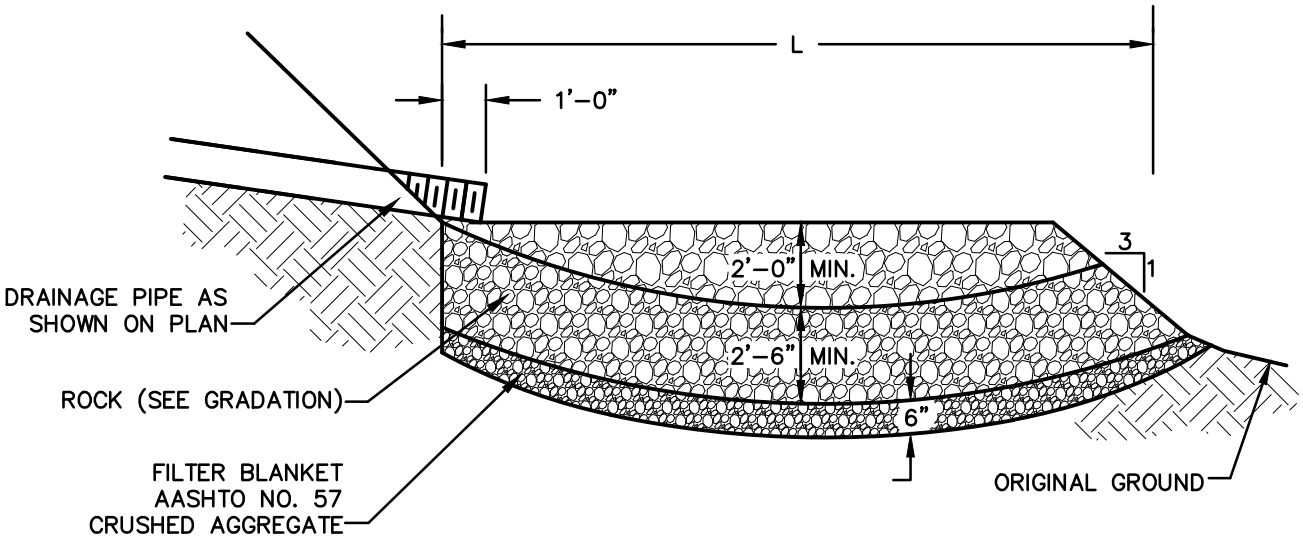
ROCK BARRIER
DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-8
FILE NO.	1301.1.00.04



PLAN



SECTION A–A

ROCK GRADATION

ROCK SIZE	MAX. % OF TOTAL WEIGHT SMALLER THAN GIVEN SIZE
36"	100%
24"	50%
12"	10%

"L" AND "W" AS SHOWN ON CONSTRUCTION DRAWINGS

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
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ROCK BASIN DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02270-9
FILE NO.	1301.1.00.04

SECTION 02485

FINISH GRADING, SEEDING, AND SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Placing topsoil
2. Soil conditioning
3. Finish grading
4. Seeding
5. Sodding
6. Mulching
7. Maintenance

B. Related work specified elsewhere:

1. Clearing and Grubbing: .....Section 02100
2. Trenching, Backfilling, and Compacting:.....Section 02221

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

   Publication 408, Specifications

2. American Association of State Highway Transportation Officials (AASHTO):

   T194 Determination of Organic Matter in Soils by Wet Combustion

3. Pennsylvania Department of Agriculture

4. Others:

   Agricultural Liming Materials Act of 1978, P.L.15

   Pennsylvania Seed Act of 1965, Act 187, as amended

   Pennsylvania Soil Conditioner and Plant Growth Substance Law, Act of December 1, 1977, P.L. 258 No. 86 (3P.S. 68.2) as amended

   Rules for Testing Seeds of the Association of Official Seed Analysts

   Federal and State pesticide acts and registration requirements

B. Sod Producer - Company specializing in sod production and harvesting with a minimum of 5 years' experience.

C. Sod Installer - Company specializing in performing this work with a minimum of 5 years' experience.

1.03 SUBMITTALS

A. Samples:

1. Unless otherwise directed, furnish three strips of sod, 4-1/2 feet long by 12" wide, laid on 3" of topsoil and tamped in place. The samples shall be representative of the sod and workmanship to be provided. Include sod source location.

2. Advise the Engineer of the location of the field, and area within the field, from which the sod is to be taken for approval.

B. Certificates:

1. Unless directed otherwise, prior to use or placement of material, submit certifications of material composition of the following for approval:

a. Topsoil analysis
b. Fertilizer
c. Lime
d. Seed mixtures
e. Inoculant
f. Sod

1.04 JOB CONDITIONS - Section not utilized.

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Having a pH of between 6.0 and 7.0; containing not less than 2% nor more than 10% organic matter as determined by AASHTO T194.

B. Fertile friable loam, sand loam, or clay loam which will hold a ball when squeezed with the hand, but which will crumble shortly after being released.

C. Free of clods, grass, roots, or other debris harmful to plant growth.

D. Free of pests, pest larvae, and matter toxic to plants.

2.02 FERTILIZER

A. Basic Dry Formulation Fertilizer:

1. Analysis 10-20-20 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

B. Starter Fertilizer:

1. Analysis 38-0-0 or 31-0-0 and as defined by the Pennsylvania Soil Conditioner and Plant Growth Substance Law.

2.03 LIME

A. Raw ground limestone conforming to Publication 408, Section 804.2(a).

2.04 SEED

A. Deliver seed fully tagged and in separate packages according to species or seed mix. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

B. Fresh, clean, dated material from the last available crop and within the date period specified, with a date of test not more than 9 months prior to the date of sowing. Percentage of pure seed present shall represent freedom from inert matter and from other seeds distinguishable by their appearance. All seeds will be subject to analysis and testing.

TABLE 1 - GRASS AND AGRICULTURAL SEEDS

Species	Minimum Guaranteed Purity (Percent)	Maximum Weed Seed (Percent)	Minimum Guaranteed Germination (Percent)
Kentucky Bluegrass *(Poapratensis)* Domestic origin; min. twenty-one pounds per bushel	98	0.20	80
Perennial Ryegrass (*Lolium perenne*, var. Pennfine)	98	0.15	90
Tall Fescue (*Festuca arundinacea*), var. Kentucky 31)	98	0.15	85
Crownvetch (*Coronilla varia*)	99	0.10	65
Pennlawn Red Fescue (*Festuca rubra*, var. Pennlawn)	98	0.15	85
Annual Rye Grass (*Lolium multiflorum*)	98	0.15	90
Timothy (*Phleum pratense*)	98	0.25	85

2.05 SEED MIXTURES

A. See Seeding Restoration Table at end of this Section.

1. Lawn areas shall be graded, topsoil, and seeded with PennDOT Formula B (lawns).

2.06 INOCULANT

A. Inoculate leguminous seed before seeding with nitrogen fixing bacteria culture prepared specifically for the species.

B. Do not use inoculant later than the date indicated by the manufacturer.

C. Protect inoculated seed from prolonged exposure to sunlight prior to sowing.

D. Reinoculate seed not sown within 24 hours following initial inoculation.

2.07 MULCHING MATERIALS

A. Mulches for seeded areas shall be one, or a combination of, the following:

1. Straw:

a. Cured to less than 20% moisture content by weight.

b. Contain no stems of tobacco, soybeans, or other coarse or woody material.

c. Wheat or oat straw.

2. Wood Cellulose:

a. No growth or germination inhibiting substances.

b. Green, air dried. Packages not exceeding 100 pounds.

c. Requirements:

Moisture Content: : 12%±3%
Organic Matter: 98.6%±0.2% on the oven dried basis.
Ash Content: 1.4%±0.2%
Minimum Water-Holding Capacity: 1,000%

3. Mushroom Manure:

a. Organic origin, free of foreign material larger than 2" and substances toxic to plant growth.

b. Organic Matter: 20% minimum

c. Water-Holding Capacity: 120% minimum

d. pH: 6.0

B. Sewage sludge compost is not permitted.

2.08 SOD

A. Well-rooted Kentucky Bluegrass (Poa pratensis) sod containing a growth of not more than 10% of other grasses and clovers.

B. Free from noxious weeds such as Bermuda grass, wild mustard, crab grass, and kindred grasses.

C. Mow sod in the field to a height of not more than 2-1/2" within 5 days prior to lifting.

D. Cut sod to a depth equal to the growth of the fibrous roots, but in no case less than 1½", exclusive of grass and thatch. Do not cut sod when the ground temperature is below 32°F.

E. Deliver sod to the project site within 24 hours after being cut and place sod within 36 hours after being cut. Do not deliver small, irregular, or broken pieces of sod. Do not deliver more sod than can be laid within 24 hours.

F. During wet weather, allow sod to dry sufficiently to prevent tearing during handling and placing. During dry weather, moisten sod to ensure its vitality and to prevent dropping of the soil during handling. Sod which dries out will be rejected.

PART 3 - EXECUTION

3.01 TIME OF OPERATIONS

A. Spring Seeding:

1. Preliminary operations for seed bed preparation may commence as soon after February 15 as ground conditions permit.

B. Fall Seeding:

1. Preliminary operations for seed bed preparation may commence after July 15.

3.02 FINISH GRADING

A. Preparation of Subgrade:

1. "Hard pan" or heavy shale:

a. Plow to a minimum depth of 6".

b. Loosen and grade by harrowing, disking, or dragging.

c. Hand rake subgrade. Remove rocks over 2" in diameter and other debris.

2. Loose loam, sandy loam, or light clay:

a. Loosen and grade by harrowing, disking, or dragging.

b. Hand rake subgrade. Remove rocks over 2" in diameter and other debris.

3. All soil types shall have no lumps or clods larger than 2" diameter. After subgrade preparation is complete, Contractor shall remove loose stones or debris and properly dispose it properly.

B. Placing Topsoil:

1. Place topsoil and spread over the prepared subgrade to obtain the required depth and grade elevation. Compact with a roller having not more than 65 pounds per roller foot width to a final compacted thickness of not less than 4".

2. Hand rake topsoil and remove all materials unsuitable or harmful to plant growth.

3. Do not place topsoil when the subgrade is frozen, excessively wet, or extremely dry.

4. Do not handle topsoil when frozen or muddy.

C. Tillage:

1. After seed bed areas have been brought to proper compacted elevation, thoroughly loosen to a minimum depth of 4" by disking, harrowing, or other approved methods. Do not work topsoiled areas when frozen or excessively wet.

2. Liming:

a. Distribute lime uniformly at the specified rates.

b. Thoroughly incorporate into the topsoil to a depth of 4".

c. Incorporate as a part of the tillage operation.

3. Basic Fertilizer:

a. Distribute basic fertilizer uniformly at the specified rate.

b. Thoroughly incorporate into the topsoil to a depth of 4".

c. Incorporate as a part of tillage operation.

D. Finish Grading:

1. Remove unsuitable material larger than ½" in any dimension.

2. Uniformly grade surface to the required contours without the formation of water pockets.

3. Rework areas which puddle by the addition of topsoil and starter fertilizer and re-rake.

3.03 SEEDING

A. Distribute starter fertilizer at the specified rates.

B. Incorporate starter fertilizer into the upper 1" of soil.

C. Uniformly sow specified seed mix by use of approved hydraulic seeder, power-drawn drill, power-operated seeder, or hand-operated seeder. Do not seed when winds are over 15 mph.

D. Upon completion of sowing, cover seed to an average depth of 1/4" by hand re-raking or approved mechanical methods.

E. Mulch immediately after seeding, using one of the following methods:

1. Place straw mulch in a continuous blanket at a minimum rate of 1,200 pounds per 1,000 square yards.

a. Anchor straw mulch by use of twine, stakes, wire staples, paper, or plastic nets.

b. Emulsified asphalt may be used for anchorage provided it is applied uniformly at a rate not less than 31 gallons per 1,000 square yards.

c. Chemical mulch binders may be used for anchorage if they are applied uniformly at the manufacturer's recommended rate.

d. Chemical mulch binders or a light covering of topsoil may be used for anchorage when the size of the area precludes the use of mechanical equipment.

2. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 square yards. Incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.

3. Spread mushroom manure uniformly to a minimum depth of ½" or to the depth indicated on the Construction Drawings.

F. When mulch is applied to grass areas by blowing equipment, the use of cutters in the equipment will be permitted to the extent that a minimum of 95% the mulch is 6" or more in length. For cut mulches applied by the blowing method, achieve a loose depth in place of not less than 2".

G. When mulching by the asphalt mix method, apply the mulch by blowing. Spray the asphalt binder material into the mulch as it leaves the blower. Apply the binder to the mulch in the proportion of 1.5 to 2.0 gallons per 45 pounds of mulch.

1. Protect structures, pavements, curbs, and walls to prevent asphalt staining.

2. Erect warning signs and barricades at intervals of 50 feet or less along the perimeter of the mulched area.

3. Do not spray asphalt and chemical mulch binders onto any area within 100 feet of a stream or other body of water.

H. Contractor shall be responsible for applying water sufficient enough produce moist soil, approximately 1" of water. However, water should be allowed to soak into the soil and not runoff.

3.04 SODDING

A. Prior to sod placement, complete finish grading and moisten prepared surface to received sod.

B. Do not place sod when the temperature is lower than 32°F.

C. Place sod by hand with tight joints and no overlap. Transverse joints shall be broken or staggered.

D. Place sod so that the top of the sod is flush with the surrounding grade.

E. Use of tools which damage the sod or dumping of sod from vehicles will not be permitted.

F. Water sod to the saturation point immediately after placement.

G. After watering, tamp with an approved tamper to close all joints and ensure close contact between sod and sod bed. After tamping, the sod shall present a smooth, even surface free from bumps and depressions. If so directed, use a light roller, weighing not more than 65 pounds per foot of roller width to complete firming and smoothing the sod.

H. When placing sod in ditches, place the strip with the long dimension at right angles to the flow of water. At any point where water will start flowing over a sodded area, the upper edge of the sod strips shall be turned into the soil below the adjacent area and a layer of compacted earth placed over this juncture to conduct the water over the edge of the sod.

I. In ditches and on slope areas, stake each strip of sod securely with at least 1 wood stake for each 2 square feet of sod. Stakes shall be ½" by 1" with a length of 8" to 12". Drive stakes flush with the top of the sod, with the long face parallel to the slope contour.

3.05 MAINTENANCE

A. Maintenance includes watering, weeding, cleanup, edging and repair of depressions, washouts or gullies.

B. Those areas which do not show a prompt catch of grass within 14 days of seeding or sodding shall be re-seeded or re-sodded until complete grass catch occurs.

C. Maintain sodded areas for 3 months from date of substantial completion, mow to maintain maximum height of 2-1/2" or as specified on Construction Drawings.

SEEDING RESTORATION TABLE

RESTORATION CONDITION	TOPSOIL	LIME*	BASIC FERTILIZER	STARTER FERTILIZER	SEED MIX & SOWING RATE (% BY WEIGHT)
Temporary Cover (PennDOT E)	N/A	1 Ton/Acre	5-5-5 @ 1000# /Acre	N/A	100% Annual Ryegrass Sow 10# per 1,000 Sq. Yds. March 15 through October 15
Roadside: Non-mowed (PennDOT D)	Yes	800# per 1000 Sq.Yds.	10-20-20 @ 140# per 1000 Sq.Yds.	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	70% Tall Fescue 30% Pennlawn Red Fescue Sow 21# per 1000 Sq. Yds. March 15 through May August through October 15
Roadside: Mowed (PennDOT B)	Yes	800# per 1000 Sq.Yds.	10-20-20 @ 140# per 1000 Sq.Yds.	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass Sow 21# per 1000 Sq.Yds. March 15 thru May/ August through October 15
Bank Areas (PennDOT C)	Yes	800# per 1000 Sq.Yds.	No	38-0-0 @ 50# per 1000 Sq.Yds or 31-0-0 @ 61# per 1000 Sq.Yds.	45% Crownvetch 55% Annual Rygrass Sow 9# per 1000 Sq. Yds. Anytime except September & October
Lawns (PennDOT B)	Yes	800# per 1000 Sq.Yds.	10-20-20 @ 140# per 1000 Sq.Yds.	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	50% Kentucky Bluegrass 30% Pennlawn Red Fescue 20% Perennial Ryegrass Sow 21# per 1000 Sq.Yds. March 15 through May August through October 15
Open Fields: Non-Cultivated, Pasture	No	No	No	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	100% Timothy Sow 10# per 1000 Sq.Yds. March through May August through October
Open Fields; Cultivated	No	No	No	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	100% Annual Ryegrass Sow 10# per 1,000 Sq. Yds. March 15 through October 15
Woods: Sparse	No	No	10-20-20 @ 140# per 1000 Sq.Yds.	38-0-0 @ 50# per 1000 Sq.Yds. or 31-0-0 @ 61# per 1000 Sq.Yds.	100% Red Fescue Sow 36# per 1000 Sq. Yds. March 15 through May August through October 15\
Sodding	Yes	800# per 1000 Sq.Yds.	10-20-20 @ 140# per 1000 Sq. Yds.	N/A	N/A
Basin/Channels	Yes	No	10-20-20 @ 140# Per 1000 Sq. Yds.	38-0-0 @ 50# per 1000 Sq. Yds or 31-0-0 @ 61# per 1000 Sq. Yds.	50% Tall Fescue, 25% Rough Bluegrass, 15% Reed Canary Grass, 10% Redtop

*Unless lesser rate indicated by soil tests

END OF SECTION

SECTION 02500

BITUMINOUS PAVING AND SURFACING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Bituminous concrete base course construction.
2. Placement and compaction of bituminous binder and wearing surface.
3. Placement of bituminous seal coat and surface treatment.
4. Surface preparation.
5. Roadway signing

B. Related work specified elsewhere:

1. Clearing and grubbing: .....Section 02100
2. Site excavation and placement of fill material:.....Section 02210
3. Roadway excavation, fill, and compaction:.....Section 02230

C. Definitions: NONE

D. Applicable Standard Details:

Refer to standards of local Municipality or construction drawings.
The “Backfill and Surface Restoration Requirements” Table in Section 02575 lists the specific paving requirements.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
Publication 27, Specification for Bituminous Mixtures (Bulletin 27)
Publication 37, Specification for Bituminous Materials (Bulletin 25)

2. American Society for Testing and Materials (ASTM):

D2950 Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

3. Pennsylvania Code:

Title 67. Transportation, Chapter 459, Occupancy of Highways by Utilities

B. Inspections:

1. Inspection by the Authority will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

1.03 SUBMITTALS

A. Certification:

1. Submit certification from bituminous and aggregate suppliers attesting that materials conform to Publication 408, Specifications.

2. Submit bituminous concrete mix design for approval.

3. Provide PennDOT certifications (CS-4171) with each load delivered to the job site.

1.04 JOB CONDITIONS

A. Control of Traffic:

1. Take measures to control traffic during paving operations. Do not allow traffic on newly paved areas until adequate stability and adhesion have been attained and the material has cooled to 140° F or less.

2. Employ traffic control measures in accordance with Publication 213 “Temporary Traffic Control Guidelines.”

3. Owner, Engineer, and all appropriate Emergency Services (police, fire, and ambulance) shall be notified by the Contractor a minimum of 36 hours in advance of any temporary lane enclosure.

B. Protection of Adjacent Areas:

1. Restore existing surface outside the limits of the work that has been damaged by the Contractor’s operations, to its original condition at the expense of the Contractor.

2. Reasonable access must be maintained for adjacent property owners and commercial properties.

PART 2 - PRODUCTS

2.01 BITUMINOUS MATERIALS AND AGGREGATES

A. All bituminous materials and aggregates used in base course construction, paving, and resurfacing are designated in these specifications by, and shall conform to, the applicable portions of the Publication 408 Specifications. The coarse aggregate used in bituminous wearing surfaces shall have the following aggregate Skid Resistance Level (SRL) letter designation based on the current Average Daily Traffic (ADT) for resurfacing or anticipated initial daily traffic on new facilities:

ADT	SRL	ALTERNATIVES
20,000 and Above	E	None
5,000 to 20,000	H	E, H, Blend of E and M, Blend of E and G
3,000 to 5,000	G	E, H, G, Blend of H and M, Blend of E and L
1,000 to 3,000	M	E, H, G, M, Blend of H and L, Blend of G and L, Blend of E and L
1,000 and Below	L	Any

Note: All blends are 50% by mass and shall be accomplished by an approved method.

B. All Superpave (HMA) mixtures shall conform to applicable portions of Publication 408 Specifications. Aggregate shall be provided by approved sources and have the SRL designation as specified above. All mixtures will be petroleum grade PG 64-22 and 1.0 million ESALS unless specified otherwise by the Authority.

PART 3 - EXECUTION

3.01 BASE COURSES

A. Bituminous Concrete Base Course - Where indicated on the drawings or requested by the Authority, construct bituminous concrete base course to compacted depth in accordance with Publication 408 Specifications, Section 305. Proof roll base course to satisfaction of the Authority. The Authority shall approve crushed aggregate base course prior to placement of BCBC.

B. Superpave Asphalt - Where indicated on the drawings, construct HMA base course to compacted depth in accordance with Publication 408, Section 309.

C. Bituminous paver shall be self-propelled with activated screed and shall have a minimum paving width of 18'. All exceptions must be approved by the Owner and Engineer.

3.02 PREPARATION OF EXISTING PAVEMENT SURFACE

A. Clean street surface of all dust, debris, loose stone, earth, or other deleterious material by means of hand brooms or approved power brooms.

B. Scarify areas shown on the drawings. Where the existing base is judged inadequate by the Authority, construct new base of the required type as specified in the "Backfill and Surface Restoration Requirements Table" in Section. 02575.

C. Seal all cracks in accordance with Publication 408, Section 469 with the Authority approval, cracks may be filled with PG 64-22.

D. Patch holes and depressions greater than one inch and less than four inches with Superpave HMA 19mm binder material, compacted in layers not exceeding two inches after compaction.

E. Holes greater than four inches in depth shall be sawed back to sound pavement, and patched with a minimum of eight inches of crushed aggregate base course and three inches of Superpave HMA 19mm binder material.

F. When required by the "Backfill and Surface Restoration Requirements Table," apply tack coat in accordance with Publication 408 Specifications, Section 460.

G. Milling of existing bituminous pavement shall be performed in accordance with Publication 408, Section 491 to the depth and limits specified in the drawings.

1. Saw cut all edges at intersections with streets and driveways and at the limits of work.

2. All milled surfaces shall be swept completely. Millings will become the property of the contractor and must be disposed of properly, unless otherwise specified.

3. Supply all water as needed.

4. Cutting, depth, width, and minimum hp rating will be as specified by the Authority.

5. Contractor shall provide transitions from milled surfaces to non-milled surfaces to allow vehicular traffic during non-working hours.

H. Construct scratch or leveling courses as directed by the Authority.

I. Proof roll subgrade before base course placement. If precipitation occurs, then subgrade must be proof rolled again prior to bituminous material placement.

3.03 SURFACE COURSES

A. Superpave Asphalt

1. HMA Binder Course - Construct HMA binder course with aggregate size, Design ESAL's and PG specified and to the compacted depth shown on the Construction Drawings, in accordance with Publication 408 Specifications, Section 409.

2. HMA Wearing Course - Construct HMA wearing course with aggregate size, Design ESAL's and PG specified and to the compacted depth shown on the Construction Drawings, in accordance with Publication 408 Specifications, Section 409.

3. Tack coat shall be applied to ensure bonding between courses and shall conform to Publication 408 Specifications, Section 460.

4. Compaction testing for in-place density shall be conducted during placement of the material, in accordance with PennDOT Publication 408, Section 409. Alternatively, pavement cores, in accordance with Section 409.4, may be substituted. Acceptable density shall be within 90-97% of the maximum theoretical density, as per ASTM D698.

5. Do not allow vehicular traffic on newly compacted Superpave HMA materials until the temperature cools below 140˚F.

6. Bituminous paver shall be self-propelled with activated screed and shall have a minimum paving width of 18'. All exceptions to paver requirement shall be approved by the Authority's Representative.

B. Bituminous Surface Course (ID-2)

1. Construct binder course meeting the requirements of Publication 408 Specifications, Section 421 to compacted depth specified in the "Backfill and Surface Restoration Requirements Table".

2. Construct wearing surface meeting the requirements of Publication 408 Specifications, Section 420 to the compacted depth specified in the "Backfill and Surface Restoration Requirements Table".

3. Do not allow vehicular traffic on newly compacted bituminous material until the temperature cools below 140˚F.

4. Bituminous paver shall be self-propelled with activated screed and shall have minimum paving width of 18’. All exceptions to paver requirements shall be approved by the Authority’s Representative.

C. Compaction

1. Compact by rolling with steel-wheel, vibration or pneumatic tire rollers or a combination of these to obtain specified layer thickness and until non-movement of material under compaction equipment is achieved, unless other density requirements are specified in Section VIII - Technical Provisions (Detailed).

2. The roller pattern and speed shall be monitored by the Contractor and the Authority’s Representative to avoid roller marks, pattern segregation and displacement of hot mixtures.

D. Bituminous Seal Coat (single application)

1. Construct bituminous seal coat in accordance with Publication 408 Specifications, Section 470.

E. Bituminous Surface Treatment (double application)

1. Construct bituminous surface treatment in accordance with Publication 408 Specifications, Section 480.

3.04 JOINTS

A. Notch

The edge of an overlay shall be saw cut to a depth of 1-1/2" for the entire length of the joint and the detached material removed to a minimum notch width of 12". Notch shall be skewed a minimum 6:1 unless otherwise noted. A cold planer may be used. The vertical face must be painted with E-6, E-8 or the same asphalt material used in mix design (Publication 408, Section 401.3(j)).

B. Sealing

All joints shall be sealed rubberized joint sealing material. When wearing course is placed adjacent to curb to form bituminous gutter, seal with hot bituminous material of the class and type designated for wearing course and extend to 6 inches from the curb, applied evenly. The use of PG 64-22 may be permitted when approval is obtain from the Authority.

3.05 SIGNS

A. Install signs at locations shown on drawings or otherwise specified by the Authority.

B. Posts shall be installed in undisturbed earth with anchor top 4" above ground on lower slope side.

C. Where posts are located in concrete, drill the existing concrete to place anchor. If in new concrete, place PVC sleeve in concrete prior to placing post.

3.06 FIELD QUALITY CONTROL

A. Proof of Product

At the time of material delivery to the site, the Authority's Representative shall be furnished with a delivery ticket indicating material specifications. The tickets shall include, but not limited to, vehicle identification, date, time, product identification, product quantity (Petroleum Grade, Equivalent Single, Axle Loading (ESAL's), aggregate size and Skid Resistance Level (SRL) (for bituminous wearing course).

B. Surface Tolerance of Base and Binder Course

After the base course has been completed as specified, the surface smoothness shall be checked with approved templates, string lines, or straightedges.

1. Templates: The Contractor shall furnish and use approved templates of required length and cut to the required crown of the finished surface of the base course, for checking the crown and contour thereof. The templates shall be equipped with metal or other approved vertical extensions attached to each end, so that the bottom of the template will be at the elevation of the top of the aggregate. At least 3 such templates shall be furnished, and used at intervals of not more than 25 feet.

2. String Lines: String lines, for controlling the finished elevation of the base course, shall be furnished with ample supports and offset along each side of the base course, and shall be maintained until all irregularities have been satisfactorily corrected.

3. Straightedges: Approved straightedges 10 feet in length shall also be furnished and used for testing longitudinal irregularities in the surface of the base course.

Any surface irregularities that exceed 1/2 inch shall be remedied by removing or adding bituminous material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

C. Tests for Depth of Finished Base Course

During the progress of the work, the depth of the base course will be measured by the Authority and unsatisfactory work shall be repaired, corrected, or replaced. The Authority will not be liable for payment for any excess depth of base course.

1. The depth will be determined by cutting or coring holes to the full depth of the completed base course. One depth measurement may be required for each 1,500 square yards, or less, of completed base course. Any section in which the depth is ½ inch or more deficient in specified depth, shall be satisfactorily corrected at no expense to the Authority.

2. All test holes shall be backfilled with similar material and satisfactorily compacted by and at the expense of the Contractor. This operation shall be performed under the observation of the Authority who will check the depth for record purposes.

D. Surface Tolerance of Wearing Course

After the wearing course has been completed as specified, the surface smoothness shall be checked with straightedges.

1. Straightedges: Approved straightedges 10 feet in length shall be furnished and used for testing longitudinal irregularities in the surface of the wearing course.

Any surface irregularities that exceed 3/16 inch shall be remedied by removing or adding wearing material as required, after which the entire area, including the surrounding surface, shall be rolled until satisfactorily compacted.

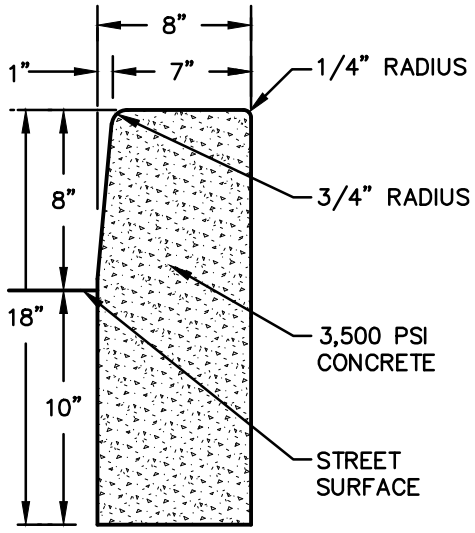
E. Tests for Depth of Finished Wearing Course.

During the progress of the work, the depth of the wearing course may be measured by the Authority and unsatisfactory work shall be repaired, corrected, or replaced. The Authority will not be liable for payment for any excess depth of wearing course.

1. The depth will be determined by cutting or coring holes to the full depth of the completed wearing course. Test holes to be excavated by the Contractor at no expense to the Authority. One depth measurement may be required for each 1,500 square yards of completed wearing course. Any section in which the depth is 1/4 inch or more deficient in specified depth, shall be satisfactorily corrected at no expense to the Authority.

2. All test holes shall be backfilled with similar material and satisfactorily compacted by and at the expense of the Contractor. This operation shall be performed under the observation of the Authority who will check the depth for record purposes.

END OF SECTION



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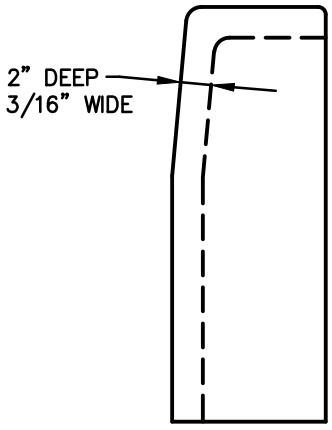

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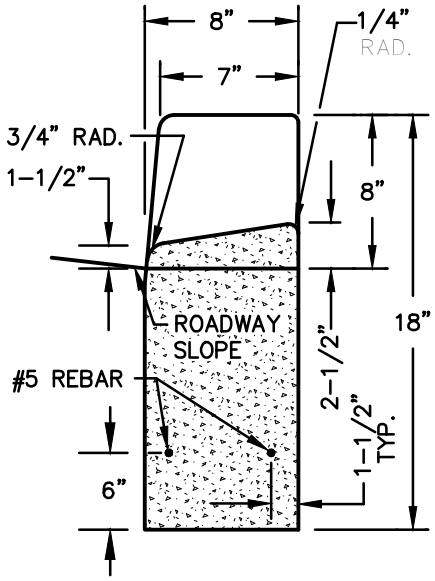

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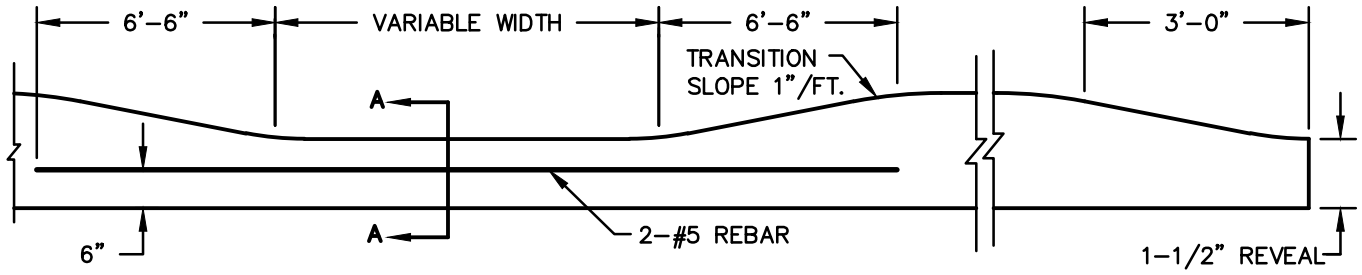

DEPRESSED CURBS FOR DRIVES

TERMINAL SECTION

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
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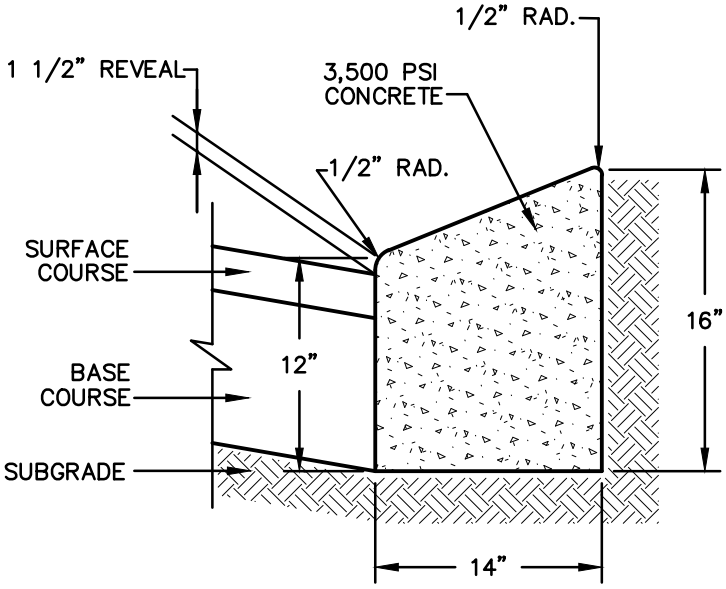
www.redlionpa.org

VERTICAL CONCRETE
CURB DETAILS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-1
FILE NO.	1301.1.00.04



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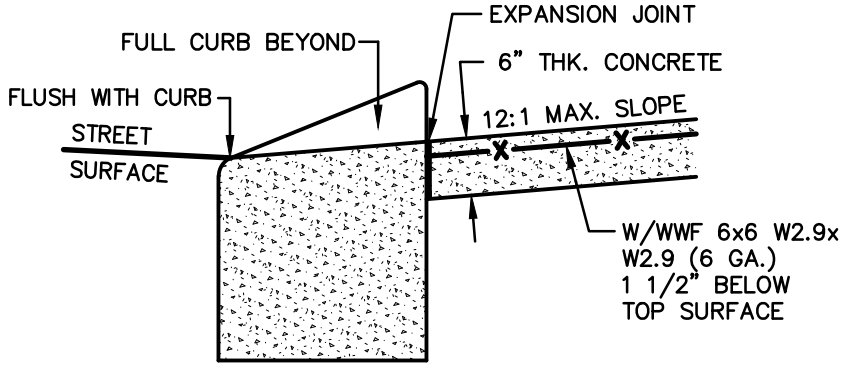

CROSS SECTION AT HANDICAP RAMPS

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
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RED LION, PA 17356
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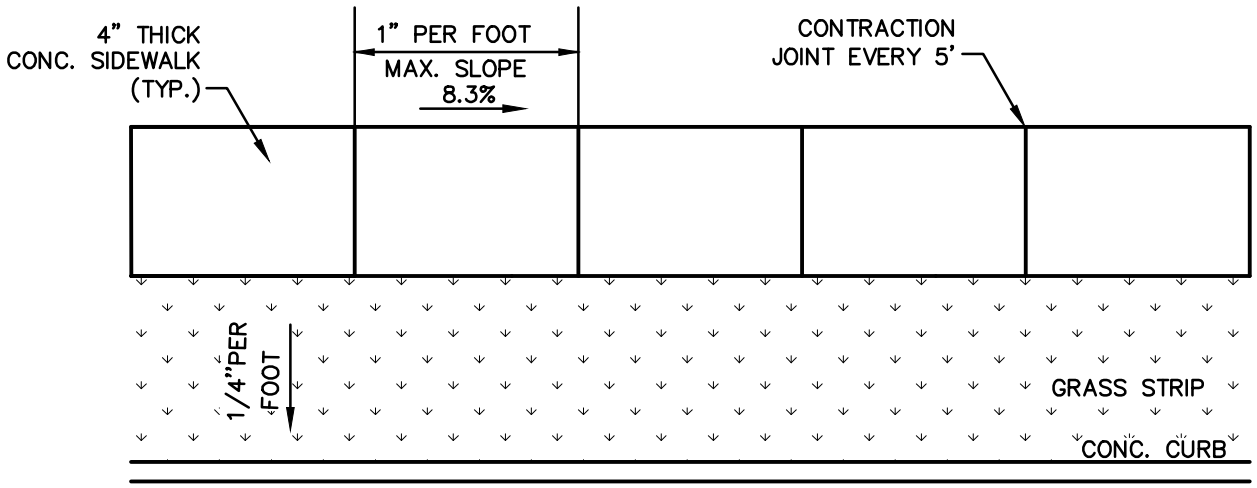
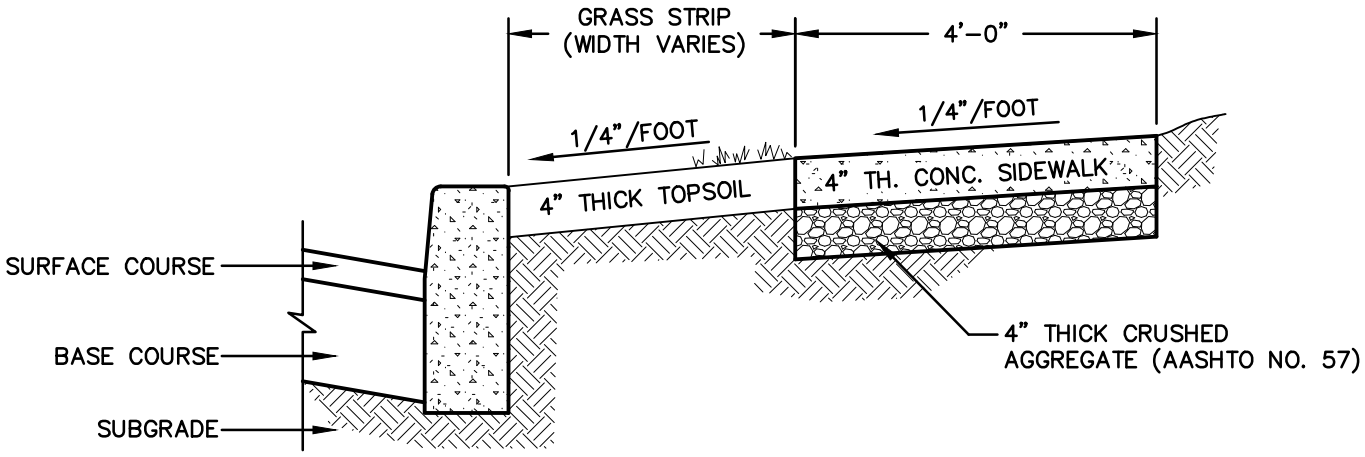
SLANT CONCRETE
CURB DETAILS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-2
FILE NO.	1301.1.00.04



PLAN



TYPICAL SECTION

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
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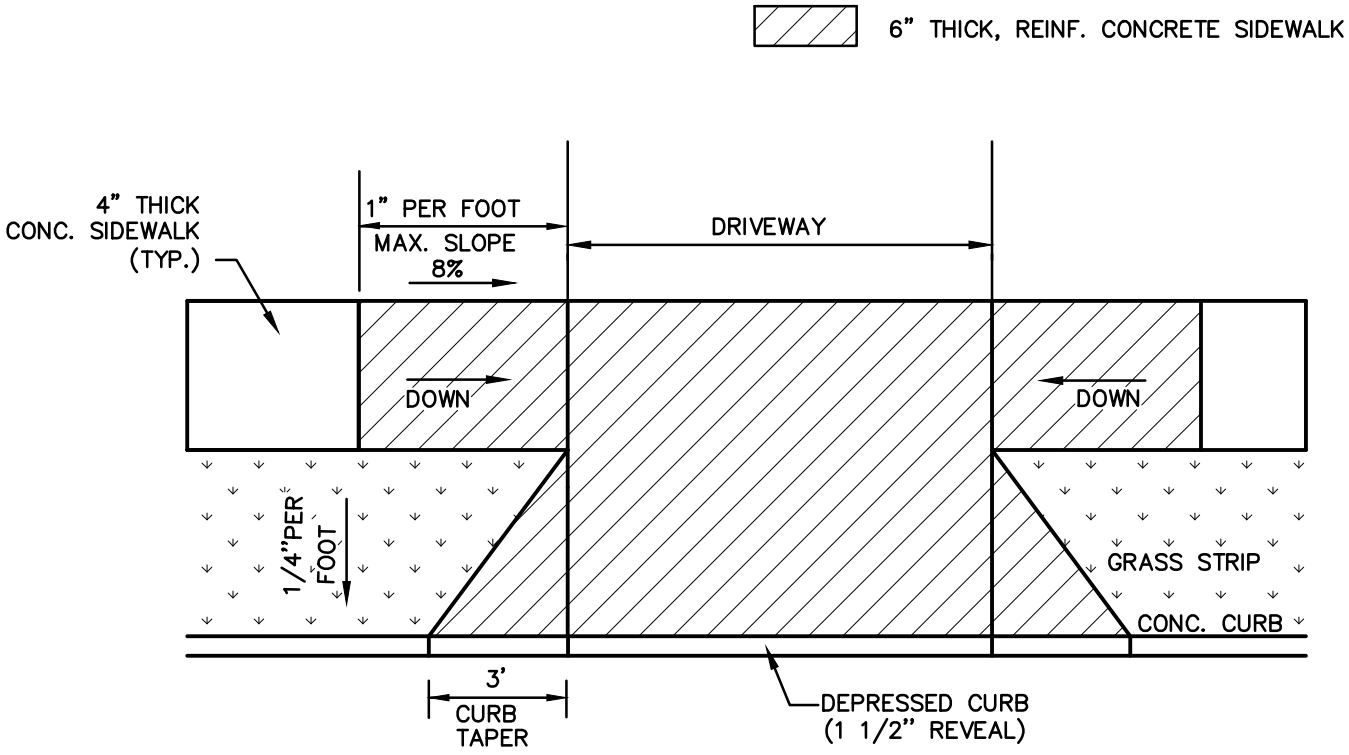
CONCRETE SIDEWALK
DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-3
FILE NO.	1301.1.00.04



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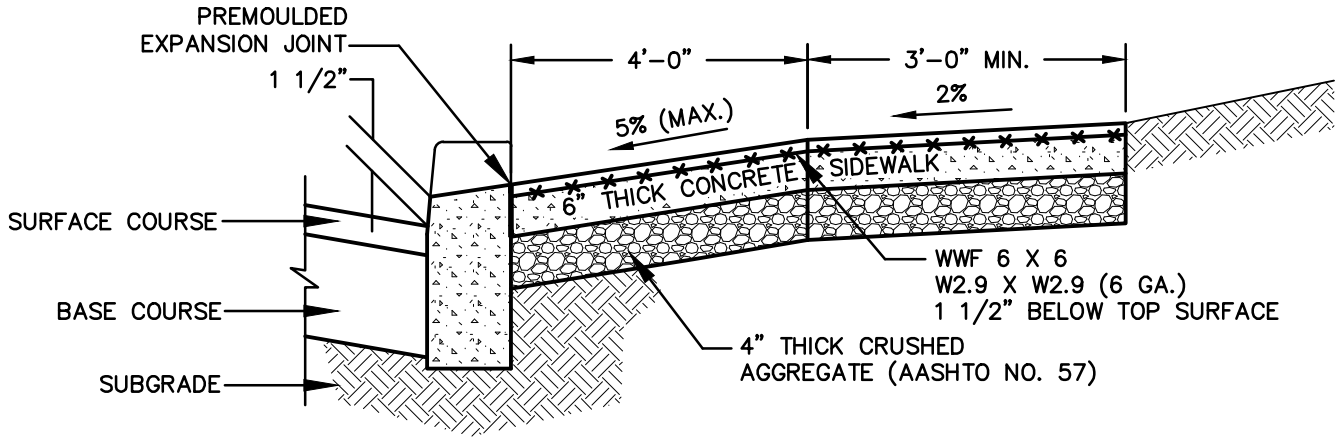

TYPICAL SECTION

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
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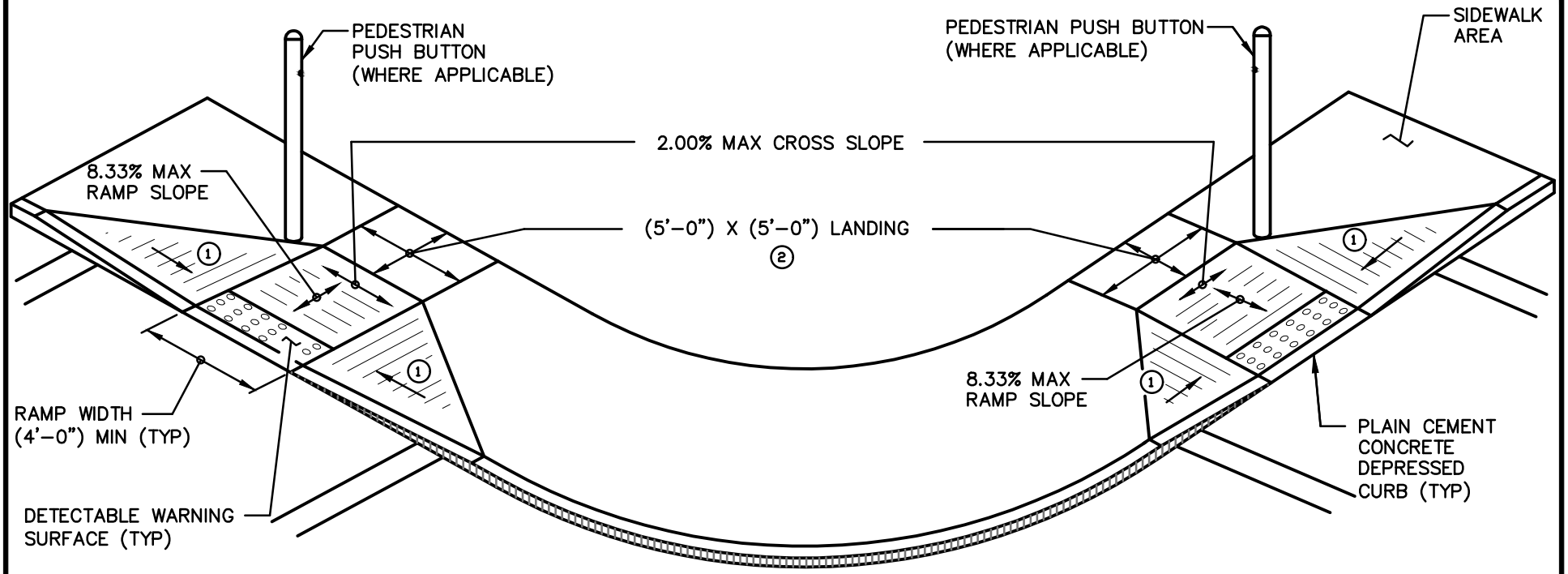
CONCRETE SIDEWALK
AT DRIVEWAY DETAILS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-4
FILE NO.	1301.1.00.04



NOTES:

1. LANDING AREAS SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.
4. PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.

① SIDE FLARES 10.00% MAX SLOPE

② 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-5
FILE NO.	1301.1.00.04

RED LION MUNICIPAL AUTHORITY
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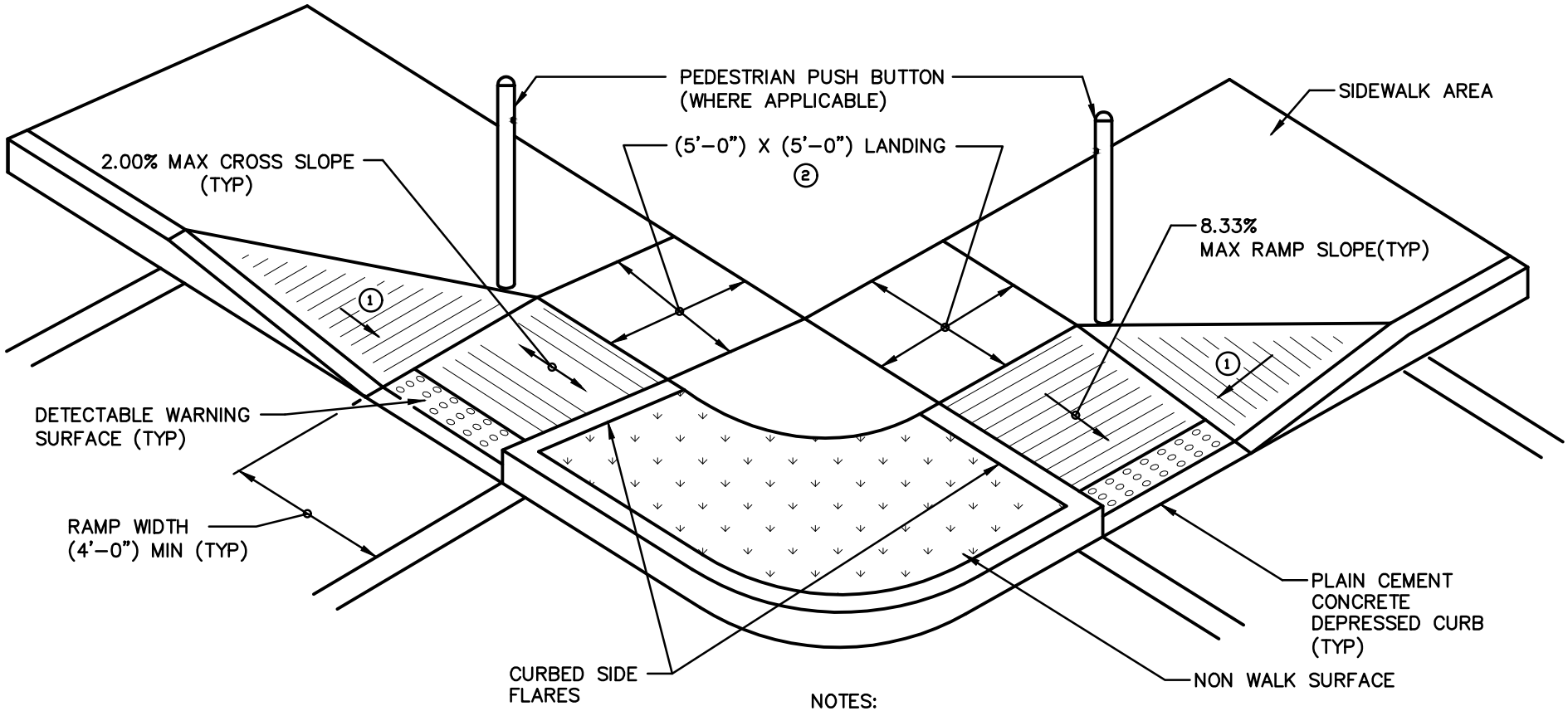
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

TYPE 1 DOUBLE

CURB RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



NOTES:

1. LANDING AREAS SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.

① SIDE FLARES 10.00% MAX SLOPE.

② 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-6
FILE NO.	1301.1.00.04

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RED LION, PA 17356
TELEPHONE: (717)244-3475
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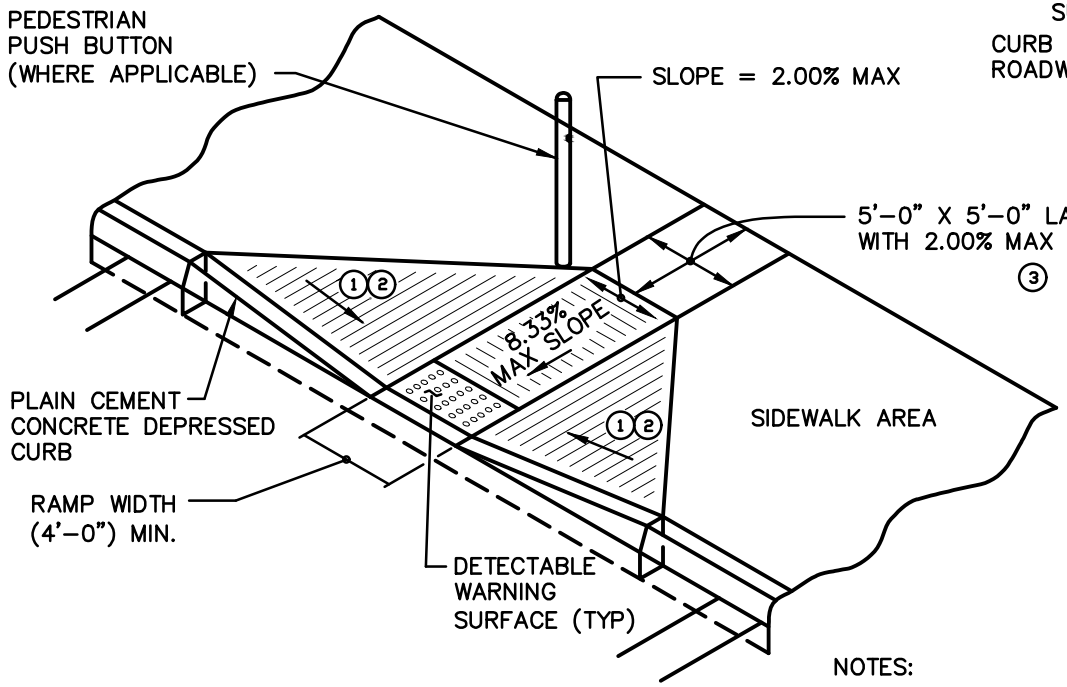
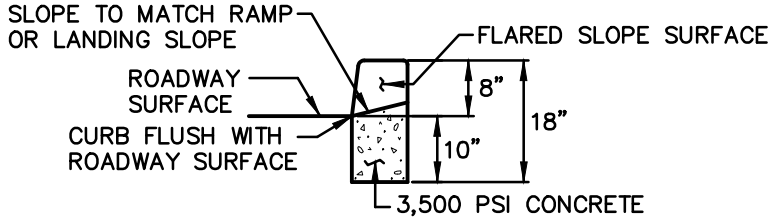
TYPE 1 DOUBLE CURB

RAMP DETAIL (ALTERNATE)

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA





DEPRESSED CURB

① SIDE FLARES 10.00% MAX SLOPE

② PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.

③ 5'–0" X 5'–0" FOOT LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS.

NOTES:

1. LANDING AREA SHALL BE AT LEAST AS WIDE AS THE CURB RAMP.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-7
FILE NO.	1301.1.00.04

RED LION MUNICIPAL AUTHORITY
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RED LION, PA 17356
TELEPHONE: (717)244-3475
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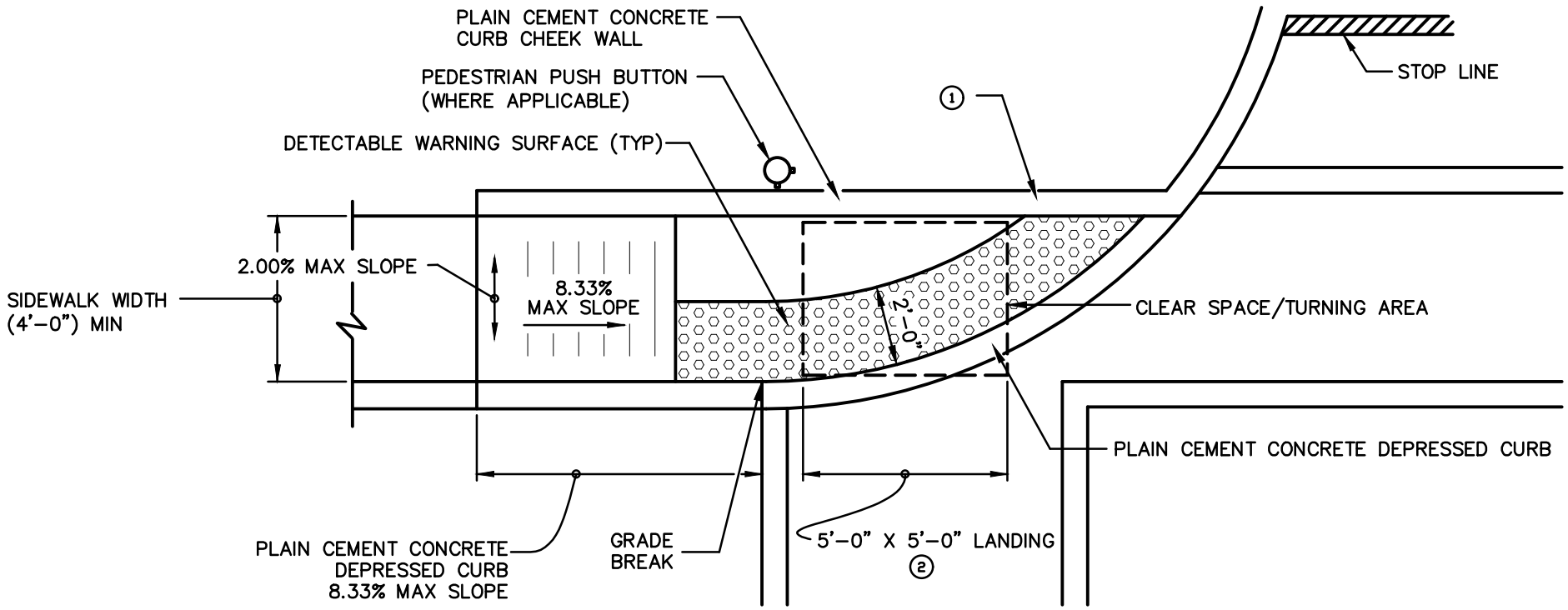
TYPE 1 CURB

RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



NOTES:

1. LANDING AREAS SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.
4. PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.
5. CLEAR SPACE SHALL BE LOCATED WITHIN MARKINGS AND OUTSIDE OF TRAVEL LANE.

① OPTIONAL ROLLED CONCRETE SURFACE OR REGRADE SLOPE CAN BE USED TO MEET THE ADJACENT SURFACES IN LIEU OF A RETURN CURB CHEEK WALL.

② 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS OUTSIDE THE TRAVEL LANE.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-8
FILE NO.	1301.1.00.04

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RED LION, PA 17356
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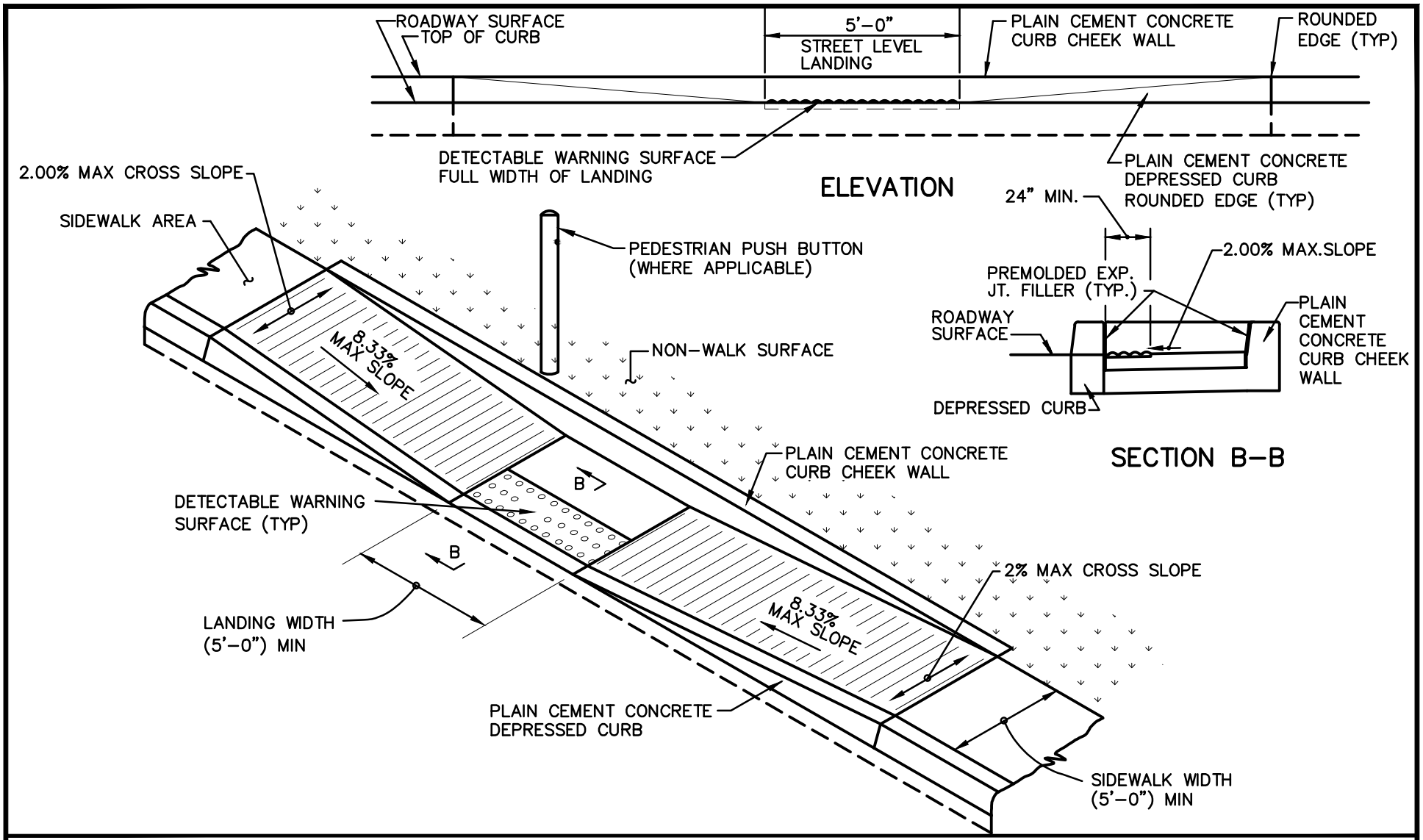
TYPE 1A CURB

RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-9
FILE NO.	1301.1.00.04

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RED LION, PA 17356
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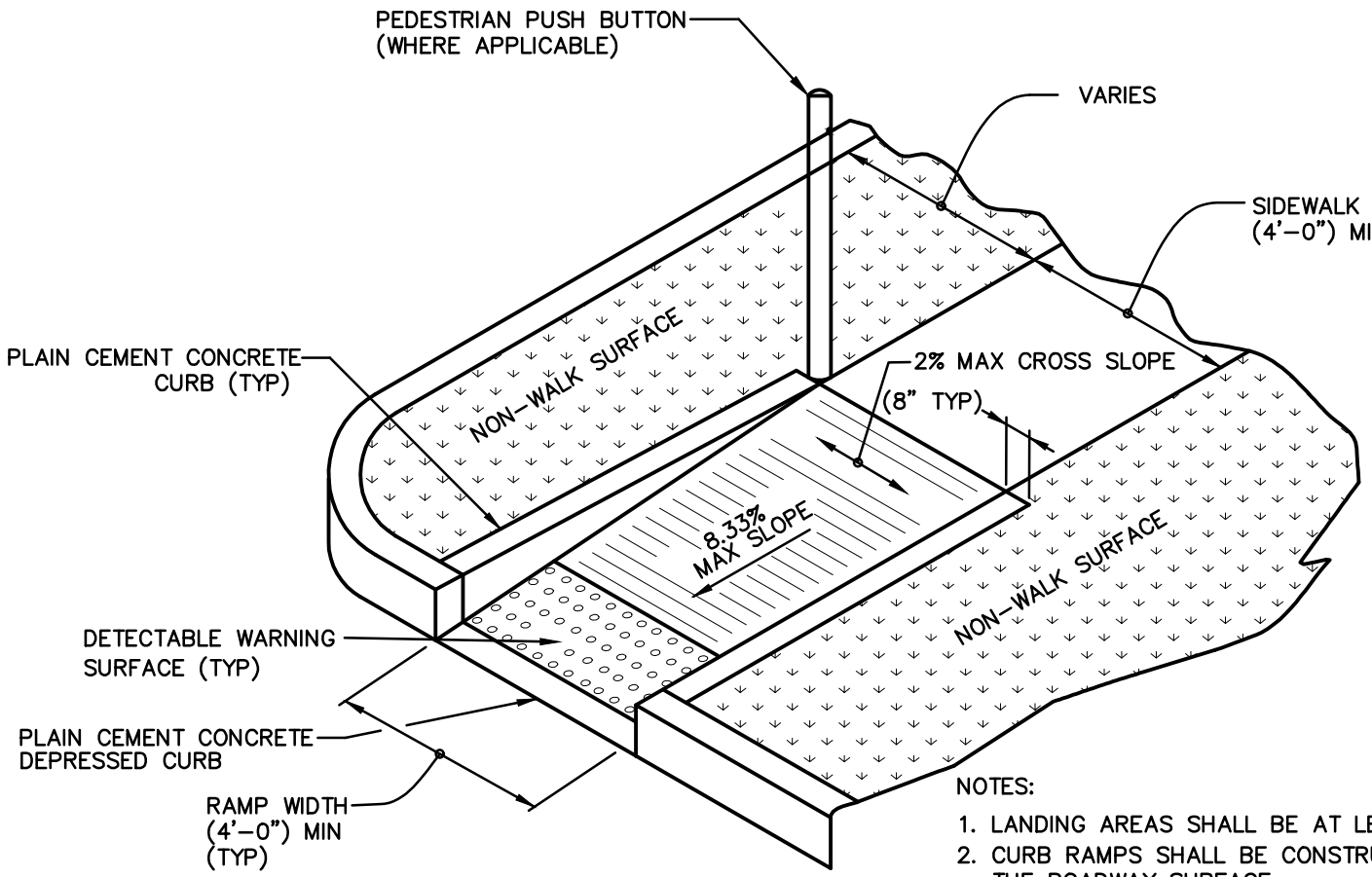
TYPE 2 CURB

RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



NOTES:

1. LANDING AREAS SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.
4. PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-10
FILE NO.	1301.1.00.04

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RED LION, PA 17356
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TYPE 3 PARALLEL

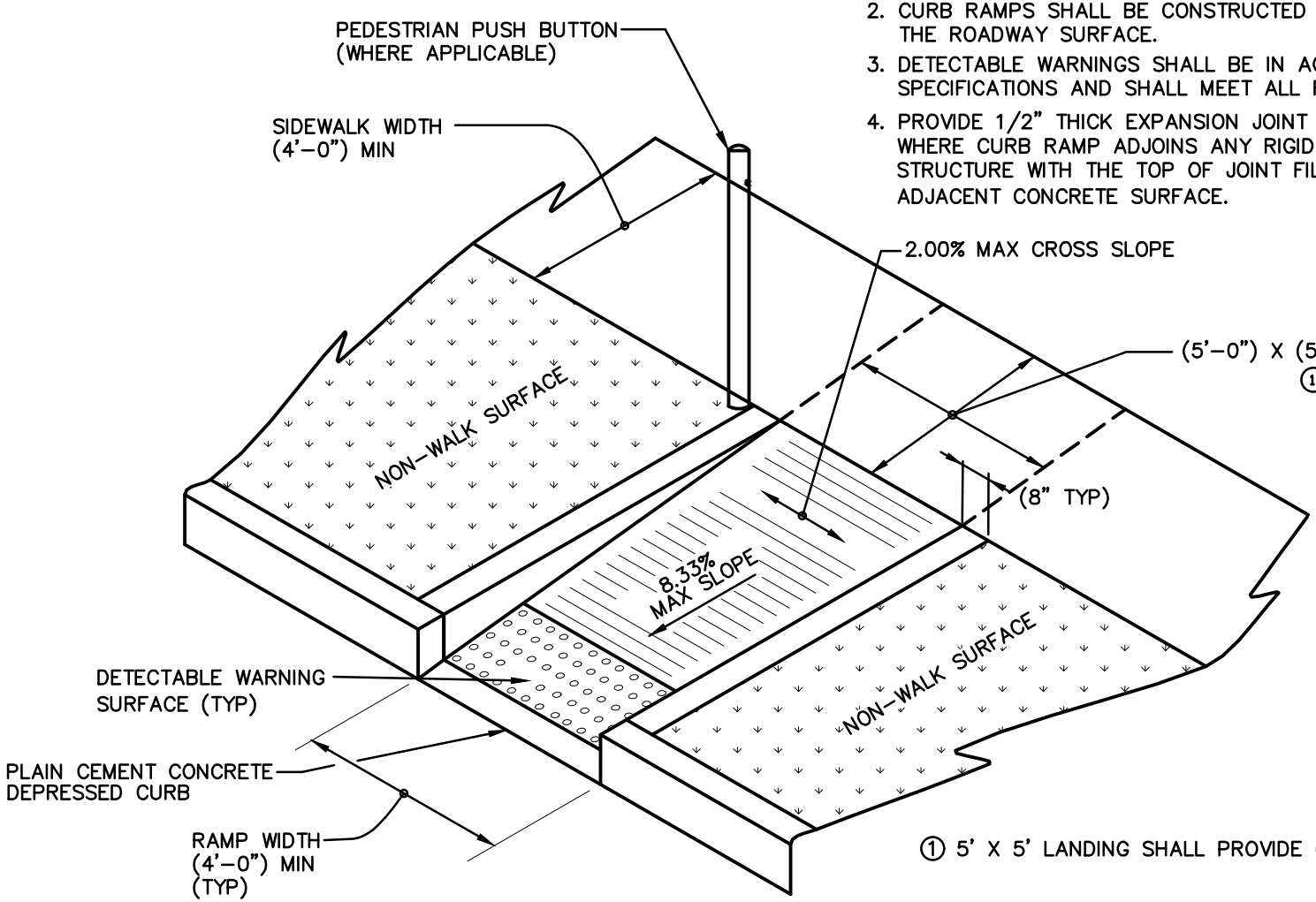
CURB RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA

NOTES:

1. LANDING AREAS SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.
4. PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.



① 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-11
FILE NO.	1301.1.00.04

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

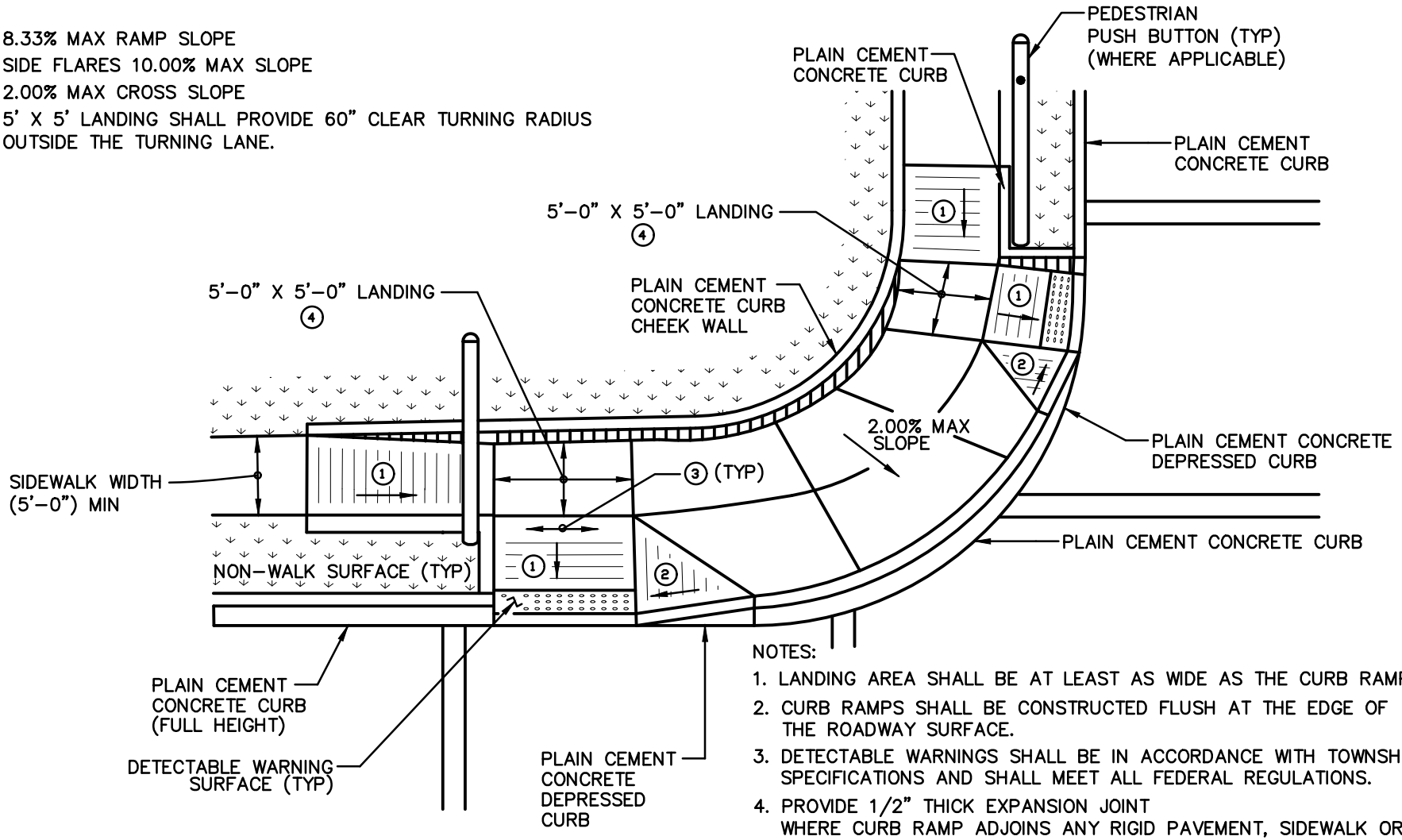
TYPE 3 PERPENDICULAR

CURB RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA

① 8.33% MAX RAMP SLOPE
② SIDE FLARES 10.00% MAX SLOPE
③ 2.00% MAX CROSS SLOPE
④ 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS OUTSIDE THE TURNING LANE.



NOTES:
1. LANDING AREA SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.
4. PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-12
FILE NO.	1301.1.00.04

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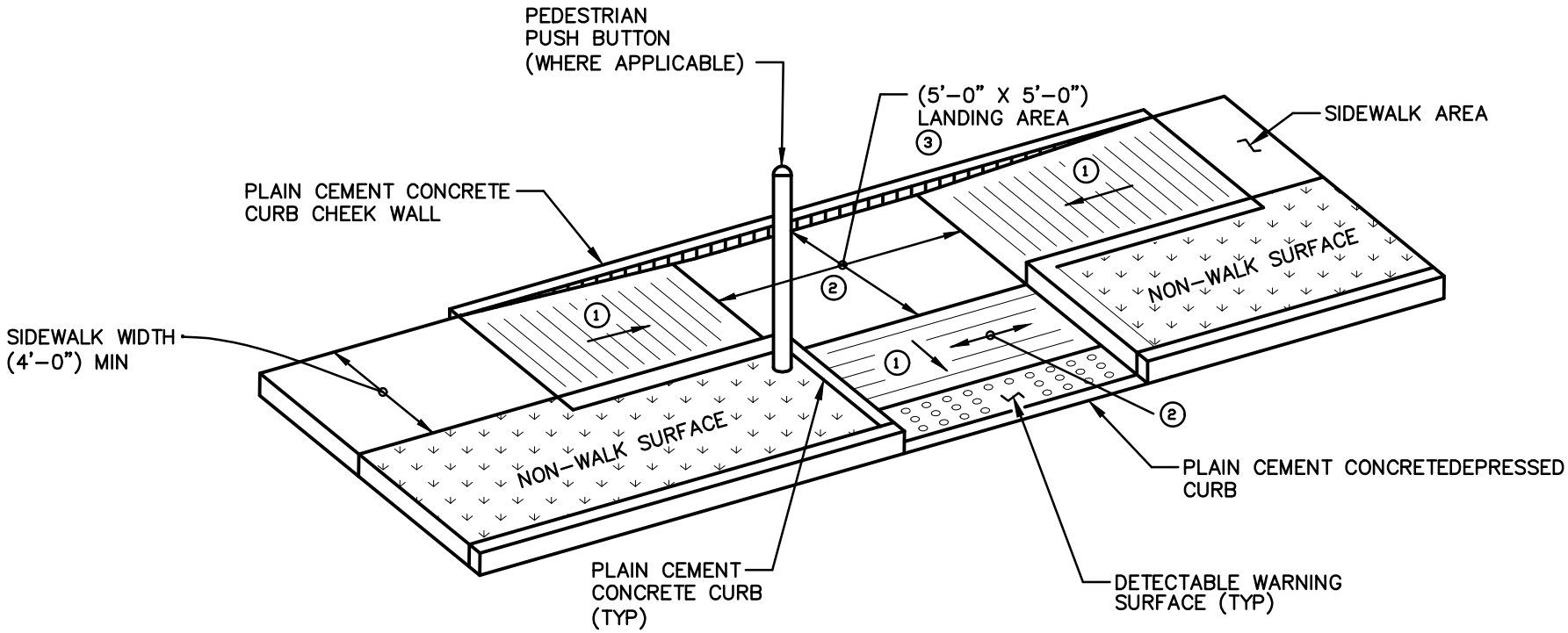
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

TYPE 4 COMBINATION

CURB RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



NOTES:

1. LANDING AREA SHALL BE AT LEAST AS WIDE AS THE CURB RAMPS.
2. CURB RAMPS SHALL BE CONSTRUCTED FLUSH AT THE EDGE OF THE ROADWAY SURFACE.
3. DETECTABLE WARNINGS SHALL BE IN ACCORDANCE WITH TOWNSHIP SPECIFICATIONS AND SHALL MEET ALL FEDERAL REGULATIONS.
4. PROVIDE 1/2" THICK EXPANSION JOINT WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.

① 8.33% MAX RAMP SLOPE
② 2.00% MAX CROSS SLOPE
③ 5' X 5' LANDING SHALL PROVIDE 60" CLEAR TURNING RADIUS.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-13
FILE NO.	1301.1.00.04

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
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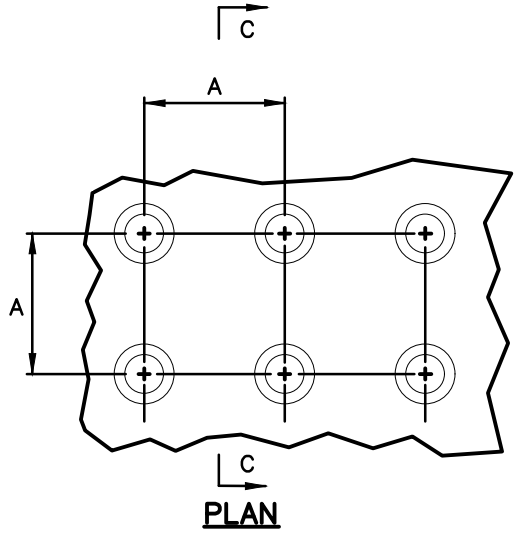
www.redlionpa.org

TYPE 4A COMBINATION

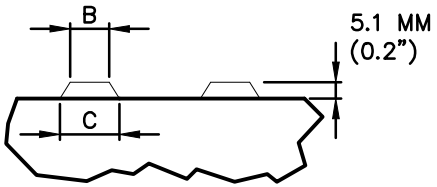
CURB RAMP DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



PLAN



SECTION D–D

NOTES:
1. THE B DIMENSION IS TYPICALLY 50% TO 65 % OF THE C DIMENSION.
2. DETECTABLE WARNINGS SHALL MEET ALL FEDERAL REGULATIONS.

TRUNCATED DOME DIMENSIONS	
DIM	mm (inch)
A	60 (2.35")
B	①
C	23 (0.9")

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-14
FILE NO.	1301.1.00.04

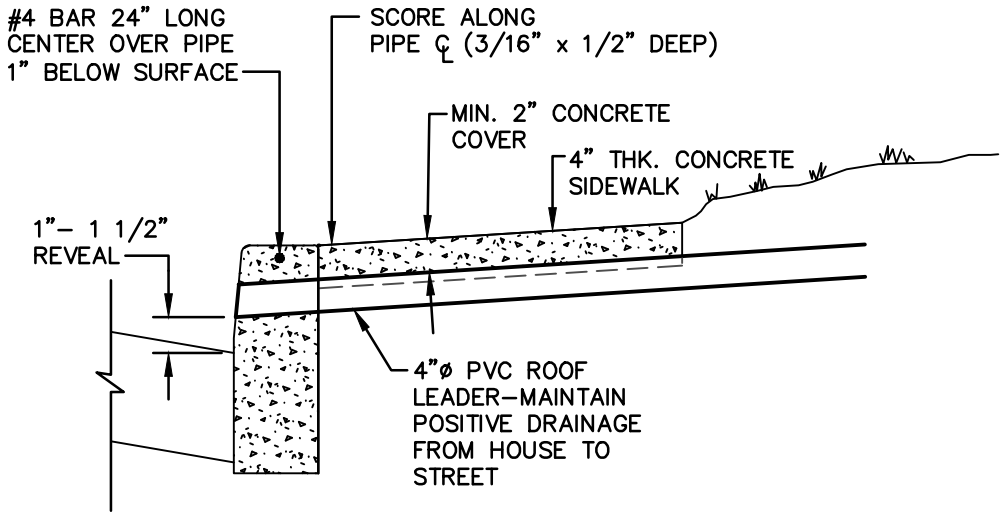
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

DETECTABLE WARNING

SURFACE DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



NOTE: USE ROOF LEADER WITH STANDARD VERTICAL CURBS ONLY

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

ROOF LEADER UNDER SIDEWALK DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02525-15
FILE NO.	1301.1.00.04

SECTION 02525

CEMENT CONCRETE CURB & SIDEWALK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Subgrade preparation
2. Construction of cement concrete curb and sidewalk
3. Construction of handicap ramps
4. Construction of brick sidewalk
5. Stamped and colored concrete sidewalk

B. Related work specified elsewhere:

1. Trenching, backfilling and compaction: .....Section 02221
2. Finish grading, seeding and sodding:.....Section 02485
3. Bituminous paving and surfacing: .....Section 02500
4. Trench paving and restoration: .....Section 02575
5. Plain and reinforced cement concrete: .....Section 03000

Refer to local Municipal regulations or construction drawings for details beyond this section.

C. Definitions: NONE

D. Applicable Standard Details:

02525-1 Vertical Concrete Curb Details
02525-2 Slant Concrete Curb Details
02525-3 Concrete Sidewalk Detail
02525-4 Concrete Sidewalk at Driveway Details
02525-5 Type 1 Double Curb Ramp Detail
02525-6 Type 1 Double Curb Ramp Details (Alternate)
02525-7 Type 1 Curb Ramp Detail
02525-8 Type 1A Curb Ramp Detail
02525-9 Type 2 Curb Ramp Detail
02525-10 Type 3 Parallel Curb Ramp Detail
02525-11 Type 3 Perpendicular Curb Detail
02525-12 Type 4 Combination Curb Ramp Detail
02525-13 Type 4A Combination Curb Ramp Detail
02525-14 Detectable Warning Surface Detail
02525-15 Roof Leader Under Sidewalk Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines

Department of Justice, Code for Regulations, ADA Standards for Accessible Design

2. American Society for Testing and Materials (ASTM):

A185 Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement
A615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C94 Specification for Ready-Mixed Concrete
C143 Test Method for Slump of Hydraulic Cement Concrete
C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
D994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
E329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

B. Inspections:

1. Inspection by the Authority will at a minimum be made of the subgrade, formwork, and any steel prior to placement of the concrete.

2. The Authority will observe all on-site testing of concrete.

C. Testing:

1. Contractor shall test concrete strength, slump, air content and temperature on site as specified in Section 03000, Paragraph 3.09.

2. All on-site testing as well as laboratory testing shall be performed by the same independent testing agency.

1.03 JOB CONDITIONS

A. Control of traffic:

1. Take measures to control traffic during all operations. Do not allow traffic on newly placed concrete until adequate strength has been attained.

2. Employ traffic control measures in accordance with Publication 203, Work Zone Traffic Control.

B. Coordination with utilities:

1. Coordinate all necessary adjustments of existing utilities to accommodate this work.

2. Provide access to the site for utility work.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Portland cement concrete shall be air-entrained and have a minimum 28-day compressive strength shall be 3,300 psi.

B. Cement Concrete criteria for curbs and sidewalks:

Slump: 1" minimum, 4" maximum
Air Content: 4.5% minimum, 7.5% maximum
Temperature: 60ºF minimum, 90ºF maximum

C. For slip formed curb, same as above except with a maximum slump of 1-1/2".

D. For replacement of curb and sidewalk at existing driveways, use air-entrained, PennDOT Class HES (High Early Strength).

2.02 FORMS

A. General requirements:

1. Forms shall be coated with a form release agent just prior to placement of concrete.

B. Straight curbing (or radius greater than 40 feet):

1. Approved metal forms.

2. Wood forms, not less than 2-inch nominal thickness, planed on finish side.

C. Radius curbing:

1. Approved metal forms.

2. Fabricated plywood or hardboard forms.

D. Curbing repairs (less than 10 feet):

1. Approved metal forms.

2. Adjust to match existing conditions (vertical 6" x 8" x 22" or rolled 24" x 10¾").

E. Machine-placed curbing:

1. Straight or radius curbing may be placed with a self-propelled machine approved by the Authority.

2.03 REINFORCEMENT

A. Welded Wire Fabric - ASTM A185. Size and spacing as shown on Standard Details.

B. Reinforcing Bars - ASTM A615, Grade 60 billet steel. Size and spacing as shown on Standard Details.

2.04 JOINT MATERIAL

A. Joint Filler – Pre-molded expansion joint material shall be fiber joint filler conforming to ASTM D994.

2.05 FORM COATING MATERIALS

A. Form release agents shall be non-staining, liquid chemical coatings free of kerosene, oil and was which effectively prevent absorption of moisture into the forms and bonding of the concrete to the forms.

2.06 CONCRETE CURING COMPOUNDS

A. Curing compounds shall be clear, non-staining liquid coatings containing no oil or wax and conforming to ASTM C309, such as Safe-Cure, Sealtight 1100, Klear Seal R-75 or Enviocure Clear 500, or similar material.

2.07 BRICK SIDEWALK

A. Brick paver, 1 5/8" thick. Color as approved by The Authority.

B. Type M mortar

2.08 STAMPED AND COLORED CONCRETE

A. Template Pattern - "old brick running board" by Matcrete (1-800-777-7063), or equal

B. Pigment - Brick Red #10160 by David Colors, Beltsville, MD, or equal

C. Clear Sealer - Sonneborn #800 as manufactured by Sonneborn, or equal

D. Template release agent - dry blend powder

PART 3 - EXECUTION

3.01 CURB CONSTRUCTION

A. Excavate to required depth, remove and dispose of material, including existing curbs and compact the subgrade material to a firm, even surface. For depressed (vertical) curb at driveways, depth of curb shall be consistent with full height curb, i.e. 10" below finish grade.

B. Saw cut existing pavement a minimum of 12" from face of new curb. Exposed edges of existing work shall be smooth and square.

C. Forms shall be placed as appropriate to the type of curbing on 2 sides (front and back). Forms shall be securely braced to limit deflection during placement of concrete.

D. Provide openings through curb for drainage pipes. Install one, 2'-0" long, #4 reinforcing bar in the middle of curb centered above the pipe as per Standard Detail.

E. Concrete shall be placed in accordance with Section 03000, Paragraph 3.05.

F. Variation of more than 1/8” from the established line and grade shall be cause for rejection of that portion of the work.

G. Form or saw contraction joints 3/16" wide and 2" deep at 10-foot maximum intervals on 2 sides (front and top). Saw as soon as possible after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking occurs in the concrete, but in no case later than 24 hours following completion of the curb placement.

H. Provide ½" expansion joints at 60-foot intervals, at the end of each pour, and at the beginning and end of all radii. Place two (2) #4 rebar dowels, 24" long, at all expansion joints. ½" expansion joint material shall also separate curb from adjacent sidewalks, poles, hydrants, walls and other permanent structures, except that 3/4" thick expansion joint material shall be provided at storm inlets. Do not dowel into inlet frames.

I. The last three feet of curb shall be tapered to a 1-1/2" reveal with expansion joint at the beginning of taper.

J. Finish top surface with wood floats. Provide depressions for drainage, driveways, and ramps for the handicapped as directed by the Authority. Tool all exposed edges to the specified radius.

K. Do not remove forms until concrete has set. Begin proper curing immediately after placement.

L. Reapply curing compound 30 days following first application.

M. For slip formed curb, uniformly feed the concrete to the machine so the concrete maintains the shape of the section, without slumping after extrusion. Voids or honeycomb on the surface of the finished curb will not be allowed. Immediately after extrusion, perform any additional surface finishing required.

N. Correct minor irregularities with a carborundum stone or mortar comprised of two parts fine aggregate to one part cement.

3.02 CONCRETE SIDEWALK CONSTRUCTION

A. Excavate to required depth and width, remove and dispose of material, including any existing sidewalks, and compact the subgrade material to a firm, even surface.

B. Exposed edges of existing work shall be smooth and square.

C. Construct ramps for handicapped persons at all street crossings (as required by ADA regulations and as indicated in Section 3.04) as directed by the Authority. Handicap ramps shall be 6" thick concrete. All handicap ramps shall have detectable warning domes as shown on drawing CT-02525-14.

D. Sidewalks across sanitary sewer or storm sewer easements shall be 8" thick.

E. Spread AASHTO No. 57 aggregate and compact to the thickness shown on the Standard Details.

F. Concrete shall be placed in accordance with Section 03000, Paragraph 3.05. Hand float to desired line and grade.

G. Score contraction joints at 5-foot intervals to sufficient depth to insure cracking at the joint. Do not saw cut the contraction joints without prior approval from the Authority. Also score sidewalks over each drainage pipe placed underneath.

H Provide 1/4" expansion joint at 30-foot intervals and at the end of each pour. Place ½" expansion joint material at adjacent curb, poles, hydrants, walls, and other permanent structures.

I. Apply light broom finish immediately after float finish as specified in Section 03000, Paragraph 3.07C.

J. Provide depressions for driveways, downspouts, and drainage as directed by the Authority or shown on the drawings. Wherever possible roof leaders shall be placed under the sidewalks in lieu of depressions. Reapply curing compound 30 days following first application.

K. Begin proper curing in accordance with Section 03000, Paragraph 3.08 and immediately following placement.

L. Monolithic sidewalk and curb will not be allowed at a radius handicap ramp. Mid-block ramps must have separate curbs.

M. Apply curing compound.

3.03 BRICK SIDEWALKS

A. Construct 6" thick PennDOT 2RC subbase and 4" thick reinforced concrete slab similar to Article 3.02 except for finish.

B. Place 1" leveling bed of mortar on concrete slab.

C. Set bricks on mortar with tight joints.

D. Slopes shall be as shown on standard details.

3.04 STAMPED AND COLORED CONCRETE SIDEWALKS

A. Excavate, place stone base and place expansion joints and reinforcing similarly to plain concrete sidewalks.

B. Pigment must be thoroughly mixed throughout concrete using ratios consistent with manufacturer's recommendations. Apply float finish and edge.

C. Sprinkle release agent onto fresh concrete prior to stamping with template.

D. Remove release agent by power washing approximately 24 hours after stamping is complete, or as recommended by the manufacturer.

E. Apply clear sealer to all concrete surfaces.

F. Release agent, pigment and sealer must be from same manufacturer or proven to be compatible with each other.

3.05 HANDICAP RAMPS

The following requirements shall be followed in all construction of handicap ramps, where these requirements are less stringent or different from ADA requirement, the ADA requirements shall govern.

A. Sidewalks

1. Sidewalk cross slopes shall not exceed 2%.

2. A minimum of 36” pedestrian path of travel, clear of obstructions, grates and other openings, shall be provided along the run of a sidewalk. A 42” pedestrian path of travel is preferred.

3. Objects shall not project more than 4 inches into the pedestrian path of travel between 27” and 80” above the sidewalk surface unless a detection barrier is provided beneath the object at a maximum of 4” less than the projection into the pedestrian path of travel.

B. Driveway aprons

1. Driveway aprons shall provide a minimum of 36” pedestrian path of travel, clear of obstructions, grates and other openings, in line with the run of a sidewalk with a maximum cross slope of 2%.

C. Curb ramps

1. Curb ramps shall have a maximum slope of 1:12.

2. The sum of the percent slope of the curb ramp and the roadway cross slope, when added together as positive values, shall not exceed 13%.

3. Curb ramps shall have a minimum width of 4 feet.

4. Curb ramps shall be constructed flush, without a reveal, at the edge of the roadway surface.

5. Curb ramps shall be perpendicular to the curb.

6. Curb ramps shall be within the crosswalk if a crosswalk exists.

7. Flares shall be provided at a maximum slope of 1:10 when a curb ramp is located in the pedestrian path of travel.

8. Return curbs shall only be provided in areas outside the pedestrian path of travel or walkway.

D. Diagonal Curb ramps

1. Diagonal curb ramps shall not be permitted in new construction. For projects proposing improvements to handicap facilities, diagonal curb ramps shall be permitted on a case to case basis as determined by the Authority.

2. Diagonal curb ramps shall have a minimum 4’x 4’ maneuvering space at the bottom of the ramp. The maneuvering space shall have a maximum 2% cross-slope in any direction. The maneuvering space shall be within the projected curb line measured from the point of curvature and point of tangent to the point of intersection of the project curb lines. The maneuvering space shall be within the crosswalk delineation.

3. Diagonal curb ramps having flared sides shall have at least a 24-inch-long segment of straight curb located on each side of the curb ramp and within the marked crossings.

E. Detectable Warning Surfaces

1. Detectable warnings shall provide significantly contrasting texture and light reflective color.

2. Detectable warnings shall be the width of the curb ramp and two feet in depth.

3. Detectable warnings shall be provided at a maximum 8” from the roadway surface.

4. Detectable warnings may be considered part of the ramp portion of the curb ramp.

5. Truncated domes within the detectable warnings surface shall provide domes in alignment with the direction of travel.

6. Truncated domes shall have a diameter of 0.9 inches, a height of 0.2 inches and a center to center spacing of 2.35 inches and shall contrast visually with adjoining surfaces, either light on dark, or dark on light.

F. Landing Areas

1. A landing area shall be provided at any curb ramp where there is more than one pedestrian path of travel accessible to the curb ramp.

2. Landing areas shall be provided as required in accordance with Federal regulations.

3. Landing areas shall be a minimum 5’ X 5’ area, clear of any obstructions, with a maximum slope of 2% in any direction. 4’ X 4’ landing with a 60” clear turning diameter maybe be permitted if a written report of noncompliance is submitted for each location proposed and approved by the Engineer.

4. Landing areas shall be provided at the following locations:

- every location the pedestrian path of travel would change direction
- at any location where the rise of a ramp exceeds 30 inches.

5. The landing area shall be at least as wide as the ramp run leading to it.

3.06 BACKFILLING AND RESTORATION

A. Temporary backfill at curbs shall consist of select granular material front and back, to within 8" of top of curb.

B. Restore adjacent areas in kind.

END OF SECTION

SECTION 02575

TRENCH PAVING AND RESTORATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Temporary trench paving
2. Permanent trench paving
3. Shoulder restoration
4. Driveway restoration
5. Concrete restoration

B. Related work specified elsewhere:

1. Trenching, backfilling, and compacting: .....Section 02221
2. Roadway excavation, fill and compaction .....Section 02230
3. Finish grading, seeding, and sodding.....Section 02485
2. Bituminous paving and surfacing: .....Section 02500
3. Plain and reinforced cement concrete: .....Section 03000

C. Definitions: NONE

D. Applicable Standard Details:

02575-1 Trench Paving Limits Detail
02575-2 Water Service Trench Restoration Detail

"Backfill and Surface Restoration Requirements Table".

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 213, Temporary Traffic Control Guidelines
Publication 27, Specification for Bituminous Mixtures (Bulletin 27)
Publication 37, Specification for Bituminous Materials (Bulletin 25)

2. American Society for Testing and Materials (ASTM):

D2950 Test Method for Density of Bituminous Concrete in Place by Nuclear Method

3. Pennsylvania Code

Title 67 Transportation, Chapter 459, Occupancy of Highways by Utilities

B. Inspections:

1. Inspection by the Authority will, at a minimum, be made of the subgrade prior to placement of the base course, and of the base course prior to placement of the binder surface.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from bituminous and aggregate suppliers attesting that materials conform to Publication 408.

2. Submit bituminous concrete mix design for approval.

3. Provide PennDOT certifications with each load delivered to the job site.

1.04 JOB CONDITIONS

A. Control of Traffic:

1. Take measures to control traffic during paving operations. Do not allow traffic on newly paved areas until adequate stability and adhesion have been attained and the material has cooled to 140° F or less.

2. Employ traffic control measures in accordance with Publication 213, Temporary Traffic Control Guidelines.

B. Protection of Adjacent Areas:

1. Restore existing surface outside the limits of the work, that has been damaged by the Contractor's operations, to its original condition at the expense of Contractor.

PART 2 - PRODUCTS

2.01 CONCRETE

A. As specified in Section 03000.

B. For Trench Type 1 and Trench Type 4, use air-entrained, PennDOT Class HES (High Early Strength).

2.02 BITUMINOUS MATERIALS AND AGGREGATES

A. All bituminous materials and aggregates used in base course construction, paving, and resurfacing are designated in these specifications by, and shall conform to, the applicable portions of the Publication 408 Specifications. See descriptions in Sections 02230 and 02500.

B. For Trench Type 1 and Trench Type 2, minimum pavement design shall be PG 64-22, 0 to <0.3 million ESAL's. Skid resistance levels for wearing course shall be a minimum of SRL-L.

C, For Trench Type 3, minimum pavement design shall be PG 64-22, 0.3 to <3.0 million ESAL's. Skid resistance level shall be a minimum of SRL-M.

PART 3 - EXECUTION

3.01 TEMPORARY TRENCH PAVING

A. Place temporary paving immediately upon completion of trench backfilling. Unpaved trenches shall not remain unpaved longer than five working days after backfilling, nor over weekends and holidays, unless construction activities are restricted by PennDOT to restore after backfill.

B. Shape and compact subgrade material, then place and compact base course to the required thickness. Apply tack coat to vertical trench sides, in accordance to Publication 408, Section 460.

C. Place temporary paving material and compact to required minimum thickness with trench roller having a minimum 300 pounds pressure per inch-width of compaction. Temporary trench paving shall consist of 2” of cold patch or 19 mm Superpave.

D. Continuously maintain temporary paving.

3.02 PERMANENT TRENCH PAVING

A. For Bituminous Surface (Trench) Type 1, saw existing paving in accordance with PA Code 67, Chapter 459. This restoration shall be used when the final surface must be established immediately.

B. For Bituminous Surface (Trench) Local Type 2, the trench restoration shall be for all trenched within the roadway surfaces on roads that are classified as local roadways.

C. For Bituminous Surface (Trench) Collector or Arterial, Type 3, trim existing paving to remove damaged areas. Cut straight joint lines and right angle offsets. This restoration shall be used for any trench restoration on a road surface where the road is classified as a collector or an arterial.

D. For concrete (trench) Type 4, trench restoration for all trenched areas within the roadway surfaces that are concrete.

E. Construct permanent base and surface courses to the required compacted thicknesses shown in the "Backfill and Surface Restoration Requirements Table", and in accordance with Publication 408 Specifications. Seal all joints.

F. Maintain permanent paving throughout the maintenance period.

3.03 BITUMINOUS OVERLAY

A. See Section 02500.

B. Restore in accordance with the “Backfill and Surface Restoration Requirements Table.”

3.04 SHOULDER RESTORATION

A. Restore shoulders as directed by the Authority. In State Highways, restore in accordance with Highway Occupancy Permit requirements.

3.05 DRIVEWAYS

A. Trim concrete and bituminous driveway surfaces to remove damaged areas. Saw or cut straight joint lines parallel to the centerline of the trench. Cut offsets at right angles to the trench centerline.

B. Restore existing concrete driveways with a 6" layer of concrete reinforced with WWF 6 x 6 - W2.9 x W2.9 (6 ga.) wire mesh, placed 2" from top surface. See Section 03000.

C. Restore existing bituminous driveways in kind; minimum 1½" layer wearing course over 6" layer of select granular material (2RC).

D. Restore earth driveways with a 6" layer of select granular material (2RC).

E. Restore stone or gravel driveways in kind; minimum 6" layer of select granular material (2RC).

F. Restore brick driveways with like bricks placed on a 4" thick wet sand bed. Place bricks in like pattern and spacing.

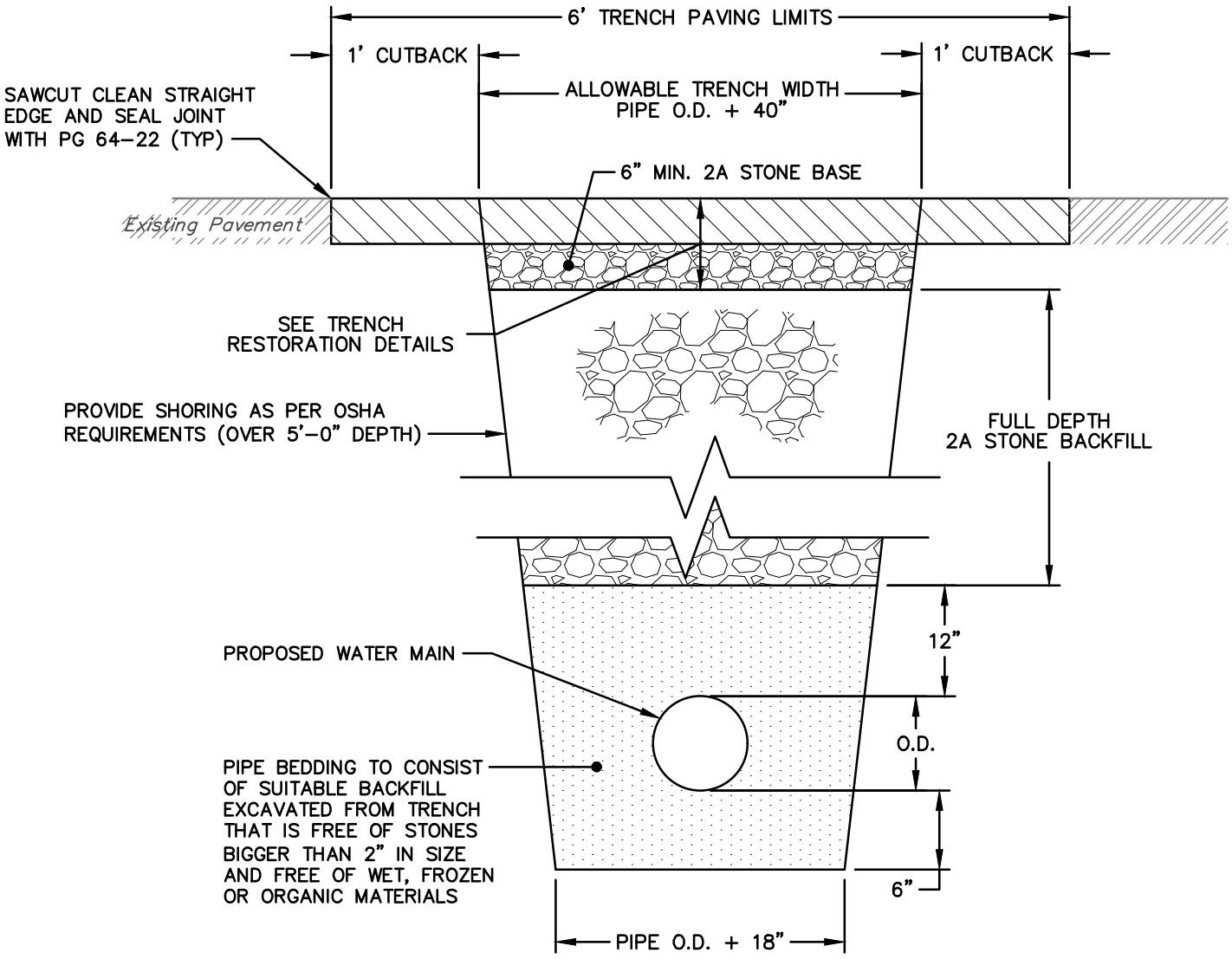
BACKFILL AND SURFACE RESTORATION REQUIREMENTS TABLE

Surface Class	Percent (1) Compaction	Temp. (3) Base	Temp. (3) Surface	Final Base	Final Surface
Vegetative	90%	- - - -	(2)	- - - -	(2)
Stone (driveway or unimproved road)	95%	- - - -	4" PennDOT 2RC	- - - -	6" Thick PennDOT 2A
Bituminous Surface Course (Trench)	95%	4" thick BCBC and 8" 2RC Stone	2" thick Binder Course	6" thick BCBC 8" thick PennDOT 2RC	2" thick, bit. Wearing Surface (8)
Concrete	95%	8" thick(4) PennDOT 2A(6)	2" thick ID-2 Binder	8" thick PennDOT 2A	Min. 6" thick Class AA concrete(7)

NOTE: Materials and construction requirements shall be in accordance with PennDOT Publication 408 Specifications.

A. Minimum, as % of maximum dry weight density at optimum moisture content plus or minus 2%.
B. See Seeding Restoration Table, Section 02485.
C. Temporary restoration shall remain in place for at 90 days but not more than 6 months. Temporary restoration shall be removed prior to construction of final base and final surface.
D. To remain as final base.
E. All thicknesses shown are minimum compacted thickness.
F. PennDOT 2A modified or 3A modified as approved by Engineer.
G. PennDOT Pub. 408, Section 704. Use High Early Strength concrete for driveways.
H. See Standard Details for HMA asphalt surface if required.

END OF SECTION



NOTES:

1. THIS DETAIL APPLIES TO ANY WATER MAIN TRENCH RESTORATION REQUIRED WITHIN THE BITUMINOUS AREAS.
2. WATER MAIN SHALL HAVE A MINIMUM COVER OF 3'-6" UNLESS OTHERWISE DEPICTED ON SHEETS 2 THROUGH 5.

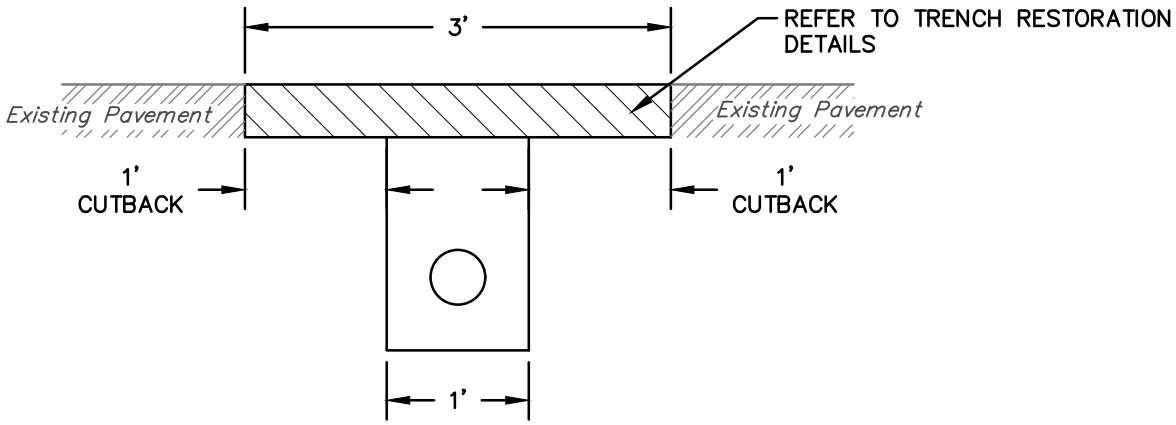
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

TRENCH PAVING LIMITS DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02575-1
FILE NO.	1301.1.00.04



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WATER SERVICE TRENCH RESTORATION DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
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DATE	04/05/2017
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FILE NO.	1301.1.00.04

SECTION 02601

MANHOLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Precast concrete manhole sections
2. Precast concrete manhole bases
3. Cast-in-place concrete manhole bases
4. Manhole steps
5. Manhole frames and covers and adjusting rings

B. Related Work Specified Elsewhere:

1. Trenching, Backfilling, and Compacting:.....Section 02221
2. Soil Erosion and Sedimentation Control: .....Section 02270
3. Finish Grading, Seeding, and Sodding: .....Section 02485
4. Sanitary Sewer Pipe:.....Section 02610
5. Sanitary Sewer Testing:.....Section 02651
6. Plain and Reinforced Cement Concrete:.....Section 03000
7. Cement Concrete for Utility Construction:.....Section 03050

C. Definitions:

1. Standard Manhole - manhole with vertical height from top of base (invert) to top of rim greater than 5'.

2. Shallow Manhole - manhole with vertical height from top of base to top of rim less than 5'.

D. Applicable Standard Details:

02601-1 Cast-in-Place Manhole Base Detail
02601-2 Precast Manhole Base Detail
02601-3 Standard Manhole Detail
02601-4 Standard Shallow Manhole Detail
02601-5 Drop Connection Detail
02601-6 Manhole Channel Configurations
02601-7 Poured in Place Concrete Adjustment Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 203, Work Zone Traffic Control
Publication RR-459, Occupancy of Highways by Utilities
Publication 19, Field Test Manual

PTM No. 106 - Moisture-Density Relations of Soils (using 5.5 lb. Rammer and 12” drop)
PTM No. 402 - Determining In-Place Density and Moisture Content of Construction Materials by Use of Nuclear Gauges
Publication 72M, Roadway Construction Standards (RC-39)

2. American Society for Testing and Materials (ASTM):

A48	Specification for Gray Iron Castings
A185	Specification for Welded Steel Wire Fabric, Plain, for Concrete Reinforcement
A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
B221	Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
C443	Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
C478	Specification for Precast Reinforced Concrete Manhole Sections
C923	Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
D1248	Specification for Polyethylene Plastics Molding and Extrusion Materials

3. Federal Specifications (FS):

SS-S-00210 - Sealing compound, preformed plastic, for expansion joints and pipe joints.

B. Inspections:

1. Inspections of the manholes by the Authority’s Representative will, at a minimum, be made of materials upon delivery to the job site; of the subgrade, prior to manhole base construction or placement; and of the completed manhole, prior to backfill.

2. Inspections of the frame and covers by the Authority’s Representative will be made upon delivery to the job site; and of the completed installation, prior to backfill.

3. A final inspection of the manhole channels, steps, frames and covers, and all joints will be performed upon completion of all testing, roadway restoration, and/or seeding.

4. Manholes shall be subject to rejection for failure to conform with these specifications or if any one of the following conditions is noted:

   a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.

   b. Defects that indicate incorrect proportioning, mixing, and molding.

   c. Surface defects larger than ½" diameter indicating honey-combed or open texture.

   d. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.

   e. Any continuous crack having a surface width of 0.01 inches or more and extending for a length of 6 inches or more, regardless of position in the section wall.

C. Concrete Testing (For Cast-In-Place Work) - As specified in Section 03000.

1.03 SUBMITTALS

A. Certificates:

1. Submit two copies of certification from material suppliers attesting that materials meet or exceed specification requirements.

B. Shop Drawings:

1. Submit details of manhole sections and precast bases if used.

2. Submit details of manhole frames and covers, including required lettering as specified on the Construction Drawings.

3. Submit details of adjusting rings.

4. Submit details of manhole steps.

5. Submit manufacturer's descriptive literature for the pipe to manhole flexible connections.

6. Submit manufacturer's descriptive literature for joint sealant compounds.

1.04 JOB CONDITIONS

A. As specified in Section 02221.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Precast Concrete Units:

1. After fabrication and curing, transport the manhole and components to the job site. Protect until required for installation.

2. Handle to avoid damage to surfaces, edges and corners and to avoid creation of stresses within the units.

PART 2 - PRODUCTS

2.01 CRUSHED STONE BASE

A. AASHTO No. 57 or AASHTO No. 8 crushed stone, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

2.02 MANHOLE BRICK: Not Permitted

2.03 CONCRETE MASONRY UNITS: Not Permitted

2.04 CEMENT MORTAR: ASTM C270, Type S

2.05 CEMENT CONCRETE: Section 03050.

2.06 RUBBER GASKETS: ASTM C443

2.07 RESILIENT PIPE-TO-MANHOLE CONNECTION: ASTM C923

A. PSX gaskets as manufactured by Press-Seal Gasket Corporation, Fort Wayne, Indiana or approved equal.

2.08 NON-SHRINK GROUT:

Fastsetting, cement-based mortar such as Waterplug, manufactured by Thoro Division of ChemRex, Shakopee, MN, or approved equal.

2.09 PRECAST CONCRETE MANHOLE BASES AND SECTIONS: ASTM C478

A. 5.5% + 1.5% air-entrained cement concrete.

B. Eccentric cone or flat slab top sections; minimum 24" access opening.

C. Precast riser sections of length to suit.

D. Precast bases of a design similar to the precast riser sections.

E. Precast drop connections, and precast lampholes are not permitted.

F. Manholes shall have a 4' inside diameter unless otherwise noted on the Construction Drawings.

G. Precast manhole bases shall be manufactured in accordance with the elevations shown on the Engineer's grade sheets and shall accommodate lateral hookups as marked in the field.

H. Precast manhole bases and precast concrete channels shall be constructed specifically for the work intended.

I. Precast products installed within PennDOT Rights-of-Way shall be in accordance with PennDOT Publication 408, Section 714, latest edition.

2.10 GLASS FIBER-REINFORCED POLYESTER MANHOLES: Not Permitted

2.11 CASTING MATERIALS

A. Gray Iron Castings shall conform to the requirements of AASHTO M105 Class 35B or ASTM A 48 Class 35B.

B. Castings shall be manufactured true to pattern and component parts shall fit together in a satisfactory manner. They shall be smooth and well cleaned by shot blasting. Circular manhole frames, covers and grates shall be furnished with machined horizontal bearing surfaces unless otherwise specified.

C. All shipments shall include appropriate certification from the producing foundry. The certification shall state that the castings have been produced in facilities operating in accordance with the applicable laws and regulations of the United States and the appropriate state, province, or local unit of government. This certification shall also state that all samples representing each lot have been tested, inspected, and have been found to meet the requirements of this specification and the applicable ASTM material specification listed in Section 3. Certification shall also state country of origin of the castings. If specified in the order, a report of the test results shall be furnished.

D. Markings

1. Each individual casting shall be identified by the foundry showing the following:

a. Name of producing foundry and country of manufacture preceded by the words "Made In", such as "Made in USA".
b. AASHTO designation or ASTM designation number.
c. Class by a number followed by a letter indicating the minimum tensile strength and size of test bar.
d. Heat identification and cast date (MM/DD/YY).
e. Casting lettering as required by the Authority.
f. Any markings as required to meet Federal requirements.

E. Records

1. All test results by this specification shall be maintained by the producing foundry for seven years and shall be made available to the purchaser upon request.

2. Records of casting certifications issued by a producing foundry shall be maintained by the producing foundry for seven years and shall be made available upon request.

2.12 JOINT SEALANT COMPOUND

A. FS SS-S-00210, preformed, flexible, self-adhering, cold-applied. Joints between manhole base and riser, between risers, between riser and cone, between cone and adjusting rings and cast iron frame, shall be made of RUB'R-NEK, a flexible plastic gasket-type sealant manufactured by K. T. Snyder Company, Inc., of Houston, Texas, or approved equal.

2.13 MANHOLE STEPS

A. Manhole steps shall be made of non-corrosive aluminum, or steel reinforced fiberglass or polypropylene materials. Steps in precast walls shall terminate 1" from outer surface and shall be cast in place wherever possible or grouted with a waterproof, non-shrink grout.

1. Aluminum alloy steps (Alloy 6061-T6) shall be Model No. F-140, manufactured by Washington Aluminum Company, Inc., of Baltimore, MD, or approved equal and shall have a protective coating consisting of asphalt coating conforming to AASHTO M-190 requirements applied to the portion to be embedded in the concrete.

2. Steel reinforced fiberglass steps shall be Model No. 115 manufactured by R.J. Manufacturing, Inc. of San Antonio, Texas, or approved equal.

3. Steel reinforced copolymer polypropylene plastic steps shall be Model No. PS-2-B or PS-2-PFS, manufactured by M. A. Industries, Inc. of Peachtree City, Georgia, or approved equal.

2.14 MANHOLE FRAMES AND COVERS

A. Domestic soft, gray cast iron castings: ASTM A48, Class 35B or better; free of bubbles, sand and air holes, and other imperfections. Castings shall be furnished unpainted.

B. Frames and covers shall be capable of withstanding an AASHTO HS-25 loading and shall have a minimum 24" clear opening. Watertight frames and covers shall meet AASHTO HS-20 loading requirements.

C. Frame and cover shall have machined bearing surfaces and matched to ensure against rocking.

D. Cover shall be lettered or marked “Red Lion Sanitary Sewer” (or “Storm Sewer”) as appropriate.

E. Standard frames and covers shall be similar to Model No. 1040, manufactured by East Jordan Iron Works, Inc., East Jordan, Michigan, or approved equal. Solid covers shall be self-sealing, have two (2) concealed watertight pick holes, and shall have two (2) lifting rings or bars, and no openings to permit surface water entry. Covers shall be 1 1/2" thick, and frames shall have a 24" diameter minimum clear opening and a minimum height of 7".

F. Heavy duty frames and covers shall be similar to Model No. 1545 manufactured by East Jordan Iron Works, East Jordan, Michigan, or approved equal. Solid cover shall be self-sealing, have two (2) concrete pick holes and shall have two (2) lifting rings or bars and no openings to permit surface water entry. Cover shall be 2 ½" thick and frames shall have a 23 15/16" diameter clear opening and a minimum height of 7".

G. Watertight frames and covers shall have suitable clamp, employing a rubber gasket seal, similar to Model No. 1893 manufactured by the by East Jordan Iron Works, Inc. East Jordan, Michigan, or approved equal. Exterior cover shall be 1-3/8” thick. Frames shall have 24-1/2” diameter clear openings and a minimum height of 7”.

H. Frames and covers shall be covered with an approved material during paving or seal coat operations to protect against tarnishing cover surface or restricting access to manhole. Protective material shall be removed immediately after road surface operations are complete. Contractor is responsible for cleaning of cover surface and restoring access to the manhole to the satisfaction of the Authority Representative.

2.15 REINFORCING STEEL: Section 03000

2.16 ADJUSTING RINGS

A. Precast cement concrete grade adjustment rings shall be cast from 4000 psi concrete (28-day compressive strength), shall be a maximum of 2" thick per ring. Circumferential reinforcement shall be in conformance with ASTM C478. Split concrete rings are not permitted.

B. Plastic adjusting rings shall be injection molded High Density Polyethylene (HDPE) conforming to ASTM D1248 as manufactured by Ladtech, Inc., Lino Lakes, MN. Maximum ring thickness shall be 2". Plastic rings must be approved by the Authority prior to use.

C. Infra-Riser Adjustment rubber rings, manufactured by East Jordan Iron Works, East Jordan Michigan or approved equal, may be substituted for concrete rings, if approved by the Engineer.

D. Poured in place concrete adjustments shall conform to Standard Detail 02601-7.

2.17 WALL PENETRATION SEALS

A. Concrete wall penetration seals shall be “link-seal” as manufactured by Thunderline Corporation, Houston, TX or approved equal.

B. Use appropriate wall sleeve type as recommended by manufacturer to provide watertight seal/connection.

2.18 STRUCTURAL CONCRETE BONDING AGENT

A. The epoxy bonding agent shall be Nitrobond EP, as manufactured by Fosroc Limited, Coleshill Road, Tamworth, Straffordshire, UK. The bonding agent shall be a two-component, solvent-free epoxy resin. The two components shall be differentially pigmented in order to ensure visually that correct mixing has taken place prior to the application. The product shall achieve 70 N/mm^2 compressive strength, 36 N/mm^2 tensile strength, 30% elongation, and 14 N/mm^2 bond strength and water absorption of 0.05%, when tested in accordance to ASTM C881: Type I, II, III, IV and V, grade 2 class E & F. Nitrobond shall be installed per manufacturer's recommendation.

PART 3 - EXECUTION

3.01 MAINTENANCE AND PROTECTION OF TRAFFIC: Section 02221

3.02 CUTTING PAVED SURFACE PRIOR TO EXCAVATION: Section 02221

3.03 BLASTING: Section 02221

3.04 EXCAVATION

A. Excavate as specified in Section 02221.

B. Excavate at location marked in the field.

C. Excavate to the required depth and grade for the invert of the manhole plus that excavation necessary for placement of base material.

3.05 STANDARD MANHOLE CONSTRUCTION

A. All manholes greater than 5' in vertical height from top of base to top of rim.

B. Install a minimum of 4" thick compacted crushed stone base. Provide cast-in-place concrete or precast concrete bases.

1. Construct cast-in-place bases as shown on Standard Detail 02601-1.

a. Cast-in-place bases may be constructed with a special form for a joint to match the manhole cylinder sections.

2. Install precast bases as shown on Standard Detail 02601-2.

a. Set the precast base on the crushed stone base.

b. Provide a sealed, flexible resilient connection between pipe and precast base section.

C. Install the proper diameter watertight manholes on precast concrete or poured-in-place concrete bases shown on the Construction Drawings.

D. Construct drop connections shown on Standard Detail 02601-5. Encase drop connection in concrete.

E. Form flow channels in manhole bases. Slope channels uniformly from influent invert to effluent invert, minimum 0.1' drop. Construct bends of the largest possible radius. Form channel sides and invert smooth and uniform, free of cracks, holes or protrusions.

F. Do not permit pipe to project more than 3” into the manhole.

G. Where special gaskets or water stops are recommended by pipe manufacturers for connections at manhole walls, these facilities shall be provided. All pipe connection joints shall be watertight.

H. Seal joints between precast concrete manhole sections with preformed rubber gaskets or joint sealant compound.

1. Place joint sealant compound on lower section to be compressed by the weight of the upper section.

I. Step placement:

1. Install manhole sections with steps in proper vertical alignment. Distance from top of rim to top step shall not be greater than 30” . Distance from floor of manhole to bottom step shall not be greater than 20” .

2. Manhole steps shall be placed perpendicular to the mainline channel. Do not locate steps over channels.

J. Install manhole frames and covers.

1. In all streets and private roadways the top rim elevation or the entire circumference of all manhole frames and covers shall be depressed 1/4" below the elevation of the adjacent street surface.

2. Seal joint between manhole frame and manhole with joint sealant compound.

3. All manholes shall be adjusted to finished street grade utilizing no more than two (4" maximum thickness) adjusting rings. Brick and stone adjustments or the use of metal extension rings shall not be permitted.

4. If the proper adjustment cannot be achieved by the use of two rings, the cone section shall be removed and the proper barrel section inserted.

5. All concrete adjusting rings shall be parged and plastered on the inside and outside with cement mortar one-half (½") inch in thickness, carefully spread and thoroughly troweled to a smooth surface on the inside only.

6. Install Infra Riser adjusting rings in accordance with manufacturer’s recommendations using approved butyl sealant between cone and ring and between rings.

K. New manholes constructed on existing pipelines:

1. Only cast-in-place manhole bases shall be installed over existing sanitary sewers.

2. Carefully excavate around existing pipeline for placement of the new manhole base.

3. Take all measures necessary to control flow through the existing pipeline and to prevent leakage into the new base.

4. After completion of the manhole, carefully saw and remove the top portion of the existing pipeline.

5. No materials, construction debris, or ground and surface water shall enter the existing pipelines.

6. Upon completion of the connections, a properly sized plumber's stopper shall be placed in the new line and be adequately braced to prevent a "blowout".

7. The stopper shall not be removed until written permission is granted by the Engineer.

L. Concrete wall penetration shall be cored at the sizes and locations indicated on the Construction Drawings or as recommended by the seal manufacturer. Place approved water-tight connectors Place wall sleeves in the concrete walls in accordance with manufactures requirements.

M. Manholes with protective liners shall be installed in accordance with Section 02604. All manholes located downstream of an existing or proposed sanitary sewer form main discharge shall be equipped with a concrete protective lining system as directed by the Red Lion Municipal Authority.

3.06 SUPPORT OF EXCAVATION: Section 02221

3.07 CONTROL OF EXCAVATED MATERIAL: Section 02221

3.08 DEWATERING: Section 02221

3.09 SHALLOW MANHOLES

A. All manholes less than five (5') feet in vertical height shall have a flat top section without a cone transition section and shall be constructed in accordance with Standard Detail 02601-4.

3.10 BACKFILLING

A. Backfill only after examination of the manhole by the Authority’s Representative.

B. Perform backfilling as specified in Section 02221

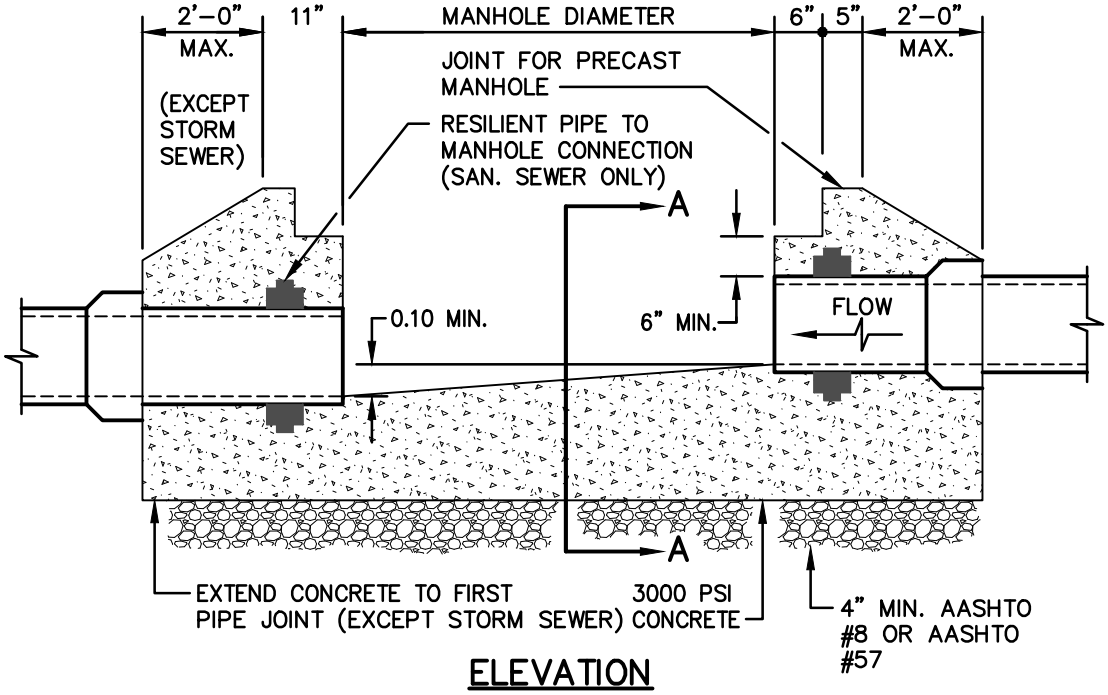
3.11 DISPOSAL OF EXCAVATED MATERIAL: Section 02221

3.12 RESTORATION OF SURFACE AREAS

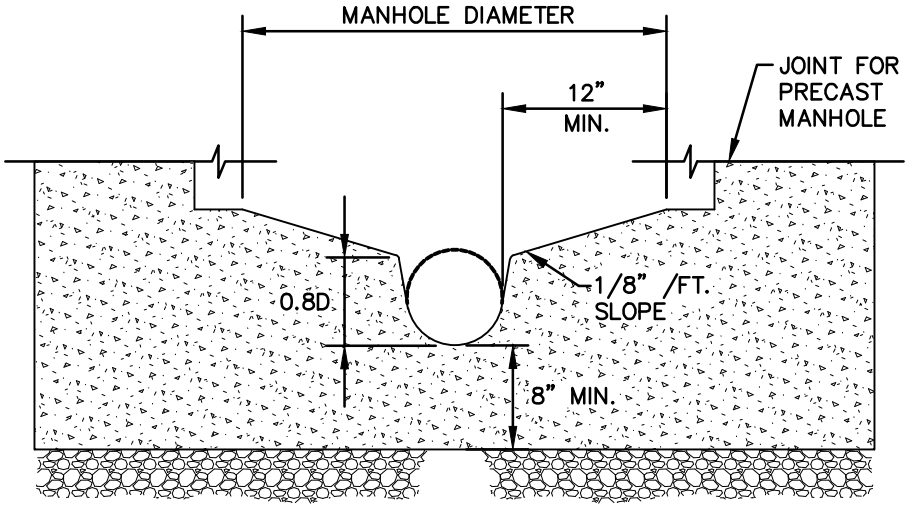
A. Restore paved areas as specified in Section 02575 by appropriate local regulations.

B. Restore unpaved surfaces as specified in Section 02221.

END OF SECTION



ELEVATION



SECTION A–A

D = PIPE INSIDE DIAMETER

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

CAST-IN-PLACE
MANOLE BASE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
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DATE	04/05/2017
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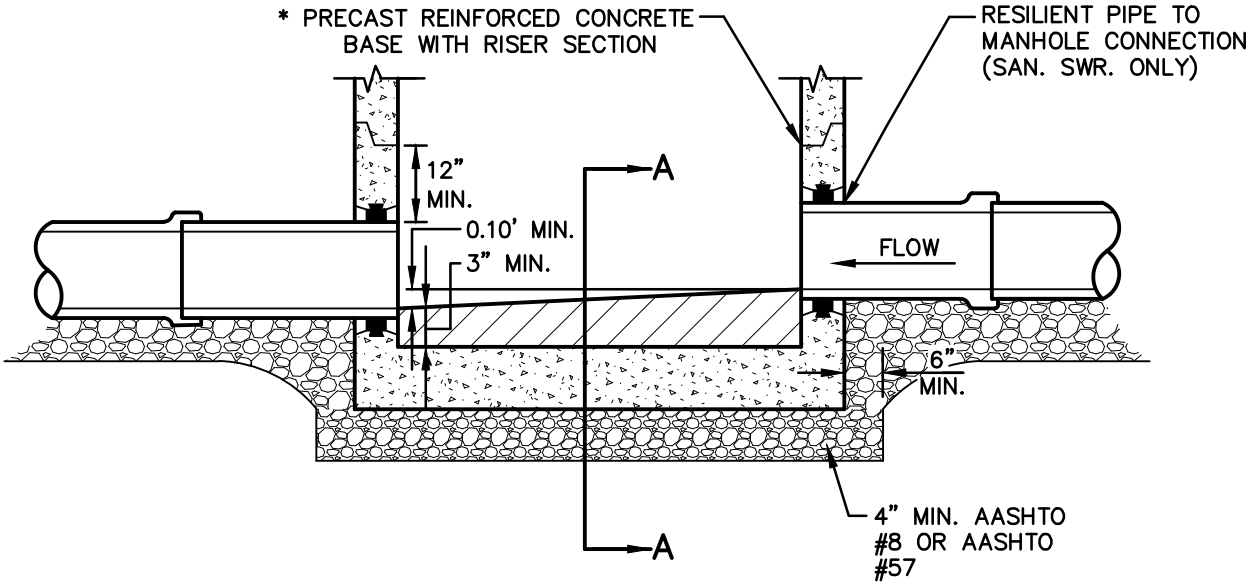

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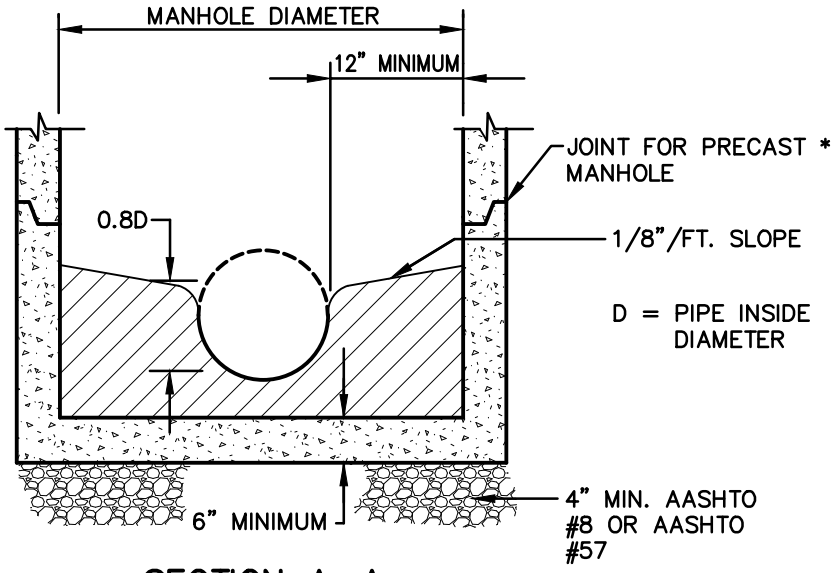

SECTION A–A

* DOUBLE RAMNECK BETWEEN ALL MH SECTIONS

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PRECAST MANHOLE
BASE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
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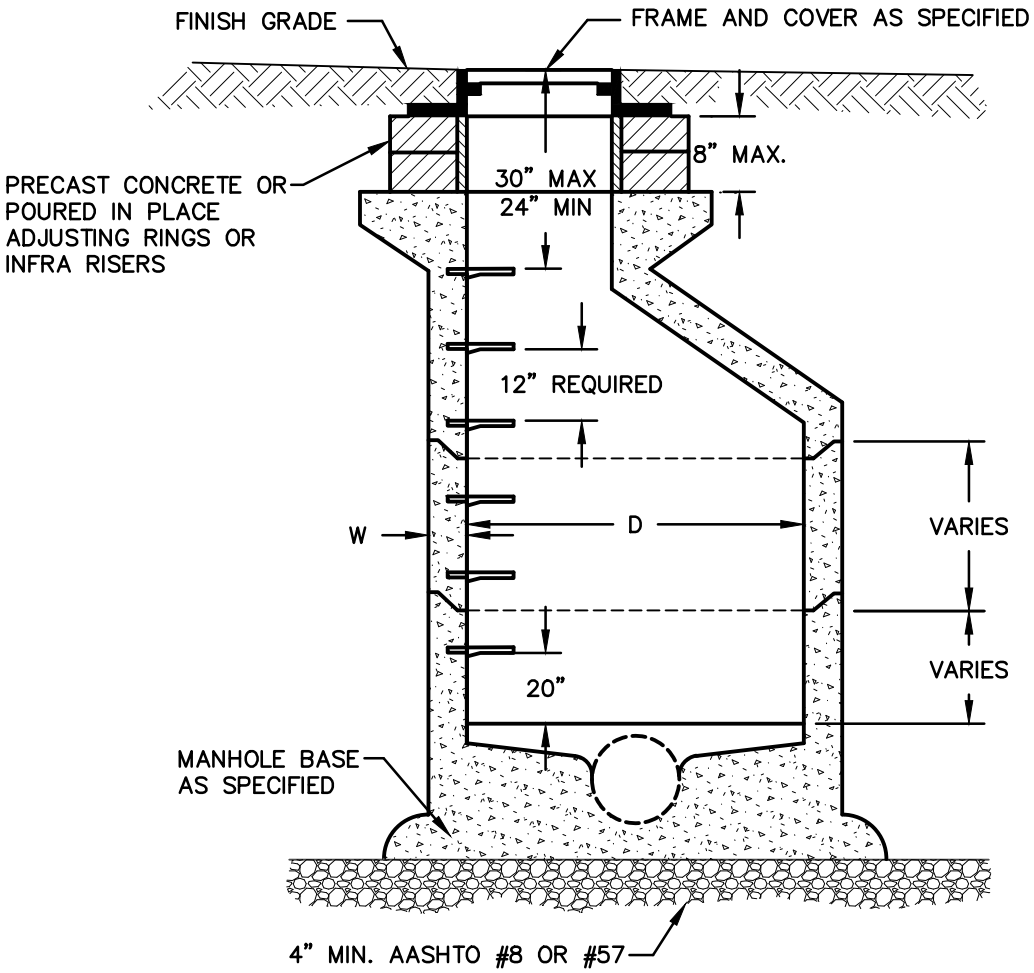
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02601-2
FILE NO.	1301.1.00.04



D	W
4'–0"	5"
5'–0"	6"
6'–0"	7"

* DOUBLE RAMNECK BETWEEN ALL ADJUSTMENTS AND FRAME

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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STANDARD
MANHOLE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
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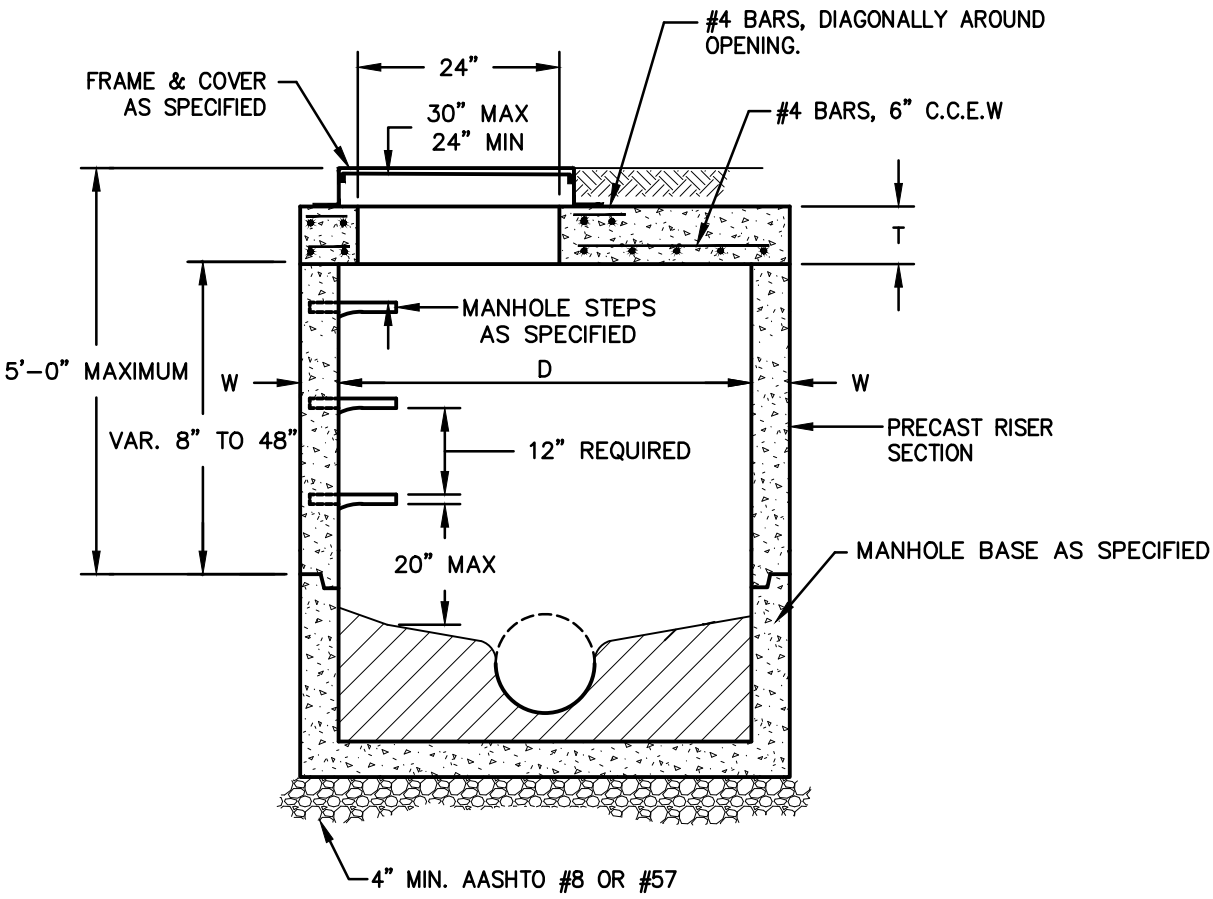
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02601-3
FILE NO.	1301.1.00.04



D	W	T
4'–0"	5"	6"
5'–0"	6"	8"
6'–0"	7"	8"

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STANDARD SHALLOW MANHOLE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

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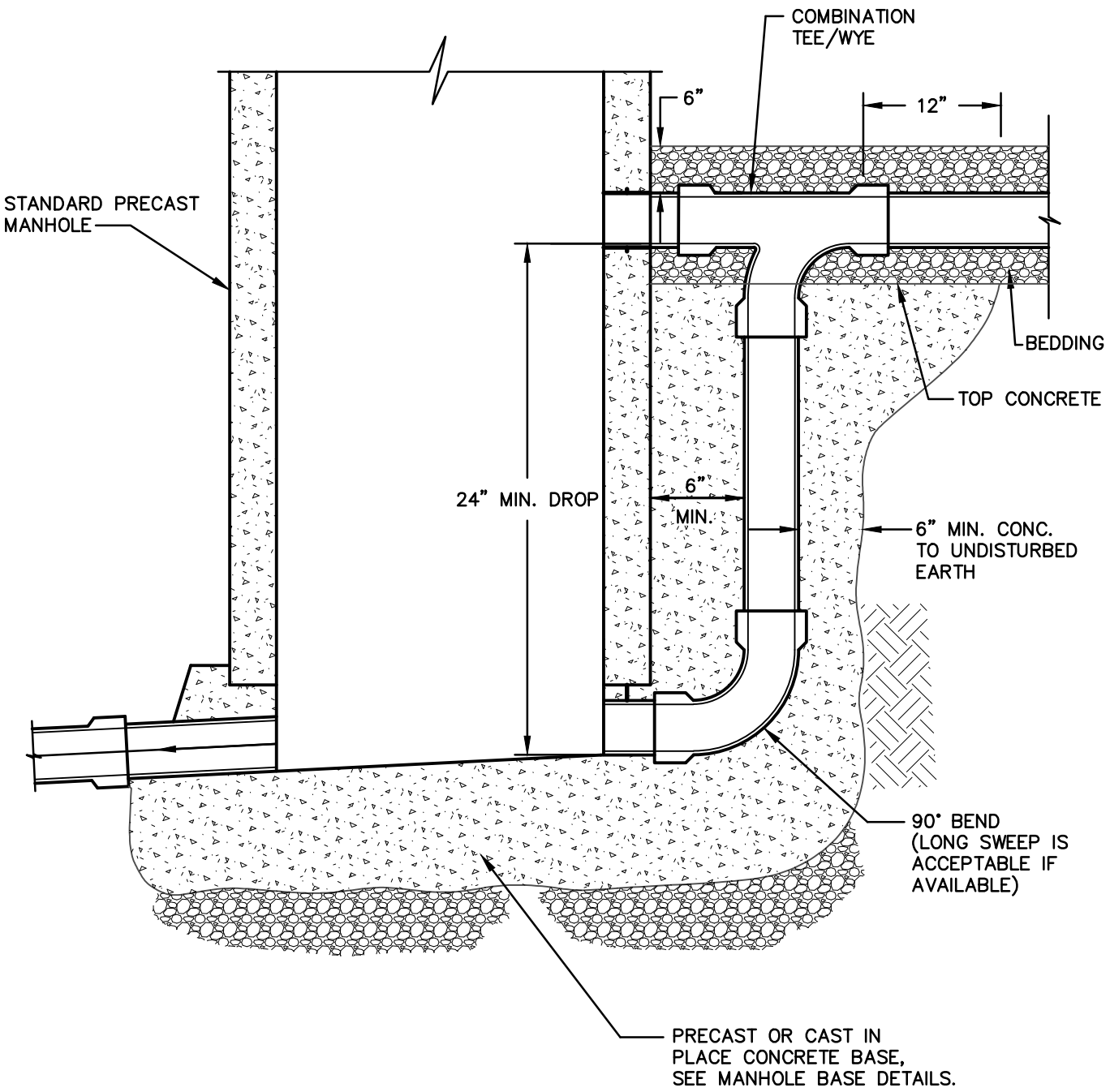
DATE	04/05/2017
DWG. NO.	02601-4
FILE NO.	1301.1.00.04



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DROP CONNECTION
DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

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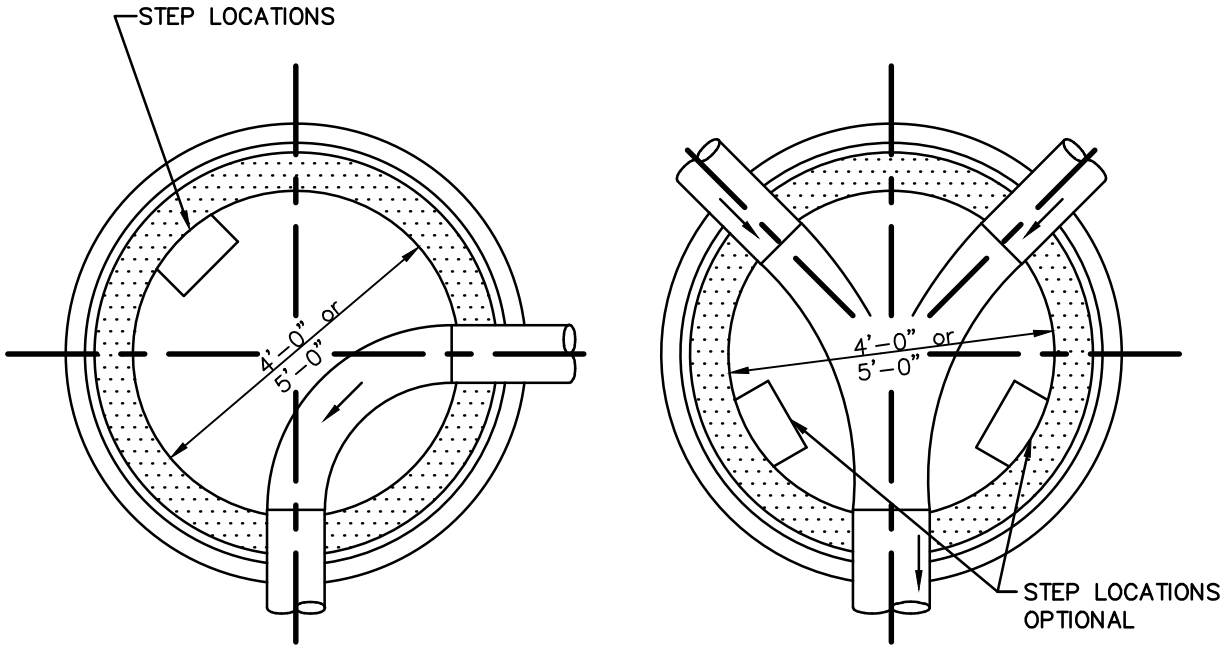
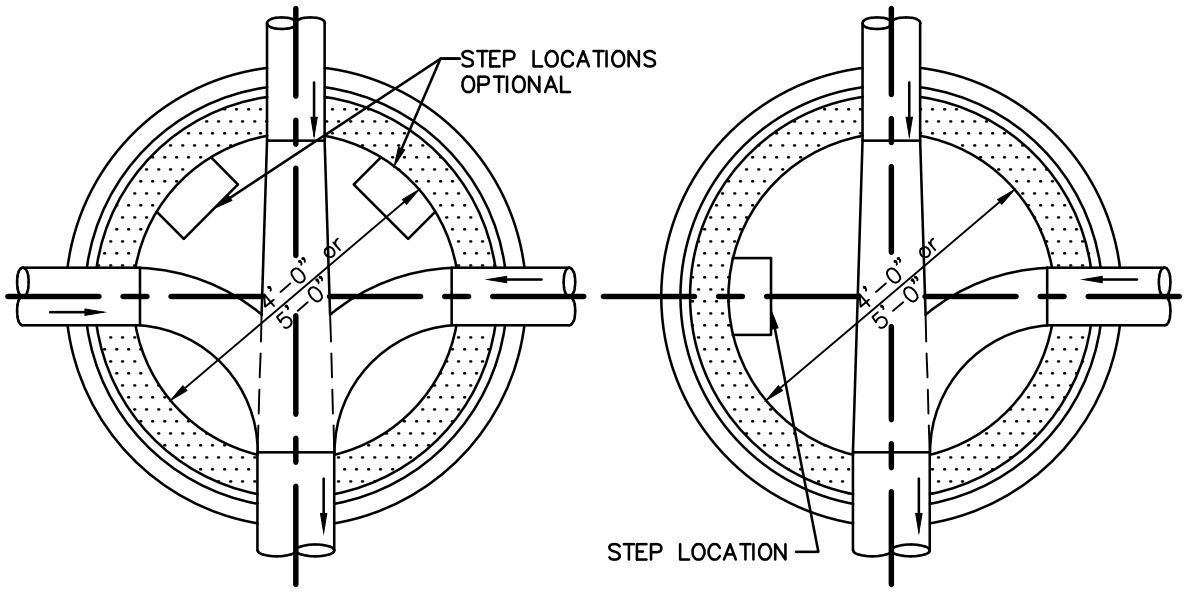
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02601-5
FILE NO.	1301.1.00.04



NOTE: ALL BENCHES SHALL
SLOPE @ 1/8" / 1' TOWARD
FLOW CHANNEL



PLANS OF MANHOLES
TYPICAL

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

MANHOLE CHANNEL
CONFIGURATIONS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02601-6
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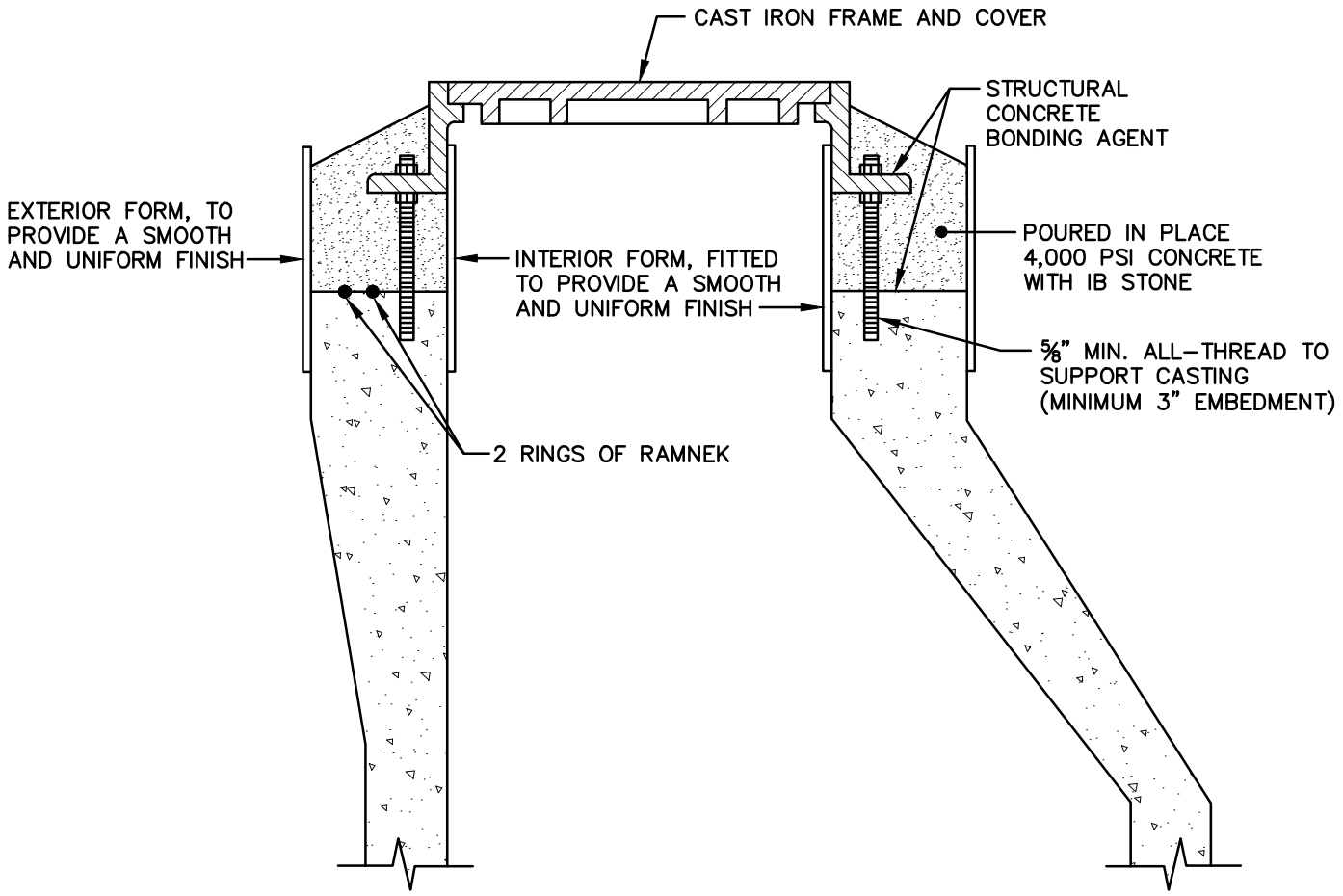

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POURED IN PLACE
CONCRETE ADJUSTMENT
DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
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DATE	04/05/2017
DWG. NO.	02601-7
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SECTION 02602

STORM INLETS, CATCH BASINS, ENDWALLS

PART 1 GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Storm drainage inlets
2. Storm drainage catch basins
3. Storm drainage pipe endwalls
4. Pipe culvert end sections

B. Related work specified elsewhere:

1. Trenching, backfilling and compacting: .....Section 02221
2. Soil erosion and sediment pollution control: .....Section 02270
3. Finish grading, seeding and sodding:.....Section 02485
4. Bituminous paving and surfacing: .....Section 02500
5. Manholes:.....Section 02601
6. Storm drain pipe: .....Section 02618
7. Plain and reinforced cement concrete:.....Section 03000
8. Cement concrete for utility construction: .....Section 03050

C. Definitions: NONE

D. Applicable Standard Details:

02602-1- Inlet/Storm Pipe Installation Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

Publication 408, Specifications
Publication 72M, Standards for Roadway Construction

2. American Society for Testing and Materials (ASTM):

A36	Specification for Carbon Structural Steel
A47	Specification for Ferritic Malleable Iron Castings
A48	Specification for Gray Iron Castings
A185	Specification for Steel Welded Wire Fabric for Concrete Reinforcement
A536	Specification for Ductile Iron Castings
A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C32	Specification for Sewer and Manhole Brick (made from clay or shale)
C270	Specification for Mortar for Unit Masonry

3. Pennsylvania Code

   Title 67, Transportation, Chapter 459, Occupancy of Highway by Utilities.

1.03 SUBMITTALS

A. Certificates:

1. Submit certification from material suppliers attesting that materials provided meet or exceed specification requirements.

B. Shop Drawings:

1. Submit detailed Shop Drawings, including reinforcing steel details.

C. Submit concrete mix designs, certified results of compressive strength tests, certified field tests and copies of batch slips for all cast-in-place inlets, catch basins or endwalls.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Precast Concrete Units:

1. After fabrication and curing, transport the units to the job site. Protect until required for installation.

2. Handle to avoid damage to surfaces, edges and corners and to avoid creation of stresses within the units.

B. Inspections

1. Inspection by the Authority will, at a minimum, be made of materials upon delivery to the job site; of the subgrade, prior to construction or placement; and of the completed structure, prior to backfill.

2. Precast cement concrete products shall be subject to rejection for failure to conform with these specifications or if any one of the following conditions is noted:

   a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.

   b. Defects that indicate incorrect proportioning, mixing, and molding.

   c. Surface defects larger than ½" diameter indicating honey-combed or open texture.

   d. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.

3. Concrete Testing (For Cast-In-Place Work): Section 03000.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Crushed Stone Subbase:

1. AASHTO No. 8 or 57, Type C, Crushed Stone or Gravel aggregate, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.

B. Brick: ASTM C32 Grade SS, solid.

C. Masonry Mortar: ASTM C270, Type S.

D. Malleable Iron Castings: ASTM A47, Grade 35018, Domestic.

E. Ductile Iron Castings: ASTM A536, Grade 60-40-18, Domestic.

F. Structural Grade Carbon Steel: ASTM A36.

G. Cast-in-Place Cement Concrete: Section 03050.

H. Cast Gray Iron Castings: ASTM A48.

2.02 FABRICATIONS

A. Precast Cement Concrete Units:

1. Comply with the requirements of Section 714, Publication 408 Specifications. Concrete shall be Class AA, unless otherwise specified.

2. All reinforcing shall comply with the requirements of Publication 72M.

3. 6' inlets shall be similar in all respects to standard inlets except that the longitudinal dimension shall be increased by 24".

4. Modified boxes (PennDOT Type 1, 2, or 3, Modified Type I or Modified Type II) shall have reinforced cover adjustment slabs in accordance with Details in Publication 72M.

B. Pipe Culvert End Sections:

1. Concrete or Metal - Comply with the requirements of, Publication 72M, RC-33.

2. Polyethylene end sections shall have smooth interior and be anchored at the flared end.

C. Inlet Grates:

1. Comply with the requirements of Publication 72M, RC-34 PennDOT approved diagonal or bicycle safe grates only.

2. 6' inlet grates shall be similar in all respects to standard inlet grates except that the longitudinal dimension shall be increased by 24".

3. Inlet grates in traffic areas shall be capable of handling HS-25 loading.

4. Welded structural steel grates and frames shall be coated with bituminous paint. All iron castings shall be furnished unpainted.

D. Adjustments

1. Precast cement concrete grade adjustment risers: Shall be cast from 4000 psi concrete (28-day compressive strength), shall be a maximum of 2" thick, and shall be reinforced in accordance with ASTM A478.

2. Brick adjustments are not permitted.

3. Infra-Riser adjustment rubber rings manufactured by East Jordan Iron Works, East Jordan Michigan or approved equal, may be substituted for concrete rings if approved by the ENGINEER.

E. Outlet Structures

1. Precast concrete or cast-in-place concrete in accordance with Article 2.02.A.

2. Construct outlet structures to dimensions shown on the drawings.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavate as specified in Section 02221, Paragraph 3.04.

B. Excavate at location marked in the field.

C. Excavate to the required depth and grade for the bottom of the unit plus that excavation necessary for placement of base material.

3.02 CONSTRUCTION

A. Construct inlets and catch basins of either precast cement concrete sections or of cast-in-place cement concrete, and of the type indicated on the drawings.

1. Place precast units on a minimum 4" compacted crushed aggregate base.

2. Construct cast-in-place units on a minimum 4” compacted crushed aggregate base.

3. Pour channels in inlet boxes to channel the flow of water to the outlet pipe and to prevent water from standing in box.

4. Unless units are cast-in-place, use precast cement concrete grade adjustment risers or Infra Risers to adjust to grade. Mortar concrete risers in place.

5. Place bicycle safe grates in all paved (present or future) areas.

B. Construct endwalls to the dimensions and design indicated on Standard Drawing RC-31M, Publication 72M, and of the type shown on the drawings. Construct endwalls of monolithically cast reinforced concrete.

C. Do not permit pipes to project more than 3" into inlets. Do not expose end of pipe through faces of endwalls.

D. Where indicated on the drawings, provide pipe culvert end sections of the design and dimensions of Standard Drawing RC-33M, Publication 72M.

E. Install polyethylene end sections in accordance with manufacturer's instructions, bedded and anchored as required.

F. Construct basin outlet structures with inverts, grates and openings at the required elevations shown on the drawings. Connect to new or existing outlet pipes, relaying or adding pipe as needed to meet the structure.

G. At junction of different sized pipes, the pipe crowns should match.

3.03 BACKFILLING

A. Backfill structures only after inspection by the Authority's Representative.

B. Perform backfilling and compaction as specified in Section 02221, Paragraph 3.11.

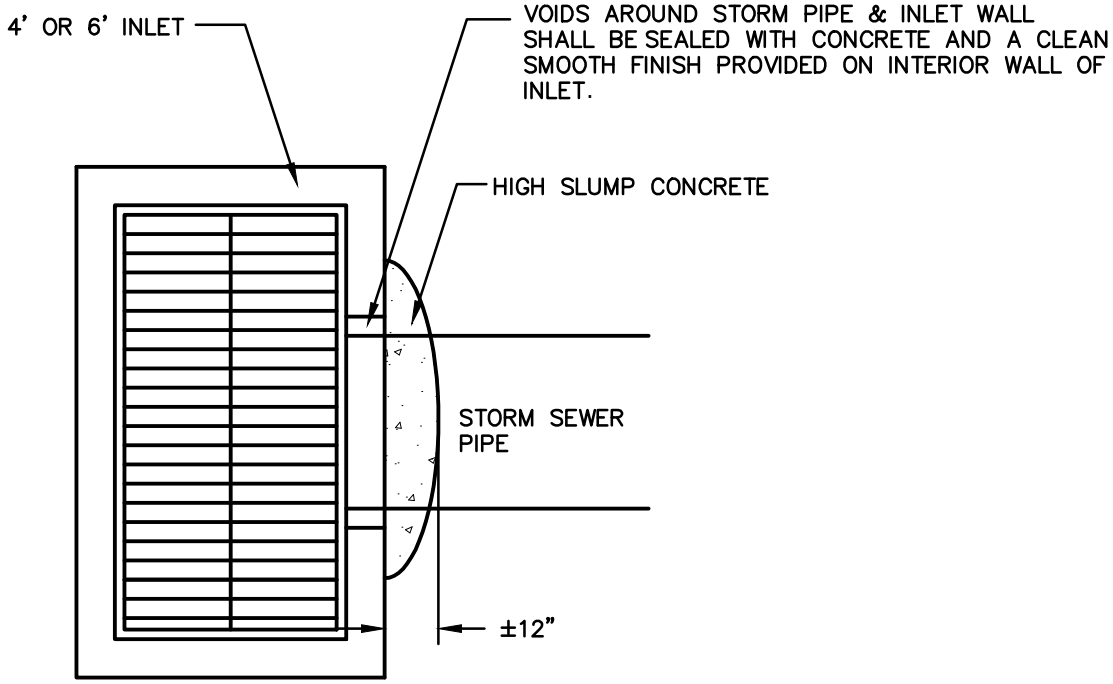
3.04 DISPOSAL OF EXCAVATED MATERIAL: Section 02221, Paragraph 3.12.

3.05 RESTORATION OF SURFACE AREAS

A. Restore paved areas in accordance with Section 02575.

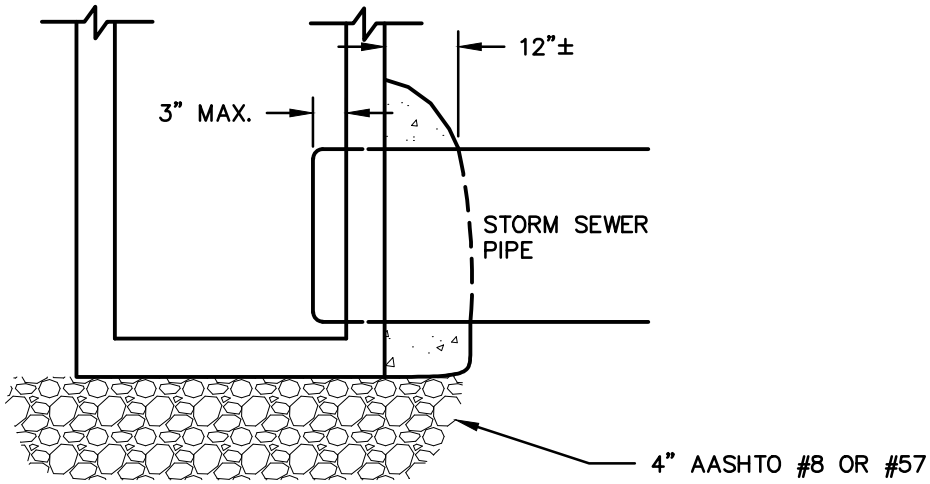
B. Restore unpaved surfaces as specified in Section 02221, Paragraph 3.14.

END OF SECTION



PLAN VIEW

NOTE:
NO MEASUREMENT OR PAYMENT WILL BE MADE FOR THE HIGH SLUMP CONCRETE THAT IS TO BE PLACED AT THE JUNCTION WITH ALL PIPES. THIS WORK IS TO BE CONSIDERED INCIDENTAL TO THE PRECAST STRUCTURE INLET, BID ITEM NO. 3.05.



ELEVATION

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INLET/STORM PIPE
INSTALLATION DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02602-1
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SECTION 02604

CONCRETE AND MASONRY STRUCTURES REHABILITATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this Section includes, but is not limited to:

1. Materials, equipment, and labor required for complete lining or coating of concrete structures based on a proven and acceptable technology meeting the minimum requirements set forth in this and all other sections.

2. Structural reinforcement and corrosive rehabilitation utilizing a cured-in-place or spray coating.

3. Void filling and protective application by applying spray monolithic resin coatings or cured in place liners to all interior surfaces of an existing structure.

B. Related work specified elsewhere:

1. Manholes.....Section 02601
2. Sanitary Sewer Testing.....Section 02651

1.02 QUALITY ASSURANCE

A. The structural designed lining or coating thickness must be sealed by a Professional Engineer (PE).

B. Furnish materials of quality required by the American Society for Testing and Materials (ASTM) standards or other approved standards and specifications.

C. The Applicator must been trained and certified by the manufacturer to handle and apply their products, as well as appropriate re-certification documentation, as necessary, by the manufacturer.

D. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the manufacturer's recommendations.

E. A 10-year performance warranty which covers both the labor and materials shall be provided. The warranty shall be non-prorated and specific to actual performance. The warranty shall cover repair of a liner or coating which is found to be deformed, separated from the substrate, showing significant reactions to chemicals, or is leaking either through the surface or behind the liner or coating within the 10-year warranty period. The Owner will be responsible for conducting tests in accordance with section 3.02 to determine imperfections which constitute a warranty claim.

F. Reference Standards (Latest Edition):

1. ASTM D638: Test Method for Tensile Properties of Plastics.

2. ASTM D790: Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics.

3. ASTM D695: Test Methods for Compressive Properties for Plastics.

4. ASTM D4060: Test Methods for Abrasion.

5. ASTM D2240: Test Method for Hardness, Shore D.

6. ASTM D4541: Adhesion to Concrete.

7. ASTM D2990: Test Methods for Tensile, Compressive and Flexural Creep and Creep Rupture in Plastics.

8. ASTM D543: Resistance of Plastics to Chemical Reagents.

9. ASTM C109: Compressive Strength of Hydraulic Cement Mortars.

10. ASTM C307: Tensile Strength of Hydraulic Cement Mortars.

11. ASTM C1244-05ae1: Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test Prior to Backfill

12. ASTM D1216: Standard Practice for Re-habitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

13. ASTM D4787: Standard Practice for Continuity Verification of Liquid or Sheet Lining Applied to Concrete Substrates.

G. Inspection/Testing:

1. Owner or Engineer shall visually inspect structure for leaks from infiltration or inflow.

2. Vacuum Test as practical.

3. Structural Pull Test. Test at 150-psi. Perform 1 test per structure (ASTM 4541)

4. All lined manholes will be inspected for cracks, voids, holes, uncured spots, dry spots, delaminations, and any defect which might affect the coating performance.

5. Holiday Test

   a. Contractor is required to utilize a high voltage Holiday detection system to determine if any Holidays (voids) exist in the lining or coating.

   b. Test the entire coated surface for holidays at 100 volts/mil. in accordance with ASTM D4787.

   c. Approved Holiday Test devices:

      - Model APW by Tinker & Rasor
      - Model 14/20 by DE Stearns
      - Equal as approved by Engineer.

6. Where defects or voids are located, mark locations for repair according to the system manufacturer's recommendations. (using original or identical materials)

7. Retest repaired voids to prove holiday free.

8. All repairs shall be made at no additional cost to the Owner.

1.03 SUBMITTALS

A. Certification from the manufacturer that lining or coating system meets or exceeds requirements of this specification.

B. Certification from the manufacturer that the Applicator has been trained and certified by the manufacturer to handle and apply their products, as well as appropriate re-certification documentation, as necessary, by the manufacturer. The Contractor shall submit a list of similar work performed within three years of the bid date, along with the previous site owner's contact information. In the absence of this experience, a Manufacturer's representative must be present onsite during application and certify installation has been completed to their standard.

C. Shop drawings for lining or coating system including physical properties, thickness and fabrication data and installation and repair instructions.

D. Shop Drawings for Patching and Profiling, Infiltration Control, and Grouting Mixes including physical properties, and installation instructions.

E. The physical requirements listed in section 2.01.D.2 must be verified by a certified independent third party testing laboratory.

F. Design calculations for liner or coating thickness, sealed by a PE, for hydraulic load generated by the groundwater table. The design depth of groundwater table will be given by the Owner/Engineer and will be specific to each structure to be rehabilitated.

G. Breakdown of time required to perform the structure rehabilitation including: cleaning, infiltration mitigation (patching and profiling), installation, curing time and total bypass pumping time.

H. The Owner/Engineer has determined that the existing steps are to remain in place. If the lining process requires removal of the existing steps, replacement steps shall be provided that are structurally and dimensionally equivalent to the existing steps. Any variation must first be approved by the Owner/Engineer. Shop Drawings shall be submitted for the new ladder or steps.

1.04 JOB CONDITIONS

A. Contractor is responsible for traffic control during rehabilitation work. Traffic control shall be in accordance with Pennsylvania Department of Transportation Publication 213, "Work Zone Traffic Control Guidelines."

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Product delivery, storage and handling shall be in accordance with all specifications and recommendations of the product manufacturer.

PART 2 PRODUCTS

2.01 LINING/COATING MATERIALS

A. The liner material shall be used to form a structurally enhanced monolithic lining or coating, covering all interior surfaces of the structure, including benches, channel and inverts of manholes.

B. The Owner reserves the sole right to determine approval/disapproval of a system or product.

C. Approved Products/ Installers:

1. MultiPlexx

   Terre Hill Composites, Inc.
   400 West Main Street, Suite 105
   Ephrata, PA 17522

2. SprayWall by Sprayroq

   Abel Recon
   P.O. Box 476
   Mountville, PA 17554

3. Raven 405

   RLS Solutions Inc.
   13105 East 61st Street, Suite A
   Broken Arrow, OK 74012

   PIM Corporation
   201 Circle Dr. North, Suite 106
   Piscataway, NJ 08854

4. Approved Equal by Engineer and Owner.

D. Design Requirements

1. The following specific design conditions shall be assumed for all structures being rehabilitated with the respective approved system:

Parameter	**Design Requirement**
a. Structure Condition	Partially/Fully Deteriorated, based on condition of the existing structure per ASTM 1216-07b, Appendix Xl
b. Soil Type	Saturated/Unsaturated
c. Soil Load	120 lbs/cu. ft.
d. Soil Modulus	500 psi.
e. Safety Factor	2 min (must be verified by design engineer)
f. Soil Cover	Distance from grade to invert
g. Water Table	Same as Soil Cover unless specifically specified by Owner or Engineer
h. Bond Strength	Shall exceed tensile strength of substrate
i. Shore D Hardness	80
j. Density	87±pcf

2. The liner or coating material shall conform to the minimum physical requirements listed below:

Type of Product	Polyurethane	Epoxy	PVCP CIPM
Tensile Strength	7,400 psi	7,600 psi	12,300 psi
Tensile Modulus	425,000 psi		267,800 psi
Flexural Strength	14,000 psi	13,000 psi	22,100 psi
Flexural Modulus (initial)	735,000 psi	727,000 psi	476,300 psi
Flexural Modulus (long term)	514,500 psi	363,500 psi	
Compressive Strength	7,900 psi	18,000 psi	12,200 psi
Compressive Modulus			1,365,000 psi

3. The finished structure shall be corrosion resistant to: 20% Sulfuric Acid; 5% Sodium Hydroxide, 5% Ammonium Hydroxide, 1% Nitric Acid; as well as other common ingredients of the sanitary sewage environment.

4. The wall of the liner or coating shall be structurally designed to withstand the hydraulic load generated by the groundwater table. Calculations must be submitted along with supporting formulas that document the version of formula used to determine the design thickness. The wall thickness shall be designed to account for the minimum strengths and/or modulus' over the long-term life of the product. The design shall be verified and sealed by Professional Engineer licensed in the State of Pennsylvania.

5. When it is pre-determined by the Owner/Engineer that groundwater loading is not an issue the rehabilitation lining or coating shall be installed to the thickness necessary to qualify as a monolithic (void free) liner. The minimum value coating thickness for structural rehabilitation shall be 125 mils.

2.02 PATCHING and PROFILING, INFILTRATION CONTROL, AND GROUTING MIXES

A. Patching and profiling mix:

A quick setting cementitious material shall be used as a patching and profiling mix. It shall be mixed and applied according to the manufacturer's recommendations and shall meet the following minimum requirements.

1. Design Requirements:

Compressive strength	ASTM C 109	1000 psi @ 1 hour 3500 psi @ 48 hours 5000 psi @ 28 days
Tensile strength	ASTM C 307	200 psi @ 24 hours 300 psi @ 7 days

B. Infiltration control mix:

A rapid-setting cementitious product specifically formulated for leak control shall be used to stop minor water infiltration, shall be mixed and applied according to the manufacturer's recommendations and shall meet the following minimum requirements.

1. Design Requirements:

Compressive strength	ASTM C 109	1,800 psi @ 1/2 hr 4,000 psi @ 24 hrs 5,000 psi @ 7 days
Tensile strength	ASTM C 190	300 psi @ 7 days 350 psi @ 28 days

C. Grouting mix:

A polyurethane grout shall be used for stopping very active infiltration, filling voids and shall be mixed /applied according to manufacturer's recommendations.

1. Approved Manufacturers/Products

   a. Deneef Hydroactive Cut
   b. Sealguard, or
   c. Approved Equal

PART 3 EXECUTION

3.01 INSTALLATION

A. All existing manhole steps are to remain, unless procedure set forth in Section 1.03.H is taken by Contractor.

3.02 MAINTAINING WASTEWATER FLOWS

A. The Contractor shall be fully responsible for restricting the normal sewage flow through the manhole where the specified rehabilitation work demands such flow restriction. The Contractor will plan his work in order to maintain flows and not interrupt sewer service. This may include night work. The cost of any night work required will be included in the contract price of the applicable item. The Contractor shall not perform work to manholes until plans for bypass pumping or flow restriction have been submitted by the Contractor and accepted by the Authority. Additionally, no plugging of existing Sanitary Sewer Gravity Mains will be made without the approval of the Authority.

3.03 PREPARATION

A. Prior to entering structures, an atmosphere evaluation shall be conducted by the Contractor to determine whether air quality permits entrance based on local, state, or federal safety regulations. Appropriate confined space procedures and equipment are required while accessing structures

B. Verify ambient temperature inside the structure is greater than or equal to 50° F.

C. Place screens, when necessary, over all pipe openings to prevent extraneous material from entering sewer system.

D. All foreign material shall be removed from the structures' wall and bench/floor using a minimum 3500 psi pressure washing system.

E. Loose or protruding brick mortar/concrete shall be removed with a mason's hammer and chisel. Fill large voids with quick setting patch mix as described in 2.02. The structure shall be reprofiled according to manufacturer's requirements.

F. The surface to be repaired must be clean and free of any loose materials.

G. The use of acid no matter how diluted for cleaning purposes is not allowed.

H. Minor leaks shall be stopped using the quick-setting specially formulated infiltration control mix described in 2.02 and applied per manufacturer's instructions.

I. Where severe infiltration is present, drilling may be required in order to pressure grout outside the structure using a cementitious or chemical grout following the manufacturer's recommendations.

J. The manhole must be infiltration free for at least 24 hours prior to placing the liner.

K. Remove all loose grout and rubble of existing channel. Rebuild channel if required by shaping and repairing slope of shelves or benches. Work shall include alignment of inflow and outflow ports in such a manner as to prevent the deposition of solids at the transition point. All inverts shall follow the grades of the pipe entering the manhole. Changes in direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit. Channels shall be shaped to allow entrance of maintenance equipment into pies including buckets, TV camera, etc. Inverts shall only be lined where indicated on the Construction Drawings.

L. Mask manhole steps to prevent the sprayed-on resin-based liner from accumulating on the steps.

M. If necessary to install liner or coating, inside drop connections may be removed, but shall be reinstalled to the condition, dimensions and structural stability of the existing inside drop.

3.04 APPLICATION

A. After proper cleaning, the substrate must be dried as specified by the resin manufacturer to ensure maximum adhesion.

B. The lining or coating shall be applied evenly over the entire structure including the invert, bench, walls and riser rings up to the frame and cover casting, insuring a monolithic system is maintained. Finished channel surface and invert surfaces shall be smooth, free of ridges, wrinkles, or sags and not impair flow.

C. If an additional application is required to meet required structural rehabilitation, the initial application must be allowed to fully cure before a second coat is applied in order to protect the repair profile from sagging due to over-application. Bypass pumping shall remain in service to allow a stable environment for the first application to cure properly.

D. For field-lining or coating at the structure, application shall not be made unless the ambient temperature inside the structure is 50° or higher. The structure shall be protected while curing to ensure temperatures consistent with the 50° or higher requirements.

E. When predetermined by the Owner/Engineer, that the existing steps are to be removed and new steps are to be installed:

1. If previously existed, a clear opening of 21" minimum shall be maintained.

2. The top step shall not be located more than 30" from the finished grade.

F. Flow through the structure should be re-established per manufacturer's recommendation and as soon as possible allowing appropriate curing.

G. Prior to structural performance testing, a minimum curing time is required per manufacturer's recommendation.

3.05 BYPASS PUMPING

A. Bypass pumping shall be in accordance with Section 02610.

3.06 RESTORATION

A. Contractor shall be responsible for any restoration necessary to return site conditions equal to that existing immediately prior to any work done.

END OF SECTION

SECTION 02610

SANITARY SEWER PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Sanitary sewer gravity pipelines
2. Sanitary sewer pressure pipelines and valves
3. Laterals/service connections

B. Related work specified elsewhere:

1. Boring and Jacking: .....Section 02150
2. Trenching, Backfilling, and Compaction:.....Section 02221
3. Soil Erosion and Sedimentation Control: .....Section 02270
4. Finish Grading, Seeding, and Sodding: .....Section 02485
5. Manholes:.....Section 02601
6. Sanitary Sewer Testing:.....Section 02651
7. Cement Concrete for Utility Construction:.....Section 03050

C. Definitions:

1. Dimension Ratio (DR) - Constant ratio between outside pipe diameter and wall thickness.

2. Standard Dimension Ratio (SDR) - Constant ratio based on Renard numbers and rated for pressure.

D. Applicable Standard Details:

02610-1 Lateral Detail
02610-2 Building Sewer Lateral Detail
02610-3 Cap Protection Casting for Cleanout Detail
02610-4 Subbase Drain Detail
02610-5 Combination Air Release Valve Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American National Standards Institute (ANSI):

A21.4 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings
A21.10 Gray-Iron and Ductile-Iron Fittings
A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for water or other liquids

2. American Society for Testing and Materials (ASTM):

A53	Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless
A74	Specification for Cast Iron Soil Pipe and Fittings
C14	Specification for Concrete Sewer, Storm Drain and Culvert Pipe
C76	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C425	Specification for Compression Joints for Vitrified Clay Pipe and Fittings
C443	Specification for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets
C564	Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
D1785	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
D1869	Specification for Rubber Rings for Asbestos-Cement Pipe
D2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR series)
D2321	Practice for Underground Installation of Termoplastic Pipe for Sewers and other Gravity-Flow Applications.
D2564	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
D2855	Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
D3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D3139	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
D3212	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
F477	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F679	Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

3. American Water Works Association (AWWA):

C301	Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and Other Liquids
C504	Rubber Seated Butterfly Valves
C507	Ball Valves, 6" through 48"
C900	Poly (Vinyl Chloride) PVC Chloride (PVC) Pressure Pipe, 4" through 12" for Water Distribution

B. Materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder will be rejected.

1.03 SUBMITTALS

A. Certificates:

1. Submit 2 copies of each manufacturer's certification attesting that the pipe, pipe fittings, valves, joints, joint gaskets and lubricants and detectable warning tape meet or exceed specification requirements.

B. Manufacturer's Literature:

1. Submit 2 copies of the manufacturer's recommendations on installation, handling and storage of materials.

C. Details of bypass pumping operation and pump curves. The Contractor shall analyze the existing flow rate and provide pumps with enough capacity to handle daily fluctuations.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling:

1. Do not place materials on private property without written permission of the property owner.

2. During loading, transporting and unloading, exercise care to prevent damage to materials.

3. Do not drop pipe or fittings. Avoid shock or damage at all times.

4. Take measures to prevent damage to the exterior surface or internal lining of the pipe.

B. Storage:

1. Do not stack pipe higher than recommended by the pipe manufacturer.

2. Store PVC pipe and gaskets for mechanical and push-on joints in a cool, dry location out of direct sunlight and not in contact with petroleum products.

3. Place on flat surface with proper support.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE

A. Pipe:

1. ANSI A21.51, Thickness Class as indicated on the Construction Drawings, minimum Class 52.

2. Standard cement-mortar lining, ANSI A21.4.

3. Standard bituminous coating, interior and exterior.

B. Fittings:

1. Ductile-iron or gray-iron, ANSI A21.10.

2. Provide with standard lining and coating as for ductile iron pipe.

C. Joints:

1. Where not specifically shown on the Construction Drawings, pipe joints may be either mechanical joint or push-on joint.

2. Fitting joints shall be mechanical joint, unless specified otherwise.

D. Rubber gaskets, lubricants, gland, bolts and nuts: ANSI A21.11

2.02 POLY (VINYL CHLORIDE) (PVC) SEWER PIPE

A. Gravity Sewer Pipe and Fittings:

1. Pipe 15" diameter and smaller: ASTM D3034, minimum SDR-35.
Min. lateral size = 6" diameter.

2. Pipe 18" to 27" diameter: ASTM F679.

3. Flexible Elastomeric Seals: ASTM D3212
Seal Material: ASTM F477

4. Where specifically approved by the Authority, pipe 15" and smaller: ASTM F789 may be substituted.

B. Pressure Sewer Pipe and Fittings (Public Infrastructure Owned & Maintained by RLMA):

1. Ductile Iron Pipe (DIP):

a. Conforming to ANSI A21.50 and ANSI A21.51 requirements

2. Wall Thickness Class, Buried Pipe: As specified by Construction Drawings or the Authority Engineer

3. Wall Thickness Class, Exposed Pipe: Class 53

4. Fittings:

a. Ductile Iron conforming to ANSI A21.10 requirements rated for 250 psi working pressure.

5. Rubber-Gasket Joints, Buried Pipe:

a. Conforming to ANSI A21.11 requirements. For buried pipe installation, provide either push-on or mechanical joints except where other types of joints are indicated on construction documents or required by the Authority.

C. Pressure Sewer Pipe and Fittings (Private Sanitary Sewer Only):

1. Pressure-Rated:

a. ASTM D2241, Pressure rating as indicated on the Construction Drawings, 125 psi minimum.

2. Schedule-Rated:

    a. ASTM D1785, Schedule rating as indicated on the Construction Drawings, Schedule 40 minimum.

3. Dimension-Rated:

    a. AWWA C900, DR 18 minimum (150 psi), for 4" diameter and larger.

    b. AWWA DR 21 minimum (200 psi), for 2" diameter and smaller.

4. Flexible Elastomeric Seals: ASTM D3139
   Seal Material: ASTM F477

2.03 CAST IRON SOIL PIPE (PLUMBING)

A. Pipe and Fittings: ASTM A74, Service Class

1. Hub and spigot or double hub

B. Joints

1. Gaskets: Double-seal compression gaskets conforming to physical requirements of ASTM C564.

2.04 STEEL CASING PIPE: Section 02150

2.05 FLEXIBLE COUPLINGS:

Leakproof, PVC compound with stainless steel clamps suitable for the pipe materials as manufactured by Fernco, Inc., Davison, MI, or approved equal.

2.06 CLEANOUTS

A. Cleanout riser pipe and buried fitting shall be PVC SDR 35.

B. Cleanout hub and plug:

1. Cast-Iron/Brass – Style A as manufactured by the General Engineering Company (GENECO), Frederick, MD, or approved equal. Model “COH” Gasketed Bell – SDR-35 PVC.

2. Cleanout hub and plug assembly shall be enclosed with a cast iron cover for 6” diameter cleanouts as manufactured by the General Engineering Company (Geneco), Frederick, MD, or approved equal.

2.07 DETECTABLE WARNING TAPE

A. Detectable warning tape shall consist of a minimum thickness of 0.5 mils solid aluminum foil core running the full length and width encased in a protective, high visibility, green color coded inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil. Foil to be visible on unprinted side. Minimum overall thickness shall be 5.5 mils. Minimum tensile strength shall be 5000 psi. Minimum weight of 2 ½ pounds per 1" x 100' unit. Tape width shall be a minimum of 6 inches and have the words "Caution Buried Sewer Line Below" imprinted on the color side. Tape shall meet Office of Pipeline Safety regulations, U.S. Department of Transportation, USAS Code B31.8.

2.08 VALVES

A. Plug valves

1. Plug valves shall be of the non-lubricated, eccentric type, and shall be designed for a working pressure of 175 psi for valves 12" and smaller. Valves shall be of round port design. If a rectangular style design is employed, port area shall be a minimum of 100% of the corresponding pipe area.

2. Valves shall provide tight shut-off with rated pressure from either direction, where required. The plug valves shall be manufactured by Dezurik of Sartell, MN, Keystone Valve of Houston, TX, or approved equal.

3. Plug valves shall be furnished with replaceable permanently lubricated sleeve-type 18-8 stainless steel bearings in the upper and lower journals. Valve seats shall be nickel with raised surface completely covered to ensure that the plug face contacts only nickel.

4. Manual gear operators shall be totally enclosed worm and gear type, permanently lubricated. Manual operator components shall withstand, without damage, a pull of 80 to 200 lbs. on the handwheel, with buried service gear units capable of withstanding input torque on the operating nut as required by AWWA C504, Section 3.8.3 and AWWA C507, Section 11, Paragraph 11.9. Gear segment shall be of ductile iron, ASTM A536, Grade 56-45-12 supported on bronze bushings.

5. Plug valves shall be tested in accordance with AWWA C504, Section 5. The leakage test shall be applied to the face of the plug tending to unseat the valve. Certified copies of reports covering proof of design testing as described in Section 5.5 shall be provided to the Engineer.

B. Combination Air Release Valves

1. Cast iron body and cover, stainless steel float, orifice sent, linkage mechanism, mountings and trim. Buna-N orifice valve. 150 psi minimum rated working pressure.

2. Orifice size as indicated on Construction Drawings.

2.09 TRACER WIRE

A. Tracer wire to be twelve (12) gauge minimum high-strength copper clad steel conductor, insulated with 30 mil, high-density, high molecular weight polyethylene insulation, and rated for direct burial use at 30 volts. Conductor must be at 21% conductivity for locate purposes, break load 380 lbs. minimum. Tracer wire shall be Copperhead™ HS-CCS HDPE 30 mil or approved equal. Wire connectors to be 3M DBR or approved equal, and shall be watertight to provide electrical continuity.

B. Manufacturers supplying copper clad steel tracer wire must have available detailed performance data including 5 years of underground testing including durability related to damage of protective insulation and effects of potential corrosion of the specific copper clad steel used. If the manufacturer had not completed 5-year corrosion testing, a 5-year warranty must be provided.

C. Tracer wire insulation color shall meet the APWA uniform color code standard for identification of buried utilities.

2.10 TRACER WIRE CONNECTORS

A. Wire connectors shall be 3M™ DBR, Copperhead Industries© SnakeBite™, or PRO-TRACE© TW™ connectors or approved equal.

2.11 TRACER WIRE ACCESS BOXES

A. For locations where valve boxes are not present, the tracer wire access point shall be composed of one false valve box as depicted on the construction drawings or one Copperhead™ SnakePit Tracer Wire Access Box or approved equal, installed at a maximum spacing of 500 feet.

2.12 TRACER WIRE TESTING REQUIREMENTS

A. Contractor shall perform a continuity test on all tracer wire in the presence of Red Lion Municipal Authority or the Engineer. If the tracer wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire at the Contractor's expense.

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform trench excavation as specified in Section 02221.

B. Unless otherwise required by the Engineer, provide for a minimum cover of 4 feet above the top of pipe laid in trenches in non-traffic areas, and 5 feet in traffic areas.

C. Provide Type IV bedding as specified in Section 02221. Place so that the pipe can be laid to the required tolerances in accordance with ASTM D2321.

D. Provide Type V bedding for 2" diameter and smaller pressure sewers, unless otherwise specified in Construction Drawings.

3.02 LAYING PIPE IN TRENCHES

A. Give ample notice to the Engineer in advance of pipe laying operations, minimum seventy-two hours.

B. Maintain no less than three batter boards, at 25' maximum interval, or their equivalent between adjoining manholes during pipe laying operations, or use laser alignment instruments.

C. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe or fittings.

D. Lay pipe proceeding upgrade with the bell or groove pointing upstream.

E. Lay pipe to a true uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings, and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

F. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

G. Clean and inspect each section of pipe before joining to mark on pipe. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Use lubricant recommended by the pipe and fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe cannot be fully inserted into the bell, disassemble joint, inspect for damage, reclean joint components, and reassemble joint.

H. Assemble joints in accordance with recommendations of the manufacturer.

1. Push-on joints:

a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.

b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.

c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket using reference mark at the spigot end of the pipe as a guide. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.

d. Pipe gaps in excess of ¼" in length will not be accepted.

2. Mechanical joints:

a. Wash the socket and plain end. Apply a thin film of lubricant. Slip the gland and gasket over the plain end of the pipe. Apply lubricant to gasket.

b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.

c. Slide the gland into position, insert bolts, and finger-tighten nuts.

d. Bring bolts to uniform tightness. Tighten bolts 180 degrees apart, alternately.

Torque Required	
Bolt Size, In.	**Torque, Ft.-Lbs.**
5/8"	45 - 60
3/4"	75 - 90
1"	100 - 120

3. Solvent cemented joints - not permitted.

4. Coupled joints - Assemble in accordance with the manufacturer's recommendations.

I. Disassemble and remake improperly assembled joints using a new gasket.

J. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed grade as shown on the Construction Drawings, or deflection of pipe joints, will be cause for rejection.

K. Place sufficient compacted backfill on each section of pipe, as it is laid, to hold firmly in place.

L. Clean interior of the pipe as work progresses. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.

M. Keep trenches and excavations free of water during construction.

N. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.

O. Joint Deflection:

1. When it is necessary to deflect pressure sewer mains from a straight alignment horizontally or vertically, do not exceed the following limits:

a. Ductile Iron Pipe: <12" diameter - 5ºE maximum deflection per joint
>12" diameter - 3ºE maximum deflection per joint

b. PVC Pipe: 4º maximum deflection per joint.

c. Reinforced Concrete Pipe: 1° maximum deflection per joint.

P. Make connections in accordance with the Construction Drawings, and perform any adjustments and ensure a watertight installation. Connections to the existing sewers shall be made under the direct observation of the Engineer or his authorized representative. Do not permit any water, earth, debris or other materials to enter the existing sewer system.

Q. As soon as connections are completed, install an adequately sized plumber’s stopper in the existing manhole and brace to prevent a “blowout”. The stopper is to prevent flow from the new line from entering the existing system and it shall not be removed until written authorization to do so is given by the Engineer. Routinely remove any accumulated ground and surface water from the line upstream and shall be totally responsible for any damages to existing facilities.

3.03 WYE BRANCHES AND TEES

A. Install wye branches or pipe tee wye at locations designated concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed.

B. For connections into an existing pipeline, where permitted by the Engineer, install a wye or tee wye with Smith Blair or JCM Industries couplings if connecting to vitrified clay or ductile iron pipe. Use PVC solid wall sleeve with gasket if connecting to PVC pipe.

C. Where specifically approved by the Authority, for taps into an existing pipeline, use a saddle wye or tee with stainless steel clamps or core drill pipe and install watertight resilient boot. Mount saddles with gasket and secure with metal bands. Lay out holes with a template and cut holes with a mechanical hole cutter.

D. Where lateral is not to be installed, install an approved watertight plug, braced to withstand pipeline test pressure thrust.

3.04 LATERALS

A. Construct laterals from the wye branch to a terminal point in accordance with Standard Detail 02610-1 or 02610-2 as specified. Lateral risers are not permitted.

B. Install an approved watertight plug, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary marker stake (minimum 2" x 2") extending from the end of the lateral to 1 foot above finished grade.

C. Laterals shall be installed at a slope of 1/8"/ft. (6" diameter) from the main to the cleanout or plug. The minimum depth under streets shall be 5'. Any deviations must be approved by the Engineer prior to installation.

3.05 CAST-IN-PLACE CONCRETE CONSTRUCTION

A. Conform to the applicable requirements of Section 03050.

3.06 CRADLES AND ENCASEMENT

A. Provide concrete cradles and encasement for pipeline where indicated on the Construction Drawings, or as directed by the Engineer, and in accordance with Standard Details in Section 03050.

3.07 THRUST RESTRAINT FOR PRESSURE PIPELINES

A. Provide all valves, tees, bends, caps, and plugs with concrete thrust blocks in accordance with Standard Detail 03050-3. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks to contain the resultant force and so pipe and fitting joints will be accessible for repair.

B. Furnish and install, tie rods, clamps, set screw retainer glands, or restrained joints if indicated on the Construction Drawings or required by the Engineer. Protect metal restrained joint components against corrosion by applying a bituminous coating.

3.08 COMBINATION AIR VALVES

A. Orient, locate, and install air release or combination air release valves on force mains where shown on the Construction Drawings.

B. Construct air release valves including valve vault as shown on Standard Detail 02610-5. Valve and valve vault shall be vertical and plumb.

C. During project start-up, verify that there are no leaks in saddle or plumbing. Verify correct function of valves.

D. Pipe penetrations shall have a manhole boot-type seal.

3.09 CARRIER PIPE IN CASINGS: Section 02150

3.10 STREAM CROSSINGS

A. Construct sanitary sewer pipeline stream crossings in accordance with Standard Detail Nos. 02221-4 and/ or 02221-5, as shown on the Construction Drawings.

B. Provide concrete encased ductile iron pipe backfilled with minimum 3" size stone to the level of the stream bed, between the limits of the stream crossing.

C. Wetland crossings: See Standard Detail 02221-6.

3.11 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after examination of pipe by the Engineer.

B. Backfill trenches as specified in Section 02221.

C. Install the detectable warning tape along the entire length of PVC force main on top of the pipe bedding but no deeper than 48 inches below finished grade. The pipe bedding (12" cover) shall maintain sufficient separation between the tape and the line.

3.12 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

B. Restore other areas in accordance with Section 02575 local regulations.

3.13 BYPASS PUMPING

A. Provide one (1) reliable pump capable of handling the existing wastewater flows and daily fluctuations and enough discharge piping to bypass pump from upstream manhole to downstream manhole. Provide one (1) backup pump on-site or provide evidence of ability to obtain backup pump within 30 minutes in case of pump failure. Bypass pumping system shall not allow backup in collection system beyond two (2) manholes. Bypass piping shall be watertight and not allow any discharge to the surface. Any leaks in the system will be just cause to discontinue bypass operation and pipe installation and tie piping back into gravity flow.

B. At the end of each workday, the bypass pumping shall stop and the new PVC piping shall be connected to the existing piping with a watertight flexible coupling. All trenches shall be properly backfilled and compacted except in the immediate area of the tie-in. Open trenches in traffic areas shall be protected with jersey barriers and steel plating and all trenches shall be protected with construction fencing.

C. The Contractor shall supply necessary equipment for bypassing operations; and inform the Authority of such. Bypassing of service connections to be reconnected is not necessary, however; the Contractor will be responsible for notifying customers that their services will be interrupted. Service shall be restored at the end of each working day.

D. Contractor is responsible for design, installation and operation of all bypass pumping. Contractor's plan for proposed bypass pumping system shall include, but not be limited to the staging area for pumps, pump sizes and number to be used; power source and standby power source and schedule for installation and maintaining of bypass pumping lines. Contractor shall size pumps for wastewater flow bypass according to normal flows in the system. Contractor shall reconnect the sanitary sewer pipe at the end of each workday to prevent system overload caused by potential storm events.

E. Plugging the upstairs pipe to prevent flow into the construction area is not acceptable in lieu of bypass pumping.

3.14 INSTALLATION OF DETECTABLE WARNING TAPE

A. Installation of detectable warning tape shall be 24" below the surface.

3.15 INSTALLATION OF TRACER WIRE

A. Tracer wire shall be installed on all water mains and services. The wire shall be installed in such a manner as to be able to properly trace all mains without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.

B. Tracer wire shall be installed in the same orientation to all installed pipe and shall be continuous and without splices from each tracer wire access point. Tracer wire shall be laid flat on top of the water main and secured every 8-10 feet in the three o'clock position. The wire shall be protected from damage during the execution of the works. No breaks or cuts in the tracer wire or tracer wire insulation shall be permitted. At service saddles, the tracer wire shall not be allowed to be placed between the saddle and the main.

C. The tracer wire shall be securely bonded together at all wire joints with an approved watertight connector to provide electrical continuity, and shall be accessible at all tracer wire access points.

D. Tracer wire access points shall in general be no more than five-hundred (500) feet and at every proposed valve box collar, valve pit, access box, or where required. Tracer wire should not be placed around the steps or any other place where a person entering the valve pit could trip on the wire. Concentrations of multiple proposed valves near pipe intersections including tees and crosses may require more than one access point assembly in each valve box collar. Tracer wire access points shall be within public right-of-way or public utility easements. Locations of trace wire access points should be noted on as-built drawings.

E. At each valve location including fire hydrant isolation valves, a loop of wire is to be brought up the inside of the valve box and looped inside the box two (2) inches below the bottom of the lid.

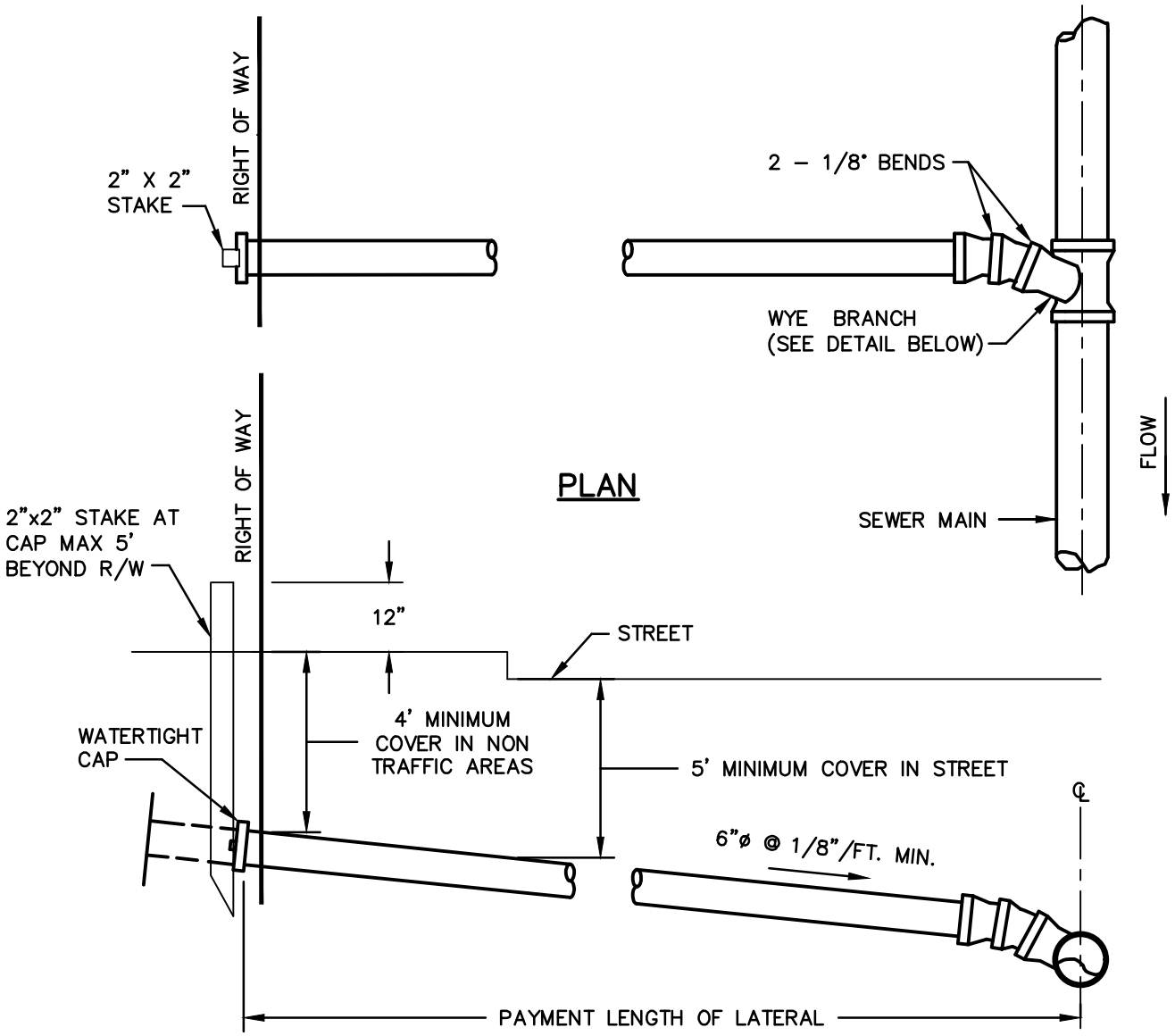
F. At the point of connection between cast or ductile iron mains, with any non-iron main, the tracer wire shall be properly connected to the iron pipe with a cad weld or approved equivalent. Tracer wire welds shall be completely sealed with the use of an approved mastic type sealer specifically manufactured for underground use. Mastic shall be applied in a thick coat a minimum of 2 inches thick and shall be protected from contamination by the backfill material with the use of a plastic membrane.

G. At all main end caps, a minimum of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a six-pound zinc anode and is to be buried at the same elevation as the water main.

H. Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at water main tees, crosses or at iron or copper water services where a portion of the branch connection water main or water service is replaced with a non-iron or non-copper material. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire. Where the existing branch connection is neither iron nor copper, then the new branch connection tracer wire shall be properly spliced to the existing tracer wire on the branch connection.

I. At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced as outlined above.

END OF SECTION



RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

LATERAL DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02610-1
FILE NO.	1301.1.00.04

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
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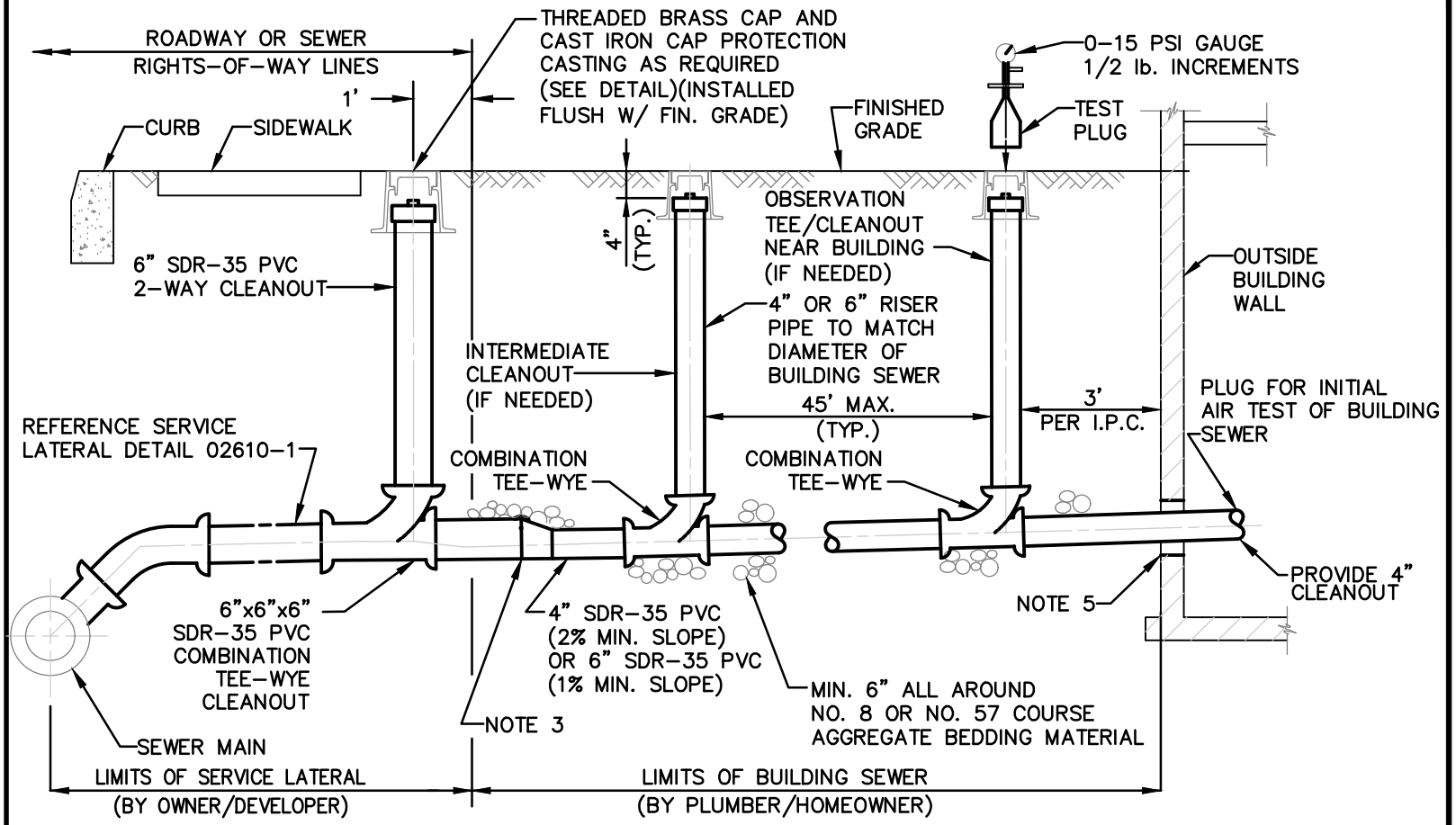
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

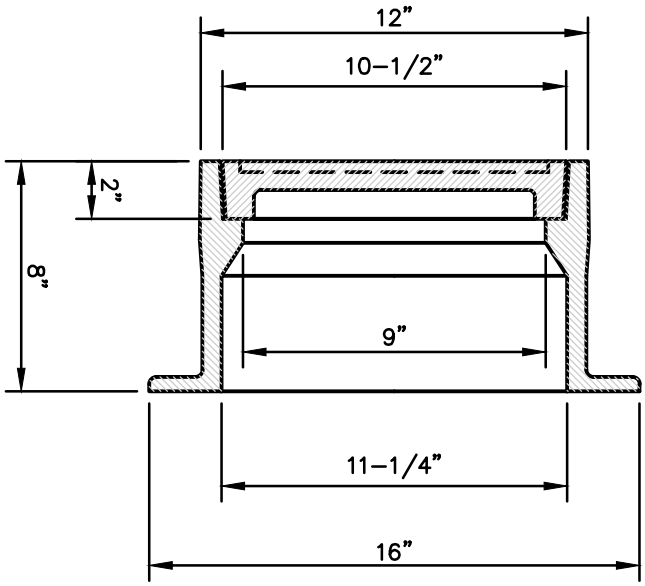


1. PIPE SIZES AND MATERIALS TO BE IN ACCORDANCE WITH AUTHORITY REQUIREMENTS.
2. CLEANOUT TO BE LOCATED WITHIN PUBLIC R/W LINE AND LOCATION TO BE SITE SPECIFIC WITH RESPECT TO CURB AND SIDEWALK.
3. FOR 4" BUILDING SEWER USE ECCENTRIC 4"x6" ADAPTER FITTING AT TRANSITION TO COMBINATION TEE-WYE (4"X6" FLEXIBLE COUPLING NOT ALLOWED).
4. CLEANOUT/TEST TEE SPACING IS 45' MAXIMUM.
5. WALL SLEEVE TO BE 2" GREATER THAN DIAMETER OF BUILDING SEWER PIPE AND SEALED WATER TIGHT.
6. ANY PIPE LESS THAN 3 FEET OF COVER SHALL BE APPROVED IN WRITING BY AUTHORITY.
7. THERE SHALL BE A 10 FOOT HORIZONTAL SEPARATION BETWEEN WATER SERVICE AND SERVICE LATERAL/BUILDING SEWER, OR WATER SERVICE SHALL BE ENCASED IN A WATERTIGHT PVC CONDUIT SEALED AT BOTH ENDS WITH APPROPRIATE FERNCO ADAPTER.
8. INSTALL TEST PLUGS AS REQUIRED FOR ACCEPTANCE AIR TESTING.
9. TRAFFIC RATED PROTECTION CASTING REQUIRED IN ALL AREAS UNLESS OTHERWISE APPROVED BY THE AUTHORITY.
10. DETECTION TAPE REQUIRED IN PIPE TRENCH AT A DEPTH OF 12-INCHES BELOW FINAL SURFACE GRADE OR PAVEMENT SUBGRADE.

BUILDING SEWER LATERAL
DETAIL

RED LION BOROUGH
YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02610-2
FILE NO.	1301.1.00.04



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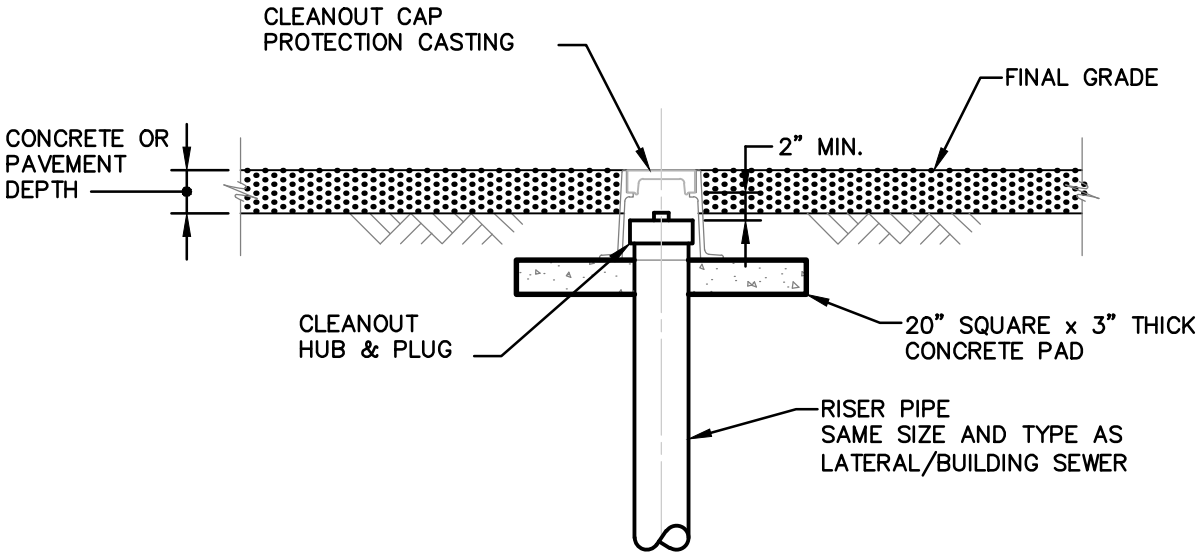

ELEVATION

NOTES:

1. CASTING FRAME AND COVER SHALL BE HEAVY DUTY WITH "S" MARKING ON COVER. (EAST JORDAN IRON WORKS CATALOG No. 1565, OR APPROVED EQUAL.)
2. HUB & PLUG SHALL BE CAST–IRON/BRASS STYLE "A" AS MANUFACTURED BY THE GENERAL ENGINEERING COMPANY (GENECO), MODEL "COH" GASKETED BELL, SDR–35 PVC (OR APPROVED EQUAL).

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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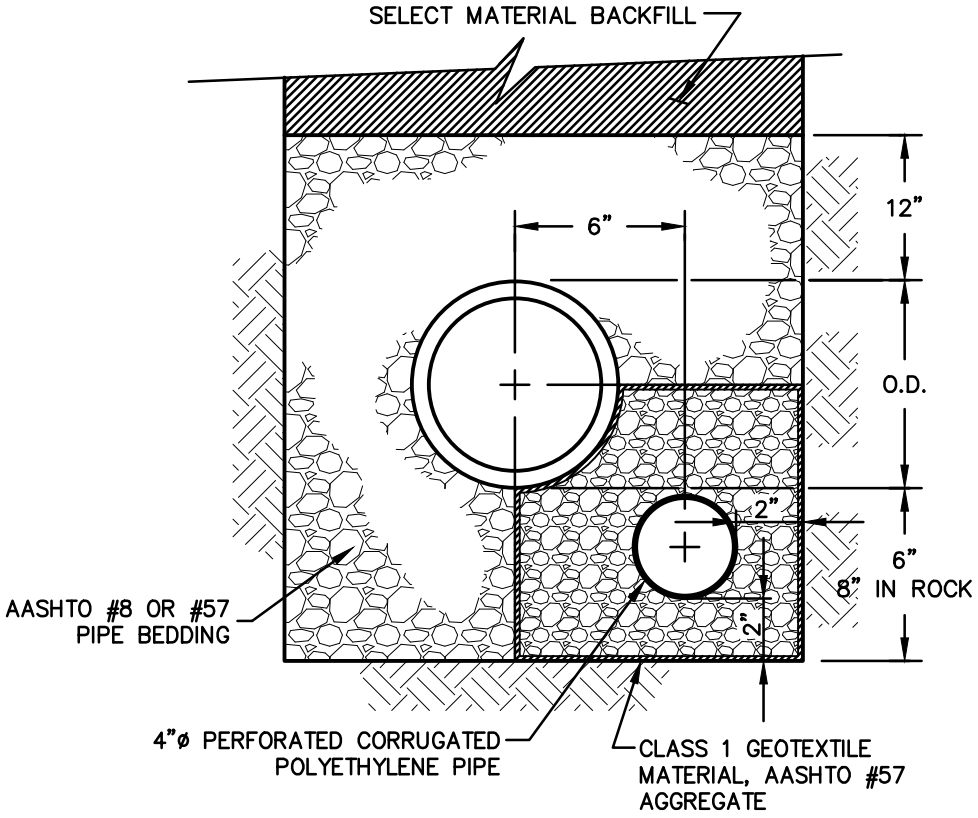
www.redlionpa.org

CAP PROTECTION CASTING
FOR CLEANOUT DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02610-3
FILE NO.	1301.1.00.04



NOTES:
1. LOCATION OF SUBBASE DRAIN IN TRENCH TO BE MODIFIED TO SUIT FIELD CONDITIONS AND TIE INTO INLETS MANHOLES, OR OTHER EXISTING PIPING. POSITIVE FLOW MUST BE MAINTAINED.
2. SUBBASE DRAIN TO BE USED WITH TYPE IV BEDDING ONLY.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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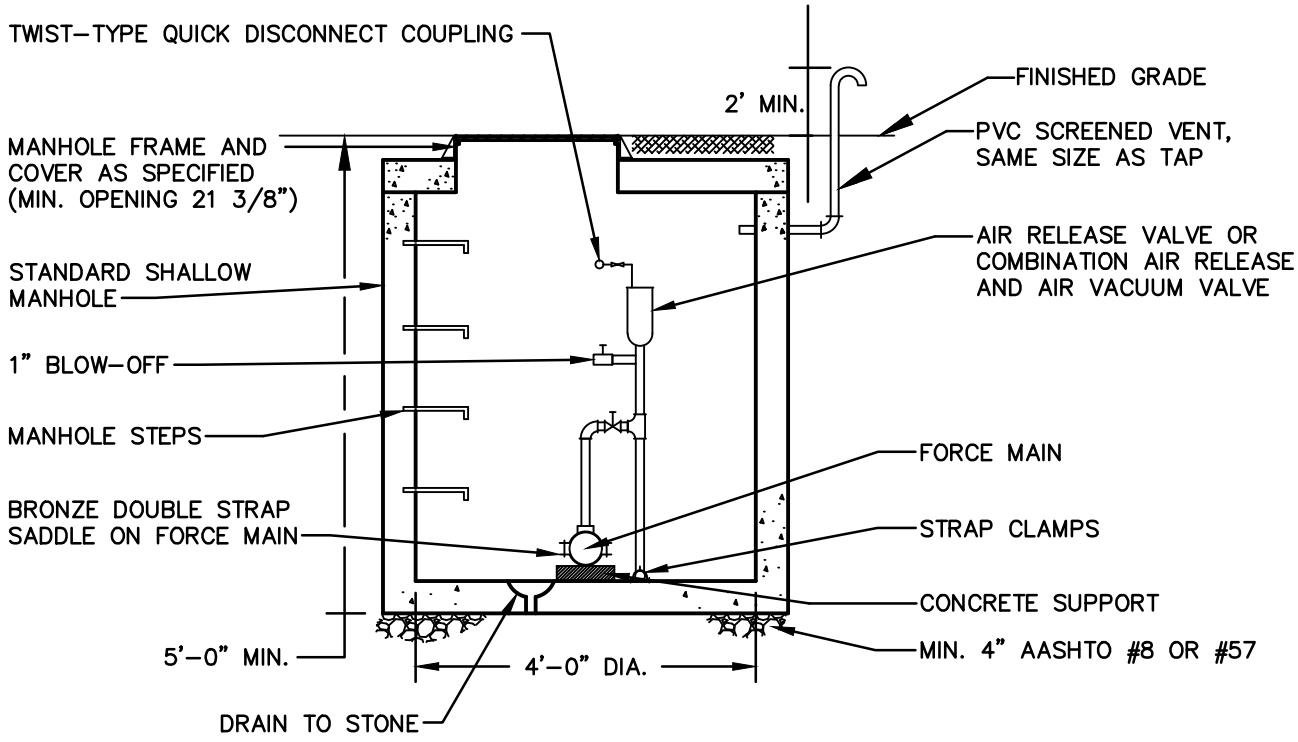
SUBBASE DRAIN DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02610-4
FILE NO.	1301.1.00.04



RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

COMBINATION AIR RELEASE VALVE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02610-5
FILE NO.	1301.1.00.04

SECTION 02611

CURED-IN-PLACE-PIPE (CIPP) LINER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This specification covers Fiberglass Tube (Ultraviolet Light Curing Application) and Felt Tube (Hot Water or Steam Curing Application). The specification includes cleaning and video-inspection of the designated line, identification of existing live taps, removing of protruding taps by remote methods, performing point repairs, installation of the CIPP liner, reopening service taps into the line, sampling and testing, clean-up and a post-rehabilitation video. Rehabilitation must be completed for the full length from the manhole to manhole, resulting in a sound, tight-fitting watertight liner with a smooth interior surface.

1.02 EXPERIENCE RECORD OF CONTRACTORS

A. The Contractor shall have successfully managed and completed CIPP rehabilitation projects on lines ranging in size from the smallest line on the project to the largest line on the project within the last three years prior to bid date. In the absence of this experience, a Manufacturer's representative will be on-site until the Authority states in writing that the Contractor has demonstrated sufficient capacity to continue on his own.

1.03 REFERENCE STANDARDS (LATEST EDITIONS)

A. Reference standards for both the fiberglass and the felt tube liner application.

1. ASTM D543- Test Method for resistance of plastics to chemical reagents.

2. ASTM D790- Test Method(s) for flexural properties of un-reinforced and reinforced plastics and electrical insulating materials.

3. ASTM D638- Standard test method for tensile properties of plastics.

B. The following reference standards for the fiberglass tube liner application.

1. ASTM F2019- Standard practice for rehabilitation of existing pipelines and conduits by the pulled in place installation of glass reinforced plastic (GRP) cured-in-placed thermosetting resin pipe (CIPP).

2. APS Standard- Water tightness standard for cured-in-place thermo-setting resin pipe/Porosity Test protocol.

3. ASTM D5812- Standard practice for determining chemical resistance of thermosetting resins used in glass fiber reinforced structures, intended for liquid service.

C. The following reference standards for the felt tube liner application.

1. ASTM F1216 (including Appendix XI) – Standard practice for rehabilitation of existing pipelines and conduits by the inversion and curing of a resin-impregnated tube.

2. ASTM F1743- Rehabilitation of existing pipelines and conduits by pulled-in-place installation of cured-in-place thermo-setting resin pipe (CIPP).

1.04 PROJECT/SITE CONDITIONS

A. Removal and replacement of fences, damage repair to yards, lawns, sidewalks, driveways, and other public or private property, due to actions or processes related to the work being performed shall be included in the cost of pipe liner system.

B. Confined space entry, work site protection, and street occupancy permission shall be the responsibility of the Contractor and costs of these items are incidental to the pipe liner system. The Contractor shall notify Police, Fire and Ambulance agencies in advance of any and all road closures. The Contractor shall comply with applicable PSHA trench safety rules.

C. Contractor is responsible for traffic control during rehabilitation work. Traffic control should be in accordance with Pennsylvania Department of Transportation Publication 213, "Work Zone Traffic Control Guidelines".

1.05 SUBMITTALS

A. The Contractor shall submit the following prior to the start of construction.

1. Type of resin to be used:

a. Attach 3rd party test results for chemical corrosion resistance testing (Section 2.02).

b. Attach statement that resin is approved to be used in the proposed CIPP system (Section 2.02.

2. Initial (laminate design) modulus of elasticity used on the project (250,000 psi minimum):

a. Attach 3rd party test results conducted in the last three years.

3. Initial (laminate design) flexural strength used on this project (4,500 psi minimum):

a. Attach 3rd party test results conducted in the last three years.

4. Long-term reduction factor:

a. Attach 3rd party test results conducted in the last three years.

5. Type of inner liner and outer liner to be used:

a. Attach manufacturers of 3rd party certification for both the inner and outer liners.

6. Certificate of "direct sizing" – for fiberglass products only.

7. 3rd party test results stating the strength of the seam – for felt products only.

8. Distance from wet-out facility to job-site.

9. Wall thickness design calculations and product specific strength values.

PART 2 - PRODUCTS

2.01 RESIN

A. Acceptable Resin Types:

1. Polyester/polyester npg.
2. Orthothalic
3. Vinylester

B. Resin Definitions and Physical Characteristics

1. The liquid thermosetting resin used in this rehabilitation project shall produce a properly cured tube which will be resistant to abrasion caused by solids, grit, and/r sand. The cured tube shall also be resistant to corrosion due to acids and gasses such as sulfuric acid, carbonic acid, hydrogen sulfide, methane, and carbon monoxide. The cure-in-place pipe system shall utilize thermosetting resins which will withstand the corrosive effect of the existing residential, commercial, and industrial effluents, liquids and/or gasses.

2. The resin system to be used shall be manufactured by an approved company selected by the Cured-In-Place process manufacturer. Documentation of approved status is a pre-contract requirement. Only corrosion resistant polyester/polyester npg, orthothalic, and vinylester resins complying with the following definitions shall be used.

3. The chemical corrosion resistance of the actual resin system used by the Contractor shall be tested by the resin manufacturer in accordance with ASTM F1216, D543 or C581 as applicable. Exposure to the chemical solutions listed below shall result in a loss of no more than twenty percent (20%) of the initial physical properties when tested in accordance with ASTM C581.

Chemical Solution	**Concentration (%)**
Tap Water (pH 6-9)	100
Nitric Acid	5
Phosphoric Acid	10
Sulfuric Acid	10
Gasoline	100
Vegetable Oil	100
Detergent	0.1
Soap	0.1

2.02 TUBE

A. Acceptable Tube Materials

1. Fiberglass (cured with ultra-violet light).

2. Felt (cured hot water or steam).

B. Tube Characteristics and Standards

1. At the time of manufacture, each lot of glass fiber or felt tube liner shall be inspected for defects and tested in accordance with applicable ASTM standards. At the time of delivery, the liner shall be homogeneous throughout, uniform in color, free of cracks, holes foreign materials, blisters and deleterious faults.

2. For testing purposes, a production lot shall consist of all liner having the same marking number. It shall include any and all items produced during any given work shift and must be so identified as opposed to previous or ensuing production.

3. The Engineer may, at any time, direct the manufacturer to obtain compound samples and prepare test specimens in accordance with ASTM standards.

4. The material shall be manufactured in such a manner as to result in a tight-fitting, continues liner after installation. There shall be no measurable annular space. The liner shall have a snug fit at manhole terminations as shall be evidenced by flares.

C. Fiberglass Tube (Ultraviolet Light Curing Application)

1. The glass fiber tubing shall be seamless and spirally wound, including an exterior and interior film that protects and contains the resin used in the liner. The exterior film will be provided with a UV light blocker foil.

2. The Tube shall consist of a seamless, spirally would glass fiber that is flexible and has strain values (expandable) of equal to eight (8) to ten (10) percent. The tube will not have a longitudinal seam, including a stitched seam, stitch-free weld or bond, or stitch-free overlap. The tube shall be constructed to withstand installation pressures and have sufficient strength to bridge missing pipe.

3. The impregnated Tube shall have a uniform thickness, that when compressed at installation pressures will meet or exceed the Design thickness. If voids are present in the pipe, the Design wall thickness must still be met or exceeded.

4. The Tube shall be sixed such that when installed, it will tightly fir the internal circumference and length of the original pipe.

5. The glass fiber Tube shall be saturated with the appropriate resin using a resin bath to allow for the lowest possible amount of air entrapment. Vacuum-suction impregnation methods are not allowed due to the introduction of air using this method. The liner will then be formed into a spirally wound shape for the purpose of being seamless in its cured state. An inner and outer material will be added that are both impervious to airborne styrene, with the outer material also having UV blocking characteristics. The inner membrane will be removed after the installation and curing processes are completed.

6. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.

7. The liner should be seamless in its cured state to insure homogenous physical properties around the circumference of the cured liner.

8. The manufacturer will test the raw materials and liner materials at various stages of manufacturing on every liner, including taking samples of every finished liner and conducting tests for e-modulus, tensile, wall thickness and porosity.

9. Fiberglass materials must be “direct sized” to enhance the fiberglass/resin bond. Certification of this coating and its compatibility with the resin system used is required.

10. The Tube shall be constructed to withstand installation pressures and have sufficient strength to bridge missing pipe while meeting or exceeding the Design wall thickness at all pipe locations during installation conditions and pressures.

11. An “inner liner” and “outer liner” film must be used for resin control (to prevent resin migration and contamination). The “inner film” and “outer film” must both be certified styrene gas barriers. The “inner liner” film must be removed during the installation process unless it is a permanent part of the system and is made an integral part of the carrier tube by bonding or fusin to the carrier tube.

D. Felt Tube (Hot Water or Steam Curing Application)

1. The Tube shall consist of one or more layers of absorbent felt fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5.

2. For work performed under this specification, the flowing felt-based carrier tube materials may be used: Non-woven polyester felt and Non-woven fiberglass filament reinforced polyester felt.

3. The Tube shall be constructed to withstand installation pressures and have sufficient strength to bridge missing pipe while meeting or exceeding the Design wall thickness at all pipe locations during installation conditions and pressures.

4. The Tube shall be sizes such that when installed will tightly fit the internal circumference and length of the original pipe. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.

5. The Tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured liner (CIPP). No dry or unsaturated layers shall be evident.

6. The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that clear detailed examination with closed circuit television inspection equipment may be made.

7. Seams in the felt Tube if applicable, shall meet the requirements of ASTM D790 and D638. Third-party test data documenting the strength of the seam is required.

2.03 DESIGN PARAMETERS

A. The newly installed liner shall be **designed for a minimum fifty-year service life** under continuous loading conditions. The design shall assume no bonding to the original pipe wall. The liner shall be designed to withstand all imposed loads.

Parameter	**C.I.P.P. System**
1. Pipe Condition	Fully deteriorated
2. Soil Type	Saturated/unsaturated
3. Design Thickness	Fiberglass: ASTM 1216 Design Formula, rounded up to Nearest .7mm manufacturing increment. Felt: ASTM 1216 Design Formula, rounded up to nearest 0.5mm manufacturing increment.
4. Ovality of Pipe	2% of circumference, unless measured and stated otherwise By Engineer in writing.
5. Soil Load	120 lbs/ft. 3
6. Traffic Loads	Per AASHTO-HS-20-44 Highway Loading
7. Modulus of Soil	1000 psi
8. Maximum Deflection	5%
9. Minimum Safety	2.0
10. Resin Migration	Minimal
11. Soil Cover	Maximum distance in feet measured between the invert of the pipe and the highest point of soil cover over the length of the pipe.
12. Water Cover	Same as soil cover unless stated otherwise by the ENGINEER, in writing, for specific lines.

B. Wall thickness design calculations for each pipe to be rehabilitated via the CIPP method must be submitted as stated in section 1.06, along with supporting formulas that document the version of formula used. Additionally, product-specific strength values, including the short term flexural modulus and the long term flexural modulus reduction factor, must be substantiated by third-party testing which will be submitted. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus and long term reduction factor used in Design.

C. Physical Properties: The cured pipe shall conform to the minimum structural standards, as follows:

1. Tensile Stress ASTM D638	3,000 psi
2. Flexural Strength ASTM D790	4,500 psi

3. Modulus of Elasticity ASTM D790 250,000 psi

4. Porosity/Water Tightness Test APS Standard (For UV cured products)

2.04 LINER THICKNESS

A. The minimum allowable wall thickness for Fiberglass CIPP products is 2.8 mm and can be increased as necessary to meet ASTM F2019 Design Formula in 0.7 mm increments. The minimum allowable wall thickness for Felt CIPP products is 6.0 mm and can be increased as necessary to meet ASTM F1216 or F1743 Design Formula in 0.5 mm increments. Fiberglass or Felt products below the stated minimum wall thickness (above) will not be allowed under any circumstances.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of the impregnated liner may be by inversion or insertion as specified by the manufacturer. All equipment, labor materials, and processes required to complete the work must be ready on-site before installation begins.

B. The first segment shall be lined, completed and accepted to become the "job standard" against which all subsequent work is judged.

C. At no time will any service lateral remain inoperative for more than an 8 hour period. Any service outage for more than 8 hours will be temporarily bypassed into mainline sanitary sewer at the Contractor's expense. Contractor shall notify property owner 24 hours prior to taking service lateral out of service.

3.02 PRE-INSTALLATION

A. Prior to installation of the liner, the following activities are required:

1. Receipt of approval of pre-installation submittals.

2. Verification of line condition and any obstructions by DVD video inspection.

3. Verification of existing taps in service by flowing water, dye test, or visually with a pan and tilt head camera or other means.

4. Cleaning of line (recorded on DVD). The existing pipeline shall be cleaned of all loose dirt, debris, grease or other deposits of jetting or other suitable methods. Where hard deposits (such as calcite) will interfere with the installation, curing or final results of the liner, these deposits shall be removed by flailing, reaming or robotic cutting. Where service connections (laterals may be protruding into the pipeline, protrusions may require trimming to facilitate the liner installation and results. Lateral protrusions left in place shall be smooth, shall not result in irregularity of the liner at the locations and shall not exceed 0.5 inches.

5. Construct and complete any and all point repairs deemed necessary and shall receive the Authority's approval before reworking the lines and prior to the liner being installed.

B. Prior to installation, the diversion pumping system, including back-up pumps, shall be tested and running.

3.03 SET-UP

A. The installation area/equipment shall be securely protected and all damaged yards, driveways, walks, etc., shall be repaired at no cost to the Authority. Plastic sheeting will be used to cover the work area around the manholes and/or access points to eliminate the opportunity of environmental contamination to the above-ground setting during the installation process.

3.04 PRELINER TUBE

A. At locations where there is significant infiltration of groundwater, a pre-liner tube shall be used to control resin loss and liner thickness. The pre-liner tube shall be reinforced plastic sheet formed into a tube sized to fit the host pipe being lined and shall be continuous from manhole to manhole. Where required, installation of the pre-liner tube shall be witnessed by the Authority. Failure to install the pre-liner tube or installation or pre-liner tube over only part of the segment when required, shall result in the completed C.I.P.P. for that segment being rejected (regardless of physical tests and thickness test results). During thickness testing, the pre-liner tube shall be removed from the thickness test core sample along with the inner liner film used. If there is any damage to the pre-liner tube, it should be repaired immediately with styrene-proof tape.

3.05 TUBE INSERTION (FOR FIBERGLASS/UV CURED PRODUCTS)

A. A slip sheet shall be installed on the bottom half of the pipe prior to liner insertion, for the purpose of smoothing out the bottom of the liner to increase flow characteristics.

B. Where required, the pre-liner tube must be inserted into the pipe or manufactured on the exterior of the liner, prior to inserting the liner.

C. A constant tension winch should be used to pull the glass fiber liner into position in the pipe. Once inserted, end plugs shall be used to cap each end of the glass fiber liner to prepare for pressurizing the liner. The end plugs should be secured with straps to prevent them from being expelled due to pressure. Liner restraints should be used in manholes.

D. The glass fiber liner shall be cured with UV light sources at a constant inner pressure. When inserting the curing equipment in the liner, care should be taken not to damage the inner film material.

1. Curing Speed
2. Light source working & wattage
3. Inner air pressure
4. Exothermic (curing) temperature
5. Date and time
6. Length of liner

E. This will be accomplished using a computer and data base that are tamper proof. During the curing process, infrared sensors will be used to record curing data that will be submitted to the Engineer with a post CCTV inspection on DVD.

1. The parameters for curing speed, inner air pressure and wattage are defined in the Quality Tracker UV curing protocol issued by the manufacturer. The optimal curing speed, or travel speed of the energized UV light sources, is determined for each length of liner based on liner diameter, liner thickness and exothermic reaction temperature.

F. The inner film material should be removed and discarded after curing to provide optimal quality of the final product.

G. Flushing of the cured fiberglass/UV cured CIPP liner (to reduce styrene residual) is not required for fiberglass/UV cured CIPP products that provide 3rd party test results that document styrene residual levels (without flushing) within acceptable defined levels.

3.06 TUBE INSERTION/INVERSION (FOR FELT, HOT WATER/STREAM CURED PRODUCTS)

A. The resin impregnated tube shall be transported and stored in a refrigerated truck until it is installed in an existing line by using an application of water, air, or cable and winch to properly place the tube between the upstream and downstream manholes.

B. When required, a pre-liner tube must be inserted into the pipe prior to inserting the liner.

C. The wet out felt tube shall be inserted, or inverted, through an existing manhole or other approved access. Liner installation head pressures (minimum and maximum for hot and cold conditions) shall not be exceeded, regardless of which method of installation (stand pipe, pressure unit, etc.) is used.

D. Using the “Inversion Procedure”, the tube end shall initially be turned inside out and attached to a platform ring, standpipe, or as approved. The addition of water or stream will be adjusted to sufficient height/pressure to cause the impregnated tube to invert from manhole to manhole, and hold the tube tight against the existing pipe wall.

E. Using the ‘Insertion Procedure”, the tube is winched into position according to manufacturer’s recommendations. The addition of water or steam will be adjusted to sufficient height/pressure to cause the calibration hose to invert from manhole to manhole and hold the tube tight against the existing pipe wall.

F. After the installation of the liner is completed, the Contractor shall use hot water, or steam system capable of providing the required amount of heat uniformly throughout the section for a complete cure of the resin.

G. All water obtained from a private or municipal fire hydrant shall be metered and paid for by the Contractor. An air gap shall be provided between pipes/hoses connected to a fire hydrant and a storage tank/equipment used by the Contractor. The cost of said water shall be included in the cost of the project. All hydrant connections shall be approved by the private or municipal water supplier.

H. The curing temperature and schedule shall be as recommended by the resin/catalyst system manufacturer. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing heat supply. Curing temperature, schedule, and cool down temperature shall be recorded and submitted to the Engineer.

I. Cool-Down - The Contractor shall cool the hardened pipe to a temperature below 100 degrees Fahrenheit, in accordance with the resin manufacturer's recommendation, before relieving the water column or pressure. Cool water may be added to the water column while maintaining circulation as water is drained from a small hole at the opposite end of the cured-in-place pipe, so that a constant water column height is maintained until cool-down is completed. Care shall be taken in the release of the water column so that a vacuum will not develop that could damage the newly installed pipe.

J. Effluent from the curing process may be disposed of directly into the existing sewer system as long as the waste is in full compliance with the wastewater treatment facility's "Industrial Pretreatment Program" requirements. Written approval shall be provided to the Engineer. Offsite disposal of waste is allowed only if a manifest and proof of proper disposal is provided to the Engineer.

3.07 SERVICE RECONNECTION –None Required

A. Service Reconnection: After the cured-in-place process is completed, the Contractor shall reconnect the existing service laterals. These services shall be recommended by internal remote cutting method. Coupon samples shall be obtained for testing.

B. After the liner has been installed, all existing active lateral sewers and services shall be reinstalled unless otherwise indicated by the Authority or on the plans. The reinstatement of laterals and services shall be done without excavation unless otherwise specified by the Engineer. Reinstatement of laterals and services will be accomplished from the interior of the pipeline by means of a television camera directed cutting device or by direct man entry when feasible. All cut lateral and service connections shall be free of burrs, frayed edges, or any restriction preventing free flow of wastewater. Laterals shall be reinstated to a minimum of 90% of their original diameter and no more than 100% of their minimum diameter. The CIPP liner shall be tightly sealed at the cut openings with no gaps. All coupons cut from the liner as a result of reopening the lateral connections shall be retrieved from the sewer and accounted for by the Contractor.

3.08 POST INSTALLATION

A. During the warranty period, which shall be defined as twenty-four (24) calendar months after acceptance by the Authority, any defects which will affect the integrity or strength of the liner pipe or hydraulic capacity shall be repaired at the Contractor's expense, in a manner mutually agreed to by the Authority and the Contractor.

B. Sealing at Manholes: The cured-in-place CIPP shall made a tight seal at the manhole opening with no annular gaps. Under all circumstances, the liner shall be sealed to the manhole and host pipe if no flair is present.

C. Finished Pipe: The finished new cured-in-place liner shall be continuous over the entire length of each section lined, and be free from visual defects such as foreign inclusion, dry spots, pinholes, leaks and delamination.

3.09 TESTING AND QUALITY ASSURANCE PROCEDURES

A. A sample shall be taken for <u>each</u> section of sewer lined using one or more of the following methods:

1. Two (2) flat plate samples shall be taken directly from the wet out tube, clamped between flat plates, and cured in the down tube.

-or-

2. 1 core of 12” diameter minimum taken by the Contractor for the inside of the pipe. If the Contractor takes his sample from inside the line he must repair the spot with a method approved by the Engineer.

-or-

3. An 18” full hoop sample as a restrained sample in the manhole equal to the exact ID of the lined pipe. The liner shall be run through 18” long section of line-sized pipe, or an appropriate restraint, to act as a mold for the liner and cured. One such sample shall be taken from liner at starting manhole and one at the ending manhole of the section being lined.

B. Testing of the completed, installed liner consists of all three components listed below:

1. Field testing:

a. The Contractor shall perform and pay for all field testing described herein.

b. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.

c. Remove the CIPP liner material form the host pipe core samples. Remove any inner liner film, pre-liner and resin that is not contained within the felt tube. Measure the liner thickness on <u>each</u> sample. <u>The smallest thickness shall be equal to or greater than the required thickness as determined by the design parameters. No undersize allowance is permitted.</u> The calculated wall thickness refers only to the part of the liner that consists of a saturated felt or fiberglass tube. Elements that are not part of the saturated felt or fiberglass tube do not contribute to the structural integrity of the liner, thereby excluding tube that is not fully saturated or portions of resin without the tube carrier.

d. After reinstatement, test service connections at mainline liner and seal any that fail the low-pressure air test.

e. The Contractor shall perform television inspection for pre-lining/post cleaning, and for post-lining and a tape of each shall be submitted to the Authority for approval. The videotapes shall be clearly and properly labeled. The television tapes shall provide an accurate length measurement of the entire segment and of the distance to each

2. Laboratory Testing:

a. The Contractor will pay for all laboratory testing described herein.

b. Samples obtained for these tests will be sent by the Contractor to an approved laboratory for testing. The approved laboratory must be a third party, ASTM or equivalent accredited materials testing firm with no financial or directorial link to liner Manufacturer or Contractor.

c. Regardless of the resin/carrier tube system used, the completed liner shall meet or exceed:

- The tensile stress (ASTM D638),
- The initial modulus of elasticity (ASTM D790),
- Initial flexural strength (ASTM D790)
- APS Porosity Standard (tight or non-porous result) for UV products and
- Wall thickness values stated on each liner design sheet.

d. Values for the four parameters above which are under the minimum values stated on the bid form are not acceptable. An under-thickness liner may be brought into compliance at no additional cost to the Authority by (1) removal and replacement of the undersized liner, or (2) addition of a second liner with the full wall thickness as stated on the liner design submittal (and after acceptable preparation of the undersized liner interior.) Option (2) will be considered by the Authority on a case by case basis considering the resulting loss of flow capacity, and can be refused by the Authority for that reason. The addition of a thin liner that makes up the amount of under sizing is not an acceptable remedy because the structural properties of CIPP liners are not additive of they are not cured simultaneously and therefore are bonded together to act as a single liner.

e. In the event of a liner failure of either/both the flexural strength and the modulus tests, another flat plate sample shall be tested. Should the second sample fail, the liner shall be brought into satisfactory compliance by the above methods.

3. Long Term Testing:

a. The Authority may at their own expense perform television inspections prior to the expiration of the two-year warranty.

END OF SECTION

SECTION 02615

WATER MAINS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Installing and repairing water mains and fittings, in excess of 2" diameter.

B. Related work specified elsewhere:

1. Boring and Jacking: .....Section 02150
2. Trenching, Backfilling, and Compacting:.....Section 02221
3. Soil Erosion and Sedimentation Control: .....Section 02270
4. Finish Grading, Seeding, and Sodding: .....Section 02485
5. Valves and Fire Hydrants: .....Section 02640
6. Water Service Connections:.....Section 02642
7. Testing and Disinfecting Water Mains: .....Section 02653
8. Cement Concrete for Utility Construction:.....Section 03050

C. Definitions: NONE

D. Applicable Standard Details:

02615-1 Tracer Wire Installation Detail
02615-2 False Valve Box Detail
02615-3 Tapping Sleeve and Valve Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Water Works Associations (AWWA) most recent revisions:

C104 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe Fittings for Water
C105 Polyethylene Encasement for Ductile Iron Pipe Systems
C110 Gray Iron and ductile Iron Fittings 3-inch through 48 inches
C111 Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings
C115 Flanged Cast Iron and Ductile Iron Pipe with Threaded Flanges
C116 Protective Fusion-Bonded Epoxy Coatings for Interior & Exterior Surfaces of Ductile Iron and Gray Iron Fittings for Water Supply Service
C150 Thickness Design of Ductile Iron Pipe
C151 Ductile Iron Pipe for Water or other Liquids
C153 Ductile Iron Compact Fittings, 3 inch through 24 inch for Water Service
C200 Steel Water Pipe 6 inches and Larger
C203 Coal Tar Protective Coatings and Linings for Steel Water Pipelines – Enamel and Tape Hot Applied
C205 Cement Mortar Protective Lining and Coating for Steel Water Pipe 4 inch and Larger - Shop Applied
C206 Field Welding of Steel Water Pipe
C207 Steel Pipe Flanges

C300 Reinforced Concrete Pressure Pipe, Steel Cylinder Type
C301 Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and other Liquids
C302 Reinforced Concrete Pressure Pipe, Non-Cylinder Type, for Water and other Liquids
C303 Reinforced Concrete Water Pipe, Steel Cylinder Type, Pretensioned
C304 Design of Prestressed Concrete Cylinder Pipe Asbestos-Cement Pipe
C400 Asbestos-Cement Pressure Pipe, 4 inch through 16 inch for Water Distribution Systems
C401 Selection of Asbestos-Cement Pressure Pipe 4 inch through 16 inch
C402 Asbestos-Cement Transmission Pipe, 18 inch through 42 inch for Potable Water & Other Liquids
C403 Selection of Asbestos-Cement Transmission & Feeder Main Pipe, sizes 18 inch through 42 inch
C600 Installation of Ductile Iron Water Mains and Appurtenances
C900 Poly (Vinyl Chloride) (PVC) Pressure Pipe, 4 inches through 12 inches, for water distribution

2. American Society for Testing and Materials (ASTM):

D1785 Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
D2241 Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Plastic Pipe (SDR Series)
D3139 Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

3. NSF/ANSI Standard 61, Section 9 and the Safe Drinking Water – Act Lead Free installation or repair of public water systems or plumbing of any residential or non-residential facility that provides water for human consumption.

B. Materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder will be rejected.

1.03 SUBMITTALS

A. Manufacturers' Literature:

1. Submit two copies of manufacturers' catalog information for each type of pipe, fittings, couplings, adapters, gaskets and assembly of joints for approval of the Engineer. Include manufacturers' recommendations for deflection in pipe joints.

B. Certificates:

1. Submit two copies of certifications for each type of pipe, fittings, gaskets, lubricants or other joint materials from the manufacturers attesting that each of these meets or exceeds specifications requirements.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCTS DELIVERY, STORAGE AND HANDLING

A. Delivery and Handing:

1. Do not place materials on private property without written permission from the property owner.

2. During loading, transporting and unloading, exercise care to prevent damage to materials.

3. Do not drop pipe or fittings. Avoid shock or damage at all times.

4. Use padded slings, hooks and tongs to prevent damage to the exterior surface or internal lining of the pipe.

B. Storage:

1. Do not stack higher than Maximum Staking Heights shown in AWWA C600 or as recommended by the pipe manufacturer.

2. Keep interior of pipe and fittings free from dirt, water or other foreign matter.

3. Store gaskets for mechanical and push-on joints in cool location out of direct sunlight and not in contact with petroleum products.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Ductile Iron:

1. Ductile Iron Pipe: AWWA C150 and AWWA C151

a. Cement mortar lined in accordance with AWWA C104.

b. Class, as indicated on the Construction Drawings, minimum Class 52.

2. Ductile Iron and Cast Iron Fittings: AWWA C110:

a. Cement mortar lined in accordance with AWWA C104.

b. Pressure rating as indicated on the Construction Drawings, minimum 350 psi for mechanical joint; 250 psi for flanged joint.

c. All tees and bends deflecting 11.25 degrees or more require a concrete thrust block.

3. Joints:

a. Mechanical or push-on joints confirming with AWWA C111.

b. Flanged joints conforming with AWWA C110 and AWWA C115.

4. Gaskets: Solid circular cross-section O-ring, ASTM C443

5. Wedges: Brass wedges in joints shall be McWane or equal.

B. Reinforced Concrete (RC):

1. Reinforced concrete pressure pipe, steel cylinder type: AWWA C300.
2. Prestressed concrete pressure pipe, steel cylinder type: AWWA C301.
3. Reinforced concrete pressure pipe, non-cylinder type: AWWA C302.
4. Reinforced concrete pressure pipe, steel cylinder type, pretensioned: AWWA C303.
5. Fittings: Type B
6. Joints: Rubber gasket and steel bell and spigot joint rings.
7. Minimum steel cylinder thickness: 16 gauge.

C. Poly (Vinyl Chloride) (PVC) Plastic Pipe:

1. Pipe:

   a. Outside diameter dimension pipe: AWWA C900, pressure class and dimension ratio as indicated on the Construction Drawings.

2. Manufactured from Poly (Vinyl Chloride) 1120 or 1220.

3. National Sanitation Foundation Seal of Approval for use with potable water required.

4. Joints: Push-on: ASTM D3139.

5. Fittings: Cast or ductile iron fittings for PVC pressure pipe: AWWA C110.

D. Steel:

1. Pipe: AWWA C200.

   a. Cement mortar lined in accordance with AWWA C205.
   b. Coal tar coated in accordance with AWWA C203.
   c. Internal pressure and minimum wall thickness as indicated on the Construction Drawings.

2. Fittings: AWWA C200.

3. Joints:

   a. Welded: AWWA C206.
   b. Flanged: AWWA C207.
   c. Mechanically coupled: Dresser Style 38, Rockwell 411 or equal.

2.02 REPAIR PRODUCTS

A. Couplings - as approved by the Authority.

B. Clamps

1. Gridded gasket
2. Full gasket coverage
3. Stainless steel hardware
4. Stainless steel material

2.03 LINE STOP FITTINGS

A. Line stop plug shall be A536 ductile iron.

B. Plug O-ring shall be Buna N Rubber.

C. Cover plate gasket shall be Neoprene rubber.

D. Pressure rated to 150 psi.

E. Nominal Sizes 4” to 8”

1. Body, flange, and bolts shall be Type 304 stainless steel.

2. Cover flange shall be A-36 cast steel, fusion plastic coated.

F. Nominal Sizes 10” to 12”

1. Body shall be ASTM 283 Grade C or ASTM A-36 carbon steel.

2. Flange shall be AWWA C207 Class D carbon steel.

3. Cover flange shall be A-36 cast steel.

4. Bolts shall be AWWA C-111, ANSI 21.11 high strength, low alloy.

G. Manufacturers

1. JCM Industries.

2. Approved equal.

2.04 TRACER WIRE

A. Tracer wire to be twelve (12) gauge minimum high-strength copper clad steel conductor, insulated with 30 mil, high-density, high molecular weight polyethylene insulation, and rated for direct burial use at 30 volts. Conductor must be at 21% conductivity for locate purposes, break load 380 lbs. minimum. Tracer wire shall be Copperhead™ HS-CCS HDPE 30 mil or approved equal. Wire connectors to be 3M DBR or approved equal and shall be watertight to provide electrical continuity.

B. Manufacturers supplying copper clad steel tracer wire must have available detailed performance data including 5 years of underground testing including durability related to damage of protective insulation and effects of potential corrosion of the specific copper clad steel used. If the manufacturer had not completed 5-year corrosion testing, a 5-year warranty must be provided.

C. Tracer wire insulation color shall meet the APWA uniform color code standard for identification of buried utilities.

2.05 TRACER WIRE CONNECTORS

A. Wire connectors shall be 3M™ DBR, Copperhead Industries© SnakeBite™, or PRO-TRACE© TW™ connectors or approved equal.

2.06 TRACER WIRE ACCESS BOXES

A. For locations where valve boxes are not present, the tracer wire access point shall be composed of one false valve box as depicted on the construction drawings or one Copperhead™ SnakePit Tracer Wire Access Box or approved equal, installed at a maximum spacing of 500 feet.

2.07 TRACER WIRE TESTING REQUIREMENTS

A. Contractor shall perform a continuity test on all tracer wire in the presence of Red Lion Municipal Authority or the Engineer. If the tracer wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire at the Contractor's expense.

2.08 DETECTABLE WARNING TAPE

A. Detectable warning tape shall consist of a minimum thickness of 0.5 mils solid aluminum foil core running the full length and width encased in a protective, high visibility, blue color coded inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil. Foil to be visible on unprinted side. Minimum overall thickness shall be 5.5 mils. Minimum tensile strength shall be 5000 psi. Minimum weight of 2 ½ pounds per 1" x 100' unit. Tape width shall be a minimum of 6 inches and have the words "Caution Buried Water Line Below" imprinted on the color side. Tape shall meet Office of Pipeline Safety regulations, U.S. Department of Transportation, USAS Code B31.8.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavate trenches as specified in Section 02221 to a point 6" below invert grade with bell holes dug as required. Provide at least 3'-6" ft. of cover form the top of the pipe to the finished grade elevation.

3.02 PIPE BEDDING

A. Place select excavated material as bedding. Provide Type IV bedding as shown on Standard Detail 02221-3.

B. Shape recesses for the joints or bell of the pipe by hand. Assure that the pipe is supported for the entire length of the barrel.

C. Select excavated material shall be placed to a point 12 inches above the top of the pipe.

D. Pipe bedding in accordance with the trench paving limits detail included in these specifications or as modified on specific construction drawings.

3.03 PIPE LAYING

A. Clean and inspect each length of pipe or fitting before lowering in the trench. Do not lower pipe into the trench except that which is to be immediately installed.

B. Lay pipe to a uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings, and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

C. Lay each section of pipe in such a manner as to form a close concentric joint with adjoining section and to avoid offsets.

D. Lubricate pipe and gaskets as recommended by the manufacturer. Assemble joints as recommended by the manufacturer. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement.

E. Check each pipe installed as to line and grade in place. Correct deviations immediately. Deflection of pipe joints in excess of maximum recommended by manufacturer will be cause for rejection.

F. Install fittings and valves as pipe laying progresses. Do not support weight of fittings and valves from pipe.

G. When the work is not in progress, and at the end of each work day, securely plug the ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.

H. Backfill concurrently with pipe laying to hold installed pipe in place. When pipe laying is terminated for any reason, provide at least 2 feet of backfill over all pipe except the last piece laid and the joints.

I. Joint Assembly

1. Push-on Joints:

    a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.

    b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.

    c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.

    d. Install 2 brass wedges between bell and spigot to ensure electrical continuity at each pipe joint.

2. Mechanical Joints:

    a. Wash the socket and plain end. Apply a thin film of lubricant. Slip the gland and gasket over the plain end of the pipe. Apply lubricant to gasket.

    b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.

    c. Slide the gland into position, insert bolts, and finger-tighten nuts.

d. Bring bolts to uniform tightness. Tighten bolts 180º apart, alternately.

Torque Required	
Bolt Size, In.	**Torque, Ft.-Lbs.**
5/8”	40 - 60
3/4”	60 - 90
1”	70 - 100

J. The Authority will inspect water mains and all testing before backfill is placed. Backfill to ½" O.D. of pipe only unless otherwise directed by the Authority.

3.04 CUTTING

A. Cut pipe full depth with rotary wheel cutter or saw without damaging pipe or lining.

B. Grind cut ends and rough edges smooth. Bevel end for push-on joints.

C. Do not field cut reinforced concrete pipe. Provide special lengths to make up distance shown.

3.05 DEFLECTION

A. When it is necessary to deflect water mains from a straight alignment horizontally or vertically, do not exceed limits as follows:

1. Ductile Iron Pipe: <12" dia. - 5º maximum deflection per joint.
>12" dia. - 3º maximum deflection per joint.

2. PVC Pipe: 4 degree maximum deflection per joint.

3. Reinforced Concrete Pipe: 1 degree maximum deflection per joint.

3.06 THRUST RESTRAINT

A. Provide all valves, tees, bends, (excluding 11 ¼˚ bend) caps, and plugs with concrete thrust blocks in accordance with Standard Detail 03050-3. Pour concrete thrust blocks against undisturbed earth. Locate thrust blocks to contain the resultant force and so pipe and fitting joints will be accessible for repair.

B. Furnish and install tie rods, clamps, set screw retainer glands, or restrained joints if indicated on the Construction Drawings or required by the Engineer. Protect metal restrained joint components against corrosion by applying a bituminous coating.

3.07 SPECIAL CONDITIONS

A. Connections to existing facilities:

1. Construct connections as shown on the Construction Drawings.

2. For connecting pipe of different materials, use transition fittings as recommended by the manufacturer and approved by the Engineer.

B. Stream Crossings: See Section 02221.

C. Wetland Crossings: Standard Detail 02221-6

D. Highway and Railroad Crossings:

1. Install water mains crossing under highways and railroads as shown on the Construction Drawings. Comply with Railroad Company, Pennsylvania Department of Transportation, and municipal permits included in the Construction Specifications.

2. When casing pipe is indicated, install as specified in Section 02150.

E. Bridge or Aerial Crossings:

1. For aboveground water mains attached to a bridge or other structural supports, furnish and install all supports, hangers and fastenings as shown on the Construction Drawings.

2. Provide insulation and jacket as indicated on the Construction Drawings.

F. Wall Sleeves:

1. Provide pipes passing through concrete or masonry construction with sleeves and mechanical seal of the type and size required or as indicated on the Construction Drawings.

3.08 COMPLETION

A. Test and disinfect water mains as specified in Section 02653.

B. Once proposed water main is in service, Contractor shall remove existing water valve boxes designated to be abandoned from surface and backfill void area.

3.09 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

B. Restore other areas in accordance with Section 02575 local regulations.

3.10 INSTALLATION OF TRACER WIRE

A. Tracer wire shall be installed on all water mains. The wire shall be installed in such a manner as to be able to properly trace all mains without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.

B. Tracer wire shall be installed in the same orientation to all installed pipe and shall be continuous and without splices from each tracer wire access point. Tracer wire shall be laid flat on top of the water main and secured every 8-10 feet in the three o'clock position. The wire shall be protected from damage during the execution of the works. No breaks or cuts in the tracer wire or tracer wire insulation shall be permitted. At service saddles, the tracer wire shall not be allowed to be placed between the saddle and the main.

C. The tracer wire shall be securely bonded together at all wire joints with an approved watertight connector to provide electrical continuity and shall be accessible at all tracer wire access points.

D. Tracer wire access points shall in general be no more than five-hundred (500) feet and at every proposed valve box collar, valve pit, access box, or where required. Tracer wire should not be placed around the steps or any other place where a person entering the valve pit could trip on the wire. Concentrations of multiple proposed valves near pipe intersections including tees and crosses may require more than one access point assembly in each valve box collar. Tracer wire access points shall be within public right-of-way or public utility easements. Locations of trace wire access points should be noted on as-built drawings.

E. At each valve location including fire hydrant isolation valves, a loop of wire is to be brought up the inside of the valve box and looped inside the box two (2) inches below the bottom of the lid.

F. At the point of connection between cast or ductile iron mains, with any non-iron main, the tracer wire shall be properly connected to the iron pipe with a cad weld or approved equivalent. Tracer wire welds shall be completely sealed with the use of an approved mastic type sealer specifically manufactured for underground use. Mastic shall be applied in a thick coat a minimum of 2 inches thick and shall be protected from contamination by the backfill material with the use of a plastic membrane.

G. At all main end caps, a minimum of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a six-pound zinc anode and is to be buried at the same elevation as the water main.

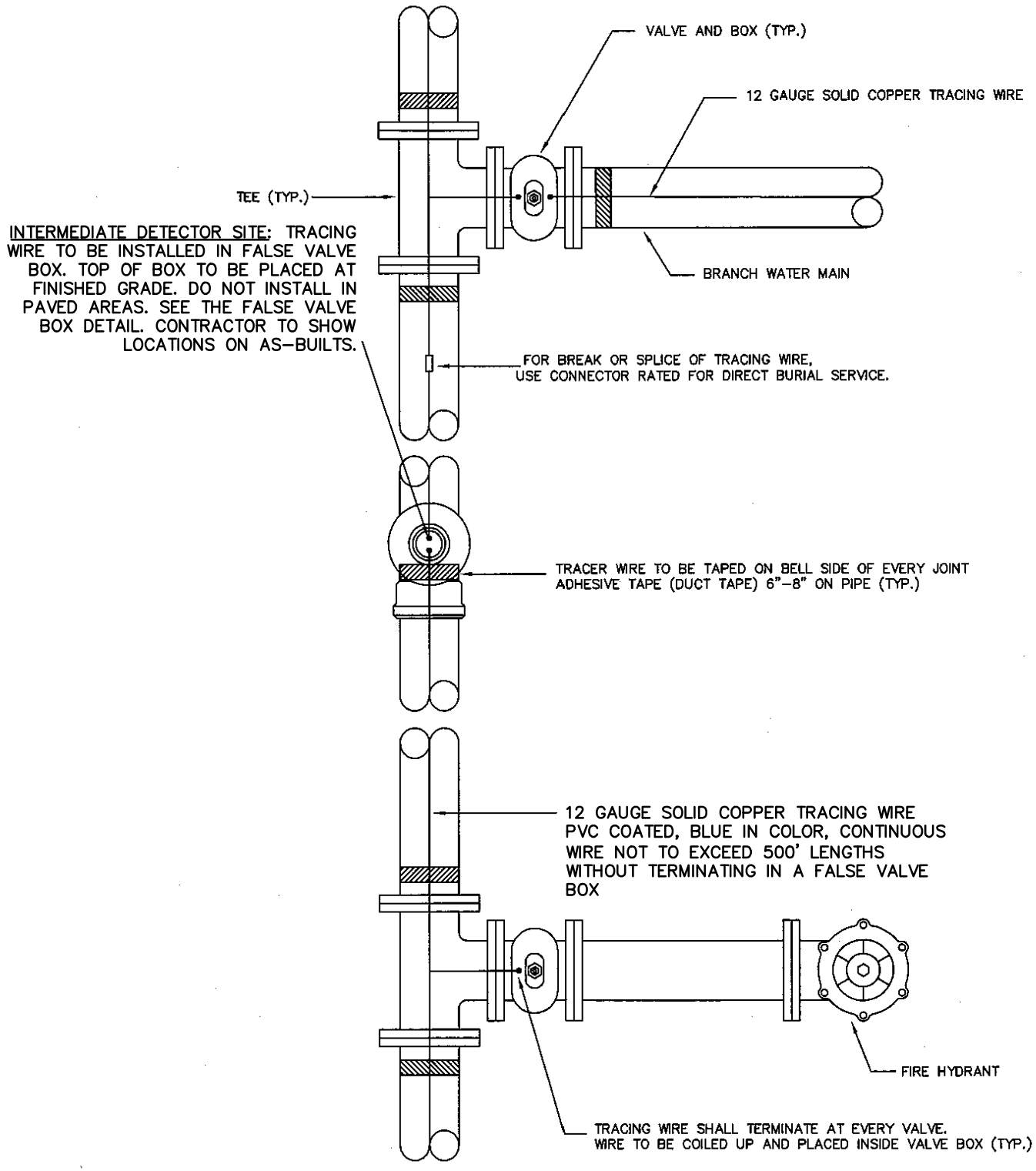
H. Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at water main tees, crosses or at iron or copper water services where a portion of the branch connection water main or water service is replaced with a non-iron or non-copper material. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire. Where the existing branch connection is neither iron nor copper, then the new branch connection tracer wire shall be properly spliced to the existing tracer wire on the branch connection.

I. At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced as outlined above.

3.11 INSTALLATION OF DETECTABLE WARNING TAPE

A. Installation of detectable warning tape shall be 24” below the surface.

END OF SECTION



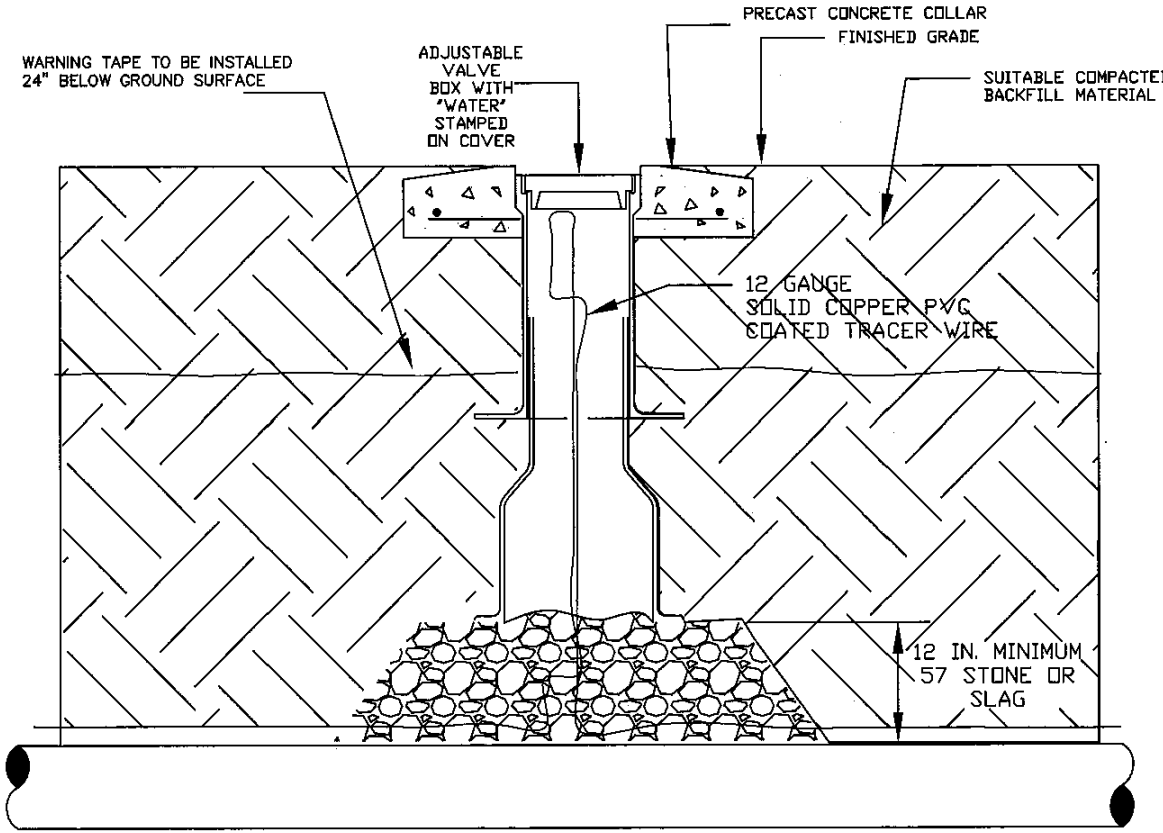
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

TRACING WIRE INSTALLATION DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02615-1
FILE NO.	1301.1.00.04



NOTES:

1. OPEN CUT INSTALLATIONS WILL REQUIRE 12 GAUGE PVC COATED COPPER WIRE.
2. TRENCHLESS INSTALLATIONS WILL REQUIRE FOUR #14 WIRES BEING INSTALLED WITH THE PIPE AND CONNECTED TO THE TRACER WIRE AT BOTH ENDS, OR CAD WELDED TO THE EXISTING IRON PIPE AT BOTH ENDS.
3. CONTRACTOR SHALL INSTALL FALSE VALVE BOXES AT INTERVALS NO GREATER THAN 500 FEET.
4. TRACER WIRE SHALL BE BLUE IN COLOR FOR WATER MAIN.

RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02615-2
FILE NO.	1301.1.00.04

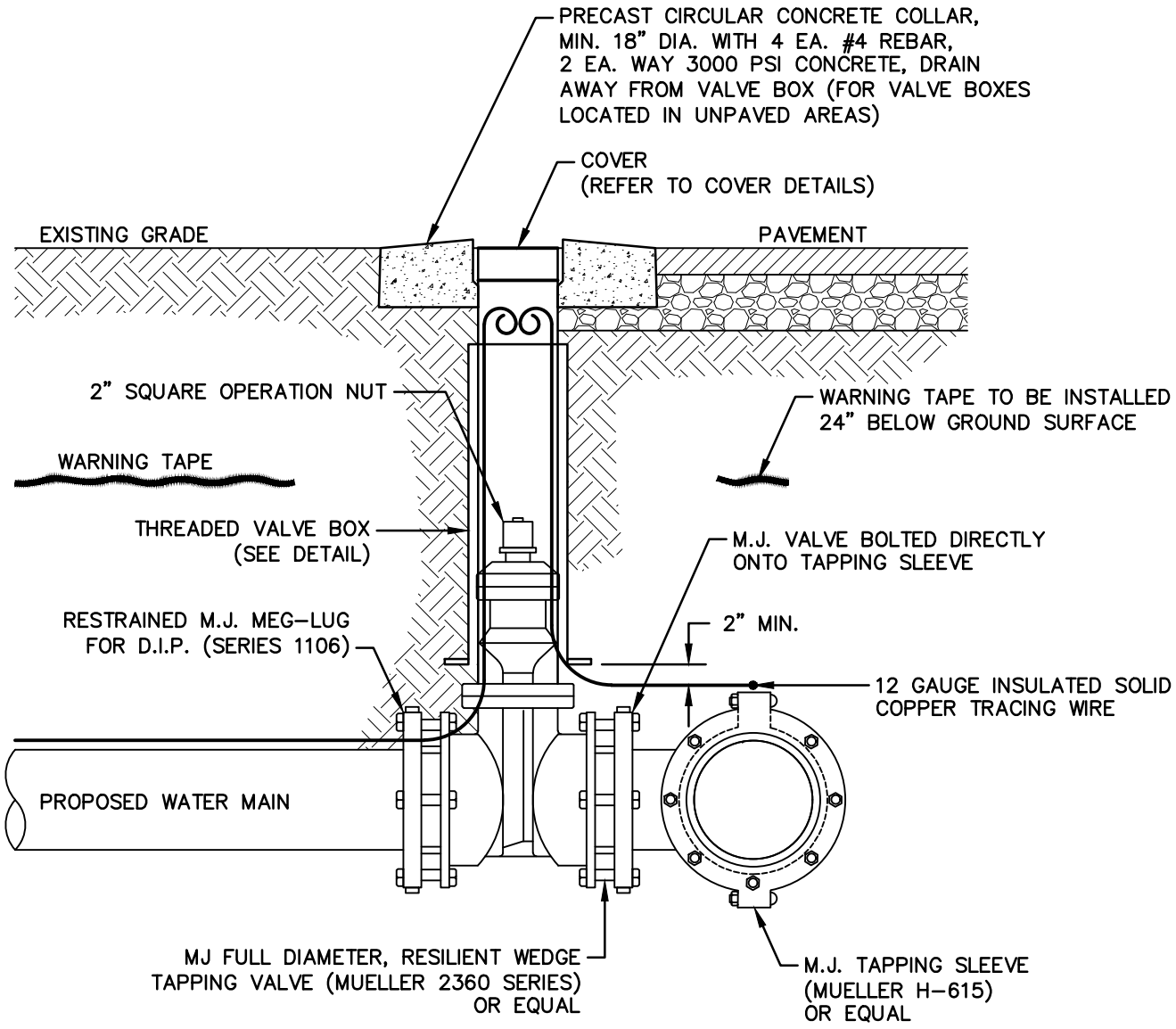
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

FALSE VALVE BOX

DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



NOTES:

1. CENTER VALVE BOX OVER OPERATING NUT TO ENSURE FREE VALVE OPERATION.
2. USE THREADED VALVE BOX ON ALL VALVES.
3. SUPPORT VALVE BOX BOTTOM ON WELL COMPACTED BACKFILL. DO NOT ALLOW VALVE BOX TO REST ON ANY PORTION OF VALVE.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

TAPPING SLEEVE AND VALVE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02615-3
FILE NO.	1301.1.00.04

SECTION 02618

STORM DRAIN PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Storm sewer pipelines
2. Pavement base drains and subdrains

B. Related work specified elsewhere:

1. Boring and jacking: .....Section 02150
2. Trenching, backfilling and compacting: .....Section 02221
3. Soil erosion and sediment pollution control: .....Section 02270
4. Finish grading, seeding and sodding:.....Section 02485
5. Trench paving and restoration: .....Section 02575
6. Manholes:.....Section 02601
7. Storm inlets, catch basins, endwalls: .....Section 02602
8. Cement concrete for utility construction: .....Section 03050

C. Definitions:

1. Polyethylene pipe Type C - full circular cross-section with corrugated surface both inside and outside.

2. Polyethylene pipe Type S - full circular cross-section with outer corrugated pipe wall and smooth inner wall.

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

   Publication 408, Specifications
   Publication 72M, Standards for Roadway Construction

2. American Society for Testing and Materials (ASTM):

C76	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C507	Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
D2241	Specification for Poly(Vinyl Chloride)(PVC) Pressure Rated Pipe (SDR series)
D2321	Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications.
F405	Specification for Corrugated Polyethylene (PE) Tubing and Fittings
F667	Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings

3. American Association of State Highway Transportation Officials (AASHTO):

   M36 Metallic (zinc or aluminum) coated corrugated steel culverts and underdrains
   M246 Precoated galvanized steel sheet for culverts and underdrains
   M252 Corrugated Polyethylene Drainage Tubing
   M278 Class PS50 Polyvinyl Chloride (PVC) Pipe
   M294 & MP6-95 Corrugated Polyethylene Pipe, 12" to 60" Diameter

1.03 SUBMITTALS

A. Certificates:

1. Submit two copies of manufacturer's certification attesting that the pipe, fittings, and joints meet or exceed specification requirements.

B. Manufacturer's Literature:

1. Submit two copies of the manufacturer's recommendations on installation, handling, and storage of materials.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. During loading, transporting, and unloading, exercise care to prevent damage to materials.

B. Do not drop pipe or fittings. Avoid shock or damage at all times.

C. Do not place materials on private property without written permission from the property owner.

PART 2 - PRODUCTS

2.01 CORRUGATED POLYETHYLENE PIPE

A. Tubing and Fittings - 3" to 6"

1. AASHTO M252
2. ASTM F405

B. Pipe and Fittings - 12" to 48”

1. Integrally formed smooth interior.
2. AASHTO M294 and MP6-95
3. ASTM F667

C. Pavement Base Drains - 4", 6"

1. AASHTO M304

2.02 REINFORCED CONCRETE PIPE

A. Pipe and Fittings:

1. ASTM C76, Minimum Class II

B. Joints:

1. Tongue and groove or bell and spigot.

2.03 ELLIPTICAL REINFORCED CONCRETE PIPE

A. Pipe:

1. ASTM C507, Minimum Class HE-A or VE-II.

2.04 CORRUGATED GALVANIZED STEEL PIPE AND PIPE ARCH

A. Pipe and Coupling Bands:

1. Section 601.2, Publication 408 Specifications.

2. AASHTO M36, Type I or AASHTO M218, Type I or AASHTO M274, Type II.

3. Minimum 14 gage; 2-2/3" x ½" corrugations unless otherwise approved by the Authority. Metal sheet thickness and corrugation size as indicated on the Construction Drawings

B. Coated Pipe:

1. AASHTO M245, Type II, AASHTO M218 and AASHTO M246, 10 mil coating.

2.05 POLY (VINYL CHLORIDE) PIPE 3" TO 6"

A. Pipe and Fittings

1. AASHTO M278
2. ASTM D3034

2.06 CORRUGATED ALUMINUM ALLOY PIPE AND PIPE ARCH- AASHTO M196

PART 3 - EXECUTION

3.01 PREPARATION

A. Perform trench excavation and associated work as specified in Section 02221.

B. Provide pipe bedding (Type III or IV) as specified in Section 02221. Place aggregate so that the pipe can be laid to the required tolerances.

3.02 LAYING PIPE IN TRENCHES

A. Give ample notice to the Authority in advance of pipe laying operations, minimum twenty-four hours.

B. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe.

C. Lay pipe proceeding upgrade with the bell or groove pointing upstream.

D. Lay pipe to a true uniform grade line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.

E. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.

F. Clean and inspect each pipe and fitting before joining. Align pipe with previously laid sections. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Assemble joints in accordance with the pipe manufacturer's instructions.

G. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed line or grade as shown on the drawings will be cause for rejection.

H. Place and compact sufficient backfill to hold each section of pipe firmly in place as the pipe is laid.

3.03 BACKFILLING TRENCHES

A. Backfill pipeline trenches only after examination of pipe by the Authority.

B. Backfill and compact trenches as specified in Section 02221.

3.04 PAVEMENT BASE DRAINS AND PIPE UNDERDRAINS

A. Construct drains of the size and type indicated on the drawings in accordance with the requirements set forth in Section 610, Publication 408 Specifications and as shown on Standard Drawing RC-30, Publication 72M.

3.05 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

B. Restore other areas in accordance with Section 02575.

END OF SECTION

SECTION 02640

VALVES AND FIRE HYDRANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Water valves
2. Fire hydrants

B. Related work specified elsewhere:

1. Trenching, Backfilling, and Compacting:.....Section 02221
2. Water Mains:.....Section 02615
3. Water Service Connections:.....Section 02642

C. Definitions: NONE

D. Applicable Standard Details:

02640-1 Air Release Valve
02640-2 Fire Hydrant Setting Detail
02640-3 Blow Off Valve Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Water Works Association (AWWA):

C500 Gate Valves, 3" through 48", for Water and Other Liquids
C502 Dry-Barrel Fire Hydrants
C504 Rubber-Seated Butterfly Valves
C509 Resilient Seated Gate Valves for Water and Sewerage Systems
C512 Air-Released, Air/Vacuum, and Combination Air Valves for Waterworks Service

2. NSF/ANSI Standard 61, Section 9 and the Safe Drinking Water Act – lead free installation or repair of public water system or plumbing of any residential or non-residential facility that provides water for human consumption.

1.03 SUBMITTALS

A. Certificates:

1. Submit two copies of manufacturer's certification attesting that valves, hydrants, and accessories meet or exceed AWWA Standards and specification requirements.

B. Product Data:

1. Submit two copies of manufacturer's latest published literature including illustrations, installation instructions, maintenance instructions and parts lists.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Prepare valves, hydrants, and accessories for shipment according to AWWA Standards and:

1. Seal valve, hydrant, and meter ends to prevent entry of foreign matter into product body.

2. Box, crate, completely enclose, and protect products from accumulations of foreign matter.

B. Store products in areas protected from weather, moisture, or possible damage.

C. Do not store products directly on ground.

D. Handle products to prevent damage to interior or exterior surfaces.

E. Do not place materials on private property without written permission from the property owner.

PART 2 - PRODUCTS

2.01 GATE VALVES

A. AWWA C-509

B. Iron body, bronze trim.

C. Resilient wedge.

D. Non-rising stem, O-ring stem seals.

E. 2” square operating nut; open counterclockwise unless otherwise indicated.

F. Flanged or mechanical joint.

G. Provide valves 16” and larger with bypass valves and gear operators.

2.02 BUTTERFLY VALVES

A. AWWA C504, Class 150B.

B. Iron body, stainless steel shaft, nylon bearings.

1. Sizes 2" through 20": 200 psi rated.

2. Sizes 24" through 48": 150 psi rated.

C. Flanged, wafer, or mechanical joint end.

D. Worm gear manual actuators, sealed, and permanently lubricated.

1. Vertical, right angle, or buried type; hand wheel, crank handle, or square nut as indicated.

2. Stem extension and valve box for buried valves.

3. Open counterclockwise unless otherwise indicated.

2.03 VALVE BOXES

A. 12" valves and smaller:

1. Domestic cast iron, two-piece, screw type, flared base.

2. 3/16" min. wall thickness.

B. Valves larger than 12" and blowoffs:

1. Domestic cast iron, three-piece, screw type.

2. Round base.

C. Cast iron lid, “Red Lion Water” lettered in cover.

2.04 AIR RELEASE VALVES

A. AWWA C512.

B. Cast iron body and cover; stainless steel float, orifice seat, linkage mechanism, mountings, and trim. Buna-N orifice valve. 150 psi minimum rated working pressure.

C. Provide with orifice size determined by the Authority.

2.05 FIRE HYDRANTS

A. Dry-barrel break-away type conforming to AWWA C502.

B. 6" mechanical joint inlet connection, 2 – 2-½ " hose connections, and 1 - 4-½ " hose connection.

C. “York” thread for all connections.

D. Bury depth over connecting pipe - 42".

E. Hydrants shall be 3-way Mueller Super Centurion 250 or Darling B62B only.

2.06 TAPPING SLEEVES AND VALVES

A. Mechanical joint tapping sleeves shall be Mueller No. H-615 or approved equal.

B. 200 psi working pressure.

C. Saddle type tapping sleeves not permitted.

D. Tapping valves shall be full diameter, resilient wedge, as determined by the Authority.

E. Tapping Valves:

1. AWWA C500.

2. Inlet flange, Class 125.

TABLE 1 - CLASS 125 PLATE FLANGES (ASME B16.1 - 1989)				
Pipe Size	**Outside Diameter**	**Number of Bolt Holes**	**Bolt Hole Diameter**	**Bolt Circle**
2"	6"	4	3/4"	4-3/4"
2-1/2"	7"	4	3/4"	5-1/2"
3"	7-1/2"	4	3/4"	6"
3-1/2"	8-1/2"	8	3/4"	7"
4"	9"	8	3/4"	7-1/2"
5"	10"	8	7/8"	8-1/2"
6"	11"	8	7/8"	9-1/2"
8"	13-1/2"	8	7/8"	11-3/4"
10"	16"	12	1"	14-1/4"
12"	19"	12	1"	17"
14"	21"	12	1-1/8"	18-3/4"
16"	23-1/2"	16	1-1/8"	21-1/4"

2.07 INSERT VALVE

A. Valve shall be a resilient wedge gate valve with a working pressure of 250 psi.

B. Valve body, bonnet, and wedge shall be ductile iron, ASTM A536, Grade 65-45-12. Valve shall have a pressure rating that meets or exceeds AWWA C515.

C. The ductile iron wedge shall be fully encapsulated with EPDM rubber by a high pressure and high temperature compression or injection mold process.

D. The resilient wedge shall seat on the valve body and not the pipe to obtain optimum seating and flow control. Pressure equalization on either side of the wedge shall not be necessary to open the valve.

E. Valve shall be coated with a minimum of 8 mils epoxy in compliance with AWWA C550 and certified to ANSI/NSF-61.

F. Valve shall feature triple O-ring stem seals. Two O-rings shall be located above the thrust collar and one O-ring shall be located below the thrust collar.

G. Manufacturers

1. Team Industrial Services.

2. Advanced Valve Technologies

3. Or approved equal.

2.08 TIE RODS

A. Tie rod restraint system - 3/4" diameter stainless steel rods, mini-tensile strength 7,000 psi each.

B. Star National Products, 1323 Holly Avenue, P.O. Box 258, Columbus, OH 43316

PART 3 - EXECUTION

3.01 GENERAL

A. Determine the exact location and size of valves and hydrants from the Construction Drawings and in consultation with the Authority.

B. Perform trench excavation, backfilling, and compaction in accordance with Section 02221.

C. Install pipe and tubing in accordance with Section 02642 and the applicable Standard Details.

D. Valve box covers shall be covered with an approved material during paving or seal coat operations to protect against tarnishing cover surface or restricting access to manhole. Protective material shall be removed immediately after road surface operations are complete. Contractor is responsible for cleaning of cover surface and restoring access to the manhole to the satisfaction of the Authority Representative.

3.02 RESILIENT GATE AND BUTTERFLY VALVES

A. Install valves in conjunction with pipe laying. Set valves and valve boxes plumb.

B. Place concrete block under valve.

C. Provide buried valves with valve boxes installed flush with finished grade.

D. Furnish one tee wrench to the Authority.

3.03 AIR RELEASE VALVES

A. Orient, locate, and install air release valves including valve vault as shown on Standard Detail 02640-1.

B. Set air release valves and vault plumb.

C. Verify there are no leaks and that the valve functions correctly.

3.04 FIRE HYDRANTS

A. Install fire hydrants as shown on Standard Detail 02640-2. Provide support blocking and drainage gravel as shown.

1. Set hydrants plumb with pumper nozzle facing the curb or street.

2. Set hydrants with nozzles at least 12 inches above the ground and the safety flange not more than 6 inches nor less than 2 inches above grade.

3. Do not block drain hole.

4. Paint hydrants in accordance with local color scheme.

B. After hydrostatic testing, flush hydrants and check for proper drainage.

3.05 BLOWOFFS

A. Install a blowoff on the dead ends of all water mains or where shown on the Construction Drawings.

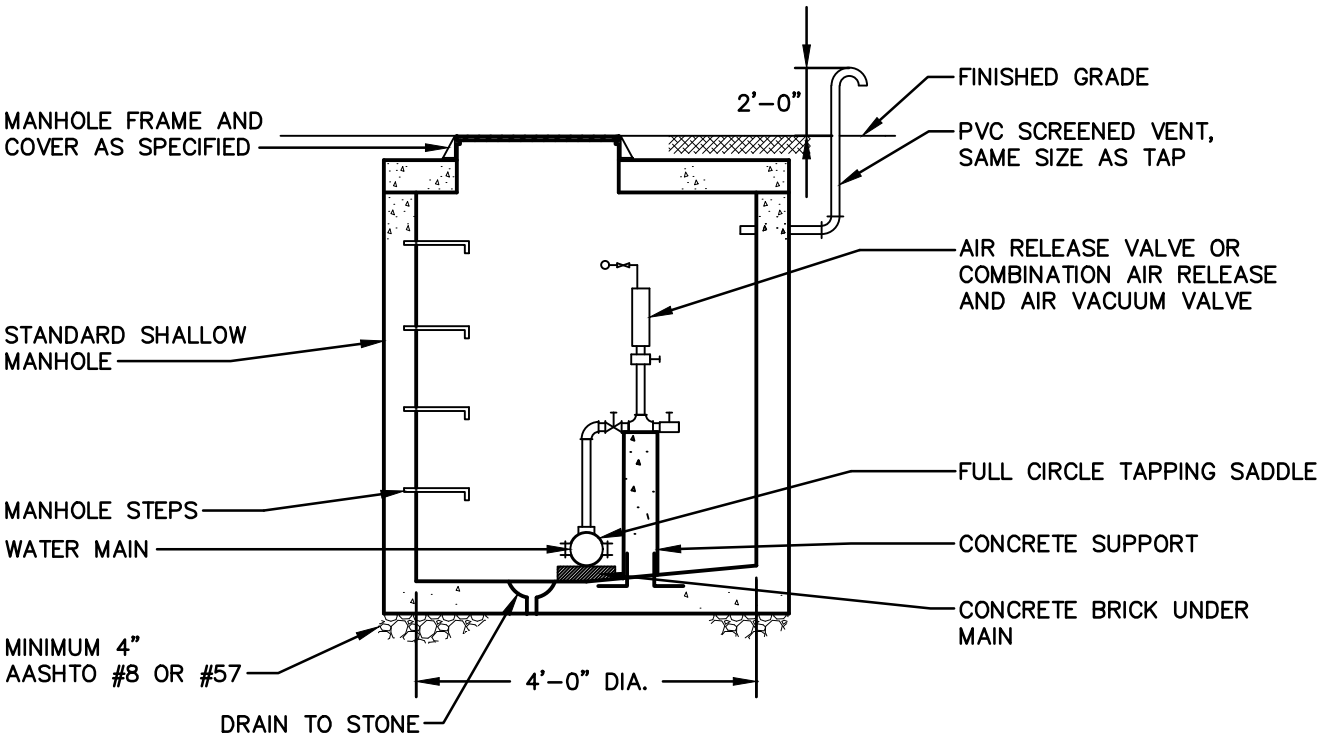
B. Construct blowoffs as shown on Standard Detail 02640-3.

3.06 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

B. Restore other areas in accordance with Section 02575 local regulations.

END OF SECTION



MAIN SIZE	TAP SIZE
4"–12"	2"
14"–20"	3"
24"–36"	4"

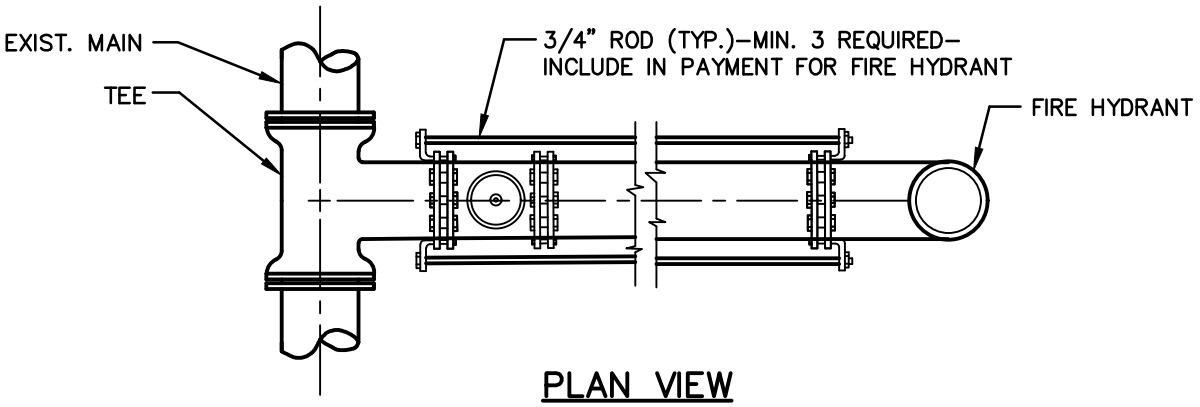
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

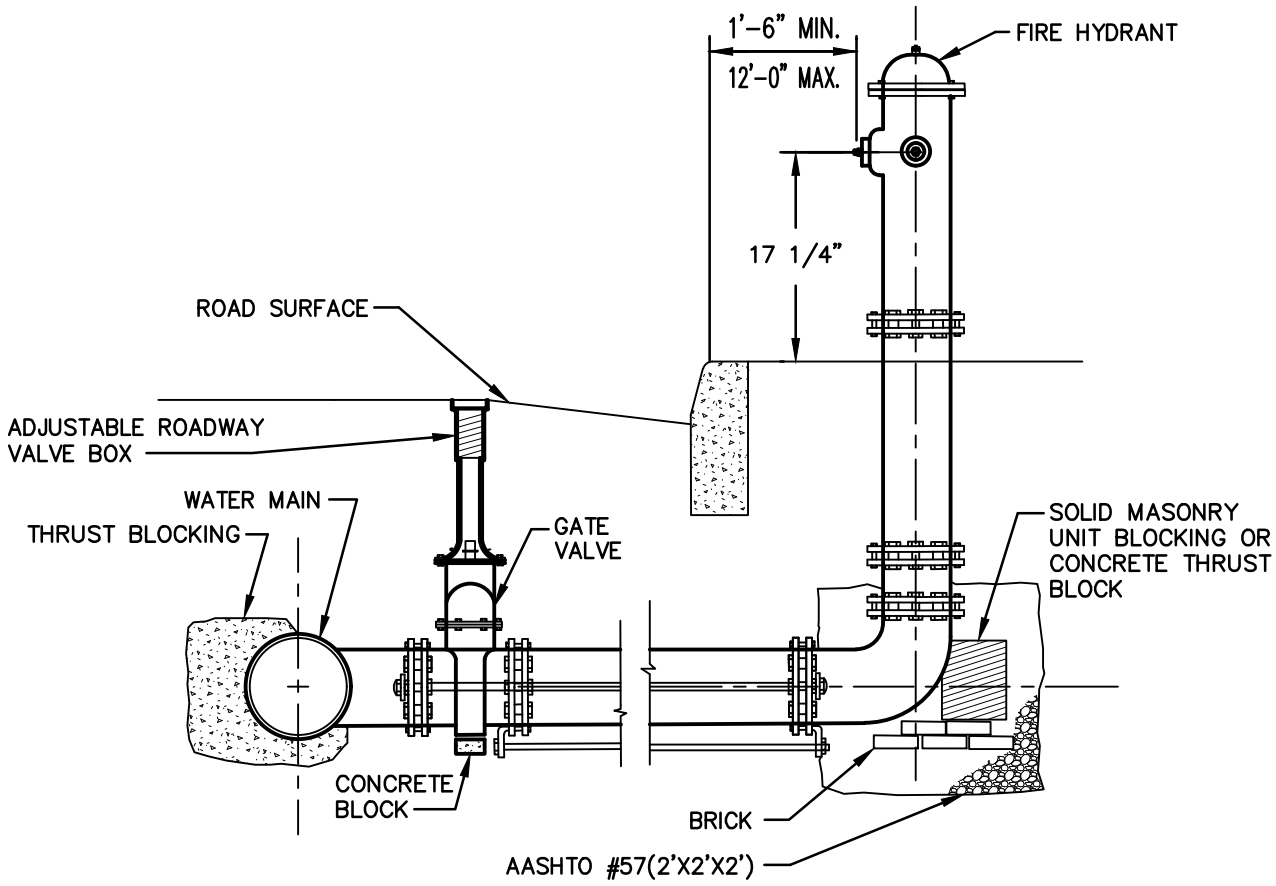
AIR RELEASE
VALVE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02640-1
FILE NO.	1301.1.00.04



PLAN VIEW



ELEVATION

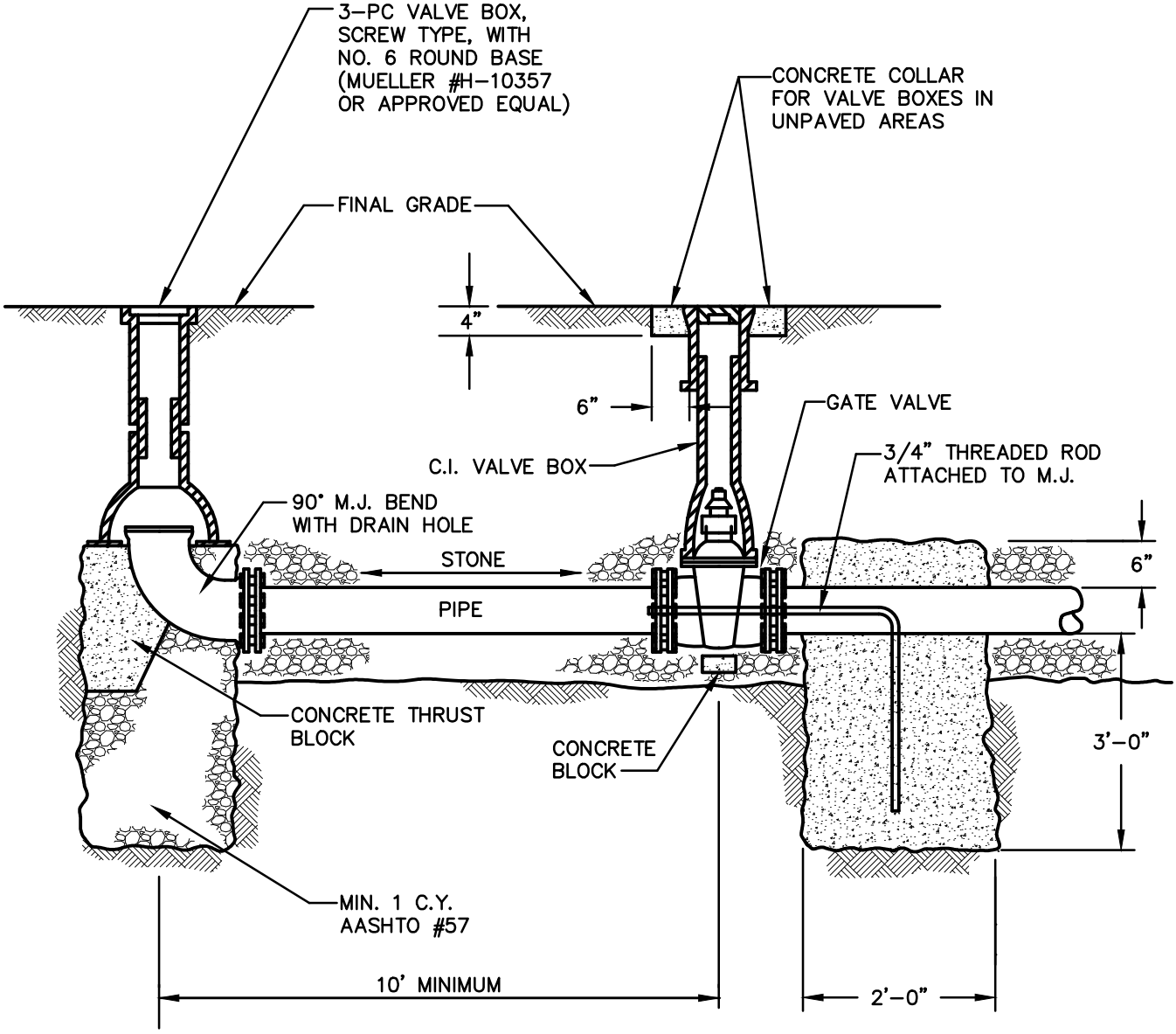
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

FIRE HYDRANT
SETTING DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02640-2
FILE NO.	1301.1.00.04



RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

BLOW OFF
VALVE DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02640-3
FILE NO.	1301.1.00.04

SECTION 02642

WATER SERVICE CONNECTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Tapping water mains by installation of corporation stops or other suitable fittings or couplings, up to and including 2" diameter.

2. Connection of service pipe and fittings up to curb stops and meter boxes.

3. Installation of meter setting equipment.

4. Configuration of residential fire line and water service line.

B. Related work specified elsewhere:

1. Trenching, Backfilling, and Compacting:.....Section 02221
2. Paving and restoration .....Section 02575
3. Water Mains:.....Section 02615

C. Definitions: NONE

D. Applicable Standard Details:

02642-1 Residential Water Service Connection Detail
02642-2 Residential Water Service with Fireline Configuration Detail
02642-3 Duplex Water Service Detail
02642-4 Water Service Curb Box Cap Detail
02642-5 Water Valve Box Cap Detail
02642-6 Water Service Installation Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Society for Testing and Materials (ASTM):

B62 Specification for Composition Bronze or Ounce Metal Castings
B88 Specification for Seamless Copper Water Tube
C62 Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)

2. American Water Works Association (AWWA):

C700 Cold Water Meters - Displacement Type, Bronze Main Case
C800 Underground Service Line Valves and Fittings

3. NSF/ANSI Standard 61, Section 9 and Safe Drinking Water Act – Lead free installation or repair of public water systems or plumbing of any residential or non-residential facility that provides water for human consumption.

1.03 SUBMITTALS

A. Certificates:

1. Submit two copies each of certificate for pipe and pipe fittings from each manufacturer attesting that each of these meets or exceeds specification requirements.

B. Manufacturers' Literature:

1. Submit two copies each of manufacturers' catalog for each size and type of corporation stop, curb stop, curb box, meter setting and pipe, fitting or coupling.

1.04 JOB CONDITIONS: Section not utilized.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Product Delivery:

1. During loading, transporting and unloading of all materials and products, exercise care to prevent any damage.

B. Storage:

1. Store all products and materials off the ground and under protective coverings and custody, and in a manner to keep products clean and in good condition until used.

2. Do not place materials on private property without written permission from the property owner.

PART 2 - PRODUCTS

2.01 PIPE OR TUBING AND FITTINGS

A. Copper Water Tubing:

1. ASTM B88, Type K, Seamless
2. Flared type union cast brass joints - no sweated joints permitted.
3. Min. size service = 3/4" unless otherwise determined by the Authority.

2.02 CORPORATION STOP ASSEMBLY

A. Corporation Stops:

1. Brass components in contact with potable water conforming to ASTM B584
2. Brass components not in contact with potable water conforming to ASTM B62.
3. Standard Mueller thread on inlet end.
4. Outlet end suitable for copper service line.

B. Service Clamps:

1. Galvanized iron or bronze body.
2. Neoprene, O-ring gasket.
3. Double straps with matching hardware.

2.03 CURB STOP ASSEMBLY

A. Curb Stops:

1. Brass components in contact with potable water conforming to ASTM B584
2. Brass components not in contact with potable water conforming to ASTM B62.
3. Plug type valve.
4. Positive pressure sealing.
5. Quarter turn style.

B. Curb Boxes and Covers:

1. Cast iron body, extension type or Buffalo type.
2. Minneapolis or arch pattern base.
3. Lid with inscription 'Red Lion Water', with PLV's valve box pentagon plug.

2.04 METER SETTING EQUIPMENT

A. Meter Setting:

1. Meter yokes, copper or iron.

2. Inlet and outlet horizontal/vertical setting with matching couplings, fittings and stops.

2.05 METERS AND METER PITS

A. Meters:

1. SENSUS iPERL™ water meter for service lines ¾" to 1" diameter.

2. OMNI C$^{2™}$ water meter for service lines 1-1/2" to 2" diameter.

3. Meters for service lines greater than 2" diameter as approved by the Authority.

4. OMNI Fireline F2™ water meter for fire suppression service lines 4" to 10" diameter

B. Pits:

1. Mueller/McCullough Thermal Coil™ meter box or approved equal.

2. Precast or cast-in-place concrete a minimum of 3' square and 4' vertical clearance inside.

3. Access lid to meter-pit shall be hinged steel or aluminum and insulated to prevent against freezing. Lids shall be equipped with a soft close dampening system.

2.06 BRICK

A. ASTM C62, Grade SW

2.07 U-BRANCH

A. Mueller H-15362N, 1” x 3/4” x 13-1/2” or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

A. Establish location of curb stops and box or meter pit for each service connection.

B. Perform trench excavation and associated work as specified in Section 02221.

3.02 TAPPING WATER MAINS

A. Each connection for different kinds of water mains shall be tapped using suitable materials, equipment and methods in accordance with manufacturer's instructions.

B. Provide service clamps for asbestos cement and PVC water mains.

C. Fill ductile iron main 24 hours in advance of tapping (no dry tap). Pretesting of main is recommended before tapping.

D. Screw corporation stops directly into a tapped and threaded iron main at 10 or 2 o'clock positions on the main's circumference. Locate corporation stops at least 12" apart longitudinally and staggered. Tap into main shall be a minimum of 2’ from the center of bell.

E. In case of plastic pipe water mains, provide full support for the service clamp all around the circumference of the pipe, with minimum 2" width of bearing area. Exercise care against crushing or other damage to water mains at the time of tapping or installing the service clamp or corporation stop.

F. Use proper seals or other devices to ensure that no leaks are left in the water mains at the points of tapping. Do not backfill and cover the service connection until observed by the Engineer.

G. Top taps shall be removed and replaced with taped brass plug.

3.03 SERVICE LINE AND FITTINGS

A. Use bends to connect the service pipe or tubing to the tapping fitting or corporation stops to provide flexibility to counteract the effects of settlement or expansion/contraction in the line.

B. Lay each section of the service line in a manner to form a tight joint with the adjoining section. Avoid offsets, kinks or awkward bends to ensure a smooth flow line. Provide Type V bedding as specified in Section 02221. Limestone based masonry sand is not permitted.

C. Clean and inspect each pipe and part of the fitting before installing and assemble to provide a flexible joint.

D. Install service fittings and appurtenances on suitable brick or concrete supports, as shown on the Construction Drawings and Standard Detail 02642-1. Do not use earth, rocks, wood, or other organic materials as supports.

E. Operate each corporation and curb stop before and after installation.

F. When the work is not in progress, and at the end of each work day, securely plug the ends of pipe and fittings to prevent any dirt or foreign substances from entering the lines.

G. Test and disinfect mains and service lines as specified in Section 02653.

H. Backfill in accordance with Section 02221.

3.04 METER PITS

A. Excavate and place minimum of 4" AASHTO No. 67 on undisturbed earth as base of meter pit.

B. Construct concrete walls or set precast box (without a bottom slab) on the stone base.

C. Location of meter pit shall be determined by the Authority.

D. Backfill in accordance with Section 02221 and as directed by the Authority.

3.05 SURFACE RESTORATION

A. Restore unpaved areas in accordance with Section 02221.

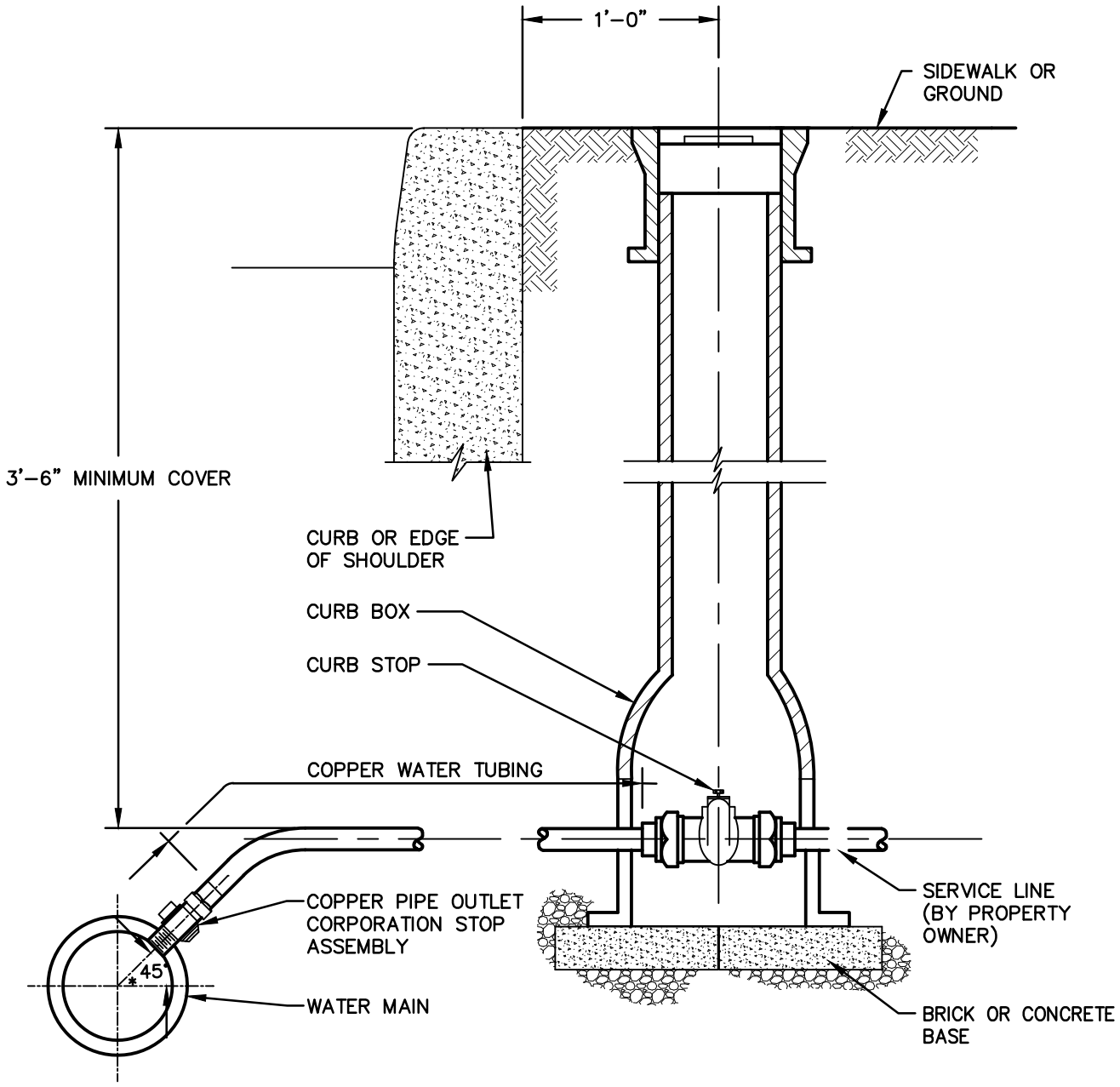
B. Restore other areas in accordance with local regulations.

3.06 RESIDENTIAL FIRE LANES

A. Residential fire lines and water service lines shall be configured as shown on Standard Detail 02642-1.

B. Water valve caps for fire lines shall be identified and installed in accordance with Standard Detail 02642-03.

END OF SECTION



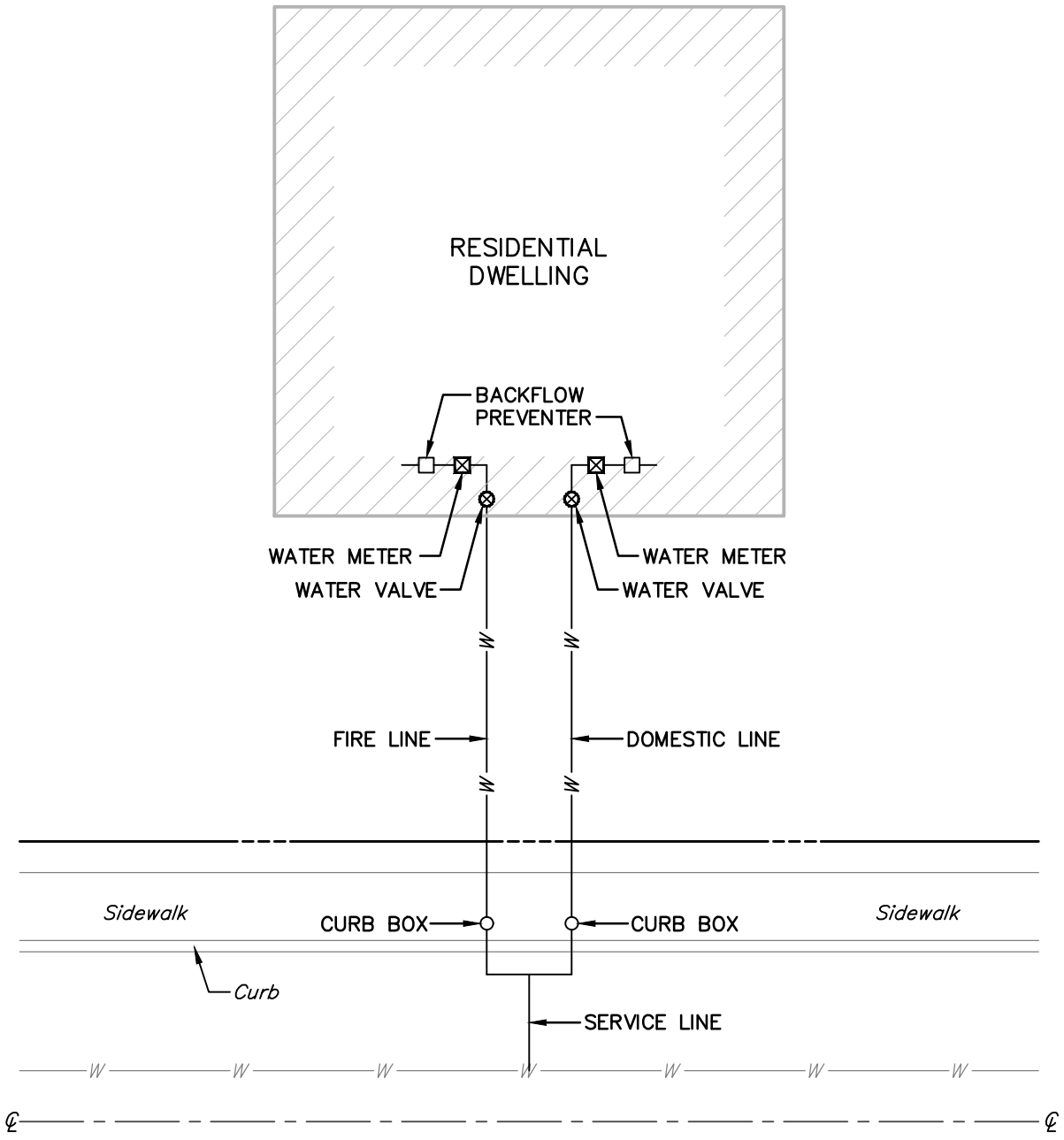
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

RESIDENTIAL WATER SERVICE CONNECTION DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02642-1
FILE NO.	1301.1.00.04



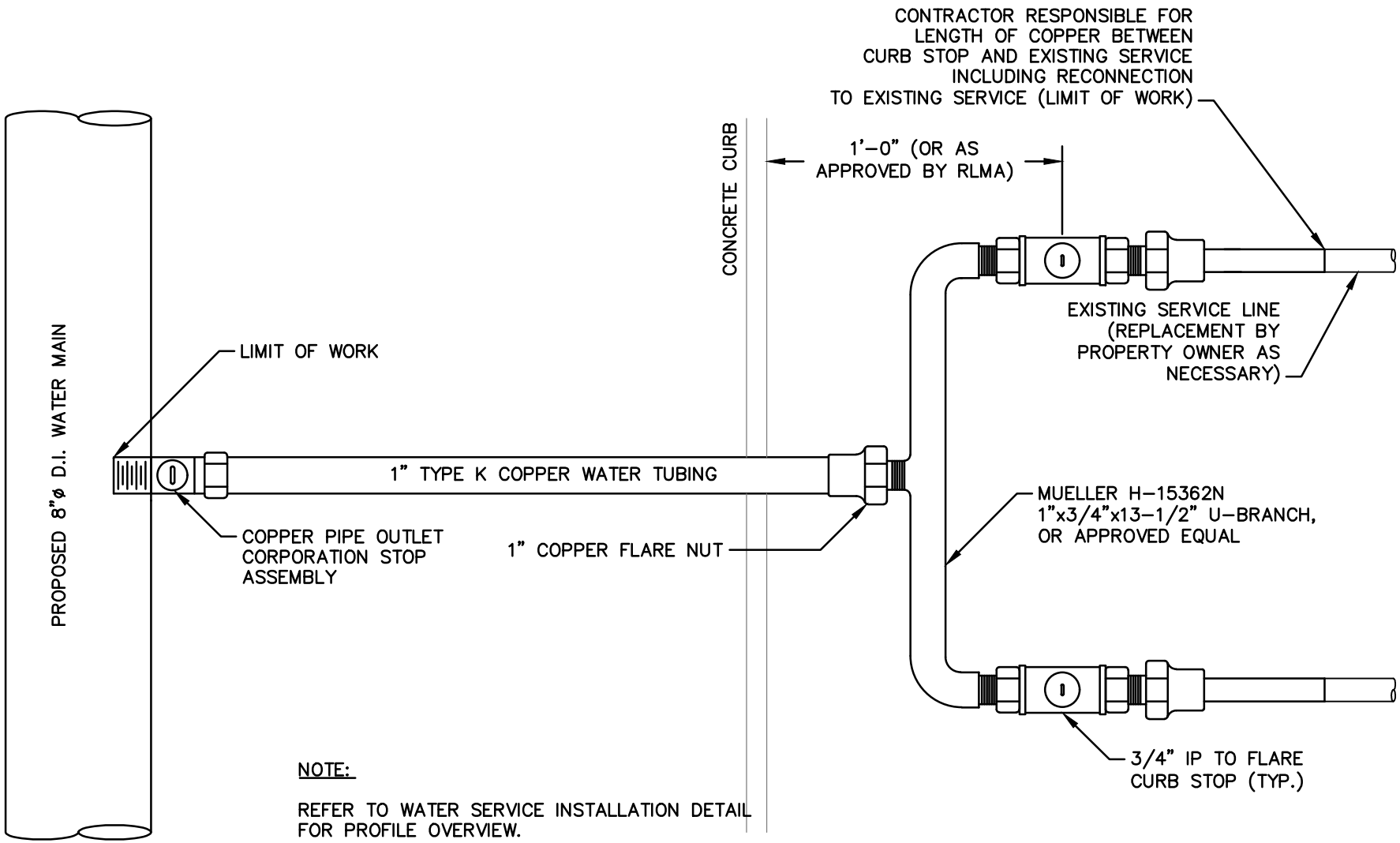
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

RESIDENTIAL WATER SERVICE
WITH FIRELINE CONFIGURATION
DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02642-2
FILE NO.	1301.1.00.04



RLMA CONSTRUCTION & MATERIAL SPECIFICATIONS

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02642-3
FILE NO.	1301.1.00.04

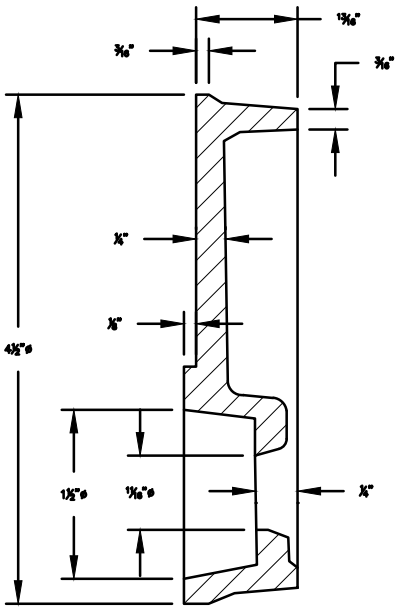
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

DUPLEX WATER

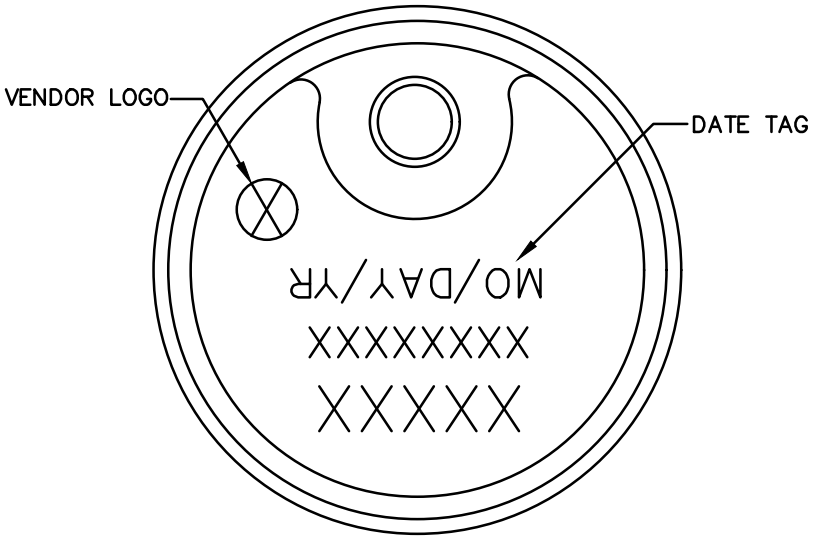
SERVICE DETAIL

RED LION BOROUGH

YORK COUNTY, PENNSYLVANIA



COVER SECTION



BOTTOM VIEW

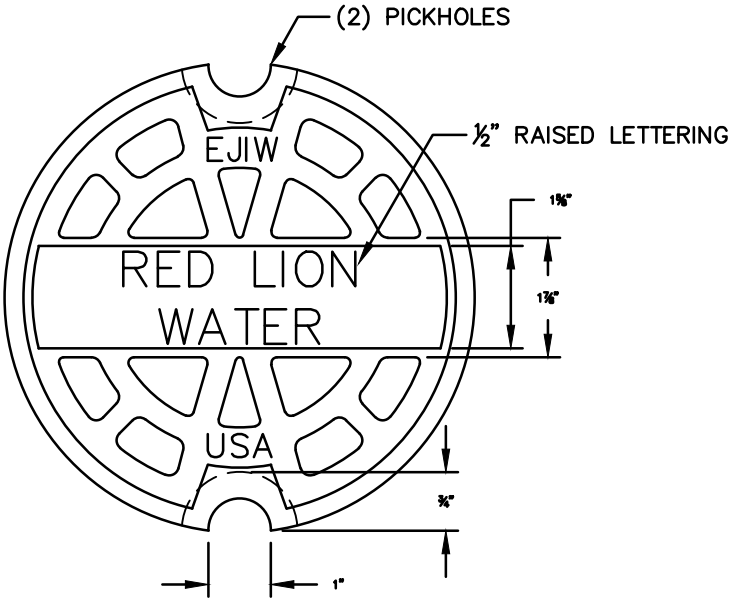
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

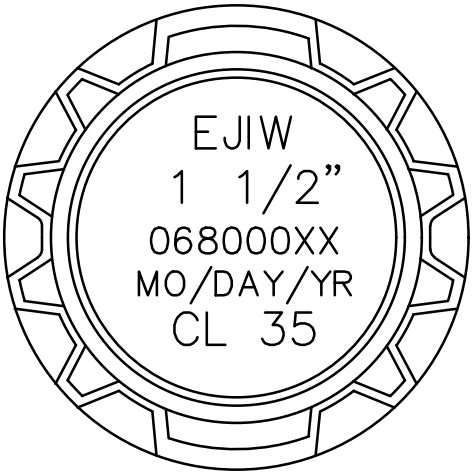
RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

WATER SERVICE CURB
BOX CAP DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02642-4
FILE NO.	1301.1.00.04





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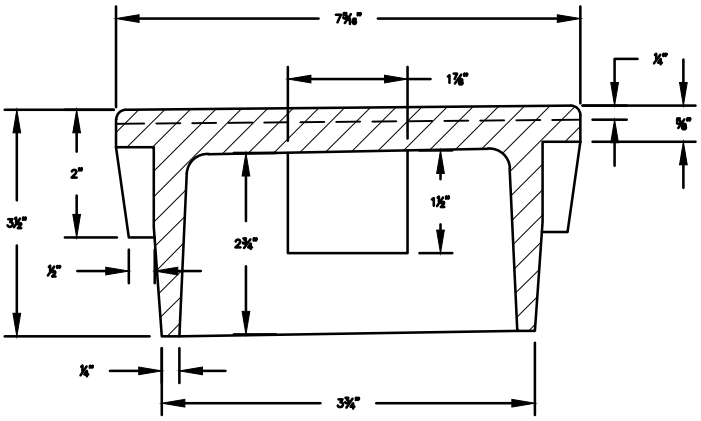

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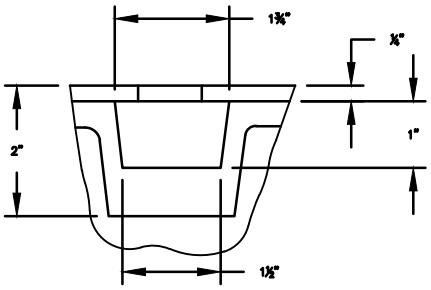


PICK HOLE DETAIL

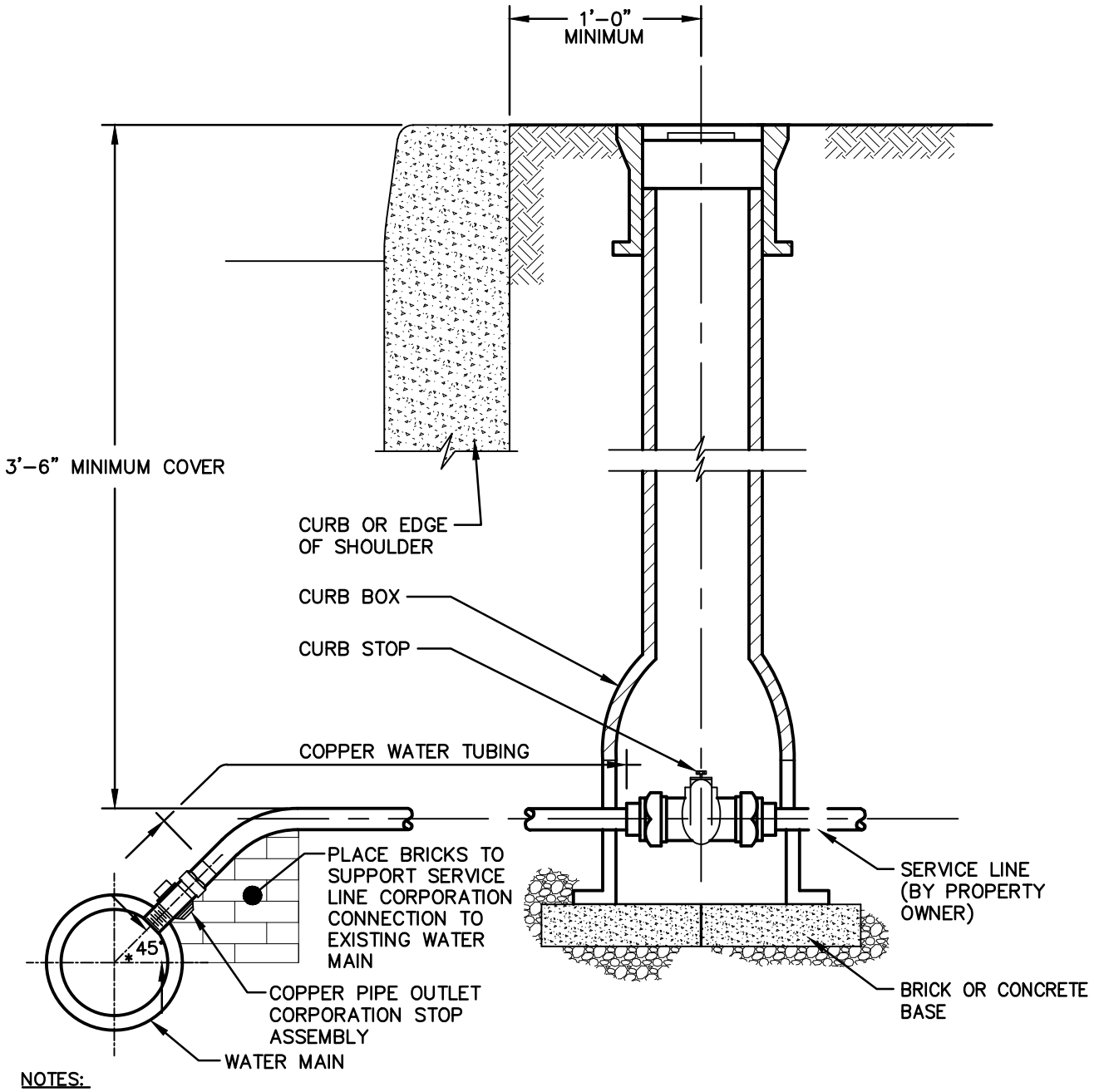
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

WATER VALVE BOX
CAP DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02642-5
FILE NO.	1301.1.00.04



NOTES:

1. CLEAN AND INSPECT EACH PIPE, CORPORATION STOP, AND CURB STOP BEFORE AND AFTER INSTALLATION.
2. SURFACE RESTORATION SHOULD BE IN ACCORDANCE WITH SIDEWALK DETAIL THIS SHEET.
3. ALL SERVICE REPLACEMENTS SHALL BE BORED FROM THE MAIN TO THE SIDEWALK.
4. WHERE EXISTING WATER SERVICE CURB BOX IS OUTSIDE OF SIDEWALK OR RIGHT OF WAY, CONTRACTOR SHALL INSTALL THE NEW CURB BOX ACCORDING TO THIS DETAIL. THE EXISTING CURB BOX WILL REMAIN IN PLACE AND BE REMOVED BY OTHERS.
5. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT OF WATER SERVICE BEYOND CURB BOX TO ACHIEVE CONNECTION TO EXISTING SERVICE LINE.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

WATER SERVICE
INSTALLATION DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	02642-6
FILE NO.	1301.1.00.04

SECTION 02651

SANITARY SEWER TESTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Testing Gravity Sewer Pipelines:

a. Lamping
b. Low-pressure air test
c. Infiltration test
d. Deflection test - PVC pipe only

2. Testing Pressure Pipelines:

a. Hydrostatic leakage test

3. Testing Manholes:

a. Vacuum test

B. Related work specified elsewhere:

1. Manholes:.....Section 02601
2. Sanitary Sewer Pipe:.....Section 02610
3. Testing and Disinfecting Water Mains: .....Section 02653

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Test Acceptance:

1. No test will be accepted until the results are within the specified limits.

2. The Contractor shall, at his own expense, determine and correct the causes of test failure and retest until successful test results are achieved.

1.03 SUBMITTALS

A. Testing procedures
B. List of test equipment
C. Testing sequence schedule
D. Provisions for disposal of flushing and test water
E. Certificate of test gauge calibration

1.04 JOB CONDITIONS:

A. The Authority will witness all tests. A minimum of 48-hour notice is required to schedule Authority personnel.

B. Do not allow personnel in manholes during pressure and vacuum testing.

C. Provide relief valves set at 10 psig to avoid accidentally over-pressurizing gravity sewer line during low pressure air testing.

PART 2 - PRODUCTS

2.01 AIR TEST EQUIPMENT

A. Air compressor
B. Air supply line
C. Shut-off valve
D. Pressure regulator
E. Pressure relief valve
F. Stop watch
G. Plugs
H. Pressure gauge, calibrated to 0.1 lbs./sq. in.

2.02 DEFLECTION TEST EQUIPMENT

A. Go, No-Go mandrels - furnished by Authority
B. Pull/retrieval ropes
C. Certificate of mandrel gauge calibration

2.03 VACUUM TEST EQUIPMENT

A. Vacuum pump
B. Pipe plugs
C. Vacuum hose
D. Test connections
E. Vacuum gauge
F. Vacuum relief valve

2.04 NON-SHRINK GROUT

A. Fastsetting, cement based mortar such as Waterplug™, manufactured by Thoro Division of ChemRex, Shakopee, MN, or approved equal.

2.05 INFILTRATION TEST EQUIPMENT

A. Weirs

PART 3 - EXECUTION

3.01 PREPARATION

A. Backfill trenches in accordance with Section 02221.

B. Provide pressure pipeline with concrete reaction support blocking.

C. Clean and flush pipeline with water to remove debris. Collect and dispose of flushing water and debris in accordance with Federal, State, and Local regulations.

D. Plug outlets, wye-branches, and laterals. Brace plugs to offset thrust.

3.02 TESTING GRAVITY SEWER PIPELINES

A. Lamping:

1. After flushing and cleaning, lamp gravity pipeline in conjunction with the Authority.

2. Assist the Authority in the lamping operation by shining a light at one end of each pipeline section between manholes. Pipeline that has not been installed with uniform line and grade will be rejected. Remove and re-lay rejected pipeline sections. Re-clean and lamp until pipeline section achieves a uniform line and grade.

B. Low Pressure Air Test, gravity mains:

1. Plug all pipe outlets with suitable test plugs. Brace each plug securely.

2. If the pipe to be tested is submerged in ground water, insert a pipe probe by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in te test should be increased by this amount.

3. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.

4. After an internal pressure of 4.0 psig is obtained, allow at least two (2) minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

5. When pressure decreases to 3.5 psig, start stopwatch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. Minimum permissible pressure holding times are indicated in the Air Test Table.

6. The air test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. Inasmuch as a force of 250 pounds is exerted on an eight (8") inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous.

7. As a safety precaution, pressurizing equipment should include a regulator set at perhaps 10 psi to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

8. Pipe sections which do not pass the above specified test shall be tested after checking all capped and plugged fittings with a soap solution or the introduction of smoke into the pipe to detect points of leakage and such repairs must be made, as required, to obtain acceptance of each pipe section.

AIR TEST TABLE					
MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3.5 PSIG TO 2.5 PSIG					
	Pipe Diameter				
Length (ft)	4"	6"	8"	10"	12"
25	4	10	18	29	40
50	9	20	35	35	79
75	13	30	53	83	119
100	18	40	70	110	158
125	22	50	88	138	198
150	26	59	106	165	236
175	31	69	123	193	277
200	35	79	141	220	317
225	40	89	158	248	340
250	44	99	176	275	340
275	48	109	194	283	340
300	53	119	211	283	340
350	62	139	227	283	340
400	70	158	227	283	340
450	79	170	227	283	340
500	88	170	227	283	340
550	97	170	227	283	340
600	106	170	227	283	340
650	113	170	227	283	340

C. Testing Pipe Over 36" Diameter:

1. Pipe over 36" diameter shall be subjected to a visual interior inspection.

D. Infiltration Test:

1. Use only when leakage is visible and as directed by the Authority.

2. Maximum Allowable Infiltration: 50-gallons per inch of pipe diameter per mile per 24 hours for the section under test.

E. Deflection Testing of Plastic Sewer Pipe:

1. Perform vertical ring deflection testing on all portions of PVC sewer piping, in the presence of the Authority, after backfilling.

2. The maximum allowable deflection for installed plastic sewer pipe shall be limited to 5% of the original vertical internal diameter.

3. Perform deflection testing with a properly sized 'Go, No-Go' mandrel provided by the Authority.

4. Pipe exceeding the allowable deflection shall be located, excavated, replaced, and retested at the sole expense of the Contractor, including surface restoration.

5. During the 12th month of the warranty period, perform a second vertical ring deflection test on all portions of PVC sewer piping, in the presence of the Engineer, including preparation in accordance with Article 3.01C.

3.03 TESTING PRESSURE PIPELINES

A. For PVC force mains, perform hydrostatic leakage test as follows:

1. Test each newly laid pressure pipeline, including any valved section thereof, hydrostatically at 1.5 times the working pressure of the pipeline based on the elevation of the lowest point in the pipeline corrected to the elevation of the test gauge. Obtain test pressure from the Engineer.

2. Slowly fill the section to be tested with water, expelling air from the pipeline at the high points. Install corporation stops at high points if necessary. After all air is expelled, close air vents and corporation stops and raise the pressure to the specified test pressure.

3. Observe joints, fittings, and valves under test. Remove and replace cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

4. After visible deficiencies are corrected, continue testing at the same test pressure for an additional two hours to determine the leakage rate. Maintain pressure within plus or minus 5.0 psi of test pressure. Leakage is defined as the quantity of water supplied to the pipeline necessary to maintain test pressure during the period of the test.

5. Compute the maximum allowable leakage by the following formula:

$$L = \frac{ND(P)^{0.5}}{7{,}400}$$

Where: L is the allowable leakage in gallons/hour
N is the number of joints in the section tested
D is the nominal diameter of the pipe in inches
P is the average test pressure in psig

If the line under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size.

6. If the test of the pipe indicated leakage is greater than that allowed, locate the source of the leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of the amount of leakage.

B. For Ductile Iron Force Main. After ductile iron force mains have been laid and partially backfilled, but prior to covering the joints, the pipe shall be subjected to a hydrostatic test of fifty (50) psi in excess of what the maximum static pressure will be when the force main is in operation. After the Authority Representative has inspected and approved all joints at this pressure, the test may be stopped and backfilling commenced, as hereinafter specified. The Contractor shall furnish all labor, equipment, water, and materials necessary for this test.

3.04 TESTING MANHOLES

A. Test all new manholes for exfiltration utilizing the vacuum test method and equipment developed by NPC Systems, Inc., Milford, NH, or approved equal.

B. The Contractor shall provide the necessary labor, equipment or materials to conduct the vacuum test.

C. The testing shall be done after complete assembly of the manhole.

D. The Contractor shall plug the pipe openings, taking care to securely brace the plugs and the pipe.

E. With the vacuum tester set in place:

1. Inflate the compression band to affect a seal between the vacuum base and the structure.

2. Connect the vacuum pump to the outlet port with the valve open.

3. Draw a vacuum to 10" of Hg. and close the valve.

F. All test subject to 10” of Hg for 60 seconds.

G. A vacuum of 9 in. of Hg. or more shall be maintained for at least the period of time indicated in the following table in order to successfully complete the test:

Depth of Manhole (Feet)	**Diameter of Manhole (Inches) Time (Seconds)**		
	48 Inches	**60 Inches**	**72 Inches**
up to 10	30	30	30
12	30	30	34
14	30	32	40
16	30	37	45
18	32	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

H. If the manhole fails the initial test, the Contractor shall locate the leak and make proper repairs. Leaks and lift holes shall be filled with approved non-shrink grout.

END OF SECTION

SECTION 02653

TESTING AND DISINFECTING WATER MAINS

PART 1-GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to:

1. Hydrostatic leakage testing
2. Disinfecting Water Main Pipelines.
3. Bacteriological Testing
4. Disinfection after repairing an existing main

B. Related work specified elsewhere:

1. Water Mains:.....Section 02615
2. Valves and Fire Hydrants: .....Section 02640
3. Water Service Connections:.....Section 02642

C. Definitions: NONE

D. Applicable Standard Details: NONE

1.02 QUALITY ASSURANCE

A. Testing Agency:

1. Hydrostatic testing will be performed by the Contractor.

2. Bacteriological testing shall be performed by Red Lion Municipal Authority Representative.

B. Reference Standards:

1. American Water Works Association (AWWA):

B300 Standard for Hypochlorites
B301 Standard for Liquid Chlorine
C651 Disinfecting Water Mains

C. Test Acceptance:

1. No test will be accepted until the results are within the specified limits.

2. The Contractor shall, at his own expense, determine and correct the sources of leakage and retest until successful test results are achieved.

1.03 SUBMITTALS

A. Test Procedures:

1. Submit a testing sequence schedule including a list of testing equipment to be used.

B. Certificates:

1. Submit, prior to starting testing, certification attesting that the pressure gauges to be used have been calibrated and are accurate to the degree specified herein.

2. Submit certification attesting that the chlorine form composition is as specified.

C. Test Reports:

1. Submit two copies each of test reports of chlorine residual and bacteriological tests.

1.04 JOB CONDITIONS: Section not utilized.

PART 2 - PRODUCTS

2.01 HYDROSTATIC TEST EQUIPMENT

A. High pressure water pump
B. Pressure hose
C. Test connections
D. Water meter
E. Pressure gauge, calibrated to 0.1 lbs./sq. in.
F. Pressure relief valve

2.02 DISINFECTING CHEMICALS

A. Liquid chlorine (gas at atmospheric pressure) or sodium hypochlorite solutions conforming to AWWA Standards B300 and B301.

PART 3 - EXECUTION

3.01 PREPARATION

A. Backfill trenches in accordance with Section 02221.

B. Provide the water line under test with reaction thrust blocking. Hydrostatic testing shall not begin until the concrete thrust blocking has set. Allow 3000 psi 28-day strength concrete to cure for a minimum of 7 days prior to testing. If 3000 psi 3-day high early strength concrete is used, hydrostatic testing may not begin until the concrete has cured for a minimum of 2 days.

C. Provide water, pumps, piping, tanks, connections, plugs, and appurtenances at no additional expense to the Authority.

3.02 TESTING PRESSURE PIPELINES

A. Hydrostatic Test (ASTM C900) 200 psi/30 min:

1. Test each newly laid pressure pipeline, including any valved section thereof, hydrostatically at 1.5 times the working pressure of the pipeline based on the elevation of the lowest point in the pipeline corrected to the elevation of the test gauge. Test pressure will not exceed twice the rated pressure of gate valves or hydrants within test section. Obtain test pressure from the Authority.

2. Slowly fill the section to be tested with water, expelling air from the pipeline at the high points. Install corporation stops at high points if necessary. After all air is expelled, close air vents and corporation stops and raise the pressure to the specified test pressure. Duration of pressure test is one hour.

3. Observe all exposed pipe, fittings, valves, hydrants, and joints during the test. Remove and replace cracked or damaged pipe, joints, fittings, and valves showing visible leakage. Retest.

B. Leakage Test

1. After visible deficiencies are corrected, continue testing at the same test pressure for an additional two hours to determine the leakage rate. Maintain pressure within plus or minus 5.0 psi of test pressure. Leakage is defined as the quantity of water that must be supplied into the newly laid pipe to maintain pressure within 5.0 psi of the test pressure after the air is in the pipeline has been expelled and the pipe filled with water.

2. Compute the maximum allowable leakage by the following formula:

$$L = \frac{ND(P)^{0.5}}{7{,}400}$$

Where: L is the allowable leakage in gallons/hour
N is the number of joints in the section tested
D is the nominal diameter of the pipe in inches
P is the average test pressure in psig

Note: Perform calculation based on 2-hour test

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed.

If the line under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size.

3. If the test of the pipe indicated leakage greater than that allowed, locate the source of the leakage, make corrections and retest until leakage is within allowable limits.

4. Correct visible leaks regard-less of the amount of leakage.

3.03 DISINFECTION

A. Preliminary Flushing

1. Prior to chlorination, the main shall be flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the pressure test is made.

2. If no hydrant is installed at the end of the main, a tap shall be provided large enough to affect a velocity in the main of at least 2.5 fps.

3. The rate of flow required to produce this velocity in pipes of various diameters is shown in the following table.

REQUIRED OPENINGS TO FLUSH PIPELINES
(40 psi Residual Pressure)

			Hydrant Outlet Nozzles	
Pipe Size (in.)	Flow Required To Produce 2.5 fps Velocity (gpm)	Orifice Size (in.)	Number (in.)	Size (in.)
4	100	15/16	1	2-1/2
6	220	1-3/8	1	2-1/2
8	390	1-7/8	1	2-1/2
10	610	2-15/16	1	2-1/2
12	880	2-13/16	1	2-1/2

4. All hydrants on the lines shall be thoroughly flushed and carefully inspected after flushing to see that the entire valve operating mechanism of each hydrant is in good condition and that small stones or other foreign material is not lodged therein.

5. No site for flushing should be chosen unless it has been determined that drainage is adequate at that site.

B. Chorine Application

1. The form of chlorine used in the disinfecting solutions shall be either liquid chlorine (gas at atmospheric pressure), or sodium hypochlorite solution.

   a. Liquid Chlorine shall be used only when suitable equipment is available and only under the direct supervision of a person familiar with the physiological, chemical, and physical properties of this element and who is properly trained and equipped to handle any emergency that may arise.

      Introduction of chlorine-gas directly from the supply cylinder shall not be permitted. The equipment shall consist of a solution feed chlorinator in combination with a booster pump for injecting the chlorine/gas/water mixture into the main to be disinfected. Direct feed chlorinators are not permitted.

b. Sodium hypochlorite is supplied in strengths from 5.25 to 16 percent available chlorine. It is packaged in liquid form. The chlorine-water solution is prepared by adding hypochlorite to water.

The hypochlorite solutions shall be applied to the water main with a gasoline or electrically-powered chemical feed pump designed for feeding chlorine solutions. For small applications, the solutions may be fed with a hand pump, for example, a hydraulic test pump. Feed lines shall be of such material and strength as to withstand safely the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the hypochlorite solution is applied to the main.

2. The preferred point of application of the chlorinating agent shall be at the beginning of the pipeline extension or any valved section of it and through a corporation stop inserted by the Contractor in the top of the newly laid pipe. In a new system, application of chlorine may be made advantageously at a pumping station, elevated tank, standpipe, or reservoir.

3. Water from the existing distribution system or other approved sources of supply shall be made to flow at a constant, measured rate into the newly-laid pipeline. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the chlorine concentration in the water in the pipe is maintained at a minimum of 50 mg/l available chlorine.

4. During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main is filled with the chlorine solution.

5. The chlorinated water shall be retained in the main for at least 24 hours during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24-hours period, the treated water shall contain no less than 25 mg/l chlorine throughout the length of the main.

C. Final Flushing

1. Chlorine residual determination shall be the responsibility of the Contractor and in accordance with the procedures described in the current edition of Standard Methods and AWWA M12-Simplified Procedures for Water Examination, to ascertain that the heavily chlorinated water has been removed from the pipeline.

2. After completion of the required disinfection, flush the line at a minimum rate of 2.5 fps until the free chlorine residual reduces to the level of the existing water supply or 1 mg/L, whichever is lower. Dispose of flushing water in conformance with Federal, State, and Local laws. Chemically dechlorinate water or store water until chlorine residual is non-detectable. Collect 3 grab samples evenly spaced over the course of discharge. Chlorine residual must be non-detectable in all samples. If water is chemically dechlorinated, dissolved oxygen must be measured with each grab sample and maintained at 5.0mg/L. Wasted water may be discharged to the public sewer system, if approved by the Engineer.

3. No flushing or bacteriological tests permitted until receipt of passed chlorine residue test results.

D. Bacteriologic Tests

1. After final flushing, and before the water main is placed in service, at least two samples shall be collected at least 24 hours apart from the end of the line and tested for bacteriologic quality and shall show the absence of coliform organisms. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulphate. No hose or fire hydrant shall be used in collection of samples.

2. A suggested sampling tap consists of a standard corporation stop installed in the main with a copper tube gooseneck assembly. After samples, have been collected, the gooseneck assembly may be removed and retained for future use.

3. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. The tablet method cannot be used in these subsequent disinfections. When the samples are satisfactory, the main may be placed in service.

3.04 DISINFECTION AFTER CUTTING INTO OR REPAIRING EXISTING MAINS

A. Leaks or breaks that are repaired with clamping devices while the mains remain full of water under pressure require no disinfection.

B. Best Management Practices Check List for Main Breaks Which Result in a Loss of Positive Pressure (ANSI/AWWA Standard C-651-05).

1. Minimize entry of contaminants:

a. Isolate the affected main segment.

b. Shut off all affected service connections that lack adequate backflow prevention, where practical.

c. Dewater excavation trenches prior to repairs. Disinfect wet trenches where practical or where evidence of contamination exists.

C. Disinfect the pipe:

1. Swab or spray pipe interiors and associated fittings with a 1% solution of hypochlorite prior to installation.

2. Where practical or where evidence of contamination exists, disinfect the entire affected main segment using the slug chlorination method. Refer to Standard C-651 for detailed disinfection procedures.

Note: Leaks or breaks that are repaired with clamping devices while the main remains full of pressurized water may present little danger of contamination and therefore may not require disinfection.

D. Remove contaminants and dechlorinate chlorinated-waste discharge:

1. Flush the affected main segment until discolored water is eliminated and the disinfectant residual concentration in the water exiting the main is no higher than the residual disinfectant concentration in the distribution system.

2. Dechlorinate the chlorinated-waste discharge by applying an adequate amount of reducing agent to thoroughly neutralize the chlorine residual remaining in the water. Refer to Standard C-651 for information about de-chlorination procedures.

E. Determine effectiveness of procedures:

1. Measure the disinfectant residual concentration to verify establishment of an acceptable residual.

2. As per Standard C-651, collect special follow-up total coliform bacteriological samples to confirm that contamination did not occur during repair or replacement activities. Refer to Table 1 for the minimum number of required samples. Samples must be analyzed by an accredited environmental laboratory. Representative sampling locations must be downstream of the main break or repair. If the direction of flow is unknown, samples must be taken both up and downstream.

Table 1: Minimum # Daily Samples Required for Line Repair

Population Affected[1]	Minimum # of Samples
1 – 500	1
501 – 1,000	2
1,001 – 2,000	3
2,001 – 3,000	4
3,001 – 4,000	5
4,001 – 5,000	6
5,001 – 7,500	7
7,501 – 10,000	8
10,001 – 25,000	9
25,001 – 50,000	10
> 50,000	11

[1]Population affected = # service connections x 2.7 people

3. Sampling shall be continued until two consecutive days of negative samples are obtained.

4. If follow-up total coliform sample results are negative for two consecutive days, go to the last check list item and record the details in your Repair Log.

5. If any follow-up total coliform samples are positive, ensure that the lab is also analyzing the samples for fecal coliform or *E. coli*.

   a. If results are total coliform-positive only, continue flushing, disinfecting and collecting follow-up samples until such time as samples are negative for total coliform bacteria.

b. If results are positive for fecal coliform or *E. coli*, notify DEP within 1 hour and issue a BWA as soon as possible, but no later than 24 hours. Refer to the *Department's Policy for Issuing and Removing Water Supply Warnings* for additional information about follow-up actions.

Where practical or where evidence of contamination exists, repaired or replaced water mains must be completely installed, flushed, disinfected and satisfactory bacteriological sample results received prior to returning the main to service. As per Standard C-651, and as per the water supplier's best professional judgment, after the appropriate disinfection and flushing procedures have been completed, the existing main may be returned to service prior to the completion of bacteriological testing in order to minimize the time customers are without water.

In certain situations, and as per the water supplier's best professional judgment, the collection of bacteriological samples may be avoided. In order to avoid collecting bacteriological samples, all of the following criteria must be met:

c. There is no evidence of contamination or a high risk of contamination.

d. All repair parts are disinfected as per Standard C-651, or if service connections are shut off, the main is disinfected utilizing the slug chlorination method.

e. Any area of repair is flushed thoroughly and background chlorine residual levels of at least 0.2 mg/L (as free chlorine or its equivalent) are re-established.

f. The water supplier has had no coliform MCL violations in the last year.

g. The water supplier is in compliance with the requirements of The Water and Wastewater Systems Operators' Certification Act and associated regulations. Specifically, an available operator with the appropriate level of certification must make all process control decisions related to repairing or replacing the water main.

h. The crew must utilize written standard operating procedures that are in conformance with Standard C-651 and this policy.

If a water supplier cannot comply with Standard C-651 and this policy for responding to a loss of positive pressure situation, water quality may be compromised. The water supplier shall notify DEP within 1 hour to discuss whether Tier 1 PN is necessary.

F. Complete recordkeeping:

1. Record details of the main break in a Repair Log, including all follow-up coliform sample results, or an indication that all criteria were met to avoid bacteriological sampling. Retain the Repair Log on-site, and make it available to DEP upon request.

G. Maintain a Repair Log for Loss of Positive Pressure Situations:

1. Water suppliers should record the main break event in their repair log. This log should include:

a. Date, location and type of repair needed to correct the break.

b. Time it was discovered.

c. Population affected.

d. Length of time required to repair.

e. Type of disinfection method used.

f. Date and time disinfectant residuals were detected.

g. Date and time coliform bacteria samples were collected, or an indication that appropriate criteria were met to avoid bacteriological sampling.

h. Results of the coliform bacteria samples and the date results were obtained.

2. The log should be made available to DEP upon request.

END OF SECTION

SECTION 03000

PLAIN AND REINFORCED CEMENT CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes but is not limited to:

1. Construction of cast-in-place plain and reinforced cement concrete structures
2. Concrete curbs and sidewalks
3. Trench restoration of concrete roadways and driveways.
4. Testing of cast-in-place concrete for curbs, sidewalks and utility related structures

B. Related Work Specified Elsewhere:

1. Cement concrete curb and sidewalk: .....Section 02525
2. Cement Concrete for Utility Construction:.....Section 03050

C. Definitions:

1. Exposed construction - Permanently exposed to view.

2. Concrete - Normal weight concrete for which density is not a controlling attribute, made with aggregates of the types covered by ASTM C33, and having unit weights in the range of 135 to 160 lb. per cubic foot.

3. f'c - The design compressive strength of the hardened concrete at an age of 28-days.

D. Applicable Standard Details: NONE

E. Work shall conform to all requirements of ACI 301-05, published by the American Concrete Institute, Farmington Hill, Michigan, except as modified by these Specifications.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. American Concrete Institute (ACI):

ACI 117 Standard Specifications for Tolerance for Concrete Construction and Materials
ACI 301 Specifications for Structural Concrete.
ACI 315 Details and Detailing of Concrete Reinforcement.
ACI 318 Building Code Requirements for Structural Concrete.

2. American Society for Testing and Materials (ASTM):

A185 Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C31 Practice for Making and Curing Concrete Test Specimens in the Field
C33 Specification for Concrete Aggregates
C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens

C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C94 Specification for Ready-Mixed Concrete
C138 Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
C143 Test Method for Slump of Hydraulic Cement Concrete
C150 Specification for Portland Cement
C171 Specification for Sheet Materials for Curing Concrete
C172 Practice for Sampling Freshly Mixed Concrete
C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
C192 Practice for Making and Curing Concrete Test Specimens in the Laboratory
C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C260 Specification for Air-Entraining Admixtures for Concrete
C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
C494 Specification for Chemical Admixtures for Concrete
D698 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3)
D994 Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
D1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
E329 Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

3. National Ready-Mixed Concrete Association, 900 Spring Street, Silver Spring, MD 20910. Check list for certification of ready-mixed concrete production facilities.

B. Testing Agencies:

1. Testing services shall be performed by an independent testing agency acceptable to the Authority at the Contractor's expense.

2. All testing agencies shall meet the requirements of ASTM E329.

1.03 SUBMITTALS

A. Submit manufacturer's or supplier's certification for the following materials verifying compliance with these Specifications:

1. Portland cement
2. Coarse and fine aggregates
3. Any specified concrete admixtures
4. Reinforcing steel
5. Joint forming and filling materials
6. Form coating materials
7. Concrete curing compounds

B. Submit concrete mix designs, including strength test records, for review and approval.

C. Submit certified results of compressive strength cylinder tests.

D. Submit copies of concrete batch slips.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Cement - Unless otherwise specified, Portland cement shall be Type I cement conforming to ASTM C150.

B. Aggregates - Aggregates for normal weight concrete shall meet the requirements of ASTM C33.

C. Water - Mixing water for concrete shall be clean, potable water meeting the requirements of ASTM C94.

D. Admixtures - Concrete admixtures, when required and/or approved for use by the Engineer, shall conform to the following Specifications:

1. Air-entraining admixtures - ASTM C260.

2. Water-reducing, retarding and accelerating admixtures - ASTM C494.

2.02 REINFORCEMENT

A. Reinforcing Bars - All reinforcing bars shall be deformed, except spirals, which may be plain bars. Reinforcing bars shall be Grade 60, billet-steel conforming to the requirements of ASTM A615, including supplementary requirement on Construction Drawings.

B. Welded Wire Fabric - Welded wire fabric shall be fabricated from smooth or deformed wire of the size and spacing required on the Construction Drawings and shall conform to the requirements of ASTM A185, except welded intersections shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.

PART 3 - EXECUTION

3.01 PROPORTIONING

A. General - Concrete for all parts of the work shall be of the specified quality and capable of being placed without excessive segregation. When hardened, concrete shall develop all characteristics required by these Specifications and the Construction Documents.

B. Strength - Unless otherwise specified, the minimum 28-day compressive strength of the concrete, f'c, shall be 3000 psi.

C. Durability - All concrete which will be subjected to potentially destructive exposure, including freezing and thawing, weather, and/or deicer chemicals, shall be air-entrained and shall conform to the air content limits in ACI 301 moderate exposure.

3.02 REINFORCEMENT

A. Welding - Welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

B. Fabricate and place all reinforcing in accordance with ACI 117.

3.03 EMBEDDED ITEMS

A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

B. All Contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

C. Placing Embedded Items - Expansion joint material, water stops, and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.04 PRODUCTION OF CONCRETE

A. Production Method - All concrete shall be ready-mixed concrete batched, mixed and transported in accordance with ASTM C94. Plant equipment and facilities shall conform to "Certification of Ready-Mixed Concrete Production Facilities (Checklist with Instructions)" of the National Ready-Mixed Concrete Association.

B. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Discharge of the concrete shall be completed within 1½ hours, or before the truck drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates. Truck batch slips must include time of batching, total drum revolutions upon arrival at the site, and quantity of water (in gallons) per cubic yard available to be added to attain the maximum design water-cement ratio.

3.05 PLACING

A. Preparation Before Placing:

1. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

2. Formwork shall be completed; snow, ice and water shall be removed; reinforcement shall be secured in place; expansion joint material, anchors, and other embedded items shall be positioned; and the entire preparation shall be accepted.

3. Concrete shall not be placed on frozen ground.

B. Conveying:

1. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

2. Conveying equipment shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day.

    a. Truck mixers, agitators and non-agitating units and their manner of operation shall conform to the applicable requirements of ASTM C94.

    b. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An acceptable arrangement shall be used at the discharge end to prevent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.

    c. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 ft. long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

    d. Pumping or pneumatic conveying equipment shall be capable of pumping the specified mix with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 2". Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

C. Depositing:

1. General - Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as indicated on the Construction Drawings. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited.

2. Segregation - Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.

3. Consolidation - All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting, or planes of weakness. Internal vibrators used shall be the largest size and the most powerful that can be properly used in the work. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 18" apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse aggregate back from the formed surface.

D. Protection:

1. Unless adequate protection is provided, concrete shall not be placed during rain, sleet or snow.

2. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

3. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints and should not exceed 90ºF. When the temperature of the steel is greater than 120ºF, steel forms and reinforcement shall be sprayed with water just prior to placing the concrete.

3.06 FINISHING OF FORMED SURFACES

A. If the finish is not designated on the Construction Drawings, the following finishes shall be used as applicable:

1. Rough form finish - For all concrete surfaces not permanently exposed. Tie holes and defects shall be patched and fins over 1/4" in heights rubbed off.

2. Smooth rubbed finish - For all concrete surfaces permanently exposed. Apply on newly hardened concrete within one day following form removal. Surfaces shall be wetted and rubbed until uniform color and texture are produced.

3.07 SLABS

A. General - Concrete for slabs shall be as specified in Article 3.01.

B. Preparation of Subgrade for Slabs on Ground:

1. The subgrade shall be well drained and of adequate and uniform load-bearing capacity. The minimum in-place density of the subgrade soils shall be not less than 95% of its maximum dry weight density at its optimum moisture content, plus or minus 2%, as determined by ASTM D698.

2. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing it shall be raised and maintained above 50ºF long enough to remove all frost from the subgrade.

3. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall not be standing water on the subgrade nor any muddy or soft spots when the concrete is placed.

C. Finishes

1. Floated finish - After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Floating with a hand float or with a bladed power trowel equipped with float shoes, or with a powered disc float shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 10' straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled and the slab shall then be refloated immediately to a uniform sandy texture.

2. Broom or belt finish - Immediately after the concrete has received a float finish, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

3. Unspecified Finish - When type of finish is not specified on the Construction Drawings, use broom finish.

3.08 CURING AND PROTECTION

A. General - Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete.

B. Preservation of Moisture:

1. For concrete surfaces, not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing:

a. Application of acceptable moisture-retaining covering as approved by the Engineer.

b. Application of a curing compound conforming to ASTM C309 - The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. It shall not be used on any surface against which additional concrete or other material is to be bonded unless it is proven that the curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded applications.

2. Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal, the concrete shall be cured.

3. Curing shall be continued for at least 7 days. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the strength, f'c. Moisture retention measures may also be terminated when the temperature of the concrete is maintained at least at 50ºF for the same length of time that laboratory-cured cylinders, representative of the concrete in-place, require to achieve 85 percent of f'c.

C. Temperature, Wind, and Humidity:

1. Cold weather - When the mean daily outdoor temperature is less than 40ºF, the temperature of the concrete shall be maintained between 50º and 70ºF for the required curing period. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

2. Hot weather - When necessary, provision for windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

3. Rate of temperature change - Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as possible and shall not exceed 5ºF in any 1-hour or 50ºF in any 24-hour period.

D. Protection from mechanical injury - During the curing period, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials or methods, by application of curing procedures, and by rain or running water.

3.09 TESTING

A. General - Concrete materials and operations will be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Authority for final acceptance.

B. Testing Services - The following testing services shall be performed by the designated testing agency.

1. Conduct strength tests of the concrete during construction in accordance with the following procedures only if requested by the Authority:

a. Secure composite samples in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.

b. Mold and cure four (4) specimens from each sample in accordance with ASTM C31. Any deviations from the requirements of this Standard shall be recorded in the test report.

c. Test specimens in accordance with ASTM C39. Two specimens shall be tested at 28 days for acceptance and two shall be tested at 7 days for information. The acceptance test results shall be the average of the strengths of the two specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result. Should both specimens in a test show any of the above defects, the entire test shall be discarded.

d. Make at least one strength test for each 50 cubic yards, or fraction thereof, of each mixture design of concrete placed in any 1 day.

2. The following testing is required for all concrete pours:

a. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using ASTM C143.

b. Determine air content of the concrete sample for each strength test in accordance with either ASTM C231, ASTM C173, or ASTM C138.

c. Determine temperature of the concrete sample for each strength test.

C. Additional Services When Required - The following services shall be performed by the testing agency when required by the Authority at the Contractor's expense:

1. Inspect concrete batching, mixing and delivery operations to the extent deemed necessary by the Authority or Engineer.

2. Sample concrete at point of placement and perform required tests.

3. Review the manufacturer's report for each shipment of cement and reinforcing steel and conduct laboratory tests or spot checks of the materials as received for compliance with specifications.

4. Mold four (4) specimens from each sample (in addition to those required in Paragraph 3.09.B.1.b) in accordance with ASTM C31 and field cure in or on the structure providing the same method of cure for the specimens as that which the structure receives.

D. Duties and Authorities of Designated Testing Agency:

1. Representatives of the agency shall inspect, sample and test the materials and the production of concrete as required by the Engineer. When it appears that any material furnished or work performed by the Contractor fails to fulfill specification requirements, the testing agency shall report such deficiency to the Engineer and the Contractor.

2. The agency shall report all test and inspection results to the Engineer and Contractor immediately after they are performed. All test reports shall include the exact location in the work at which the batch represented by a test was deposited. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.

3. The testing agency and its representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of the Construction Documents, nor to approve or accept any portion of the work.

E. Responsibilities and Duties of Contractor:

1. The Contractor shall provide the necessary testing services for the following:

   a. Qualification of proposed materials and the establishment of mixture designs.

   b. Other testing services needed or required by the Contractor.

2. The use of testing services shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Construction Documents.

3. The Contractor shall submit to the Engineer the concrete materials and the concrete mix designs proposed for use with a written request for acceptance. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. No concrete shall be placed in the work until the Contractor has received such acceptance in writing.

4. To facilitate testing and inspection, the Contractor shall:

   a. Furnish any necessary labor to assist the testing agency in obtaining and handling samples at the project or other sources of materials.

b. Advise the testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

c. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hours as required by ASTM C31.

END OF SECTION

SECTION 03050

CEMENT CONCRETE FOR UTILITY CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work of this section includes, but is not limited to cast-in-place cement concrete for:

1. Reaction and support blocking
2. Cradles and encasements
3. Miscellaneous utility related cast-in-place cement concrete construction

B. Related work specified elsewhere:

1. Trenching, Backfilling, and Compaction:.....Section 02221
2. Trench paving and restoration: .....Section 02575
3. Manholes:.....Section 02601
4. Sanitary Sewer Pipe:.....Section 02610
5. Water Mains:.....Section 02615
6. Valves and Fire Hydrants: .....Section 02640
7. Plain and Reinforced Cement Concrete:.....Section 03000

C. Definitions: NONE

D. Applicable Standard Details:

03050-1 Concrete Encasement Detail
03050-2 Concrete Anchor Detail
03050-3 Thrust Blocking Details
03050-4 Special Concrete Encasement for Frost Protection Detail

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. Pennsylvania Department of Transportation (PennDOT), latest revision:

   Publication 408, Specifications

B. Inspections:

1. Inspections by the Engineer will, at a minimum, be made of the subgrade, formwork, supports, and reinforcement prior to placement of the concrete; and of the concrete prior to backfilling.

C. Testing:

1. As specified in Section 03000.

1.03 SUBMITTALS

A. Submit concrete mix designs, including strength test records, for review and approval.

B. Submit certified results of compressive strength cylinder tests.

C. Submit copies of concrete batch slips.

PART 2 - PRODUCTS

2.01 CEMENT CONCRETE

A. As specified in Section 03000.

B. For work involving a time constraint, use PennDOT Class HES (High Early Strength).

2.02 REINFORCEMENT STEEL

A. As specified in Section 03000.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Comply with Section 03000 for construction requirements including placement, curing, and protection of cement concrete.

B. Excavate and shape trench bottoms and sides to accommodate thrust block forms, encasements, manhole bases, drop connections, inlets and vaults.

C. Support pipes, valves and fittings at the required elevation with brick or concrete block. Do not use earth, rock, wood, or organic materials as supports.

D. Provide spacers, chairs, bolsters, ties and other devices for properly placing, spacing, supporting and fastening reinforcement in place.

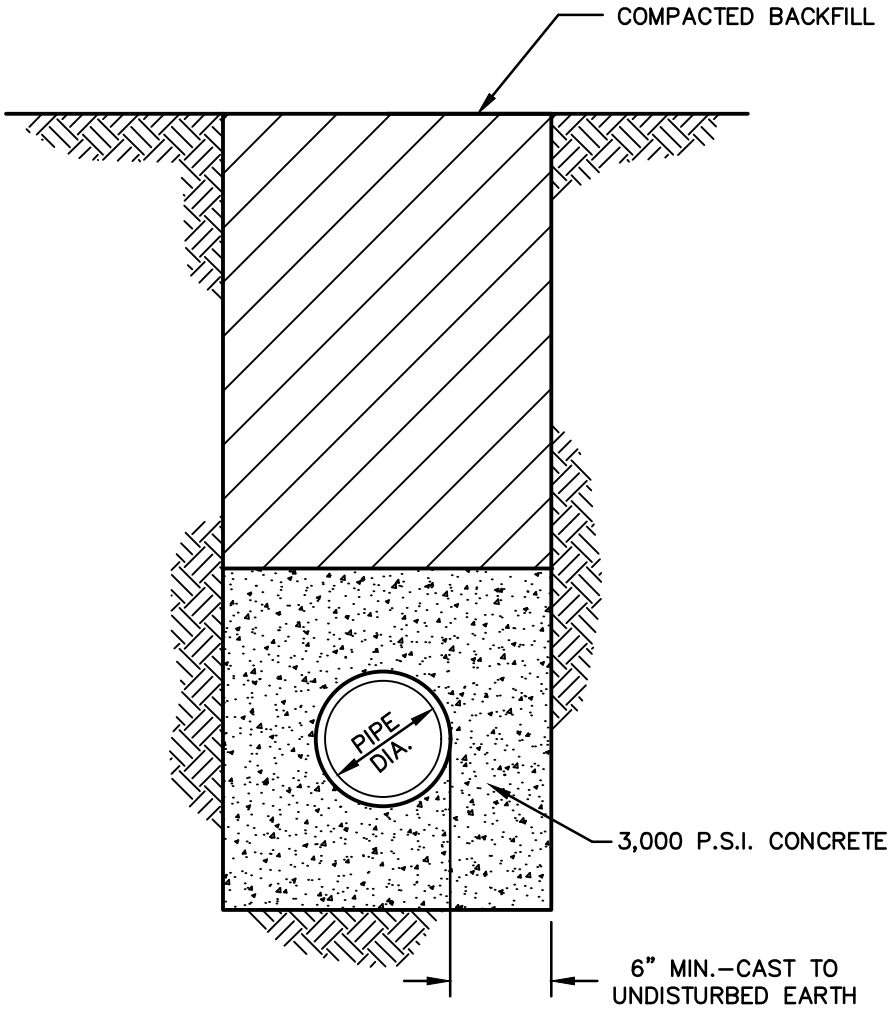
E. Place concrete utilizing all possible care to prevent displacement of pipes or fittings. Return displaced pipes or fittings to line and grade immediately.

F. Ensure tie rods, nuts, bolts and flanges are free and clear of concrete.

G. Do not backfill structures until concrete has achieved its initial set and forms are removed.

H. Perform backfilling and compaction as specified in Section 02221.

END OF SECTION



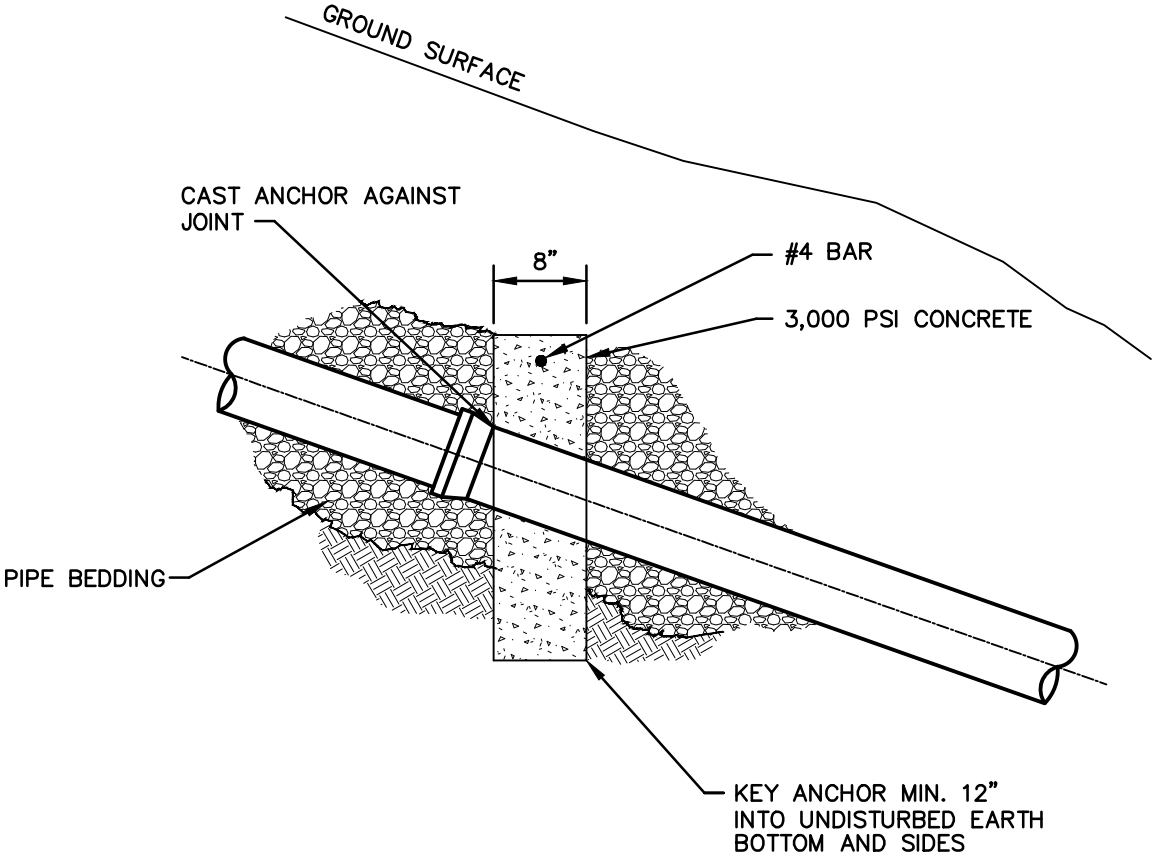
RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
TELEPHONE: (717)244-3475
www.redlionpa.org

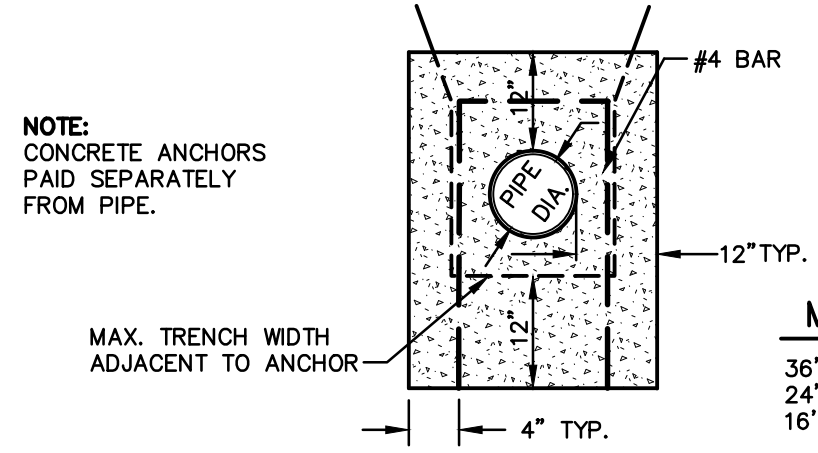
CONCRETE ENCASEMENT DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	03050-1
FILE NO.	1301.1.00.04



SECTION



NOTE:
CONCRETE ANCHORS PAID SEPARATELY FROM PIPE.

MAXIMUM SPACING

36' O.C. 20% TO 35% SLOPES
24' O.C. OVER 35% TO 50% SLOPES
16' O.C. OVER 50% SLOPES

ELEVATION

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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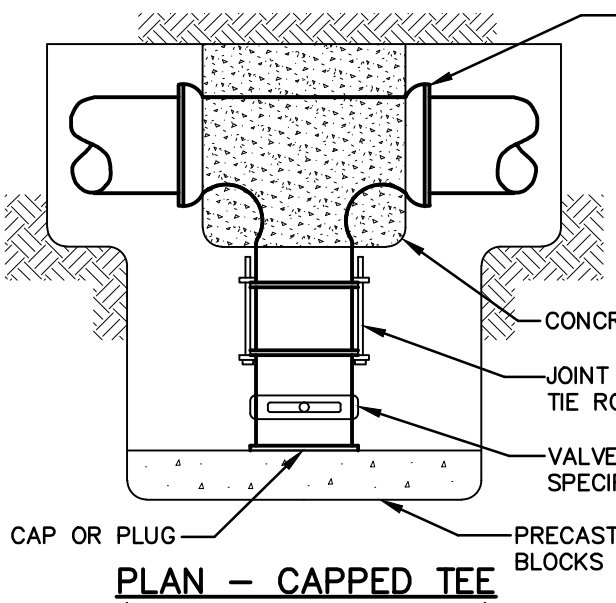
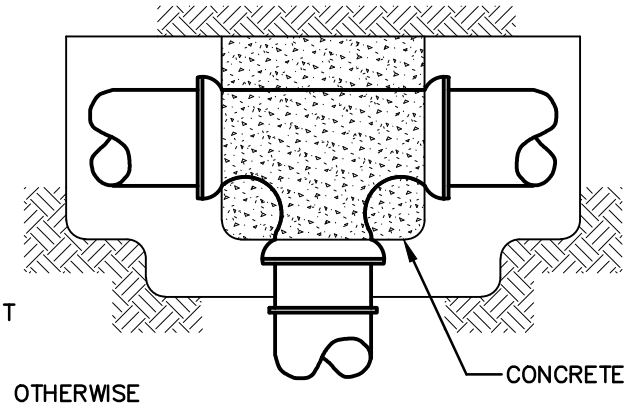
CONCRETE ANCHOR DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

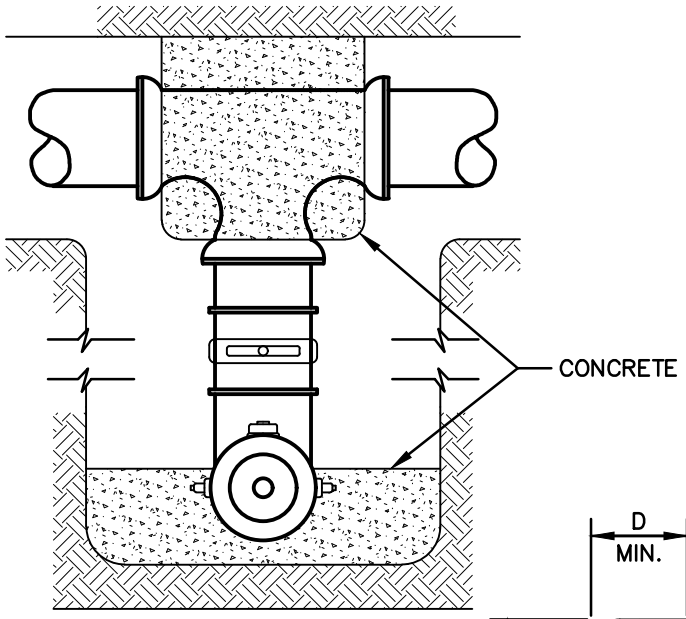
DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	03050-2
FILE NO.	1301.1.00.04



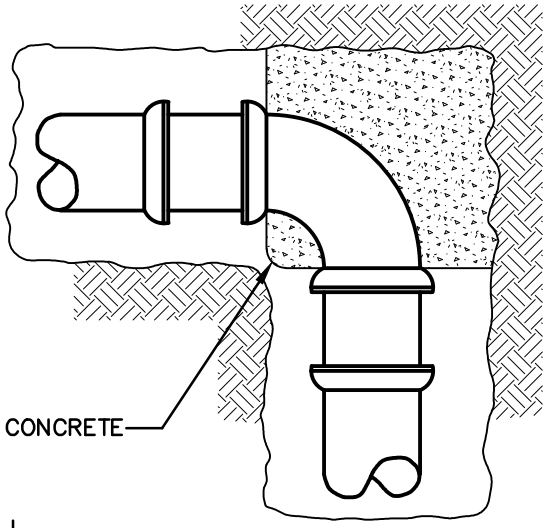
PLAN – CAPPED TEE
(CAPPED RUN OF TEE SIMILAR)



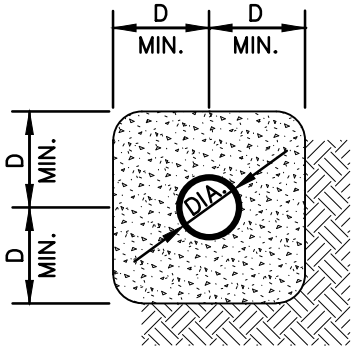
PLAN – TEE



PLAN – HYDRANT



PLAN – 90° BEND
(LESSER BENDS SIMILAR)



TYPICAL SECTION

D= OUTSIDE DIAMETER OF PIPE

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

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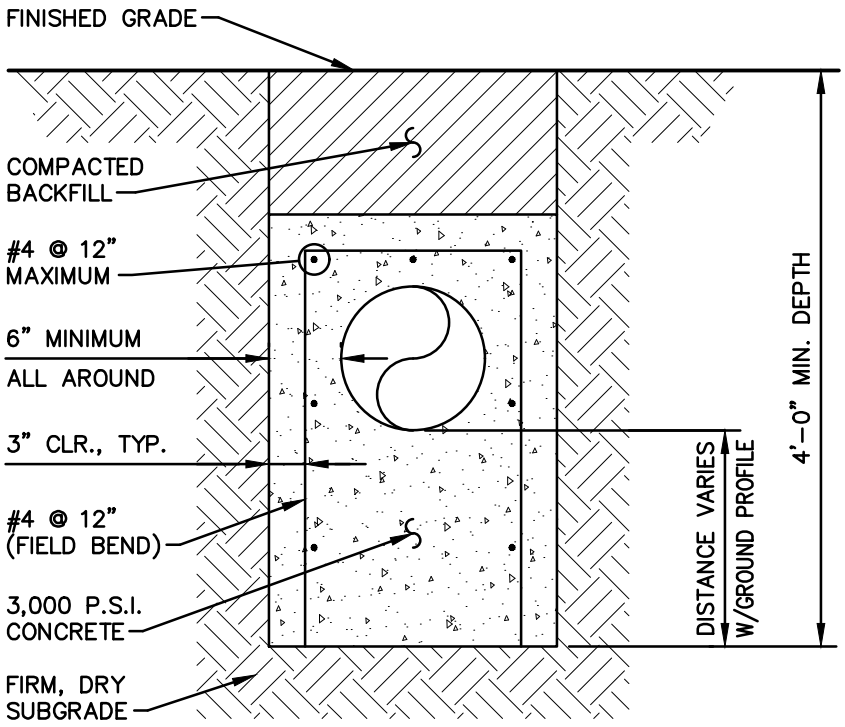
THRUST BLOCKING
DETAILS

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	03050-3
FILE NO.	1301.1.00.04



NOTES:

- STABILIZE PIPE & REINFORCEMENT WITHIN EXCAVATION TO PREVENT MOVEMENT DURING CONCRETE PLACEMENT.
- CONCRETE ENCASEMENT PAID SEPARATELY FROM PIPE UNDER ITEM 6.03.
- THE USE OF FLOWABLE FILL WILL NOT BE ALLOWED AS A SUBSTITUTE MATERIAL.
- REBAR SPACING CAN BE INCREASED IF APPROVED BY ENGINEER.

RLMA CONSTRUCTION & MATERIALS SPECIFICATIONS

RED LION MUNICIPAL AUTHORITY
11 E. BROADWAY, P.O. BOX 190
RED LION, PA 17356
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SPECIAL CONCRETE ENCASEMENT FOR FROST PROTECTION DETAIL

RED LION BOROUGH YORK COUNTY, PENNSYLVANIA

DRAWN BY	CWS
CHECKED BY	JAR
SCALE	NOT TO SCALE
DATE	04/05/2017
DWG. NO.	03050-4
FILE NO.	1301.1.00.04