



CONSTRUCTION SPECIFICATIONS
AND STANDARDS

GEORGETOWN UTILITY SYSTEMS
CITY OF GEORGETOWN
SECOND EDITION VERSION THREE
ISSUE DATE: JUNE 21, 2006

TABLE OF CONTENTS

CONSTRUCTION SPECIFICATIONS

<u>Section</u>	<u>Title</u>
CAPITAL IMPROVEMENT PROJECT REQUIREMENTS	
Section CIP 0	Development
Section CIP1	Definition of Terms
Section CIP2	Abbreviations
Section CIP3	Summary of Work
Section CIP4	Site Conditions
Section CIP5	Contractor Use of Premises (NOT USED)
Section CIP6	Control of Work
Section CIP7	Control of Materials
Section CIP8	Legal Relations and Responsibilities to the Public
Section CIP9	Environmental Protection Procedures
Section CIP10	Submittals
Section CIP11	Trench Safety Requirements
Section CIP12	Testing of Pipelines
Section CIP 13	Summary of Testing (Miscellaneous)
Section CIP14	Project Closeout
Section CIP15	Project ID Signage
Section CIP16	Warranty
Section CIP17	Inspection of Projects

GENERAL SPECIFICATIONS

Section G1	Barricades, Signs and Traffic Handling
Section G2	Site Preparation
Section G3	Site Clearing
Section G4	Trenching, Backfilling and Compaction
Section G5	Granular Fill Materials
Section G6	Sedimentation and Temporary Erosion Control
Section G7	Loaming, Hydroseeding and Permanent Erosion Control
Section G8	Miscellaneous Work and Clean-up
Section G9	Structural Excavation

STREETS AND DRAINAGE SPECIFICATIONS

Section SD1	Hot Mix Asphaltic Concrete Pavement
Section SD2	Roadway Excavation

Section SD3	Embankment and Subgrade
Section SD4	Flexible Base
Section SD5	Striping
Section SD6	Storm Sewer Manholes

WATER SPECIFICATIONS

Section W1	Ductile Iron Pipe and Fittings
Section W2	Polyvinyl Chloride (PVC) Pipe Water
Section W3	Valves, Hydrants and Appurtenances
Section W4	Encasement Pipe

WASTEWATER SPECIFICATIONS

Section WW1	Precast Concrete Manholes
Section WW2	Polyvinyl Chloride (PVC) Pipe-Wastewater
Section WW3	Connections to and Work on the Existing System

CONCRETE SPECIFICATIONS

Section C1	Concrete Structures
Section C2	Concrete for Structures
Section C3	Riprap
Section C4	Concrete Curb and Gutter
Section C5	Concrete Sidewalks, Driveways and Flatwork
Section C6	Membrane Curing
Section C7	Reinforcing Steel
Section C8	Reinforced Concrete Pipe
Section C9	Flowable Backfill

APPENDIX A –CONSTRUCTION STANDARDS

<u>Detail Number</u>	<u>Title</u>
----------------------	--------------

EROSION CONTROL STANDARDS

EC- 01	Temporary Erosion and Sedimentation Guidelines
EC- 01A	Erosion/Sedimentation and Tree Protection Notes
EC- 02	Silt Fence Standard
EC- 03	Rock Berm Standard
EC- 04	High Service Rock Berm Standard
EC- 05	Triangular Filter Dike
EC- 06	Stabilized Construction Entrance
EC- 07	Sediment Trap Standard
EC- 08	Sediment Basin Baffle Design

EC- 09	Tree Protection – Chain Link Fence
EC- 10	Tree Protection – Wood Slats

STREETS AND DRAINAGE STANDARDS

SD- 01	Typical Half Cross – Sections for HMAC Surfaced Streets
SD- 02	Typical Rural Paving Standard
SD- 02A	Typical Rural (Collector) Paving Standard
SD- 03	Concrete Valley Gutter Standard
SD- 04	Typical “Non-Single Family” & “Non-Two Family” Cul-de-Sac Plan
SD- 05	Curb Stamp Standard
SD- 06	Curb and Gutter Standard
SD- 07	Mountable Curb and Gutter Standards
SD- 08	Ribbon Curb Standards
SD- 09	Curb Inlet Standard
SD- 10	Curb Drain Inlet Typical Section
SD- 11	Standard Storm Sewer Manhole Cover (24”)
SD-11A	Bolted Storm Sewer Manhole Set
SD- 12	Standard Storm Sewer Manhole Frame (32”)
SD- 13	Standard Storm Sewer Manhole Set (38” Cover)
SD- 14	Sidewalk Section and Joint Standard
SD- 15	Concrete Driveway Approach Typical
SD- 16	Concrete Dip Driveway Approach
SD- 17	Rural Residential Driveway Approach with Culvert Pipe
SD- 18	Rural Non-Residential Undivided Driveway Approach with Culvert Pipe
SD- 19	Typical Concrete Rip-Rap at Pipe
SD- 20	Energy Dissipater Standard
SD- 21	Permanent End-of-Road Barricade
SD- 22	Type III Construction Barricade
SD- 23	Universal Anchor System
SD- 24	Poz-Loc (Breakaway Foundation)
SD- 25	Standard Street Sign Detail
SD- 26	Project Sign Type II
SD- 27	Standard Street Sign Detail II
SD- 28	Pedestrian Ramps General Notes
SD- 29	Typical Intersection Layout
SD- 30	Curb Ramp Placements at Intersections
SD- 31	Sidewalk Ramp Details Type 1-3
SD- 32	Sidewalk Ramp Detail Type 4
SD- 33	Sidewalk Ramp Detail Types 5-6
SD- 34	Driveway Apron Type 10

SD- 35	Driveway Aprons Types 12-13
SD- 36	Curb Ramps at Median Islands
SD- 37	Curb Ramp Textures Type A
SD- 38	Curb Ramp Textures Type B
SD- 39	Concrete Trench Cap Detail for Storm Sewer
SD- 40	Trench and Embedment and Pavement Replacement Detail under Existing Roadway for Storm Sewer
SD- 41	Trench and Embedment Detail Under Proposed Roadway for Storm Sewer
SD- 42	Trench and Embedment Detail (Profile) for Storm Sewer
SD- 43	Temporary All Weather Driving Surface
SD- 44	Temporary All Weather Driving Surface Turn Around
SD-45	Downtown Overlay District – Type III and IV Sidewalk Details

WATER STANDARDS

W- 01A	Utility Assignments for Local Streets, Residential Collectors and Major Collectors
W- 01B	Utility Assignments for Minor Arterial and Major Arterial Roadways
W- 02	Trench and Embedment Standard Under Non-Paved Areas
W- 02A	Concrete Trench Cap Standard
W- 03	Typical Water Service - Elevation
W- 04	Single Water Service - Plan
W- 05	Double Water Service - Plan
W- 06	Quadruple Water Service - Plan
W- 07	Typical Valve Setting
W- 08	Standard Riser Box for Corporation Stop
W- 09	Standard Blow - Off
W- 10	Typical Fire Hydrant Installation
W- 11	Typical Thrust Blocks for Water and Force Mains
W- 12	Standard Air Release Valve for Water Main
W- 13	Standard Air Release Valve for Water Main
W- 14	Installation of PVC Pipe Through Casing
W- 15	Concrete Encasement Standard
W- 16	Concrete Encasement Standard
W- 17	Trench and Embedment and Pavement Replacement Standard Under Existing Roadway
W- 18	Tracer Wire Installation and Test Station Location
W- 19	Fire Hydrant Sampling Point
W- 20	Customer's Cut-Off
W- 21	Inline Valve Installation
W- 22	Trench and Embedment Standard Under Proposed Roadway
W- 23	Meter Box (Non-Traffic Areas)

WASTEWATER STANDARDS

WW- 01A	Utility Assignments for Local Streets, Residential Collectors and Major Collectors
WW- 01B	Utility Assignments for Minor Arterial and Major Arterial Roadways
WW- 02	Standard Manhole - Plan
WW- 03	Standard Manhole – Section
WW- 04	Drop Connection – Precast Manhole Type “A”
WW- 05	Drop Connection – Precast Manhole Type “B”
WW- 06	Flow Patterns for Invert Channels
WW- 07	Standard Wastewater Manhole Set
WW-07A	Bolted Wastewater Manhole Set
WW- 08	48” x 5” to 33” x 8” x 36” Tall Eccentric Concrete Section
WW- 09	48” Manhole Flat Lid
WW- 10	Flexible “Seal Boot” Connector
WW- 12	Sewer Clean – Out Standard
WW- 13	Sewer Service Connections
WW- 13A	Gasketed Sewer Fitting for Sewer Service Connections to Existing Mains
WW- 14	Standard Air Release Valve for Force Main
WW- 15	Standard Air Release Valve for Force Main
WW- 16	Trench and Embedment Standard Under Non-Paved Areas
WW- 17	Trench and Embedment and Pavement Replacement Standard Under Existing Roadways
WW- 18	Trench and Embedment Standard Under Proposed Roadway
WW-19	Typical Manhole with Vent
WW-20	Precast Manhole on Cast-in-Place Foundation
WW-21	Concrete Casting Manhole Detail

ELECTRIC STANDARDS

GEO-117	35’ Streetlight Pole and Mast Arm (Dark Bronze Powder Coat)
GEO-117A	35’ Streetlight Pole and Mast Arm (Dark Bronze Powder Coat)
GEO-118	Streetlight Pole and Mast Arm (Brushed Aluminum Round Tapered)
GEO-118A	Streetlight Pole and Mast Arm (Brushed Aluminum Round Tapered)
GEO-122	Decorative Streetlight Pole (Dark Green)
GEO-122A	Decorative Streetlight Pole (Dark Green)
GEO-206	24.9/14.4 kV Primary 600V Secondary – (Junction Box, Cover, and Extension)
GEO-206A	24.9/14.4 kV Primary 600V Secondary – (Junction Box, Cover, and Extension)
GEO-207	24.9/14.4 kV Primary Single-Phase Concrete Pad (Transformer, Vacuum Switch, or Junction Box)
GEO-207A	24.9/14.4 kV Primary Single-Phase Concrete Pad (Transformer, Vacuum Switch, or Junction Box)
GEO-208	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Junction Box)

GEO-208A	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Junction Box)
GEO-209	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Switchgear 82" x 90")
GEO-209A	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Switchgear 82" x 90")
GEO-210	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Transformer)
GEO-210A	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Transformer)
GEO-225	Miscellaneous UG Conduit Installation
GEO-225A	Miscellaneous UG Conduit Installation
GEO-225B	Miscellaneous UG Conduit Installation
GEO-227	36" Frame, Cover, and Grade Rings for Manhole Entry
GEO-227A	36" Frame, Cover, and Grade Rings for Manhole Entry
GEO-229	Quickset Pull Box (4' x 8' x 4')
GEO-229A	Quickset Pull Box (4' x 8' x 4')
GEO-230	Quickset Manhole (8' x 10' 8')
GEO-230A	Quickset Manhole (8' x 10' 8')
GEO-231	Quickset Manhole (8' x 12' x 8')
GEO-231A	Quickset Manhole (8' x 12' x 8')
GEO-235	Concrete Foundation Streetlight Pole (18" Diameter x 48" Depth)
GEO-235A	Concrete Foundation Streetlight Pole (18" Diameter x 48" Depth)
GEO-236	Concrete Foundation Streetlight Pole (18" Diameter x 72" Depth)
GEO-236A	Concrete Foundation Streetlight Pole (18" Diameter x 72" Depth)
GEO-238	Junction Box and Pull Box Combination Detail
GEO-238A	Junction Box and Pull Box Combination Detail
UGDEM1.1	Conduit Stub-out and Electronic Marker Installation
UGG1.1	Alternate Grounding System for Pad-Mount Transformers and Switchgear (Single Phase)
UGG1.2	Alternate Grounding System for Pad-Mount Transformers and Switchgear (Three Phase)
UGPB1.1	Protective Bollard Installation for Pad-Mount Transformers, Junction Boxes and Switchgear

APPENDIX B – WAGE DECISION

APPENDIX C – ADOPTED REVISIONS

CAPITAL IMPROVEMENT PROJECT REQUIREMENTS

SECTION CIP

TECHNICAL SPECIFICATIONS

SECTION CIP00 – DEVELOPMENT PROJECTS

CIP00.01

TESTING

- A. All testing for private development projects shall be coordinated and paid for by the developer. All tests that require witness by the City of Georgetown or its designated representative shall be scheduled a minimum of two (2) working days prior to the test. Working days shall be defined as Monday through Friday excluding all holidays observed by the City of Georgetown.
- B. All tests shall be certified by the appropriate authority and documentation shall be provided to the City clearly stating the results of the tests.

CIP00.02

SPECIFICATIONS

- A. All portions of the specifications found within shall apply to development projects excluding the PAYMENT sections. All testing as required by a specification shall be done in accordance with the appropriate section except that the developer shall bear all costs of testing and shall coordinate all testing.
- B. SECTION CIP3 – SUMMARY OF WORK shall not apply to development projects.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP1 – DEFINITION OF TERMS

CIP1.01

DEFINITIONS

- A. Wherever in these specifications or in other contract documents, the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:
1. CITY - The City of Georgetown, party of the First Part.
 2. COUNCIL - The Georgetown City Council.
 3. COUNTY - A political Subdivision of the State.
 4. ENGINEER - Representative of the City.
*ENGINEER - Representative of the Contractor or the Developer.
 5. INSPECTOR - The authorized representative of the City assigned to inspect any or all parts of the work and the materials to be used therein.
 6. CONTRACTOR - The individual, firm or corporation or any combination thereof, Party of the Second Part, with which the contract is made by the City, Developer or Public Cooperation.
 7. SUPERINTENDENT - The representative of the Contractor authorized to receive and fulfill instructions from the Engineer or representative of the City, and who shall supervise and direct the construction.
 8. PAVEMENT DESIGN MANUAL - Texas Department of Transportation manual outlining procedure to be followed in the design and control of asphaltic concrete and portland cement concrete mixes for structures and pavements.
 9. MANUAL OF TESTING PROCEDURES - Texas Department of Transportation Materials and Tests Division manual outlining testing methods and procedures.
 10. PLANS - The drawings approved by the City, or true reproductions thereof, which show the location, character, dimensions, and details of the work and which are a part of the contract. Plans and specifications to be prepared by a Professional Engineer registered in the State of Texas.
 11. SPECIFICATIONS - The directions, provisions and requirements contained herein or in the Special Provisions, supplemented by such "Special Provisions or Standards" as may be issued or made pertaining to the method and manner or performing the work or qualities of materials to be furnished. Where the phrases "or directed by the City", "ordered by the City", or "to the satisfaction of the City" occur, it is to be understood that the directions, orders, or instructions of which they relate are within the limitations of, and authorized by the contract. "Special Provisions" will cover work pertaining to a particular project included in the proposal but not covered by the specifications. Where reference is made to specifications of ASTM, AWWA, AASHTO or Bulletins and Manuals of the Texas Department of Transportation it shall be construed to mean the latest standard or tentative standard in effect on the date of the proposal.
 12. RIGHT OF WAY - The land provided for a highway or street, owned by the City of Georgetown or the municipality in which the highway or street is in.
 13. ROADWAY - The portion of the highway or street within the limits of construction.
 14. ROADBED - The graded portion of the roadway between the intersection of top and side slopes upon which the base course, surface course, shoulders and median are constructed.
 15. SUBGRADE - That portion of the roadbed upon which the subbase, base, or pavement structure is to be placed.

16. BRIDGES - Structures of over 20-foot span measured from face to face of abutments, or in case of copings, from face to face of copings, and multiple span structures of over 20-foot length, measured between inside of end walls along the centerline of the roadbed.
17. CULVERTS - All drainage structures not defined as bridges.
18. TEMPORARY STRUCTURES - All temporary bridges and structures required to maintain traffic during the construction of the work.
19. SUBSTRUCTURE - That part of the structure below the bridge seats or below the springing lines of arches. Parapets, back walls and wing walls of abutments shall be considered as parts of the substructure.
20. SUPERSTRUCTURE - The part of the structure above the bridge seats or above the springing lines of arches.
21. THE WORK - The work shall include the furnishing of all labor, materials, equipment, and other incidentals necessary or convenient to the successful completion of the project and the carrying out of all the duties and obligations imposed by the contract.
22. PROJECT - The specific section or sections of the highway or street together with all appurtenances and construction to be performed thereon under the contract.
23. ASTM - American Society for Testing Materials.
24. AASHTO - American Association of State Highway and Transportation Officials.
25. ANSI - American National Standards Institute.
26. API - American Petroleum Institute.
27. UL - Underwriters Laboratory, Inc.
28. SCREENS AND SIEVES - As defined by the ASTM.
29. HIGHWAY, STREET OR ROAD - A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way. Recommended usage in urban areas-highway or road.
30. ARTERIAL HIGHWAY OR STREET - A general term denoting a highway or street primarily for through traffic, usually on a continuous route.
31. MAJOR STREET OR MAJOR HIGHWAY - An arterial highway or street with intersections at grade and direct access to abutting property, and on which geometric design and traffic control measures are used to expedite the safe movement of through traffic.
32. THROUGH STREET OR THROUGH HIGHWAY - Every highway, street, or portion thereof at the entrance to which vehicular traffic from intersecting highways or streets is required by law to stop before entering or crossing the same and when stop signs are erected.
33. LOCAL STREET OR LOCAL ROAD - A street or road primarily for access to residence, business, or other abutting property.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP2 - ABBREVIATIONS

CIP2.01

SCOPE

A. Whenever in these Contract Documents or Specifications the following abbreviations are used, the intent and meaning shall be interpreted as follows:

- | | | |
|-----|------------|---|
| 1. | AA | Aluminum Association |
| 2. | AAMA | Architectural Aluminum Manufacturers' Association |
| 3. | AASHTO | American Association of State Highway and Transportation Officials |
| 4. | ACI | American Concrete Institute |
| 5. | AFBMA | Anti-Friction Bearing Manufacturers' Association |
| 6. | AGA | American Gas Association |
| 7. | AGMA | American Gear Manufacturers' Association |
| 8. | AISC | American Institute of Steel Construction |
| 9. | AISI | American Iron and Steel Institute |
| 10. | AITC | American Institute of Timber Construction |
| 11. | AMCA | Air Moving and Conditioning Association |
| 12. | ANSI | American National Standards Institute |
| 13. | APA | American Plywood Association |
| 14. | API | American Petroleum Institute |
| 15. | AREA | American Railway Engineering Association |
| 16. | ASAE | American Society of Agricultural Engineers |
| 17. | ASCE | American Society of Civil Engineers |
| 18. | ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. |
| 19. | ASME | American Society of Mechanical Engineers |
| 20. | ASTM | American Society of Testing and Materials |
| 21. | AWI | Architectural Woodwork Institute |
| 22. | AWPA | American Wood Preservers' Association |
| 23. | AWPB | American Wood Preservers' Bureau |
| 24. | AWS | American Welding Society |
| 25. | AWWA | American Water Works Association |
| 26. | BHMA | Builders' Hardware Manufacturers' Association |
| 27. | CBMA | Certified Ballast Manufacturers' Association |
| 28. | CDA | Copper Development Association |
| 29. | CISPI | Cast Iron Soil Pipe Institute |
| 30. | CMAA | Crane Manufacturers' Association of America |
| 31. | CRSI | Concrete Reinforcing Steel Institute |
| 32. | Fed. Spec. | Federal Specifications |

33.	HI	Hydraulic Institute
34.	HMI	Hoist Manufacturers' Institute
35.	ICBO	International Conference of Building Officials
36.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
37.	IPCEA	Insulated Power Cable Engineer's Association
38.	MMA	Monorail Manufacturers' Association
39.	NACE	National Association of Coatings Engineers
40.	NBMA	National Builders' Hardware Association
41.	NEC	National Electrical Code
42.	NEMA	National Electrical Manufacturers' Association
43.	NESC	National Electric Safety Code
44.	NFPA	National Fire Protection Association
45.	NLMA	National Lumber Manufacturers' Association
46.	NWMA	National Woodwork Manufacturers' Association
47.	OECI	Overhead Electrical Crane Institute
48.	OSHA	Occupational Safety and Health Act (both Federal & State)
49.	PS	Product Standards Sections - U.S. Department of Commerce
50.	RMA	Rubber Manufacturers' Association
51.	SAE	Society of Automotive Engineers
52.	SSPC	Steel Structures Painting Council
53.	TCA	Tile Council of America
54.	TxDOT	Texas Department of Transportation
55.	TEMA	Tubular Exchanger Manufacturers' Association
56.	UBC	Uniform Building Code
57.	UL	Underwriter's Laboratories, Inc.
58.	WWPA	Western Wood Products Association

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP3 – SUMMARY OF WORK

*** For Projects Contracted by the City of Georgetown for Capital Improvements ***

CIP3.01 SCOPE OF WORK

- A. This specification covers the requirements for constructing **Insert Name of Project** as shown on the construction Plans and specified herein.
- B. The Work is located within the City of Georgetown as shown on the Location Map included in the Plans.
- C. The Work includes, but is not necessarily limited to, the following:
 - 1. **List Items of Construction**

CIP3.02 WORK SEQUENCE

- A. Perform work in sequence as agreed upon at the pre-construction conference.

CIP3.03 PROGRESS OF THE WORK

- A. The Work shall be started within 10 days following the effective date of the Notice to Proceed, and the Work shall be executed with such progress as may be required to prevent any delay to the general completion of the project. The Work shall be executed at such times and in or on such parts of the project, and with such personnel, materials, and equipment to assure completion of the Work in the time established by the Agreement.
- B. If the Contractor for his convenience and at his own expense, should desire to carry on his work at night or outside regular hours, he shall submit a written approval request to the City and he shall allow ample time for satisfactory arrangements to be made for inspecting the work in progress. The Contractor shall pay the expenses for extra inspection required for work outside regular hours. Normal working hours for this purpose are Monday through Friday, 7:00 a.m. to 6:00 p.m. The Contractor shall light the different parts of the Project as required to comply with all applicable Federal and State regulations and with all applicable requirements of the City of Georgetown.

CIP3.04 CONSTRUCTION SCHEDULE

- A. The Contractor shall, within 5 days after the effective date of the Notice to Proceed, provide and submit to the City for approval, the Schedule for the project.. A complete updated schedule shall be submitted with monthly pay requests. The Schedule shall account for all the work of the Contractor and his Subcontractors and suppliers. In addition to all reasonably important construction activities, the Schedule shall provide for the proper sequence of construction considering the various crafts, purchasing time, submittal approval, material delivery, equipment fabrication, and similar time consuming factors.
- B. The Schedule shall include, as a minimum, the earliest starting and finish dates, and latest starting and finish dates, and the total float for each task or item. The Contractor shall update (monitor) the schedule as necessary and shall submit to the City a copy of the updated schedule (monthly) at the same time the pay estimate is prepared. The schedule shall contain all of the items of the Periodic Estimate and Pay Schedule.

While the Contractor bears full responsibility for scheduling all phases and stages of the Work to ensure its successful prosecution and completion within the time specified in accordance with all provisions of these Specifications, the Contractor is specifically required to complete fully or complete such stages of work to enable his Subcontractors and suppliers to complete their work within the respective times specified.

- C. If the City determines that operations are falling behind schedule at any time during the construction period, the City may require the Contractor to add to his plant, equipment and/or construction forces,

including increases in working hours, in such quantities as are required to bring operations back on schedule. Upon receipt of written communication from the City requiring such addition, the Contractor shall furnish same at no additional cost to the City.

CIP3.05

PRECONSTRUCTION CONFERENCE

- A. A pre-construction conference shall be held as soon as possible after Award of Contract and before work is started. The conference will be held at a location selected by the City. The conference will be attended by:
 - 1. Contractor's Office Representative.
 - 2. Contractor's General Superintendent.
 - 3. Any subcontractors' or suppliers' representatives whom the Contractor may desire to invite or the City may request.
 - 4. Engineer's Representatives.
 - 5. City's Representatives.
 - 6. Such other individuals that the City may invite.
- B. A suggested format would include but not be limited to the following subjects:
 - 1. Check of required bonds and insurance certifications.
 - 2. Liquidated damages.
 - 3. Shop drawing submittal and approval procedure.
 - 4. Chain of command, direction of correspondence, and coordinating responsibility between Contractors.
 - 5. Schedule of periodic job meetings for all involved.
 - 6. Introduction of the key project personnel.
 - 7. Equal opportunity requirements.
 - 8. Laboratory testing of material requirements.
 - 9. Inventory of material stored on site provisions.
 - 10. Progress estimate and payment procedure.
 - 11. Discussion of Contractor's Safety program.
 - 12. Scheduled plan for work requiring interruption of existing operations.
 - 13. Review of the construction Plans and Specifications.
 - 14. Discussion of Contractor's storage facilities for the Project.
- C. The City's Representative will preside at the conference, prepare the minutes of the meeting and distribute copies of same to all participants who so request by fully completing the attendance form to be circulated at the beginning of the conference.

CIP3.06

CONSTRUCTION MEETINGS

- A. Periodic Construction meetings shall be held at intervals designated by the City, generally weekly to

review the progress at the project, submittals, upcoming activities, pay requests, etc. The Contractor is expected to have at least the project Superintendent present for all meetings. Attendance at the meetings shall not be directly paid for but shall be considered subsidiary to the items of the Contract.

- B. In the event the Contractor is 30 minutes late or more or fails to attend a Construction meeting without 48 hours prior notice, the Contractor shall be billed the time for the Engineer(s) to represent the City at \$150.00 per hour up to one (1) hour.

CIP3.07

COORDINATION WITH CITY'S OPERATIONS AND EXISTING FACILITIES

- A. Several parts of the proposed Work under this Contract may connect with or into existing facilities.. The Contractor shall plan carefully the schedule of that portion of the Work which will affect the existing facilities. Such plans and schedules shall be subject to the approval of the City of Georgetown.
- B. Work which requires shutdown or in any way impedes the operations of existing facilities shall be closely coordinated with the City of Georgetown. A minimum of 48 hours written notice shall be given to the City of Georgetown.
- C. Immediately after the award of a Contract for this Project, the Contractor shall outline and submit a scheduled plan for installation of the work, which requires interruption of operations.

CIP3.08

CONTRACTOR'S USE OF PREMISES

- A. Contractor shall limit the use of the premises for his/her work and coordinate use of the premises with the City to allow for:
 - 1. Work by other Contractors.
 - 2. Public use.
- B. Contractor shall assume full responsibility for security of all materials and equipment stored on the site.
- C. If directed by the City, move any stored items, which interfere with operations of the City, other contractors, or the public.
- D. Obtain and pay for use of additional storage or work areas at no additional cost to the City if needed to perform the Work.
- E. Contractor shall submit to the City for approval a plan of operations, designating proposed areas of the property to be used for his operations, material storage, equipment storage, employee's parking, offices and shops. The area shall effect minimal interference with the present operations.
- F. Any damage to existing facilities, including contamination, which may be caused by Contractor's personnel, callers, visitors, materials or equipment, shall be repaired or corrected at the sole expense of the Contractor.
- G. Any fence that is damaged or removed by the Contractor will be replaced at the Contractor's expense in like kind, and to the satisfaction of the City.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP4 – SITE CONDITIONS

CIP4.01 SCOPE OF WORK

- A. This specification covers the requirements for investigation and verification of site conditions for the Project.

CIP4.02 SUBSURFACE INFORMATION

- A. No subsurface investigations have been made by the City. The Bidder / Contractor shall be responsible for any subsurface explorations and tests deemed necessary.
- B. No test borings have been made by the City to indicate subsurface materials.

CIP4.03 SITE INVESTIGATION AND REPRESENTATION

- A. The Bidder / Contractor acknowledges that he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, river/stream stages, or similar physical conditions at the site; the conformation and conditions of the ground; the character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract.
- B. The Contractor further acknowledges that he has satisfied himself as to the character, quality, and quantity of surface and subsurface materials to be encountered from inspecting the site and from evaluating information derived from exploratory work, if any, that has been done by the City as presented in the geotechnical report, as well as from information presented herein as a part of these Contract Documents. Any failure by the Contractor to acquaint himself with all the available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work. Neither the City nor the Engineer assume responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the City or the Engineer.
- C. Existing ground profiles shown on the Plans were plotted from field surveys.

CIP4.04 RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

- A. Known utilities and structures adjacent to or encountered in the work are shown on the Plans. The locations shown are taken from existing records and the best information available from existing plans; however, it is expected that there may be some discrepancies and omissions in the locations and quantities of utilities and structures shown. Those shown are for the convenience of the Contractor only, and no responsibility is assumed by either the City or the Engineer for their accuracy or completeness.
- B. Neither the City nor its officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.
- C. The Contractor shall at all times provide unobstructed access to fire hydrants and structures as per Fire Code, underground conduit, manholes, and water or gas valve boxes.
- D. Where the Contractor's operations could cause damage which might result in considerable expense, loss, or inconvenience when his operations are adjacent to or near railway, telegraph, telephone, television, power, oil, gas, water, sewer, irrigation, or other systems, no operations shall be commenced until the Contractor has made all arrangements necessary for the protection of these utilities and services.
- E. The Contractor shall notify all utility offices that are affected by the construction operation at least 15 days in advance of commencing construction operations. The Contractor shall not expose any utility without first obtaining permission from the affected agency. Once permission has been granted, locate and, if necessary, expose and provide temporary support for all existing underground utilities in advance

of operations.

- F. The Contractor shall be solely and directly responsible to the City and operators of such utility properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage that may result from the construction operations under this Contract.
- G. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, the Contractor shall promptly notify the proper authority and cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair.
- H. The Contractor shall replace, at his own expense, any and all other existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents.
- I. Where existing utility lines or structures are so located as to physically conflict with permanent structures to be constructed under this Contract, the conflicting utility line or structure shall be permanently relocated.
- J. The Contractor shall give immediate notice to the Engineer, the City and the owner of the utility (where applicable) when a physical conflict is determined to exist.
 - 1. Contractor will not be charged contract time for delays caused by unanticipated conflicts.
 - 2. Contractor shall not charge the City of Georgetown for lost time or down time for unanticipated conflicts.
- K. Where existing utility lines or structures are so located as to interfere with the Contractor's prosecution of the work, but do not physically conflict with completed manholes or other permanent structures to be constructed under this Contract, any modification, alteration, or relocation of interfering utility, either permanent or temporary, shall be accomplished at the expense of the Contractor.

CIP4.05

INTERFERING STRUCTURES

- A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground. An attempt has been made to show major structures on the Plans. While the information has been compiled from the best available sources, it's completeness and accuracy cannot be guaranteed, and it is presented as a guide to avoid known possible difficulties.
- B. Protect existing structures from damage, whether or not they lie within the right-of-way or the limits of the easements obtained by the City. Where existing structures must be removed to properly carry out the work, or are damaged during the work, they shall be restored at the Contractor's own expense to at least their original condition and to the satisfaction of the Engineer.
- C. The Contractor may, with the approval of the Engineer and without additional compensation, remove and replace in a condition as good as or better than original, any small interfering structures such as fences and signposts that interfere with the Contractor's operations.

CIP4.06

FIELD RELOCATION

- A. During the progress of the work, minor relocations of the work may be necessary. Such relocations shall be made only by direction of the Engineer or the City. If existing structures are encountered that will prevent construction as shown, notify the Engineer before continuing with the work in order that the Engineer may make such field revisions as necessary to avoid conflict with the existing structures. If the Contractor fails to notify the Engineer when an existing structure is encountered and proceeds with the work despite this interference, he shall be responsible for any damage that may occur.

CIP4.07

LAND MONUMENTS

- A. The Contractor shall preserve or replace any existing Federal, State, County, City, and private land monuments encountered.

- B. Any damaged or destroyed monuments shall be replaced at the sole expense of the Contractor as designated by the controlling authority of the Entity.

CIP4.08

PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP5 – CONTRACTOR USE OF PREMISES

NOT USED

TECHNICAL SPECIFICATIONS

SECTION CIP6 – CONTROL OF WORK

CIP6.01 SCOPE OF WORK

- A. This specification covers the requirements for exercising control of work performed on the Project.

CIP6.02 AUTHORITY OF ENGINEER OR INSPECTOR

- A. The work will be done in accordance with the Contract, Plans and Specifications. The Engineer or Inspector will decide all questions which may arise as to the quality or acceptability of materials furnished and work performed and the interpretations of the Plans and Specifications. His decisions will be final, and he will have executive authority to enforce and make effective such decisions and orders.

CIP6.03 CONFORMITY WITH PLANS, SPECIFICATIONS AND SPECIAL PROVISIONS

- A. All work performed and all materials furnished shall be in reasonable close conformity with the lines, grades, cross sections, dimensions, details, gradations, physical and chemical characteristics of materials in accordance with tolerances shown on the Plans or indicated in the Specifications and Special Provisions. The limits establishing reasonable close conformity will be as defined in these items of the contract.
- B. In the event the City finds that the work performed or the materials used are not within reasonable close conformity with the Plans, Specifications and Special Provisions, the affected material or product shall be removed and replaced or otherwise satisfactorily corrected by and at the expense of the Contractor.
- C. Deviations from the Plans and approved working drawings as may be required will in all cases be determined by the City and authorized in writing. Before final acceptance of the project is issued by the City, the Contractor shall provide the City with a set of record drawings for the project certified by the Engineer of record.

CIP6.04 COORDINATION OF PLANS, SPECIFICATIONS AND SPECIAL PROVISIONS

- A. The Specifications, the accompanying Plans, Special Provisions, and Supplemental Agreements, are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be co-operative and to describe and provide for a complete work. In cases of disagreement, figured dimensions shall govern over scaled dimensions, the Plans shall govern over Specifications, and Special Provisions shall govern over both Specifications and Plans.

CIP6.05 AUTHORITY AND DUTIES OF INSPECTORS

- A. Inspectors will be authorized to inspect all work done and all materials furnished. Such inspection may extend to all or to any part of the work and to the preparation or Manufacturer of the materials to be used. Such inspection will not relieve the Contractor from any obligation to perform the work in accordance with the requirements of the Specifications. In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the Inspector will have authority to reject materials or suspend work until the question at issue can be referred to and decided by the City. The Inspector will not be authorized to revoke, alter, enlarge, or release any requirement of these Specifications, nor to approve or accept any portion of work, nor to issue instruction contrary to the Plans and Specifications. He will in no case act as foreman or perform other duties for the Contractor nor interfere with the management of the work.

CIP6.06

PLANT

- A. The Contractor shall furnish plant and equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Proposal. If at any time such plant appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character or increase the plant and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of work and rate of progress required.

CIP6.07

PRIVATE LAND

- A. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the respective landowner.

CIP6.08

PIPE LOCATIONS

- A. Pipelines shall be located substantially as indicated on the Plans, but the Engineer and the City reserve the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Plans, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

CIP6.09

OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight. The Contractor shall take precautions, such as fences and barricades, to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles, which could be dangerous to the public, shall be well lighted at night. All trenches shall conform to the requirements of OSHA.

CIP6.10

TEST PITS

- A. Test pits for the purpose of locating underground pipelines or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer or the City. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer and the City.

CIP6.11

MAINTENANCE OF TRAFFIC

- A. Unless permission to close a street is received in writing from the proper authority, all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer and the City.
- B. Detours around construction will be subject to the approval of the City and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the City.
- C. The Contractor shall take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in

progress. The Contractor shall be fully responsible for damage or injuries whether or not police protection has been provided.

CIP6.12 BLASTING

- A. No blasting shall be allowed unless approved in writing by the City of Georgetown.

CIP6.13 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better than existing before the damage was done, or he shall make good the damage in some other manner acceptable to the Engineer and the City.

CIP6.14 MAINTENANCE OF FLOW

- A. The Contractor shall, at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work, and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer and the City well in advance of the interruption of any flow.

CIP6.15 COOPERATION WITHIN THIS CONTRACT

- A. The Contractor shall cooperate with Subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the Contractor and his Subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer or the City.

CIP6.16 CLEANUP

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. The Contractor shall dispose of all rubbish resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

CIP6.17 FINAL INSPECTION

- A. Whenever the work provided for in, and contemplated under, the contract has been satisfactorily completed, the City will make the "Final Inspection". If the work is found to be satisfactory, the Contractor will be notified in writing of the acceptance of the same. The City will require a Certificate of Completion and Final Acceptance from the Inspector before any building, electric or plumbing permits will be issued or any City utilities provided. No such Certificate will be issued until all monuments have been set and record drawing reviewed by the Engineer of Record are provided to the City. If items are found in need of repair or completion, a final punch list will be generated and the items shall be completed by the Contractor. The City will inspect the punch list items one time following their completion. Any subsequent inspections due to inadequate repair or completion of the punch list items shall be paid for by the Contractor or Developer at \$200.00 per inspection.
- B. Final acceptance of the Project or Development does not relieve the Contractor or Developer of the responsibility of insuring all work shown on the Plans has been completed. If any portion of the work is found at a later date to be inferior or incomplete, the Contractor or Developer shall replace or complete the work at no expense to the City.

CIP6.18 PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP7 – CONTROL OF MATERIALS

CIP7.01 SCOPE OF WORK

- A. This specification covers the requirements for exercising control of materials used on the Project.

CIP7.02 SOURCES OF SUPPLY AND QUALITY OF MATERIALS

- A. The source of supply of each of the materials shall be approved by the City before any deliveries and at the option of the City, may be sampled and tested for determining compliance with the governing Specifications by the City before delivery begins. If it is found after trial that sources of supply previously approved do not produce uniform and satisfactory products, or if the product from any source proves unacceptable at any time, the Contractor shall furnish materials from other approved sources. Only materials conforming to the requirements of these Specifications and approved by the City shall be used in the work. All materials being used are subject to inspection or test at any time during their preparation or use. Any materials which have been tested and accepted at the source of supply may be subjected to a check test after delivery and all materials which, when retested, do not meet approval or have in any way become unfit for use shall not be used in the work.
- B. Throughout these Specifications where reference is made to ASTM, AASHTO or bulletins of the Texas Department of Transportation for the quality of materials or sampling and testing, the most current standard, tentative standard or bulletin issued prior to the date of the proposal shall govern.

CIP7.03 SAMPLES AND TEST

- A. All materials, before being incorporated in the work, shall be inspected, tested and approved by the City and any work in which materials are used without prior test and approval or written permission of the City may be ordered removed and replaced at the Contractor's expense. The Contractor shall be responsible for and pay for all charges of testing laboratories for services in conjunction with initial tests made on all imported materials to the project site including but not limited to embedment materials, fill materials, backfill materials, select material, crushed limestone base, sub-base, concrete, steel, wood forms, liquid asphalt, aggregate, water, cement, guard rail etc. Sampling and testing of all materials, on the project site will be coordinated by the Contractor and paid for by the City. The selection of the method of test shall be designated by the City. Where tests are required, other than those made in the laboratory, for the purpose of control in the manufacture of a construction item, the Contractor will be required to furnish such facilities and equipment as may be necessary to perform the tests and inspection and shall be responsible for calibration of all test equipment required. When requested, the Contractor shall furnish a complete written statement of the origin, composition, and/or manufacture of any or all materials that are to be used in the work. Testing of all materials and work shall conform to the Texas Department of Transportation "Manual of Testing Procedures" which outlines testing methods and procedures. Other Texas Department of Transportation Bulletins shall apply.

CIP7.04 PAYMENT

- A. No separate payment will be made for work performed under this section of the specifications, and the cost thereof shall be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP8 – LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

CIP8.01 SCOPE OF WORK

- A. This specification covers the requirements for complying with all Federal, State, and local laws, ordinances, and regulations, which in any manner affect the conduct of the work on the Project.

CIP8.02 LAWS TO BE OBSERVED

- A. The Contractor shall make himself familiar with and at all times shall observe and comply with all Federal, State, and local laws, ordinances, and regulations which in any manner affect the conduct of the work and shall indemnify and save harmless the City and its representatives against any claim arising from the violation of any such law, ordinance, or regulation, whether by himself or by his employees.

CIP8.03 PERMITS, LICENSES AND TAXES

- A. The Contractor shall procure all permits and licenses, pay all charges, fee and taxes, and give all notices necessary and incident to the due and lawful prosecution of the work.

CIP8.04 RESTORATION OF SURFACES OPENED BY PERMIT

- A. The Contractor shall not allow any party to make an opening in the highway or street unless a duly authorized permit signed by the owner of the facility is presented. Until the acceptance of the work, the Contractor shall make all necessary repairs in the roadway where openings have been made by due authority.

CIP8.05 PUBLIC SAFETY AND CONVENIENCE

- A. The safety of the public and the convenience of traffic shall be regarded as of prime importance. Unless otherwise shown on the Plans or except as herein provided, all portions of the highway and street shall be kept open to traffic. It shall be the entire responsibility of the Contractor to provide for traffic along and across the highway and streets as well as for ingress and egress to private property all as specified herein, as shown on the Plans or as directed by the City.
- B. The Contractor shall plan and execute his operations in a manner that will cause the minimum interference with traffic. The Contractor shall secure the City's approval of his proposed plan of operation, sequence of work and methods of providing for the safe passage of traffic before it is placed into operation. If at any time during construction, the approved plan does not accomplish the intended purpose, due to weather or other conditions affecting the safe handling of traffic, the Contractor shall immediately make necessary changes in accordance with the latest version of the TMUTCD to correct the unsatisfactory conditions.
- C. If due to rains or other reasons, the shoulders, slopes and ditches become unsatisfactory for handling traffic, construction operations shall be suspended and the base course or surface area shall be opened to traffic. Where the Specifications require that traffic be carried over or along the proposed work, construction operations shall be so prosecuted and new material so kept that placement and spreading will allow the passage of traffic in comfort and safety.
- D. Where an Asphalt Surface Treatment is placed for the full width in an operation, traffic shall be carried on the shoulder slopes and ditches where appropriate. During the operation of placing asphalt and aggregate, the surface or pavement shall not be closed to traffic for a period of more than 45 minutes.

- E. During construction of proposed structures, unless otherwise shown on the Plans, the Contractor shall provide and maintain detours including temporary structures or crossovers of adequate structural design as may be required for the safety and convenience of the traffic.
- F. At night or otherwise, all equipment not in use shall be stored in such manner and such locations as not to interfere with the safe passage of traffic. The Contractor shall provide and maintain flagmen at such points and for such periods of time as may be required to provide for the safety and convenience of public travel and Contractor's personnel, and as directed by the City. Flagmen shall have a sense of responsibility for the safety of the public and the workers, adequate training in safe temporary traffic control practices, average intelligence, good physical condition, including sight, mobility, and hearing, mental alertness and the ability to react in an emergency, courteous but firm manner, and a neat appearance. When directing traffic, flagmen shall use the standard attire, flags and signals and follow the flagging procedure set forth in "Instructions to Flagmen" published by the Texas Department of Transportation.

CIP8.06

BARRICADES AND DANGER, WARNING AND DETOUR SIGNS

- A. The Contractor shall place and maintain in good condition, standard barricades and warning signs at each end of the project and at other locations therein as called for on the Plans or as called for in the Contractor's approved plan of operation. The signs shall be of standard design as shown on the Plans and in accordance with Texas Department of Transportation Standards.
- B. All barricades and signs remaining in place at night and all points of hazard to traffic shall be either retro-reflective with a material that has a smooth, sealed outer surface or illuminated by lights to show the same shape and similar color both day and night. Signs which refer to construction operations which do not apply after work has ended for the day, shall be moved to points out of the clear zone that are not visible to traffic until construction is resumed.
- C. The Contractor may provide special signs not covered by the Plans to protect the traveling public against special conditions or hazards, provided however, that such signs are first approved by the City.
- D. Upon completion of the work, all signs and evidences thereof shall be removed by the Contractor.

CIP8.07

PROJECT IDENTIFICATION SIGNAGE

- A. Project identification signage shall be in accordance with Section CIP14- PROJECT IDENTIFICATION SIGNAGE. This does not apply to private development Projects.

CIP8.08

USE OF EXPLOSIVES

- A. When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secure manner, and all storage places shall be marked clearly, "DANGEROUS - EXPLOSIVES". The method of storing and handling explosives and highly flammable materials shall conform with Federal and State laws and regulations. **The use of explosives must be approved in writing by the City prior to any use.**
- B. In advance of doing any blasting work, involving the use of electric blasting caps within 200 feet of any railroad track, the Contractor shall give at least 24 hours advance notice to the nearest Roadmaster, Section Foreman, Agent, Signal Maintainer or Telegraph Operator with the request that his Superintendent be advised immediately of the pending use of explosives.

CIP8.09

PROTECTION OF ADJOINING PROPERTY

- A. The Contractor shall take proper measures to protect the adjacent or adjoining property which might be damaged by any process of construction, and in case of any injury or damage resulting from any act or omission on the part of or on behalf of the Contractor, he shall restore at his own expense the damaged property to a condition equal or better than that existing before such injury or damage was done, or he shall make good such injury or damage in an acceptable manner.

CIP8.10

RESPONSIBILITY FOR DAMAGE CLAIMS

- A. The Contractor shall save harmless the City from all suits, actions or claims brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the work by the Contractor, or from any claims or amounts arising or recovered under the "Workmen's Compensation Laws" or any other laws. He shall be responsible for all damage or injury to property of any character occurring during the prosecution of the work resulting from any act, omission, neglect, or misconduct on his part in the manner or method of executing the work; or from his failure to properly execute the work; or from defective work or materials. He shall not be released from such responsibility until all claims have been settled and suitable evidence to that effect furnished the Council.
- B. The Contractor's attention is directed to the fact that pipelines and other underground installations as may be shown on the Plans have been taken from the best available information. There may be other pipelines or installations. The Contractor shall save harmless the City from any and all suits or claims resulting from damage by his operations to any pipeline or underground installation.

CIP8.11

CONTRACTOR'S RESPONSIBILITY FOR WORK

- A. Until the final acceptance of the work by the City as evidenced in writing, it shall be under the charge and care of the Contractor. The Contractor shall rebuild and make good at his own expense all injuries and damages to the work occurring before its completion and acceptance. In case of suspension of work for any cause, the Contractor shall be responsible for the preservation of all materials. He shall provide suitable drainage of the roadway and shall erect temporary structures where required. The Contractor shall maintain the roadway in good and passable condition until final acceptance.
- B. Wherever, in the opinion of the City, any roadway or portion thereof is in suitable condition for travel, it shall be opened to traffic, as may be directed, and such opening shall not be held to be in any way the final acceptance of the roadway or any part of it or as a waiver of any of the provisions of the Contract. Where it is considered by the City to be in the public interest, any substantially completed roadway or portion thereof may be opened to traffic.

CIP8.12

PERSONAL LIABILITY OF PUBLIC OFFICIALS

- A. In carrying out the provisions of the contract or in exercising any power or authority granted thereunder, there shall be no liability upon the City or its authorized assistant, either personally or otherwise, as they are agents and representatives of the City.

CIP8.13

PROSECUTION OF WORK

- A. Prior to beginning construction operations, the Contractor shall submit to the City a chart or brief outlining the manner of prosecution of the work that he intends to follow in order to complete the Contract. Before any work is started on the project or development, a "Pre-Construction Conference", shall be held between the City, Contractor, Developer and any other interested parties.

CIP8.14

PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP9 – ENVIRONMENTAL PROTECTION PROCEDURES

CIP9.01

SCOPE OF WORK

- A. This specification covers the requirements for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area. Specific requirements are specified in Section G6-SEDIMENTATION AND TEMPORARY EROSION CONTROL.
- D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.
- E. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Texas Commission on Environmental Quality, and U.S. EPA.

CIP9.02

SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including descriptions of any special operations required, temporary roads and embankments, and all other pertinent data to illustrate conformance to the specification found within.

CIP9.03

APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

CIP9.04

NOTIFICATIONS

- A. The Engineer and/or City will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his/her authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the City may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

CIP9.05

IMPLEMENTATION

- A. Prior to commencement of the work, the Contractor shall meet with the City to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program. All environmental and pollution control features shall be in place prior to any construction.
- B. Remove temporary environmental control features, when approved by the Engineer, and incorporate permanent control features into the Project at the earliest practical time.

CIP9.06

PROTECTION OF WATERWAYS

- A. The Contractor shall observe the rules and regulations of the State of Texas and agencies of the U.S. Government prohibiting the pollution of any lake, stream, river, or wetland by the dumping of any refuse, rubbish, dredge material, or debris therein.
- B. Contractors are specifically cautioned that disposal of materials into any waters of the State must conform with the requirements of the Texas Commission on Environmental Quality, and an applicable permit from the U.S. Army Corps of Engineers.
- C. The Contractor shall be responsible for providing holding ponds or an approved method which will handle, carry through, or divert around his work all flows, including storm flows and flows created by construction activity, so as to prevent silting of waterways or flooding damage to the property or adjacent properties.
- D. The Contractor is responsible for researching the need for a U.S. EPA NPDES permit for the construction site. If one is required, the Contractor is responsible for obtaining the permit and for monitoring the site per the permit requirements until final completion.

CIP9.07

DISPOSAL OF EXCESS EXCAVATION AND OTHER WASTE MATERIALS

- A. Excess excavated material not required or suitable for backfill and other waste material must be disposed of at sites approved by the City and Engineer.
- B. Unacceptable disposal sites, include, but are not limited to, sites within a wetland or critical habitat and sites where disposal will have a detrimental effect on surface water or groundwater quality.
- C. The Contractor may make his own arrangements for disposal subject to submission of proof to the Engineer that the Owner(s) of the proposed site(s) has a valid fill permit issued by the appropriate governmental agency and submission of a haul route plan including a map of the proposed route(s).
- D. The Contractor shall provide watertight conveyance of any liquid, semi-liquid, or saturated solids which tend to bleed or leak during transport. No liquid loss from transported materials will be permitted whether being delivered to the construction site or being hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at the selected disposal site.

CIP9.08

USE OF CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture or any other applicable regulatory agency. Use of all such chemicals and disposal of residues shall be in conformance with the Manufacturer's instructions.
- B. Any oil or other hydrocarbon spilled or dumped during construction must be excavated and completely removed from the site prior to final acceptance. Soil contaminated by the Contractor's operations shall become the property of the Contractor, who will bear all costs of testing and disposal.
- C. Before a Contractor commences work, the following steps shall be completed.

1. The City will inform the Contractor of his rights under the Texas Hazards Communication Act.
2. The City will provide a copy of the Chemical List giving the hazardous chemicals to which the Contractor, his employees and agents may be exposed to on the Project site.
3. The City will provide copies of all Material Safety Data Sheets (MSDS) to the Contractor for the hazardous chemicals, which he may be exposed to on the Project site.
4. The City will inform the Contractor of his obligation to inform his employees and agents of each of the above requirements.
5. The Contractor shall provide MSDS for all hazardous chemicals he may bring onto the project site that the City's employees may be exposed to.
6. The Contractor shall sign a Contractor Acknowledgement certifying that he/she has received the information provided by the City on hazardous chemicals and maintain the Acknowledgement with the original Contract.

CIP9.09

EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, silt fences, rock berms, hay check dams, mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented. Ditches around the construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

CIP9.10

PROTECTION OF STREAMS

- A. Care shall be taken to prevent, or reduce to a minimum, any damage to any stream from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such waters will be diverted through a settling basin or filter before being directed into the streams.
- B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a Contingency Action Plan approved by the Texas Commission on Environmental Quality. Contractor shall submit two (2) copies of approved contingency plans to the Engineer.
- D. Water being flushed from structures or pipelines after disinfection, with a Cl_2 residue of 2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Engineer, prior to discharge.

PROTECTION OF LAND RESOURCES

- A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the Project. Confine all construction activities to the appropriate areas shown on the Plans.
- B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.
- C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them in accordance with Section S6- SEDIMENTATION AND TEMPORARY EROSION CONTROL. Monuments and markers shall be protected similarly before beginning operations near them.
- D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer or the City will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

All scars made on trees by equipment, construction operations, or by the removal of limbs larger than one (1) inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer or the City, shall be immediately removed and replaced.

- E. The locations of the Contractor's storage, and other construction buildings, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Plans and shall require written approval of the Engineer and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Plans showing storage facilities shall be submitted for approval of the Engineer or the City.
- F. If the Contractor proposes to construct temporary roads or embankments and excavations for plant and/or work areas, he/she shall submit the following for approval at least 10 days prior to scheduled start of such temporary work.
 - 1. A layout of all temporary roads, excavations and embankments to be constructed within the work area.
 - 2. Details of temporary road construction.
 - 3. Plans and cross sections of proposed embankments and their foundations, including a description of proposed materials.
 - 4. A landscaping drawing showing the proposed restoration of the area. Removal of any trees and shrubs outside the limits of existing clearing area shall be indicated. The drawing shall also indicate location of required guard posts or barriers required to control vehicular traffic passing close to trees and shrubs to be maintained undamaged. The drawing shall provide for the obliteration of construction scars as such and shall provide for a natural appearing final condition of the area. Modification of the Contractor's approved drawings shall be made only with the written approval of the Engineer. No unauthorized road construction, excavation or embankment construction including disposal areas will be permitted.

- G. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess waste materials, or any other vestiges of construction as directed by the Engineer or the City. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in Section G7-LOAMING, HYDROSEEDING AND PERMANENT EROSION CONTROL, or as approved by the Engineer or the City.
- H. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

CIP9.12

PROTECTION OF AIR QUALITY

- A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.
- B. Dust Control. The Contractor will be required to maintain all excavations, embankment, subgrade, road bed, base course stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or outside the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.
- C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the Engineer or the City.
- D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer or the City.

CIP9.13

MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. During the life of this Contract, the Contractor shall maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

CIP9.14

NOISE CONTROL

- A. The Contractor shall make every effort to minimize noises caused by his/her operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal regulations.

CIP9.15

PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP10 - SUBMITTALS

CIP10.01

SCOPE OF WORK

- A. This specification covers the requirements for submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, Mock Ups, Construction Photographs, and Construction or Submittal Schedules. Detailed submittal requirements will be specified in the technical specification sections.
- B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

CIP10.02

SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings

- 1. Shop drawings as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
- 2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
- 3. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Plans and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
- 4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the Plans before being submitted for approval.

B. Product Data

- 1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the Manufacturer's product specification and installation instructions, availability of colors and patterns, Manufacturer's printed statements of compliance's and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the work.

C. Samples

- 1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or the City for independent inspection and testing, as applicable to the work.

CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
1. Field measurements
 2. Field construction criteria
 3. Catalog numbers and similar data
 4. Conformance with the Specifications
- B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets eleven by seventeen (11" x 17") and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Resident Project Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer or the City.
- C. The Contractor shall utilize a 10 character submittal identification numbering system in the following manner:
1. The first character shall be a D, S, P, M, or R, which represents Shop/Working Drawing and other Product Data (D), Sample (S), Preliminary Submittal (P), Operating/Maintenance Manual (M), or Request for Information (R).
 2. The next sequence shall be the applicable Specification Section Number.
 3. The next three (3) digits shall be the numbers 001 - 999 to sequentially number each initial separate item or drawing submitted under each specific Section number.
 4. The last character shall be a letter, A-Z, indicating the submission, or resubmission of the same Drawing (i.e. A=1st submission, B=2nd submission, C=3d submission, etc.). A typical submittal number would be as follows:

D-C2-008-B
D = Shop Drawing
C2 = Specification Section for Concrete for Structures C2
008 = The eighth initial submittal under this specification section
B = The second submission (first resubmission) of that particular shop drawing
- D. Notify the Engineer or the City in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.
- E. The review and approval of shop drawings, samples or product data by the Engineer or the City shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer or the City will have no responsibility therefore.
- F. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to

approved shop drawings and data shall be at the Contractor's risk. The City will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

- G. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

CIP10.04

SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other Contractor.
- B. Each submittal, appropriately coded, will be returned within 30 working days following receipt of submittal by the Engineer or the City.
- C. Number of submittals required:
1. Shop Drawings as defined in Paragraph G10.02 A: Six (6) copies.
 2. Product Data as defined in Paragraph G10.02 B: Six (6) copies.
 3. Samples: Submit the number stated in the respective Specification Sections.
- D. Submittals shall contain:
1. The date of submission and the dates of any previous submissions.
 2. The Project title and number.
 3. Contractor identification.
 4. The names of:
 - a. Contractor
 - b. Supplier
 - c. Manufacturer
 5. Identification of the product, with the specification section number, page and paragraph(s).
 6. Field dimensions, clearly identified as such.
 7. Relation to adjacent or critical features of the Work or materials.
 8. Applicable standards, such as ASTM or Federal Specification numbers.
 9. Identification of deviations from Contract Documents.
 10. Identification of revisions on re-submittals.
 11. Two (2) five-inch by three-inch (5"x3") blank space for Contractor and Engineer stamps.

CIP10.05

REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

- A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed as:
1. Permitting any departure from the Contract requirements;
 2. Relieving the Contractor of responsibility for any errors, including details, dimensions, and materials; and/or
 3. Approving departures from details furnished by the Engineer or the City, except as otherwise

provided herein.

- B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the City and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.
- D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 "REVIEWED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 "PROVIDE AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 "PROVIDE AS NOTED/CONFIRM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 "PROVIDE AS NOTED/RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a re-submittal of the package. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This re-submittal is to address all comments, omissions and non-conforming items that were noted. Re-submittal is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the re-submittal.

Code 5 "NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 6 "COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

- E. Re-submittals will be handled in the same manner as first submittals. On re-submittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.
- F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Not Approved" until resubmitted. The Engineer may at his/her option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.
- G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven (7) working days prior to release for manufacture.
- H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall

carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

CIP10.06

DISTRIBUTION

- A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed six (6).

CIP10.07

MOCK UPS

- A. Mock Up units as specified in individual Sections include, but are not necessarily limited to, complete units of the standard of acceptance for that type of work to be used on the Project. Remove at the completion of the Work or when directed.

CIP10.08

GENERAL PROCEDURES FOR SUBMITTALS

- A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and re-submittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP11 – TRENCH SAFETY REQUIREMENTS

CIP11.01

SCOPE OF WORK

- A. This specification covers the requirements to plan, design, construct, install, maintain, monitor, modify as necessary, and remove upon completion, a Trench Safety System as specified herein.
- B. The requirements of this Section apply to all trenches which equal or exceed a depth of five (5) feet, measured from the ground surface at the highest side of the trench to the trench bottom.
- C. All applicable and non-conflicting portions of Section G4- TRENCHING, BACKFILLING AND COMPACTION apply as appropriate.

CIP11.02

SUBMITTALS

- A. Within 30 days after the Notice to Proceed, but not less than 10 calendar days prior to execution of any trench excavation operations, the Contractor shall submit a site specific Trench Safety System Conformance Affidavit stating that operations will be conducted in full conformance with the OSHA Standards.
 - 1. The Conformance Letter shall also describe the Trench Safety System techniques proposed to be used on the Project.
 - 2. Specific references to the applicable OSHA Standards sections shall be included for each technique to be used.
- B. The Trench Safety System Plan shall be in writing, site specific and sufficiently detailed and clear to be understandable and usable by all personnel who will be executing, supervising and witnessing the trenching operations. A copy of the Trench Safety System Plan shall be available at the site of trenching operations at all times.
- C. If borings and/or detailed geotechnical analyses are required to develop the Trench Safety System Plan, they shall be executed by the Contractor at his cost.
- D. For trenches having depths greater than the various limits given in the OSHA Standards (8, 12 or 20 feet, depending on the techniques used), a site specific protective system shall be designed by a Registered Professional Engineer, registered in the State of Texas experienced in soil mechanics and structural design. The design shall be signed, sealed and dated by the Professional Engineer, and it shall identify those specific locations where the design is applicable.

CIP11.03

GENERAL

- A. All materials and products incorporated into the Trench Safety System shall be suitable for their intended uses; shall meet all design criteria and parameters used by the Trench Safety System designer; and shall meet all applicable requirements of OSHA Standards.

CIP11.04

METHODS OF PROVIDING FOR TRENCH SAFETY

- A. Protective systems referenced in this Section shall be as defined and described in 29 CFR 1962.652, "Requirements for Protective Systems."
- B. It is the duty, responsibility and prerogative of the Contractor to determine the specific applicability of a proposed Trench Safety System for each field condition encountered on the Project. Contractor specifically holds the City, Engineer, and any of their designated representatives harmless in any actions resulting from the failure or inadequacy of the Trench Safety System used to complete the Project.
- C. Unless otherwise noted on the drawings or excluded below, Sloping/Benching, Trench Shielding with trench boxes, and/or Sheet piling/Shoring/Bracing protective systems may be used on this Project.

D. Restrictions on the use of the various protective systems for this Project are as follows:

1. Sloping or Benching. Allowed with prior approval from the City.
2. Trench Shields/Boxes. No restrictions.
3. Sheeting/Shoring/Bracing. No restrictions.

CIP11.05

INSPECTION DUTIES OF CONTRACTOR

- A. Provide a Competent Person, as defined in the OSHA Standards, to make frequent inspections of the trenching operations and the Trench Safety System in full conformance with the OSHA Standards.
- B. If evidence of a possible cave-in or landslide is apparent, all work in the trench shall immediately cease and not be resumed until all necessary precautions have been taken to safeguard personnel entering the trench.
- C. In an emergency situation, which may threaten or affect the safety or welfare of any persons or properties, the Contractor shall act at his discretion to prevent possible damage, injury or loss. Any additional compensation or time extension claimed for such actions shall be considered in view of the cause of the emergency and in accordance with the General Conditions.

CIP11.06

MEASUREMENT AND PAYMENT

- A. Payment for the Trench Safety Plan shall be on a Lump Sum price basis, the Lump Sum price being as given in the Bid Proposal.
- B. Payment for the Trench Safety Plan Implementation shall be on a unit price basis, the unit price being as given in the Bid Proposal, and the unit of measure being linear feet of trench and/or square foot of bore pit or structure, without regard to whether specific trench safety precautions are required or used for the trench reach being measured.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP12 – TESTING OF PIPELINES AND MANHOLES

CIP12.01 SCOPE OF WORK

- A. This specification covers the requirements to perform ex-filtration testing and deflection testing of gravity pipelines and to perform pressure and leakage testing of pressure pipelines.

CIP12.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including a description of the deflection test procedure for flexible pipe greater than 27-inches in diameter, video inspection of gravity wastewater lines, and all other pertinent data to illustrate conformance to the specification found within.

CIP12.03 GENERAL

- A. The entire length of the installed gravity line and the force main shall be field tested for water tightness. Gravity wastewater lines shall be video taped by camera.
- B. Hydrostatic pressure and leakage tests shall be made on all pressure pipelines carrying wastewater or water.
- C. All labor and equipment, including, but not limited to test pump with regulated by-pass meters and gauges required for conducting pipeline tests, shall be furnished by the Contractor. The Contractor shall furnish equipment and necessary piping as required to transport water used in testing from source to test location.
- D. Time and sequence of testing shall be scheduled by the Contractor, subject to observation and approval by the City. The Contractor shall provide adequate labor, tools and equipment to operate valves and to locate and repair any leaks discovered during the initial filling of the pipeline prior to actual testing or during the course of the tests.

CIP12.04 CLEANING

- A. At the conclusion of the work, thoroughly clean all pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered the pipes during the construction period. Debris cleaned from the lines shall be removed from the low end of the pipeline. If after this cleaning, obstructions remain, they shall be removed. After the pipelines are cleaned and if the groundwater level is above the pipe or following a heavy rain, the Engineer will examine the pipes for leaks. If any defective pipes or joints are discovered, they shall be repaired, and/or replaced by the Contractor at his expense.

CIP12.05 TEST PROCEDURES FOR GRAVITY PIPELINES, FORCE MAINS AND MANHOLES

- A. Scope: After sewers and manholes have been installed and backfilled, subject newly laid gravity lines and manholes to a leakage test. Contractor to furnish all labor, materials, tools and equipment to test lines. Take such precautions as required to prevent damage to lines and appurtenances being tested. Repair any damage resulting from test at Contractor's expense. Conduct test in presence of Engineer or designated City Representative.
- B. Test Procedures for Leakage Test of Gravity Sewer: Contractor, at his option, may test lines by hydrostatic or low pressure air test as specified below. However, the Engineer may direct a specific test be performed in specified areas of the Project.

C. Infiltration or Exfiltration Test (for Gravity Sewer)

1. Preparation: Seal ends of line section being tested with water tight plugs, equipped with pipe riser inserted and braced in the inlet of the manholes. Fill section with water 24-hours prior to start of test. Fill slowly from downstream manhole in test section so that no air is trapped in the line. Leave outlets of stacks and service lines exposed and unplugged until after exfiltration test has been made. Outlets terminating below level of test water surface to be temporarily extended upward by installing additional lengths of pipe. After completion of satisfactory test, remove lengths of pipe added for test.
2. Duration of Test: Test for 24-hours. Minimum head of either two (2) feet measured above the crown, inside pipe at upper end of section or four (4) feet measured above trench water table, whichever is higher, so that a net positive of two (2) feet TCEQ is used for testing.
3. Allowable Leakage: Allowable leakage or exfiltration in any individual section under construction shall not exceed 10 gallons per inch of inside diameter per mile of pipe per 24 hours.

D. Low Pressure Air Test

1. Preparation: Clean pipe to be tested by propelling snug fitting inflated rubber ball through the pipe with water or by use of water jet cleaning equipment. After manhole to manhole reach of pipe has been backfilled and cleaned, pneumatic plugs shall be placed in the line at each manhole and inflated to 25 psig. Add air slowly to the section under test until the 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.

2. Duration of Test and Allowable Leakage

Decrease pressure to 3.5 psig and 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 seconds and shall be computed by the following equation:

$$T = (0.085 \times D \times K) / Q$$

T = time for pressure to drop 1.0 pound per square inch gauge in seconds

K = 0.000419 x D x L, but not less than 1.0

D = average inside diameter in inches

L = length of line of same pipe size being tested, in feet

Q = rate of loss assume 0.0015 cubic feet per minute per square foot internal surface shall be used

Since K value of less than 1.0 shall not be used, there are minimum times for each pipe diameter as outlined below:

Pipe Diameter	Minimum Time	Length for Minimum Time	Time for Longer Length
(inches)	(seconds)	(feet)	(seconds)
6	340	398	0.855(L)
8	454	298	1.520(L)
10	567	239	2.374(L)
12	680	199	3.419(L)
15	850	159	5.342(L)
18	1020	133	7.693(L)
21	1190	114	10.471(L)
24	1360	100	13.676(L)

Pipe Diameter	Minimum Time	Length for Minimum Time	Time for Longer Length
27	1530	88	17.309(L)
30	1700	80	21.369(L)
33	1870	72	25.856(L)
36	2040	66	30.771(L)

The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the testing period, then the test shall continue for the entire test duration as outlined above or until failure. Lines with a 27-inch average inside diameter and larger may be air tested at each joint. If the joint test is used, a visual inspection of the joint shall be performed immediately after testing. The pipe is to be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure has stabilized, the minimum time allowable for the pressure to drop from 3.5 psi gauge to 2.5 psi gauge shall be 10 seconds.

E. Test Procedures for Hydrostatic Test for Manholes

1. Manholes shall be tested for leakage separately and independently of the wastewater lines by hydrostatic exfiltration testing, or other methods acceptable to the City. If a manhole fails a leakage test, the manhole must be made water tight and retested. The maximum leakage for hydrostatic testing shall be 0.025 gallon per vertical foot per hour. Alternative test methods must ensure compliance with the above allowable leakage. Hydrostatic exfiltration testing shall be performed as follows: all wastewater lines coming into the manhole shall be sealed with an internal pipe plug, then the manhole shall be filled with water and maintained full for at least one (1) hour. For concrete manholes a wetting period of 24-hours may be used prior to testing in order to allow saturation of the concrete.

F. Test Procedures for Vacuum Testing Manholes

1. In lieu of the hydrostatic exfiltration test, manholes may be tested by vacuum. Manholes tested by vacuum shall be performed by the Contractor in compliance with these specifications.
2. Manholes shall be tested after installation of all connections (existing and/or proposed) in place. All lift holes shall be plugged with an approved non-shrink grout and all drop connections and gas sealing connections shall be installed prior to testing. The lines entering the manhole shall be temporarily plugged with the plugs braced to prevent them from being drawn into the manhole. The plugs shall be installed in the lines beyond the drop-connections, gas sealing connections, etc. The test head shall be placed inside the frame at the top of the manhole and inflated in accordance with the manufacturer's recommendations. A vacuum of 10-inches of mercury shall be drawn, and the vacuum pump shall be turned off. With the valve closed, the level of vacuum shall be read after the required test time as shown in the following table. If the drop in the level is less than one (1) inch of mercury (final vacuum of nine (9) inches of mercury), the manhole will have passed the vacuum test. The required test time shall be 120-seconds.
3. Manholes which have a final vacuum of nine (9) inches of mercury after the time indicated will be accepted. Any manhole which fails the vacuum test as described above shall be repaired with an approved non-shrink grout or other material acceptable to the Engineer and the City based on the material from which the manhole is constructed. The manhole shall be retested as described above until a successful test is made.

G. Exfiltration Test

1. Preparation: Seal ends of manhole being tested with watertight plugs. Fill manhole 24-hours prior to start of test. Manholes to be filled to top of manhole cone section.
2. Duration of Test: The test shall be performed for a 24-hour duration.
3. Allowable Leakage: No leakage is allowed. The water elevation shall be the same at beginning and end of test period.

H. Deflection Testing

1. Deflection tests shall be performed on all flexible pipes. For pipes with inside diameters less than 27-inches, a rigid mandrel shall be used to measure deflection. For pipelines with an inside diameter of 27-inches and greater, the Contractor shall submit to the Engineer the proposed method, with which shall provide a precision of \pm two tenths of one percent (0.2%) deflection, for review and approval by the Texas Commission on Environmental Quality. The test shall be conducted after final backfill has been in place at least 30 days in the presence of a representative of the City's Utilities Department. No pipe shall exceed a deflection of five percent (5%). If a pipe should fail to pass the deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place an additional 30 days. Test shall be performed without mechanical pulling devices.
 2. Mandrel Sizing: The rigid mandrel shall have an outside diameter (O.D.) equal to 95% of the inside diameter (I.D.) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter of the pipe minus two minimum wall thickness for O.D. controlled pipe and the average inside diameter for the I.D. Controlled pipe, all dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.
 3. Mandrel Design: The rigid mandrel shall be constructed of a metal or rigid plastic material that can withstand 200 psi without being deformed. The mandrel shall have nine or more "runners" or "legs" as long as the total number of legs is an odd number. The barrel section of the mandrel shall have a length of at least 75% of the inside diameter of the pipe. A proving ring shall be provided and used for each size mandrel in use.
 4. Method Options: Adjustable or flexible mandrels are prohibited. A television inspection is not a substitute for the deflection test. A deflectometer may be approved provided the Contractor notifies the Engineer in a timely manner and submits adequate information for the Engineer to submit to the Texas Commission on Environmental Quality for review and approval. Mandrels with removable legs or runners may also be approved provided the Contractor notifies the Engineer in a timely manner and submits adequate information for the Engineer to submit to the Texas Commission on Environmental Quality for review and approval.
- I. Repairs of Lines: Remove and replace or make approved corrective repairs to any section of line or manhole which has leakage that exceeds above amounts. Repair any individual leaks that may appear whether or not overall section meets leakage requirements. Individual leaks will ordinarily be revealed by looking through sewer with a light while groundwater level is over sewer, during water tamping operations or immediately after water leakage is emptied from sewer.
- J. Retest: Sewers and/or manholes failing to meet requirements of leakage test will, after repair by Contractor, be tested again for leakage. No sewer or manhole will be accepted until leakage is less than allowable amount.

K. Video Inspection

1. The use of a television camera for inspection prior to placing the sewer in service will be required. Video inspection is at the cost of the Contractor, and copies of the DVD will be presented to the City prior to final acceptance. One (1) copy of the DVD shall be submitted to the City.
2. Post construction video of the gravity wastewater lines will be evaluated on a case-by-case basis for acceptance. Preparation for video taping of wastewater line shall be as follows:
 - a. Flush and clean the gravity wastewater line prior to video taping.
 - b. The videotape shall display the station, in accordance with the Plans and Standards, and counter on the screen. Manhole numbers and stations shall correspond to the contract documents.
 - c. If debris is evident in the line during the video, the line will be flushed and cleaned to allow a clean video.
 - d. All manholes will be identified at the beginning and end of the video corresponding to contract documents with upstream and downstream ends identified.
 - e. Additional video inspections shall be performed prior to completion of one-year warranty period and submitted on DVD.

L. Force Main

1. Force Main shall be pressure tested one and one-half (1 1/2) times the maximum output of the pumps. The allowable hydrostatic leakage rate shall be based on CIP 12.06 Table 6A.

CIP12.06

TEST PROCEDURES FOR PRESSURE PIPELINES

A. General

1. After the pipe has been laid and backfilled and the backfill has been otherwise consolidated, all newly laid pipe, or any valved section thereof, shall be subjected to the hydrostatic pressure specified below for that particular type of pipe. The duration of the hydrostatic test shall be at least two (2) hours. Unless otherwise specified or noted on the Plans. All meters, fixtures, devices or appliances which are connected to the pipeline system and which might be damaged if subjected to the specified test pressure shall be disconnected and the ends of the branch lines plugged or capped during the testing procedures.
2. Each valved (capped or plugged) section of pipe shall be filled slowly with water and all air shall be expelled. If permanent air vents are not located at all high points, the Contractor shall install, at his own expense, corporation or blow-off cocks at such points so that air can be expelled as filling takes place. After verification that all air has been expelled, the cocks shall be closed and the pipe kept filled until tested. All exposed pipe, fittings, valves, hydrants and joints shall be examined while under test pressure and all visible leaks shall be stopped. Any cracked or defective pipe, fittings, valves or hydrants discovered during testing shall be removed and replaced by the Contractor. Replacement shall be with sound material and the test shall be repeated until satisfactory to the City.

B. Special Requirements: Where any section of pipeline is provided with concrete reaction blocking, the hydrostatic pressure shall not be made until at least five (5) days have elapsed after installation of the blocking. However, if high-early-strength cement is used in the concrete, two (2) days shall have elapsed prior to testing.

C. Leakage Test: A Leakage Test will be conducted on each valved section over the entire Project. The leakage test shall be at 150 psi for at least four (4) hours. Fire lines shall be tested at 200 psi for two (2)

hours with 0 loss.

D. Allowable Leakage

1. The allowable hydrostatic leakage rate shall be based on the following formula:

Fire lines 0 loss

$$L = \frac{SD}{133,200} \sqrt{P}$$

L = testing allowance in gallons per hour

S = length of pipe tested in feet

D = nominal diameter of the pipe in inches

P = average test pressure during the hydrostatic test in pounds per square inch (gauge)

Table 6A

Hydrostatic testing allowance per 1,000 ft of pipeline* - *gph*[†]

Avg. Test Pressure <i>psi</i>	Nominal Pipe Diameter – in.																	
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64
450	.48	.64	.95	1.27	1.59	1.91	2.23	2.55	2.87	3.18	3.82	4.78	5.73	6.69	7.64	8.60	9.56	10.19
400	.45	.60	.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.41	6.31	7.21	8.11	9.01	9.61
350	.42	.56	.84	1.12	1.40	1.69	1.97	2.25	2.53	2.81	3.37	4.21	5.06	5.90	6.74	7.58	8.43	8.99
300	.39	.52	.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12	3.90	4.68	5.46	6.24	7.02	7.80	8.32
275	.37	.50	.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99	3.73	4.48	5.23	5.98	6.72	7.47	7.97
250	.36	.47	.71	.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27	4.99	5.70	6.41	7.12	7.60
225	.34	.45	.68	.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70	3.38	4.05	4.73	5.41	6.03	6.76	7.21
200	.32	.43	.64	.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.09	5.73	6.37	6.80
175	.30	.40	.59	.80	.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58	4.17	4.77	5.36	5.96	6.36
150	.28	.37	.55	.74	.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31	3.86	4.41	4.97	5.52	5.88
125	.25	.34	.50	.67	.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02	3.53	4.03	4.53	5.04	5.37
100	.23	.30	.45	.60	.75	.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70	3.15	3.60	4.05	4.50	4.80

* If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

[†] Calculated on the basis of Eq. 1.

- a. These formulas are based on a testing allowance of 11.65 gpd/mi/in. (1.079 L/d/km/mm) of nominal diameter at a pressure of 150 psi (1,034 kPa).
- b. 5.2.1.6.1 Testing allowance at various pressures is shown in Tables 6A and 6B.
- c. 5.2.1.6.2 When testing against closed metal-seated valves, an additional testing allowance per closed valve of 0.0078 gal/h/in. (1.2 mL/h/mm) of nominal valve size shall be allowed.
- d. 5.2.1.6.3 When hydrants are in the test section, the test shall be made against the main valve in the hydrant.
- e. 5.2.1.7 Acceptance of installation. Acceptance shall be determined on the basis of testing allowance. If any test of laid pipe discloses a testing allowance greater than that specified in Sec. 5.2.1.6, repairs or replacements shall be accomplished in accordance with the specifications.
- f. 5.2.1.7.1 All visible leaks are to be repaired regardless of the allowance used for

testing.

2. If such testing discloses leakage in excess of this specified allowable, the Contractor, at his expense, shall locate and correct all defects in the pipeline until the leakage is within the specified allowance. All known leaks, irregardless of this test, shall be repaired.

E. Pressure Test: After satisfactorily completing the leakage test, each valved section over the entire project, shall be tested at 200 psi for a sufficient period (approximately 10 min) to discover all leaking or defective materials and/or workmanship.

F. Disinfecting Water Mains: The Contractor shall disinfect all water mains before the new facilities are placed into service. Disinfection must be performed in accordance with AWWA C651, latest revision and water samples must be submitted to a laboratory approved by the Texas Department of Health. Sample must be collected by the Contractor or his representative in the presence of the City or his representative. The Contractor shall be responsible for delivering the samples to an approved laboratory for testing. Sample results must indicate the facility is free of microbiological contamination before it is placed into service. It shall be the Contractor's responsibility to obtain a current copy of AWWA C651 to determine the correct forms of chlorine for disinfection, the basic disinfection procedure, preventive and corrective measures during construction, methods of chlorination, final flushing procedures, procedures for bacteriological tests, procedures for redisinfection and disinfection procedures when cutting into existing mains. The Contractor, at its expense, will supply the concentrated chlorine disinfecting material, the City's personnel will supervise and direct the overall sterilization procedure. The Contractor, at his own expense, shall provide all other equipment, supplies and necessary labor to perform the sterilization under general supervision by the City.

G. General

1. All valves shall be arranged to prevent the strong disinfecting dosage from flowing back into the existing water supply piping. The new pipeline shall then be completely filled with disinfecting solution by feeding the concentrated chlorine and approved water from the existing system uniformly into the new piping in such proportions that every part of the line has a minimum concentration of chlorine as prescribed in AWWA C651.
2. Unless otherwise identified, all quantities called for herein refer to measurements by the testing procedures in the current edition of "Standard Methods of Examination of Water and Wastewater". The chlorine concentration of each step in the sterilization procedure shall be verified by chlorine residual determinations. This disinfecting solution shall be retained in the piping for at least twenty-four (24) hours, and all valves, hydrants, etc., shall be operated to disinfect all their parts. After this retention period, the water shall contain no less than the chlorine residual prescribed in AWWA C651 throughout the treated section of the pipeline.
3. This heavily chlorinated water shall then be carefully flushed from the line until the chlorine concentration is not higher than the residual generally prevailing in the existing distribution system, or approximately 1.0 parts per million. Proper planning and appropriate preparations to handle, dilute and dispose of this strong chlorine solution without causing injury or damage to the public, the water system, the environment must be approved by the City before flushing of the line may begin, and the flushing shall be witnessed by an authorized representative of the City.

H. Bacteriological Testing

1. After final flushing of the strong disinfecting solution, water samples from the line shall be tested for bacteriological quality, at the Contractor's expense, and must be found free of coliform organisms before the pipeline may be placed in service. One (1) test sample shall be drawn from the end of the main and additional samples collected at intervals of not more than one-thousand (1,000) feet along the pipeline. A minimum of three (3) samples must be collected.
2. The Contractor, at his own expense, shall install sufficient sampling taps at proper locations along the pipeline. Each sampling tap shall consist of a standard corporation cock installed in

the line and extended with a copper tubing gooseneck assembly. After samples have been collected, the gooseneck assembly shall be removed and retained for future use.

3. Samples for bacteriological analysis shall be collected only from suitable taps, in sterile bottles. Collection of the test samples shall be made in the presence of City personnel. If the initial disinfection fails to produce acceptable sample tests, the disinfection procedure shall be repeated (without extra compensation) until satisfactory test results have been obtained, before the piping may be placed in service.

CIP12.07

FINAL ACCEPTANCE

- A. No pipe installation will be accepted until all known leaks have been repaired whether or not leakage is within allowable limits. Locating and repairing of leaks shall be performed by the Contractor at no additional cost to the City.
- B. The City will certify that all required pressure and leakage tests have been successfully completed before the pipeline is accepted.

CIP12.08

PAYMENT

- A. No separate payment will be made for work completed in accordance with this specification, and the cost thereof will be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP13 – SUMMARY OF TESTING (MISCELLANEOUS)

CIP13.01 SCOPE OF WORK

- A. This specification covers the requirements to perform testing of various work items for this Project.

CIP13.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature and all other pertinent data to illustrate conformance to the specification found within.

CIP13.03 TESTING FOR ROADS

Testing for roads shall be in accordance with Table 13-1.

Table 13-1

Item	Test Method	Passing Criteria	Comments
Hot Mix Asphaltic Concrete (HMAC)	Tex-200-F Tex-207-F Tex-210-F Tex-227-F Tex-208-F	See SD1.06 A 94.5%-97.5%Lab Density; 91.0%-96.0%In-PlaceField Density See SD 1.06 B Max 35	Sieve Analysis of Fine and Coarse Aggregate Determining Density of Compacted Bituminous Mixtures Determining Asphalt Content of Bituminous Mixtures by Extraction Max. Specific Gravity of Bituminous Mixtures Stability
Trench Backfill	Applicable Tex Testing Method	See Section G4.05	Minimum of one test every 250 linear feet of trench length for each lift.
Embankment	Tex-114-E		Test every 2,000 SY of roadbed surface
Flexible Base	Tex-107-E, Part II Tex-411-A Tex-110-E Tex-113-E Tex-115-E Tex-116-E Tex-117-E Tex-460-A Tex-106-E Tex-104-E Tex-103-E	2% shrinkage 100% Density 40 Max. 45 psi @ 0 psi lateral & 175 psi @ 15 psi lateral Max. increase ≤ 20 Plasticity Index ≤ 10 Liquid Limit ≤ 35 $\pm 2\%$ Optimum	Bar Linear Shrinkage Magnesium Soundness Sieve Analysis Moisture Density Roadway Density Wet Ball Mill Triaxial Test (Part I or II) Particle Count (Part I) Plasticity Index Liquid Limit Moisture Content

Table 13-1, cont.

Item	Test Method	Passing Criteria	Comments
Striping	Tex-828-B	10 or more stripes visible (day) 6 or more stripes visible (night) 0.060-inches minimum thickness for edgeline markings	Glass Beads: If criteria is not met, check Tex-828-B for scheduling replacement of striping.
	Tex-854-B	0.090-inches minimum thickness for stop bars, legends, symbols, gore and centerline/no passing barrier line markings 0.180-inches maximum thickness for all markings	The average of the readings across each sample must be equal to or above the specified minimum thickness. No reading should be more than 10-mils below the specified minimum thickness.

CIP13.04 TESTING FOR WATER/WASTEWATER

Testing for water/wastewater shall be in accordance with Table 13-2.

Table 13-2

Item	Test Method	Passing Criteria	Comments
Valves, Hydrants and Appurtenances	Manufacturer's Recommendations	Manufacturer's Recommendations	Functional field test of each valve, including actuators and valve control equipment.
Water and Wastewater Lines			As described in Section CIP 12: Testing of Pipelines

CIP13.05 TESTING FOR CONCRETE

Testing for concrete shall be in accordance with Table 13-3.

Table 13-3

Item	Test Method	Passing Criteria	Comments
Asphalt Board	Tex-524-C	Deflection from horizontal $<1:3\frac{1}{2}$	
Concrete Slump			See Table 13-4 for Slump
Coarse Aggregate	Tex-413-A Tex-410-A Tex-411-A	0.25% by weight clay lumps 1.00% by weight shale 5.00% by weight laminated and/or friable particles 40% wear 12% loss Sodium Sulfate 18% loss Magnesium Sulfate	See Table 13-5 for Gradation Soundness Test

Table 13-3, cont.

Fine Aggregate	Tex-612-J Tex-408-A	60% by weight acid insoluble residue subject to direct traffic. Color shall not be darker than Organic Color No. 3 (Gardner No. 11)	Color Test
----------------	----------------------------	--	------------

	Tex-401-F Tex-203-F Tex-402-A	Not less than 80 Between 2.3 & 3.1 for Non-Class K Between 2.6 & 2.8 for Class K	See Table 13-6 for Gradation Sand Equivalent Fineness Modulus
Membrane Curing	Tex-219-F	2% loss for 24-hour test 4% loss for 72-hour test	Water Retention Test

Table 13-4

Concrete Designation	Slump	Maximum Slump
1. All drill shaft	6	7
2. Uncased drill shafts, thin walled sections (<9") and pre-stressed concrete members	4	5
3. Slabs, caps, columns, piers, wall sections over 9", etc.	3	4
4. Underwater or seal concrete	6	7
5. Riprap, curb, gutter and other miscellaneous concrete.	As specified by City.	

Table 13-5

Aggregate Grade No.	Nominal Size (in)	Amount Retained (%)								
		2 1/2 in	2 in	1 1/2 in	1 in	3/4 in	1/2 in	3/8 in	No 4	No 8
1	2	0	0-20	15-50		60-80			95-100	
2 (467)*	1 1/2			0-5		30-65		70-90	95-100	
3	1 1/2			0-5		10-40	40-75		95-100	
4 (57)*	1				0-5		40-75		90-100	95-100
5 (67)*	1/4					0-10		45-80	90-100	95-100
6 (7)*	1/2							30-60	85-100	95-100
7	3/8							5-30	75-100	
8	3/8							0-5	35-80	90-100

Table 13-6

Aggregate Grade No.	Amount Retained (%)							
	3/8 in	No 4	No 8	No 16	No 30	No 50	No 100	No 200
1	0	0-5	0-20	15-50	35-75	65-90	90-100	97-100

CIP13.06

PAYMENT

- A. No separate payment will be made for work completed in accordance with this specification, and the cost thereof will be included in the appropriate items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP14 – PROJECT CLOSEOUT

CIP14.01

SCOPE OF WORK

- A. This specification covers the administrative and procedural requirements for Project closeout, including but not limited to:
1. Closeout procedures.
 2. Final cleaning.
 3. Adjusting.
 4. Project record documents.
 5. Spare parts and maintenance materials.

CIP14.02

RECORD DOCUMENTS

- A. Maintain on site, one (1) set of the following documents; actual revisions to the Work shall be recorded in these documents:
1. Contract Drawings.
 2. Specifications.
 3. Addenda.
 4. Change Orders and other Modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and Modifications.
- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract Drawings.
- F. Submit documents to City with claim for final Application or Payment. Retention monies will not be released until complete record documents have been submitted.

CIP14.03

CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's and/or City's inspection.
- B. Provide submittals to the City that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

CIP14.04

FINAL CLEANING

- A. At the completion of work and immediately prior to final inspection, cleaning of the entire project shall be accomplished according to the following provisions:
 - 1. The Contractor shall thoroughly clean, sweep, wash, and polish all work and equipment provided under the Contract, including finishes. The cleaning shall leave the structures and site in a complete and finished condition to the satisfaction of the City.
 - 2. All Subcontractors shall similarly perform, at the same time, an equivalent thorough cleaning of all work and equipment provided under their contracts.
 - 3. The Contractor shall remove all temporary structures and all debris, including all dirt, sand, gravel, rubbish and waste material.
 - 4. Should the Contractor not remove rubbish or debris, or not clean the buildings and site as specified above, the City reserves the right to have the cleaning done at the expense of the Contractor.
- B. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturers.
- D. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces. Polish surfaces so designated to shine finish.
- F. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.
- G. Replace air-handling filters if units were operated during construction.
- H. Vacuum clean all interior spaces, including inside cabinets. Broom clean paved surfaces, mow any areas planted with grass which are in excess of two (2) inches high, and rake clean other surfaces of grounds.
- I. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
- J. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

CIP14.05

ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

CIP14.06

FINAL INSPECTION

- A. After final cleaning and restoration and upon written notice from the Contractor that the work is completed, the Engineer and/or City will make a preliminary inspection, with the Contractor present. Upon completion of this preliminary inspection, the Engineer and/or City will notify the Contractor, in writing, of any particulars in which this inspection reveals that the work is defective or incomplete.
- B. Upon receiving written notice from the Engineer and/or City, the Contractor shall immediately undertake the work required to remedy deficiencies and complete the work to the satisfaction of the City.
- C. When the Contractor has corrected or completed the items as listed in the Engineer's/ City's written notice, he/she shall inform the City in writing, that the required work has been completed. Upon receipt of this notice, the Engineer and/or City and the Contractor, will make the final inspection of the Project.
- D. Should the Engineer and/or City find all work satisfactory at the time of his inspection, the Contractor will be allowed to make application for final payment in accordance with the provisions of the Standard Form of Agreement. Should the Engineer and/or City still find deficiencies in the work, the Engineer and/or City will inform the Contractor of the deficiencies and will deny the Contractor's request for final payment until such time as the Contractor has satisfactorily completed the required work. Additional inspections of deficiencies shall be paid for by the Contractor at \$200.00 per inspection.

CIP14.07

ACCESSORY ITEMS

- A. The Contractor shall provide to the City, upon acceptance of the equipment, all special accessories required to place each item of equipment in full operation. These special accessory items include, but are not limited to, the specified spare parts, adequate oil and grease as required for the first lubrication of the equipment, initial fill-up of all chemical tanks and fuel tanks, light bulbs, fuses, hydrant wrenches, valve wrenches, valve keys, handwheels, and other expendable items as required for initial start-up and operation of all equipment.

CIP14.08

GUARANTEES, BONDS, AND AFFIDAVITS

- A. No application for final payment will be accepted until all guarantees, bonds, certificates, licenses, and affidavits required for work or equipment as specified are satisfactorily filed with the Engineer.

CIP14.09

RELEASE OF LIENS OR CLAIMS

- A. No application for final payment will be accepted until satisfactory evidence of release of liens has been submitted to the City as required by the Standard Form of Agreement.

CIP14.10

FINAL PAYMENT

- A. Final payment will be made to the Contractor in accordance with Item 47- "Payment Procedures", Standard Form of Agreement. Final payment and release of retention monies will not be made until the Contractor has submitted one (1) set of as-built plans to the City for the Project.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP15 – PROJECT IDENTIFICATION SIGNAGE

CIP15.01 SCOPE OF WORK

- A. This specification covers the requirements for furnishing, fabricating and erecting Project Signs on Capital Improvement Projects (C.I.P.) and for project identification at other construction sites, when required on the Plans or by the City.

CIP15.02 MATERIALS

- A. Sign Face: The sign face shall be manufactured on standard exterior waterproof plywood sheets or other suitable material approved by the Engineer or the City. Unless indicated otherwise on the Plans, the thickness of the plywood sheet shall be a minimum of $\frac{3}{4}$ -inches.
- B. Posts: Plastic post, of the size indicated on the Plans, shall be pressure treated with pentachlorophenol.
- C. Paint: Exterior oil base paint shall be used and colors shall be as indicated on the Plans.
- D. Signs for Capital Improvements Projects: City seals shall be provided by the City.

CIP15.03 INSTALLATION

- A. The signs shall be erected at each major entrance to the project for maximum public identification and exposure. At locations where construction is confined to an adequate area defined by the City, the installed sign size shall be four-feet by eight-feet (4'x8'). At locations where roadway construction is in progress, such as a street paving or construction of a sidewalk, the sign shall be two-feet by three-feet (2'x3'). The signs shall be posted on portable wood frames or stanchions and will be located in the proximity of the work area as construction progresses. All lumber shall be painted with two (2) coats of paint as indicated on the Plans.
- B. In special cases, the size of the sign may be changed to meet special requirements, but general proportions shall be maintained.
- C. It shall be the responsibility of the Contractor to maintain and relocate signs, if necessary, during the progression of the project. Care shall be exercised to assure that placement of the signs does not interfere with or cause sight obstruction to vehicular and pedestrian traffic.
- D. The Contractor may install, at his own expense, company signs to identify the Contractor, Developer, etc. Signs are to be securely attached to the posts at locations indicated on the Plans and shall not be larger than 18-inches by 36-inches.

CIP15.04 PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP16 – WARRANTY

CIP16.01 SCOPE OF WORK

- A. This specification covers the requirements of the Contractor's or Developer's one (1) year warranty period for all work performed on the Project.

CIP16.01 WARRANTY

- A. Upon final acceptance by the City of Georgetown, the Contractor warrants for a period of one (1) year, the construction of the Project according to Plans and Specifications as they may be modified in accordance with the Contract Documents, and further warrants the proper operation of mechanical, electrical, and other devices or other equipment, if any, included in the project for a period of one (1) year. The Contractor or Developer warrants to the City that all materials and equipment furnished under this Contract shall be new unless otherwise approved by the City's Representative and that all work will be of good quality, free from faults and defects, and in conformance to these requirements, including substitutions not properly approved and authorized, may be considered defective.
- B. This warranty is in addition to any rights or warranties expressed or implied by law and consumer protection claims arising from misrepresentations by the Contractor or Developer. This warranty obligation shall be covered by any performance or payment bonds tendered in compliance with the Contract Provisions.
- C. If within one (1) year after the date of substantial completion of the work or designated portion thereof, or within one (1) year after acceptance by the City of the designated Project, or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents, any of the work is found or determined to be defective, including obvious defects, or otherwise not in accordance with the Contract Documents, the Contractor or Developer shall correct it promptly.
- D. If within 10 days after the City has notified the Contractor or Developer of a defect, failure, or abnormality in the work, the Contractor or Developer has not started to make the necessary repairs or adjustments, the City is hereby authorized to make the repairs or adjustments, or to order the work to be done by a third party. The cost of the work shall be paid by the Contractor or Developer. The cost of all materials, parts labor, transportation, supervision, special tools, and supplies required for the replacement or repair of parts and for correction of defects, shall be paid by the Contractor, Developer or by the surety. This guarantee shall be extended to cover all repairs and replacements furnished under the guarantee, and the period of the guarantee for each repair or replacement shall be one (1) year after the installation or completion. The one (1) year warranty shall cover all work equipment, and materials that are part of this project, whether or not a warranty is specified in the individual section prescribing that particular aspect of the work. Where more than a one (1) year warranty is specified in the individual section, that warranty shall govern.
- E. After receipt of written notice from the City to begin corrective work, the Contractor or Developer shall promptly begin the corrective work, unless the City's Representative has previously given the Contractor a written acceptance of such condition. This obligation shall survive the termination of the Contract. This guarantee shall not constitute the exclusive remedy of the City, nor shall other remedies be limited to either the warranty or guarantee period.

CIP16.03 PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION CIP17 – INSPECTION OF PROJECTS

CIP17.01

INSPECTION

- A. All Projects, whether by a private development or the City of Georgetown shall be inspected by the City or a designated representative of the City.
- B. The time that the City of Georgetown or its designated representative will be available for inspection is from 8:00 AM to Noon and 1:00 PM to 5:00 PM on working days. Working days shall be defined as Monday through Friday excluding all holidays observed by the City of Georgetown. All inspections shall be scheduled with the City a minimum of two (2) working days prior to the inspection.
- C. If the Contractor, for his convenience and at his own expense, should desire to carry on his work at night or outside regular hours, he shall submit a written approval request to the City and he shall allow ample time for satisfactory arrangements to be made for inspecting the Work in progress. The Contractor shall pay the expenses for extra inspection required for work outside regular hours at a rate of \$50.00/hour. Normal working hours for this purpose are Monday through Friday, 7:00 a.m. to 6:00 p.m. The Contractor shall light the different parts of the Project as required to comply with all applicable Federal and State regulations and with all applicable requirements of the City of Georgetown.

CIP17.02

AUTHORITY AND DUTIES OF INSPECTORS

- A. Inspectors will be authorized to inspect all work done and all materials furnished. Such inspection may extend to all or to any part of the Work and to the preparation or Manufacturer of the materials to be used. Such inspection will not relieve the Contractor from any obligation to perform the Work in accordance with the requirements of the Specifications. In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the Work, the Inspector will have authority to reject materials or suspend work until the question at issue can be referred to and decided by the City. The Inspector will not be authorized to revoke, alter, enlarge, or release any requirement of these Specifications, nor to approve or accept any portion of the Work, nor to issue instruction contrary to the Plans and Specifications. He will in no case act as foreman or perform other duties for the Contractor nor interfere with the management of the Work.

END OF SECTION

GENERAL SPECIFICATIONS

SECTION G

TECHNICAL SPECIFICATIONS

SECTION G1 – BARRICADES, SIGNS AND TRAFFIC HANDLING

G1.01 SCOPE OF WORK

- A. This specification covers the requirements to provide, install, move, replace, maintain, clean and remove temporary or permanent street closure barricades, signs or other devices required to handle the traffic in conformance with the current edition of the Texas Manual of Uniform Traffic Control Devices for Streets and Highways (TMUTCD) and as indicated by the Engineer or the City.

G1.02 SUBMITTALS

- A. Within 10 days after the Notice to Proceed, the Contractor shall submit to the Engineer a site-specific Traffic Control Plan. The Traffic Control Plan shall be sealed by a Professional Engineer Registered in the State of Texas as required by the Project Specifications, City, or Engineer.

G1.03 CONSTRUCTION METHODS

- A. Prior to commencing the construction, suitable "Barricades, Signs and Traffic Handling" devices shall be installed to protect the workers and the public. A traffic control plan specific to the Project shall be designed and submitted to the City prior to the start of construction. If indicated by the Plans or requested by the City the plan shall be designed by a qualified traffic engineer who is a Registered Professional Engineer in the State of Texas.
- B. The Contractor shall be responsible for installing all markers, signs and barricades conforming to the Texas Manual on Uniform Traffic Control Devices and/or as indicated. If, in the opinion of the Engineer, additional markers, signs or barricades are needed in the interest of safety, the Contractor will install such as are required or as directed by the Engineer.

G1.04 MAINTENANCE

- A. It shall be the Contractor's responsibility to maintain, clean, move and replace if necessary, barricades, signs and traffic handling devices during the time required for construction of the Project. When no longer needed all temporary barricades, signs and traffic handling devices shall be removed and the area restored to its original condition or as directed by the Engineer.

G1.05 PAYMENT

- A. Payment shall be made for the work performed in accordance with this specification and the appropriate bid items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G2 – SITE PREPARATION

G2.01 SCOPE OF WORK

- A. This specification covers the requirements for performing all clearing, grubbing and stripping of topsoil complete as shown on the Plans and as specified herein.

G2.02 SUBMITTALS

- A. None required unless specifically called for in the Plans, Standards or requested by the City or the Engineer.

G2.03 CLEARING AND GRUBBING

- A. Except as otherwise directed, cut, grub, remove and dispose of all trees, stumps, brush, shrubs, roots and any other objectionable material within the limits defined on the Plans.
- B. All trees, stumps, brush, shrubs, roots and other objectionable material shall be cut, grubbed, removed and disposed of from areas to be occupied by buildings, structures, roads, pipelines and any other areas to be stripped. Trees and brush shall be removed to a depth at least three (3) feet below the finished grade.
- C. In addition, heavy growths of weeds or other plants shall be stripped from the surface in order to provide clear access to the work site and to prevent their inclusion in stockpiled soil which is to be reused later. Trees, stumps, surface plants and all debris removed from the site shall be disposed of off-site by the Contractor at his own expense.
- D. Before the start of construction, protect trees or groups of trees, designated by the Engineer to remain, from damage by all construction operations by erecting suitable barriers, or by other approved means. Clearing operations shall be conducted in a manner to prevent falling trees from damaging trees designated to remain.
- E. Areas outside the limits of clearing shall be protected from damage and no equipment or materials shall be stored in these areas.
- F. No stumps, trees, limbs, or brush shall be buried in any fills or embankments.

G2.04 STRIPPING

- A. Strip topsoil from all areas to be occupied by buildings, structures, roadways and all areas to be excavated or filled. Avoid mixing topsoil with subsoil and stockpile topsoil in areas on the site as approved by the Engineer. Topsoil shall be free from brush, trash, large stones and other extraneous material and protected until it is placed as specified under Section G7- LOAMING, HYDROSEEDING AND PERMANENT EROSION CONTROL. Dispose of any remaining topsoil as directed by the City. All excess topsoil shall remain property of the City at its option, and Contractor shall place extra materials at a site designated by the City.

G2.05 DISPOSAL OF MATERIALS

- A. All tree trunks, limbs, roots, stumps, brush, foliage, other vegetation and objectionable material shall be removed from the site and disposed of in a permitted disposal site in a manner satisfactory to the Engineer.
- B. Burning of cleared and grubbed materials will not be permitted.
- C. Disposal of Excavated Materials
 - 1. Suitable excavated materials may be stockpiled to be used for backfilling. Excess excavated

materials and unsuitable backfill materials shall be disposed of by the Contractor in the following manner:

- a. Clays, sands and gravel in excess of project requirements shall be disposed of by the Contractor at such locations and under consideration arranged by the Contractor at his expense.
 - b. Limestone and other rock excavation shall be disposed of by the Contractor at such locations and under consideration arranged by the Contractor at his expense.
2. The classification of clays, sands, gravel, limestone and rock shall be made in accordance with the Unified Soil Classification System, U.S. Army Corps of Engineers, T.M. 3-357.
 3. Desirable topsoil, sod, or area fill shall be carefully removed and piled separately adjacent to the work when required. Excavated materials shall be handled at all times in such a manner as to cause a minimum of inconvenience to the City's operations, and to permit safe and convenient access to private and public property adjacent to the work

G2.06

UNAUTHORIZED EXCAVATION

- A. Whenever the excavation is carried beyond or below the lines and grades as shown on the plans, except as specified above, all such excavated space shall be refilled with such material and in such a manner, as may be directed by the City, so as to insure the stability of the affected structure. Beneath all structures, space excavated without authority shall be refilled by the Contractor, at his own expense, with Class "C" concrete, crushed stone or selected fill materials, as directed by the City.

G2.07

PAYMENT

- A. Payment will be made for work performed in accordance with this specification by the unit quantity for the item for right-of-way preparation in the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G3 – SITE CLEARING

G3.01 SCOPE OF WORK

- A. This specification covers the requirements for site clearing operations for this Project.

G3.02 SUBMITTALS

- A. None required unless specifically called for in the Plans, Standards, or requested by the City or the Engineer.

G3.03 TRAFFIC

- A. Conduct site-clearing operations to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

G3.04 PROTECTION

- A. Provide temporary fences, barricades, coverings, or other protection to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Provide protection for adjacent properties as required.
- B. Restore damaged work to condition existing prior to start of work.
- C. Protect existing trees and vegetation that are indicated to remain from physical damage. Do not store materials or equipment within tree drip line. Replace damaged trees that cannot be restored to full growth, as determined by arborist, unless otherwise acceptable to the Engineer or the City.
- D. Protect existing property and easement corners and pins. In the event that property or easement corners or pins are moved, disturbed or destroyed, the Contractor shall replace them at his own expense. They shall be replaced by a Registered Professional Land Surveyor registered in the State of Texas.

G3.05 EXISTING SERVICES

- A. Locations indicated are approximate; determine exact location before commencing work. Coordinate with local utility service requirements and comply with their instructions.

G3.06 SITE CLEARING

- A. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as indicated or that interfere with new construction. Removal includes digging out stumps and roots, together with subsequent off-site disposal.
- B. Strip and stockpile topsoil that will be reused in the Work.
- C. Remove existing improvements, both above-grade and below-grade, to extent indicated or as otherwise required to permit new construction.

G3.07 SALVAGEABLE ITEMS

- A. Carefully remove items indicated to be salvaged and store on the City's premises where indicated or directed.

G3.08 AIR POLLUTION

- A. Control air pollution caused by dust and dirt; comply with governing regulations.

G3.09

REGRADING

- A. Fill depressions and voids resulting from site-clearing operations. Using satisfactory soil materials, place in maximum six (6) inch deep horizontal layers and compact each layer to density of surrounding original ground.
- B. Grade ground surface to conform to required contours and to provide surface drainage.

G3.10

DISPOSAL OF MATERIAL

- A. Dispose of waste materials including trash, debris and excess topsoil. No waste material shall remain on the City's property.
- B. Burning waste materials on site is not permitted.

G3.11

PAYMENT

- A. No separate payment will be made for work performed in accordance with this specification, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G4 - PIPE EXCAVATION, TRENCHING, EMBEDMENT, ENCASEMENT AND BACKFILLING

G4.01 SCOPE OF WORK

- A. This specification covers the requirements for furnishing all labor, equipment and material and performing all work necessary, in connection with excavation, trenching, embedment, encasement, and backfilling, for the installation of water lines, storm sewer lines, wastewater lines, etc. in this Project.

G4.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including a Trench Safety Plan (which shall be sealed by a Professional Engineer registered in the State of Texas, if required) embedment material (source, gradation and type), backfill material (source, gradation and type), encasement material (if required), equipment and all other pertinent data to illustrate conformance to the specification found within.

G4.03 EXCAVATION

A. General

1. Excavation shall include the removal of any trees, stumps, brush, debris, or other obstacles that may obstruct the line of work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the pipe and appurtenances in conformance with the line and grades shown in the Plans, or as specified.

B. Maximum and Minimum Width of Trenches

1. The sides of all trenches shall be cut as nearly vertical as possible. Unless otherwise specified on the Plans, the minimum width of trench in which the pipe may be installed shall not be less than 12-inches plus the outside diameter of the pipe, and the maximum width shall not be more than 24-inches plus the outside diameter of the pipe, measured at an elevation in the trench which is 12-inches above the top of the pipe when it is laid to grade.
2. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the class embedment or encasement required by the Engineer to provide the load carrying capacity for the trench width as actually cut, and the additional cost incurred will be borne by the Contractor.

C. Sheeting and Shoring

1. Where required in the Contractor's Trench Safety System, or where required for other reasons in caving ground, or in wet, saturated or flowing materials, the sides of all trenches and excavations shall be adequately sheeted and braced so as to maintain the excavation free from slides or cave-ins.
2. Shoring and sheeting shall not be left in place unless its removal is impractical.

D. Dewatering Excavations

1. There shall be sufficient pumping equipment, in good working order, available at all times to remove any water that accumulates in excavations. Where the pipeline crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provisions shall be made for the

satisfactory disposal of surface water pumped so as to prevent damage to public or private property. The Contractor shall be responsible for maintaining safe working conditions and suitable construction techniques.

E. Disposal of Excavated Materials

1. Suitable excavated materials may be piled adjacent to the work to be used for backfilling. Excavated materials unsuitable for backfilling, or in excess of that required for backfilling, shall be disposed of by the Contractor. Desirable topsoil, sod, etc. shall be carefully removed and piled separately adjacent to the work when required. Excavated materials shall be handled at all times in such a manner as to cause a minimum of inconvenience to public travel. Suitable selected bedding or backfill material shall be provided at no additional cost to the City.

F. Trench Depth

1. Excavation for the pipeline shall be removed to a depth below the pipe barrel and pipe bell as shown in the Plans for the type of embedment specified, and the bottom of the trench brought to true subgrade with the embedment or encasement shown in the Plans.

G. Soft Subgrade

1. Where soft or spongy material is encountered in the excavation at subgrade level, it shall be removed to such a depth that a stable foundation is achieved by replacing the unsuitable material with tamped gravel, brought to the level of the bottom of bedding.
2. Gravel used shall be washed gravel or crushed stone and may fit any gradation of size up to three (3) inches. The particular gradation shall take into consideration the actual field conditions.

H. Excavated Materials

1. Excavated materials shall be piled adjacent to the work to be used for backfilling as required. After the trench has been refilled, topsoil shall be replaced to the extent that rock excavated from the trench will be completely covered and the area is returned to its original condition.
2. Where required on the Plans or when otherwise specified, desirable topsoil shall be piled separately in a careful manner and replaced in its original position.
3. Where a trench is required to cross a paved area, the asphalt or concrete shall be saw cut and removed for a total width that is two (2) feet greater than the trench width. The Contractor shall dispose of all excavated concrete, asphalt and subgrade material that is unsuitable for backfilling or in excess of that required for backfilling.

I. Damage to Existing Utilities

1. Where existing utilities are damaged, they shall be replaced immediately with material equal to or better than the existing material. Such work shall be at the entire expense of the Contractor.

G4.04

EMBEDMENT AND ENCASEMENT

A. General

1. Embedment shall be as required in the Plans or Standards. All embedment materials shall be free of grass, roots, vegetation, and other deleterious materials. Embedment Standards are shown on the Plans or Standards.

2. When the pipe has been checked for line and grade, the trench shall be backfilled with enough granular material or concrete on both sides to hold the pipe firmly in position. When placing granular material or concrete around the pipe, care shall be taken to fill all voids around the pipe. The pipe shall not be floated. The embedment or encasement material shall be carefully tamped to assure uniform pipe support and density.

B. Embedment Materials

1. Material for embedment shall conform to the following sieve analysis:

<u>Sieve Size</u>	<u>$\frac{3}{8}$" F % Retained</u>	<u>$\frac{1}{2}$" D % Retained</u>
$\frac{1}{2}$ "	0	0
$\frac{3}{8}$ "	0-2	5-25
4m	40-85	80-100
10m	95-100	96-100

C. Concrete Embedment and Encasement

1. Concrete embedment and encasement and cap shall have a minimum compressive strength of 2,000 pounds per square inch at 28 days.
2. Dry mix will not be permitted. The concrete cushion portion of the embedment or encasement will be mixed moist or damp to give a slump of not more than one (1) inch. Concrete for the sides and top, if specified, shall be mixed to obtain a slump of not less than one (1) inch or more than three (3) inches.
3. After pipe joints are completed, the voids at the joints in the embedment section shall be filled with concrete, and the embedment shall be brought up to proper grade. Where concrete is placed over or along the pipe, it shall be placed in such a manner as not to damage or injure the joints or displace the pipe. Care shall be taken in the placement of concrete to assure that a uniform pad, free of voids and of specified thickness, is constructed under the entire pipe section.
4. A cleavage line between the base concrete and the side embedment concrete will not be allowed. Backfilling shall be done in a careful manner and at such time, after concrete embedment or encasement has been placed, as not to damage the concrete in any way.

G4.05

BACKFILLING

A. General

1. Backfilling shall include the refilling and consolidating of the fill in trenches and excavations up to the surrounding ground surface or road grade at crossings. No backfill shall be placed until the Engineer, the City or his authorized Inspector has inspected the trench and pipe in place and has authorized the placing of backfill.
2. Backfilling shall be done with select material or concrete backfill as described hereafter and shown on the Plans. No material of a perishable, spongy or otherwise unsuitable nature shall be used in backfilling.

B. Select Backfill Material

1. Unless otherwise shown on the Plans, or approved by the Engineer, the select material backfill shall be Specification Section SD4 Flexible Base, Type A Grade 1.

2. If approved by the Engineer, good, sound earth may be used as select material for backfill over the pipe. Good, sound earth as defined as gravel, sandy loam or loam, free from excessive clay. Select material shall not have rocks with an average dimension larger than one (1) inch, and no dimension greater than two (2) inches.
3. An alternative to the flexible base as select backfill will be on-site or imported select material so long as it is properly moisture-conditioned, placed and compacted.
4. It shall be the full responsibility of the Contractor to explore the project and subsurface materials to determine if the trench excavation will be suitable for use as select materials and to follow as closely as possible this Specification to insure a good, sound pipeline when completed.

C. Concrete Trench Cap

1. Where 36-inch minimum cover cannot be obtained or due to potential surface loading, the City may require a cap to be installed.

D. Concrete Backfill

1. Where shown on the Plans, concrete backfill shall consist of selected rock material or granular sand material mixed with a minimum of three sacks of cement per cubic yard. All material shall be mixed in a concrete mixer or transit mixed unless otherwise approved by the City.

E. Backfilling Operation

1. Backfilling operation outside of pavement shall be compacted to the required density without damaging the pipe or bedding. Backfill under non paved areas, two feet outside of any structure or utilities and excluding lines within a floodplain, streams and watercourses shall be compacted to 90% of the maximum dry density in accordance Tex-114-E. Areas within two feet of structures or existing utilities and areas within a floodplain, streams and water courses shall be compacted to 95% in accordance with Tex-114-E. Prior to any compaction, moisture shall be within $\pm 3\%$ of the optimum moisture content.
2. All trenches under proposed or existing concrete roadways, driveways and sidewalks, paved waterways, brick roadways, asphaltic roadways with concrete base, gravel roadways, and roadways with gravel base and asphalt surface, shall be backfilled to the required density in six (6) inch maximum lifts without damaging the pipe or bedding except the first lift over the pipe bedding will be twelve (12) inches in depth. Swelling soils (soils with a plasticity index of 20 or more) shall be sprinkled as required to provide not less than optimum moisture nor more than 3% over the optimum moisture content to the extent necessary to provide not less than 95% nor more than 102% of the maximum dry density as determined in accordance with Tex-114-E. Non-swelling soils (soils with a plasticity index less than 20) shall be sprinkled as required and compacted to the extent necessary to provide not less than 95% of the optimum dry density with the moisture within $\pm 3\%$ of the optimum moisture content in accordance with Tex-114-E. Jetting with water will not be permitted. Flexible base used as select backfill shall be compacted to 95% of Tex-113E at $\pm 3\%$ of the optimum moisture content.
3. After the trench has been refilled, topsoil shall be replaced to the extent that rock excavated from the trench will be completely covered or removed and the area is returned to its original condition, except that in cultivated areas a minimum of six (6) inches of topsoil shall be replaced.

- A. No separate payment will be made for work performed under this Specification for excavating, trenching, embedment, and backfilling. All costs incurred shall be included in the contract price for the appropriate items in the Proposal and Bid Schedule.
- B. No separate payment will be made for the bedding used in embedment. All costs incurred shall be included in the contract price for the appropriate bid item.
- C. Separate payment, if authorized by the City, will be made for crushed stone or washed gravel as described in these specifications under Section G4.02(G), SOFT SUBGRADE, at the contract unit price per cubic yard as provided in the Proposal and Bid Schedule under "Extra Gravel for Embedment."
- D. Separate payment will be made for 2,000 psi Concrete Encasement or Backfill at the contract unit price per cubic yard or linear foot as provided in the Proposal and Bid Schedule under 2,000 psi Concrete Encasement. Concrete and three (3) sack granular sand or rock material mix backfill will be measured in cubic yards or linear feet actually placed based on actual trench width not to exceed the specified maximum trench width and will be paid for at the contract price per cubic yard or linear foot as provided in the Proposal and Bid Schedule.
- E. Where authorized by the Engineer, gravel used to replace unsuitable material will be paid for at the unit bid price for Extra Gravel for embedment.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G5 – GRANULAR FILL MATERIALS

G5.01 SCOPE OF WORK

- A. This specification covers the requirements for the use of granular fill materials for this Project.

G5.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to Engineer or the City for approval, technical product literature including the source of the material, gradation, type of material, and all other pertinent data to illustrate conformance to the specification found within.

G5.03 GENERAL

- A. Granular fill materials are specified in this Section, but their use for bedding pipe, pavement base, are specified in detail in sections G4 TRENCHING, BACKFILLING AND COMPACTION and SD4 FLEXIBLE BASE. The Engineer may respectively order the use of fill materials for purposes other than those specified in other Sections if, in his/her opinion, such use is advisable.

G5.04 MATERIALS

- A. Common fill shall consist of mineral soil, substantially free of clay, organic material, loam, wood, trash, and other objectionable material which may be compressible, or which cannot be compacted properly. Common fill shall not contain stones larger than six (6) inches in any dimension, broken concrete, masonry, rubble, asphalt pavement, or other similar materials. It shall have physical properties, as approved by the Engineer, such that it can be readily spread and compacted.
- B. Select common fill shall be as specified above for common fill except that the material shall contain no stones larger than two (2) inches in its largest dimension.
- C. Crushed Stone Backfill shall consist of hard, durable, particles of proper size and gradation, free from sand, loam, clay, excess fines and deleterious materials. The size of the particles shall be uniformly graded such that the following bedding specifications are met:

<u>Sieve Size</u>	<u>$\frac{3}{8}$" F % Retained</u>	<u>$\frac{1}{2}$" D % Retained</u>	<u>Washed Gravel % Retained</u>
$\frac{1}{2}$ "	0	0	0
$\frac{3}{8}$ "	0-2	5-25	---
4m	40-85	80-100	---
10m	95-100	96-100	---
$\frac{3}{4}$ "	---	---	100

- D. Crushed Stone Base shall consist of sound, durable stone, free of any foreign material, angular in shape, free from structural defects and comparatively free of chemical decay. This material shall comply with Texas Department of Transportation Item 248, Type "A", Grade 1 unless otherwise shown on the Plans or Standards. The stone shall have a maximum size of $\frac{7}{8}$ -inch.
- E. Cement Stabilization Sand Backfill shall consist of a mixture of ASTM C33 fine aggregate and Type I cement. The mix shall be proportioned of two (2) sacks of cement per cubic yard.

G5.05 PAYMENT

- A. No separate payment will be made for work performed in accordance with this specification, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G6 – SEDIMENTATION AND TEMPORARY EROSION CONTROL

G6.01 SCOPE OF WORK

- A. This specification covers the requirements necessary to perform all installation, maintenance, removal and area cleanup related to sedimentation control work as shown on the Plans and as specified herein.

G6.02 SUBMITTALS

- A. Within 10 days after Notice to Proceed, the Contractor shall submit to the Engineer for approval, technical product literature for all commercial products to be used for sedimentation and erosion control.

G6.03 GENERAL

- A. The work shall include, but not necessarily be limited to: triangular filter dike, rock berm, silt fence, curb inlet protection, stabilized construction entrance, tree protection, excelsior matting, and temporary mulching, sediment removal and disposal, device maintenance, removal of temporary devices, temporary mulching, excelsior matting installation and final cleanup. All sedimentation and erosion control shall be installed prior to the start of any construction activities.

G6.04 QUALITY ASSURANCE

- A. The Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the movement of sediment from the construction site to off site areas or into the stream system via surface runoff or underground drainage systems. Measures in addition to those shown on the Plans necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the City will be considered.
- B. Sedimentation and erosion control measures shall conform to the requirements outlined in the Texas Natural Resources Conservation Commission, Chapter 213.

G6.05 MATERIALS

A. Triangular Filter Dike

1. Triangular filter dike sections shall be either 10-feet or 20-feet in length.
2. Geotextile fabric shall extend to 12-inches upstream of triangular filter dike structure.
3. Triangular filter dike structure shall be 18-inches in length on all three (3) faces.
4. Three (3) inch to five (5) inch open graded rock shall be placed over skirt to anchor it on the upstream side.
5. Structure shall be formed by six (6) gauge six inch by six inch (6"x6") welded wire mesh.
6. Geotextile fabric shall be non-woven, 4.5 oz. minimum and 36-inches wide.

B. Rock Berm

1. Woven wire sheathing shall be 20-gauge with one (1) inch openings.
2. Rock shall be three inches to five inches (3"-5") open graded.

C. Silt Fence

1. Steel posts shall be a minimum of four (4) feet in length, heavy weight T-Post.
2. Welded wire fabric shall be two-inch by four-inch (2"x4") mesh of 12-gauge by 12-gauge galvanized wire mesh.
3. Silt fence fabric shall be a 4.5 oz minimum non-woven geotextile filter fabric 36-inches wide.
4. Tie wires for securing silt fence fabric to wire mesh shall be light gauge metal clips (hog rings), or $\frac{1}{32}$ -inch diameter soft aluminum wire.
5. Prefabricated commercial silt fence may be substituted for built-in-field fence. Prefabricated silt fence shall be "Envirofence" as manufactured by Mirafi Inc., Charlotte, NC or equal.

D. Curb Inlet Protection

1. 4.5 oz. minimum non-woven geotextile filter fabric shall be used.
2. Sand bags shall be used to hold the filter fabric in place.

E. Stabilized Construction Entrance

1. Stabilized construction entrance shall have a minimum width of 12-feet and a minimum length of 50-feet.
2. An eight (8) inch high diversion ridge shall be constructed 15-feet from the edge of the existing roadway.
3. Stabilized construction entrance shall be graded to drain towards the existing roadway at a two-percent (2%) slope.
4. Rock shall be four-inches to eight-inches (4"-8") coarse aggregate.
5. Rock shall be placed to a depth of at least eight (8) inches.

F. Tree Protection – Chain Link Fence

1. Chain link fence shall be five (5) feet in height.
2. Fence shall be installed around the driplines of the trees to be protected.

G. Tree Protection – Wood Slats

1. Where any exceptions result in a fence being closer than four (4) feet to a tree trunk, protect the trunk with strapped-on-planking two inches by four inches (2"x4") wood slats to a height of eight (8) feet, or to the limits of lower branching in addition to the reduced fencing provided.
2. Trees most heavily impacted by construction activities should be watered deeply once a week during periods of hot, dry weather. Tree crowns should be sprayed with water periodically to reduce dust accumulation on the leaves.
3. Any trenching required for the installation of landscape irrigation shall be placed as far from existing tree trunks as possible.
4. No landscape topsoil dressing greater than four (4) inches shall be permitted within the dripline of a tree. No soil is permitted on the root flare of any tree.
5. No vehicles or equipment shall be allowed to park within the dripline of an existing tree.

H. Soil Retention Blankets

1. Soil retention blankets shall be installed in all seeded drainage swales and ditches as shown on the Plans or as directed by the Engineer. Only soil retention blankets included on TxDOT's Approved Products List will be considered acceptable for use on this Project.

I. Temporary Mulch

1. Temporary mulch shall be applied to areas where rough grading has been completed but final grading is not anticipated to begin within 30 days of the completion of rough grading.

G6.06

INSTALLATION

A. Triangular Filter Dike

1. Layout the filter dike following as closely as possible to the contour.
2. Clear the ground of debris, rocks, and plants that will interfere with installation.
3. Place the filter dike sections one (1) at a time, with the skirt on the uphill side towards the direction of flow anchoring each section to the ground before the next section is placed.
4. Anchors should be placed on two (2) foot centers alternating from front to back so that there is actually only one (1) foot in between anchors.
5. Securely fasten the skirt from one (1) section of filter dike to the next.
6. Filter dikes must maintain continuous contact with the ground.
7. After the site is completely stabilized, the dikes and any remaining silt should be removed. Silt should be disposed of in a manner that will not contribute to additional siltation.

B. Rock Berm Installation

1. Layout the rock berm following as closely as possible to the contour.
2. Clear the ground of debris, rocks or plants that will interfere with installation.
3. Place woven wire fabric on the ground along the proposed installation with enough overlap to completely encircle the finished size of the berm.
4. Place the rock along the center of the wire to the designated height.
5. Wrap the structure with the previously placed wire mesh secure enough so that when walked across, the structure retains its shape.
6. Secure with tie wire.
7. The ends of the berm should be tied into existing upslope grade and the berm should be buried in a trench approximately four (4) inches deep to prevent failure of the control.
8. The rock berm should be left in place until all upstream areas are stabilized and accumulated silt removed.

C. Silt Fence Installation

1. Layout the silt fence following as closely as possible to the contour.
2. Clear the ground of debris, rocks, and plants (including grasses taller than two (2) inches) to provide a smooth flow approach surface. Excavate four-inches deep by four-inches wide (4"x4") trench on upstream side of face per Plans.

3. Drive the heavy duty T-post at least 12-inches into the ground and at a slight angle towards the flow.
4. Attach the two-inches by four-inches (2"x4") 12-gauge welded wire mesh to the T-post with 11½-gauge galvanized T-post clips. The top of the wire to be 24-inches above ground level. The welded wire mesh to be overlapped six (6) inches and tied at least six (6) times with hog rings.
5. The silt fence to be installed with a skirt a minimum of 11-inches wide placed on the uphill side of the fence inside excavated trench. The fabric to overlap the top of the wire by one (1) inch.
6. Anchor the silt fence by backfilling with excavated dirt and rocks.
7. Geotextile splices should be a minimum of 18-inches wide attached in at least six (6) places.

D. Curb Inlet Protection Installation

1. Clear the pavement of debris, rocks, etc. to provide a smooth surface for installation.
2. Place the filter fabric over the inlet and extend to five (5) feet beyond inlet opening, upstream of inlet. Terminate fabric in street gutter with sand bags placed in gutter flowline.
3. Place sandbags on top of filter fabric around the perimeter of the protected area to secure the filter fabric.
4. Care shall be taken insure that the inlet protection will remain in place during periods of heavy runoff and that severe ponding will not occur in the street.

E. Stabilized Construction Entrance Installation

1. Clear the area of debris, rocks or plants that will interfere with installation.
2. Grade the area for the entrance to flow back on to the construction site. Runoff from the stabilized construction entrance onto a public street will not be allowed except for the first 15 feet connecting to the public street.
3. Place geotextile fabric if required.
4. Place rock as required.

F. Tree Protection – Chain Link Fence

1. Tree protection fences shall be installed prior to the commencement of any site preparation work (clearing, grubbing or grading).
2. Fences shall completely surround the tree, or clusters of trees; will be located at the outermost limit of the tree branches (dripline), and will be maintained throughout the construction project in order to prevent the following:
 - a. Soil compaction in the root zone area resulting from vehicular traffic, or storage of equipment or materials.
 - b. Root zone disturbances due to grade changes greater than six (6) inches cut or fill or trenching not reviewed and authorized by the City.
 - c. Wounds to exposed roots, trunks or limbs by mechanical equipment.
 - d. Other activities detrimental to trees, such as chemical storage, cement truck cleaning and fire.
3. Exceptions to installing fences at tree driplines may be permitted in the following cases:

- a. Where permeable paving is to be installed, erect the fence at the outer limits of the permeable paving area.
- b. Where trees are close to a proposed building, erect the fence no closer than six (6) feet to building.

G. Tree Protection – Wood Slats

1. Any roots exposed by construction activity shall be pruned flush with the soil. Backfill root areas with good quality top soil as soon as possible. If exposed root areas are not backfilled within two (2) days, cover them with organic material in a manner which reduces soil temperature, and minimizes water loss due to evaporation.
2. Prior to excavation or grade cutting within tree dripline, make a clean cut between the disturbed and undisturbed root zones with a rock saw or similar equipment, to minimize damage to remaining roots.
3. Pruning to provide clearance for structures, vehicular traffic and equipment shall take place before construction starts.

H. Excelsior Matting

1. The area to be covered shall be properly prepared, fertilized and seeded with permanent vegetation before the blanket is applied.
2. When the blanket is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area.
3. The blankets shall be applied in the direction of water flow, and stapled. Blankets shall be placed a minimum of three (3) rows, of four (4) foot wide (total approx. 12-foot width) within the drainage swale/ditch and stapled together in accordance with Manufacturer's instructions.
4. Side overlaps shall be four (4) inch minimum. The staples shall be made of wire, 0.091-inch in diameter or greater, "U" shaped with legs 10-inches in length and a 1½-inch crown. The staples shall be driven vertically into the ground, spaced approximately two (2) linear feet apart, on each side, and one (1) row in the center alternately spaced between each side.
5. Upper and lower ends of the matting shall be buried to a depth of four (4) inches in a trench.
6. Erosion stops shall be created every 25-feet by making a fold in the fabric and carrying the fold into a silt trench across the full width of the blanket. The bottom of the fold shall be four (4) inches below the ground surface. Staple on both sides of fold.
7. Where the matting must be cut or more than one (1) roll length is required in the swale, turn down upper end of downstream roll into a slit trench to a depth of four (4) inches. Overlap lower end of upstream roll four (4) inches past edge of downstream roll and staple.
8. To ensure full contact with soil surface, roll matting with a roller weighing 100-pounds per foot of width perpendicular to flow direction after seeding, placing matting and stapling.
9. Thoroughly inspect channel after completion. Correct any areas where matting does not present a smooth surface in full contact with the soil below.

I. Temporary Mulching

1. Straw mulch shall be applied at rate of 100 lbs/1,000 ft² and tackified with latex acrylic copolymer at a rate of 1 gal/1,000 ft² diluted in a ratio of 30 parts water to one (1) part latex acrylic copolymer mix.

A. Inspections

1. Contractor shall make a visual inspection of all sedimentation control devices once per week and promptly after every rain event exceeding ¼-inch. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas or into the vent trench, Contractor shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

B. Device Maintenance

1. Triangular Filter Dikes

- a. Realign berms as needed to prevent gaps between the sections.
- b. Accumulated silt should be removed after each rainfall event, and disposed of in a manner which shall not cause additional siltation.

2. Rock Berm

- a. Remove sediment and other debris when buildup reaches six (6) inches and dispose of the accumulated silt in an approved manner.
- b. Repair any loose wire sheathing.
- c. Reshape as needed.
- d. Replace berm when the structure ceases to function as intended due to silt accumulation among the rocks, washout, construction traffic damage, etc.

3. Silt Fences

- a. Remove accumulated sediment when buildup reaches six (6) inches.
- b. Replace damaged fabric, or patch with a two (2) foot minimum overlap.
- c. Replace or repair any sections crushed or collapsed in the course of construction activity.
- d. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.

4. Curb Inlet Protection

- a. Repair any damaged fabric, or patch with a two (2) foot minimum overlap.
- b. Replace any damaged sandbags.
- c. Remove accumulated sediment.

5. Stabilized Construction Entrance

- a. Periodic top dressing with additional stone may be required as conditions demand to prevent tracking or flowing of sediment onto public rights-of-way.
- c. Cleanout any measures used to trap sediment as needed.
- d. All sediment spilled, dropped, washed or tracked on to public rights-of-way should be removed immediately by the Contractor.
- e. When necessary, wheels should be cleaned to remove sediment prior to entrance onto public rights-of-way.

- f. When washing is required, it should be done on an area stabilized with crushed stone that drains into an approved sediment trap or sediment basin.
 - g. All sediment should be prevented from entering any storm drain, ditch or water course by using approved methods.
- 6. Tree Protection – Chain Link Fence
 - a. Repair or replace any chain link fence damaged by construction activities.
- 7. Tree Protection – Wood Slats
 - a. Repair or replace any wood slats damaged by construction activities.
- 8. Excelsior Matting
 - a. Replace matting as needed to prevent erosion from occurring.
- 9. Temporary Mulch
 - a. Replace mulch as needed to prevent erosion from occurring.

G6.08

REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized against erosion, remove sediment control devices and all accumulated silt. Dispose of silt and waste materials in proper manner. Re-grade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated on the Plans.

G6.09

PAYMENT

- A. Silt fence and rock berm will be paid per linear foot installed as listed in the Proposal and Bid Schedule.
- B. Stabilized Construction Entrance will be paid per each installed as listed in the Proposal and Bid Schedule.
- C. Tree protection will be paid per each installed as listed in the Proposal and Bid Schedule.
- D. Erosion Control Blankets will be paid per square yard as listed in the Proposal and Bid Schedule.
- E. Triangular Filter Dikes will be paid per linear foot as listed in the Proposal and Bid Schedule.
- F. No separate payment will be made for all other work performed in accordance with this specification, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G7 – LOAMING, HYDROSEEDING AND PERMANENT EROSION CONTROL

G7.01 SCOPE OF WORK

- A. This specification covers the requirements to provide erosion control and place topsoil, finish grade, apply fertilizer, hydraulically apply seed and mulch and maintain all seeded areas as shown on the Plans and as specified herein, including all areas disturbed by the Contractor.

G7.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, samples of all materials to be used and all other pertinent data to illustrate conformance to the specification found within.

G7.03 TOPSOIL

- A. Topsoil shall be fertile, friable, natural topsoil typical of topsoil of the locality and shall be obtained from a well drained site that is free of flooding. It shall be without admixture of subsoil or slag and free of stones, lumps, plants or their roots, sticks, clay, peat and other extraneous matter and shall not be delivered to the site or used while in a frozen or muddy condition. Topsoil as delivered to the site or stockpiled shall have pH between 6.0 and 7.0 and shall contain not less than three (3) percent organic matter as determined by loss of ignition of moisture-free samples dried at 100 degrees Celsius. The topsoil shall meet the following mechanical analysis:

	<u>Percentage Passing</u>
1-inch screen opening	100
No. 10 mesh	95 - 100
No. 270 mesh	35 - 75
0.002 mm*	5 - 25

* Clay size fraction determined by pipette or hydrometer analysis.

- B. At least 10 days prior to anticipated start of topsoiling operations, a one (1) pint sample of topsoil material shall be delivered by the Contractor to a laboratory for testing and approval. All testing shall be at the sole expense of the Contractor. Based on tests performed by the laboratory, the topsoil shall be identified as acceptable, acceptable with certain fertilizer and limestone applications or unacceptable. If the topsoil is found acceptable the fertilizer and lime requirements will be as specified or as recommended by the laboratory. If the topsoil is found unacceptable, the Contractor shall be responsible for identifying another source of topsoil and shall incur all expenses associated with testing additional samples. All topsoil incorporated into the site work shall match the sample provided to the laboratory for testing. Topsoil stockpiled under other Sections of these Specifications may be used subject to the testing and approval outlined above. Contractor will be responsible for screening stockpiled topsoil and providing additional topsoil as required at his/her own expense.
- C. Lime shall be ground limestone containing not less than 85-percent calcium and magnesium carbonates and be ground to such fineness that at least 50-percent shall pass a 100-mesh sieve and at least 90-percent shall pass a 20-mesh sieve.
- D. All planting shall be done between May 1 and September 15 except as specifically authorized in writing. If planting is authorized to be done outside the dates specified, the seed shall be planted with the addition of winter fescue (Kentucky 31) at a rate of 100 lbs. per acre.

- E. The seed shall be furnished and delivered premixed in the proportions specified within. A Manufacturer's Certificate of Compliance to the specified mixes shall be submitted by the Manufacturers for each seed type. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.
- F. Seed shall be delivered in sealed containers bearing the dealer's guaranteed analysis.
- G. Mulch shall be a specially processed cellulose fiber containing no growth or germination-inhibiting factors. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the material become uniformly suspended to form a homogeneous slurry. When sprayed on the ground, the material shall allow absorption and percolation of moisture. Each package of the cellulose fiber shall be marked by the manufacturer to show the air-dry weight content and not contain in excess of 10-percent moisture.
- H. Excelsior matting blanket installed in all drainage swales and ditches shall be in accordance with Section G6- SEDIMENTATION AND TEMPORARY EROSION CONTROL.

G7.04

APPLICATION OF TOPSOIL

- A. Unless otherwise shown on the plans, topsoil shall be placed to a minimum compacted depth of six (6) inches on all parts of the site not covered with structures, pavement, or existing woodland.
- B. For all areas to be seeded:
 - 1. Fertilizer (10-20-10) shall be applied at the rate of 30-lbs. per 1,000-sq. ft. or as determined by the soil test.
 - 2. Seed shall be applied at the rate of five (5) lbs. per 1,000-sq. ft.
 - 3. Fiber mulch shall be applied at the rate of 40-lbs. per 1,000-sq. ft.
- C. After the topsoil is placed and before it is raked to true lines and rolled, limestone shall be spread evenly over the loam surface and thoroughly incorporated by heavy raking to at least one half the depth of topsoil.
- D. The application of fertilizer may be performed hydraulically in one (1) operation with hydroseeding and fiber mulching. The Contractor is responsible for cleaning all structures and paved areas of unwanted deposits of the hydroseeded mixture.

G7.05

INSTALLATION OF TOPSOIL

- A. Previously established grades, as shown on plans shall be maintained in a true and even condition.
- B. Subgrade shall be prepared by tilling prior to placement of topsoil to obtain a more satisfactory bond between the two layers. Tillage operations shall be across the slope. Tillage shall not take place on slopes steeper than two (2) horizontal to one (1) vertical or where tillage equipment cannot be operated. Tillage shall be accomplished by disking or harrowing to a depth of nine (9) inches parallel to contours. Tillage shall not be performed when the subgrade is frozen, excessively wet, extremely dry or in other conditions which would not permit tillage. The subgrade shall be raked and all rubbish, sticks, roots and stones larger than two (2) inches shall be removed. Subgrade surfaces shall be raked or otherwise loosened immediately prior to being covered with loam.
- C. Topsoil shall be placed over approved areas to a depth sufficiently greater than required so that after natural settlement and light rolling, the complete work will conform to the lines, grades and elevations indicated. No loam shall be spread in water or while frozen or muddy.
- D. After topsoil has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the loamed area and disposed of by the Contractor. The areas shall also be free of smaller stones, in excessive quantities, as

determined by the Engineer or the City. The whole surface shall then be rolled with a hand roller weighing not more than 100-lbs per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional loam and the surface shall be regraded and rolled until a smooth and even finished grade is created.

- E. Seeding shall be done within 10 days following soil preparation. Seed shall be applied hydraulically at the rates and percentages indicated. The spraying equipment and mixture shall be so designed that when the mixture is sprayed over an area, the grass seed and mulch shall be equal in quantity to the specified rates. Prior to the start of work, the Contractor shall furnish the Engineer with a certified statement as to the number of pounds of materials to be used per 100-gallons of water. This statement shall also specify the number of square feet of seeding that can be covered with the quantity of solution in the Contractor's hydroseeder. Upon completion of seeding operations, the Contractor shall furnish the Engineer and the City with a certified statement on the actual quantity of solution applied.
- F. In order to prevent unnecessary erosion of newly topsoiled and graded slopes and unnecessary siltation of drainageways, the Contractor shall carry out seeding and mulching as soon as he/she has satisfactorily completed a unit or portion of the project. A unit or portion of the project shall be determined by the City or Engineer. When protection of newly loamed and graded areas is necessary at a time which is outside of the normal seeding season, the Contractor shall protect those areas by what ever means necessary as approved by the Engineer and the City and shall be responsible for prevention of siltation in the areas beyond the limit of work.
- G. When newly graded subgrade areas cannot be topsoiled and seeded because of season or weather conditions and will remain exposed for more than 30 days, the Contractor shall protect those areas against erosion and washouts in accordance with Section G6- SEDIMENTATION AND TEMPORARY EROSION CONTROL, or by other measures as approved by the Engineer and the City. Prior to application of topsoil, any such materials applied for erosion control shall be removed or thoroughly incorporated into the subgrade by diskings. Fertilizer shall be applied prior to spreading of topsoil.
- H. On slopes, the Contractor shall provide against washouts by a method approved by the Engineer and the City. Any washout which occurs shall be regraded and reseeded at the Contractor's expense until a good sod is established.

G7.06

HYDROMULCHING

- A. Fertilizer: 18-18-5, (Nitrogen, Phosphoric Acid, Potash) slow release granular at a rate of 25-lbs per 1,000-sq. ft.
- B. Water: The Contractor shall provide water necessary for grass planting and maintenance until acceptance by the City.
- C. Planting Seasons: Grass planting by sodding, sprigging, or hydromulching shall normally be done between May 1 and September 15.
- D. Hydromulching General
 - 1. Submit Manufacturer's product specifications and guaranteed purity analysis for fertilizer.
 - 2. Product Delivery, Storage and Handling
 - a. Deliver fertilizer to site in original unopened containers bearing Manufacturer's guaranteed chemical analysis, name, trademark and conformance to State Law.
 - b. Store fertilizer in a dry location and protect from weather.
 - 3. Guaranty and Replacement

- a. Provide guaranty for a period of one (1) year after final completion and acceptance of project, that the installed grass areas be at least the quality and condition as during acceptance.
- b. Rehydromulch unacceptable areas during the guaranty period. Guaranty shall not include damage or loss of lawn due to acts of God, acts of vandalism or negligence on the part of the City.

E. Native Grass Hydromulching-Products

1. Grass Seed: Common Bermuda grass, hulled, minimum 82% pure live seed. All grass seed shall be free from noxious weed, grade "A" recent crop, recleaned and treated with appropriate fungicide at time of mixing. Seed shall be furnished in sealed, standard containers with dealer's guaranteed analysis.
2. Mulch: Conwed regular wood fiber mulch or approved equal.
3. Fertilizer: 18-18-5, water-soluble or an approved equal.
4. Topsoil: Supply high quality imported topsoil of loamy character to the limits shown on the Plans, high in humus and organic content from local agriculture source. Topsoil to be free from clay, lumps, coarse sands, stones, roots and other foreign matter. There shall be no toxic amounts of acid or alkaline elements. Soil to be used for on-site mixing of backfill.

F. Native Grass Hydromulching-Execution

1. Preparation: Fine grade to final elevation removing any debris and insuring the seedbed is smooth.
2. Installation: Use a hydromulcher (sprayer) and apply the mixture at the following rate. (Mix in accordance with Manufacturer's recommendations.)
 - a. Hydromulch mixture shall contain 2.5-lbs. of common Bermuda grass seed per 1,000-sq. ft. hydromulch applied.
 - b. Mulch – 60-lbs. per 1,000-sq. ft.
 - c. Fertilizer – 25-lbs (18-18-5) per 1,000-sq. ft.
3. General Maintenance
 - a. Water the completed installation as necessary to insure germination of grass.
 - b. Maintain grass areas until complete germination and establishment of all areas.
 - c. Correct defective work as soon as apparent. Maintenance shall include, but not be limited to, weeding and fertilizing.
 - d. Clean up: Remove trash and debris from the site.
 - e. Acceptance: Substantial completion inspection to determine acceptance of grass areas will be made by the City after complete germination and coverage has been attained.

G7.07

MAINTENANCE OF DEVELOPING GRASS

- A. The Contractor shall water and maintain all grassed areas until final acceptance. He shall also re-fertilize at the rate of one (1) pound of nitrogen and one (1) pound of phosphorous per 1,000-sq. ft. every 60 days until the grass is accepted.

- B. Areas which, due to settling or improper leveling, do not have positive drainage shall be re-leveled with topsoil and replanted with grass.
- C. Areas damaged by erosion, vehicle ruts and similar damage shall be re-leveled with topsoil and replanted. Finished ground surface shall be sufficiently smooth and level to facilitate mowing.

G7.08

ACCEPTANCE

- A. Work under this section shall be considered acceptable when finish graded surfaces are level and well-drained, when there are no bare spots larger than three (3) square feet, when no more than 10 percent of the total area has bare spots larger than one (1) square foot, when not more than 15 bare spots larger than six (6) inches square and the grass is at least two (2) inches high, and when other requirements listed herein are met.
- B. Acceptance of work normally coincides with final acceptance of the entire project. However, seasonal factors may be cause for delay in grass planting, development, and acceptance.
- C. The City will accept responsibility for normal maintenance when grass is accepted. However, the Contractor shall remain responsible for any subsequent grass damage that he causes and for warranty of materials and workmanship for a period of not less than one (1) year from the time of acceptance.
- D. The Contractor shall furnish full and complete written instruction for maintenance of the seeded areas to the City at the time of acceptance.

G7.09

PAYMENT

- A. No separate payment will be made for finish grading, placement of topsoil or grass planting and fertilizing. All related costs shall be included in the proper item of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION G8 – MISCELLANEOUS WORK AND CLEANUP

G8.01 SCOPE OF WORK

- A. This specification covers the requirements to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Plans.

G8.02 SUBMITTALS

- A. Within 10 days after the Notice to Proceed, the Contractor shall submit to the Engineer, in triplicate, a breakdown of any lump sum included in the Proposal and Bid Form. This breakdown shall be subject to approval by the Engineer and when so approved shall become the basis for determining progress payments and for negotiation of change orders, if required. In some contracts a lump sum item shall not be provided in the Proposal and Bid Form and shall be subsidiary to the other work items.

G8.03 GENERAL

- A. When applicable, the Contractor will perform the work in accordance with other sections of this Specification. When no applicable specification exists the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.
- B. The work of this Section includes, but is not limited to, the following:
 - 1. Crossing and Relocating Existing Utilities
 - 2. Restoring Driveways, Fences and Curbing
 - 3. Cleaning Up
 - 4. Incidental Work
 - 5. Restoring Easements and Rights-of-Way

G8.04 CROSSING AND RELOCATING EXISTING UTILITIES

- A. This item includes any extra work required in crossing culverts, water courses including streams and drainage ditches, drains, gas mains, water mains and water services and other utilities. This work shall include but is not limited to the following: bracing, hand excavation and backfill (except screened gravel) and any other work required for crossing the utility or obstruction not included for payment in other items of this specification. Notification of Utility Companies shall be the Contractor's responsibility.
- B. In locations where existing utilities cannot be crossed without interfering with the construction of the work as shown on the Plans, the Contractor shall remove and relocate the utility as directed by the Engineer or Representative of the City or cooperate with the Utility Companies concerned if they relocate their own utility.
- C. At pipe crossings and where designated by the Plans, the Contractor shall furnish and place crushed stone bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid-diameter of the pipe crossed.

G8.05

RESTORING OF DRIVEWAYS AND FENCES

- A. Existing public and private driveways disturbed by the construction shall be replaced. Paved drives shall be repaved to the limits and thicknesses existing prior to construction. Gravel dirt roads and drives shall be replaced and regraded.
- B. Fences in the vicinity of the work shall be protected from damage. If damaged, fences shall be replaced in condition equal to that prior to being damaged and the work shall be satisfactory to the City.

G8.06

CLEANING UP

- A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition. All stored materials shall be kept in a neat manner, secured and protected from the public.

G8.07

INCIDENTAL WORK

- A. Do all incidental work not otherwise specified, but obviously necessary to the proper completion of the Contract as specified and as shown on the Plans.

G8.08

RESTORING THE EASEMENTS AND RIGHTS-OF-WAY

- A. Portions of the work may be within easements through private property. The Contractor shall be responsible for all damage to private property due to his/her operations. The Contractor shall protect from injury all walls, fences, cultivated shrubbery and vegetables, fruit trees, pavement, underground facilities, such as water pipes, or other utilities which may be encountered along the easement. If removal and replacement are required, it shall be done in a workmanlike manner so that replacement is equivalent to that which existed prior to construction.
- B. Existing lawn and sod surfaces damaged by construction in easements shall be replaced. The Contractor may cut and replace the lawn and sod, or may restore the areas with an equivalent depth and quality of loam, seeded and fertilized as specified in Section G7- LOAMING, HYDROSEEDING AND PERMANENT EROSION CONTROL if acceptable to the owner of the private property and the City. These areas shall be maintained and re-seeded or re-sodded at the option of the owner of the private property and the City, if necessary, until all work under this Contract has been completed and accepted. Any additional work required to restore easements to their original condition shall be performed by the Contractor.

G8.09

PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATION

SECTION G9-STRUCTURAL EXCAVATION

G9.01 SCOPE OF WORK

- A. This specification covers the requirements for excavation for the placing of structures, except pipe, for the disposal of such excavated material, and for the backfilling around completed structures to the level of the original ground.

G9.02 SUBMITTALS

- A. None required unless specifically called for in the Plans, Standards or requested by the Engineer or the City.

G9.03 CONSTRUCTION METHODS

- A. Excavation shall be done in accordance with the lines and depths indicated on the Plans or as established by the City. Unless otherwise specified on the Plans or permitted by the City no excavation shall be made outside a vertical plane three (3) feet from the footing lines and parallel thereto. When caissons are provided, no excavation will be permitted outside the outer faces of the caissons.
- B. To permit the City to judge the adequacy of a proposed foundation, the Contractor, if requested, shall make soundings or take cores to determine the character of the subgrade materials. The maximum depth of soundings or cores will in general, not exceed five (5) feet below the proposed footing grade. It is the intent of this provision that soundings shall be made at the time the excavation in each foundation is approximately complete.
- C. Excavations shall conform to elevations shown on the Plans, or raised or lowered by written order of the City, when such alterations are judged proper. When deemed necessary to increase or decrease the plan depth of footings, the alterations in the details of the structure shall be as directed by the City. The City shall have the right to substitute revised details resulting from consideration of changes in the design conditions.
- D. When a structure is to be placed on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation and the final excavation to grade shall not be performed until just before the footing is placed.
- E. Excavated material required to be used for backfill may be deposited by the Contractor in storage piles at points convenient for its rehandling during the backfilling operations and with the approval of the City.
- F. For all single and multiple box culverts, pipe culverts, pipe arch culverts, and box sewers of all types, where the soil encountered at established footing grade is a quicksand, muck, or similar unstable material, the following procedure shall be used unless other methods are called for on the Plans:
 - 1. The depth to which unstable material is removed will be determined by the City. The depth will not exceed two (2) feet below the footing of culverts that are two (2) feet or more in height, and will not exceed the height of culverts of those less than two (2) feet high. Excavation shall be carried at least one (1) foot horizontally beyond the limits of the structure on all sides. All unstable soil removed shall be replaced with suitable stable material, in uniform layers of suitable depth for compaction as directed by the City. Each layer shall be wetted; if necessary, and compacted by rolling or tamping as required to provide a stable foundation for the structure. Soil which has sufficient stability to properly sustain the adjacent sections of the roadway embankment will be considered a suitable foundation material.
 - 2. When in the opinion of the City, it is not feasible to construct a stable footing as outlined above, the Contractor shall construct it by the use of special materials, such as flexible

base, cement stabilized base, cement stabilized backfill or other material, as directed by the City.

- G. When the material encountered at footing grade of a culvert is found to be partially rock, or incompressible material, and partially a compressible soil which is satisfactory for the foundation, the incompressible material shall be removed for a depth of six (6) inches below the footing grade and backfilled with a compressible material similar to that used for the rest of the structure.

G9.04

BACKFILLING

- A. General: As soon as practicable, all portions of excavation not occupied by the permanent structure shall be backfilled. Back-fill material shall be free from large or frozen lumps, wood or other extraneous material.
1. That portion of backfill which will not support any portion of completed roadbed or embankment shall be placed in layers not more than 10-inches in depth (loose measurement) and shall be compacted to a density comparable with the adjacent, undisturbed material.
 2. That portion of the backfill which will support any portion of the roadbed or embankment or is within two (2) feet of the roadbed or embankment shall be placed in uniform layers not to exceed six (6) inches in depth (loose measurement) and each layer compacted to the density specified for the appropriate material. Each layer of backfill material, if dry, shall be wetted uniformly to the moisture content required to obtain the specified density and shall be compacted to that density by means of mechanical tamps, except that the use of rolling equipment of the type generally used in compacting embankments will be permitted on portions which are accessible to such equipment. All portions of embankment too close to any portion of a structure to permit compaction by the use of the blading and rolling equipment used on adjoining sections of embankment, shall be placed and compacted in the same manner as specified above for backfill material. These provisions require the mechanical compaction, by means of either rolling equipment or mechanical tamps, of all backfill and embankment adjoining the exterior walls and wingwalls of culverts. Unless otherwise provided by the Plans or Special Conditions, hand tamping will not be accepted as an alternate for mechanical compaction. As a general rule, material used in filling or backfilling the portions described in this paragraph shall be an earth free of any appreciable amount of gravel or stone particles more than four (4) inches in greatest dimension and of a gradation that permits thorough compaction. The percentage of fines shall be sufficient to fill all voids and insure a uniform and thoroughly compacted mass of proper density. When required by the Plans or by written order of the City, cement stabilized material shall be used for backfilling.
 3. All portions of fill and backfill described in the preceding paragraph shall be compacted to the same density requirements specified for the adjoining sections of embankment in accordance with the governing specifications therefore.
 4. Where no embankment is involved on the Project and no specifications therefor are included in the Contract, all backfill shall be compacted to a density comparable with the adjacent undisturbed material.
 5. Care shall be taken to prevent any wedging action of backfill against the structure, and the slopes bounding the excavation shall be stepped or serrated to prevent such action.
 6. Backfilling shall not proceed prior to inspection and approval of the inspector.

PIPE CULVERTS

- A. The following requirements shall apply to the backfilling of pipe culverts in addition to the pertinent portions of the general requirements given in the preceding and in pipe bedding Standards.
1. Backfilling shall be continued in this manner to the elevation of the top of the pipe. Special care shall be taken to secure thorough compaction of the material placed under the haunches of the pipe. In the case of pipe in trenches, that portion of the backfill above the top of the pipe which supports embankment or the roadbed or is within two (2) feet of the roadbed or embankment shall receive mechanical compacting as specified, and the portion which will not support any portion of embankment or roadbed shall be placed in layers not more than ten (10) inches in depth (loose measurement) and shall be compacted by whatever means the Contractor chooses, to a density comparable with the adjacent, undisturbed material.

PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END SECTION

STREETS AND DRAINAGE

SECTION SD

TECHNICAL SPECIFICATIONS

SECTION SD1 - HOT MIX ASPHALTIC CONCRETE PAVEMENT

SD1.01 SCOPE OF WORK

- A. This specification covers the requirements for furnishing and installing hot mix asphaltic concrete as shown in the Plans and specified within. Construction shall include a base course, a level-up course, a surface course or any combination of these courses as shown on the Plans, each course being composed of a compacted mixture of aggregate and asphalt mixed hot in a mixing plant, in accordance with the details shown on the Plans and the requirements herein.

SD1.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer for approval, technical product literature including mix design, aggregate source, aggregate gradation, aggregate type, and all other pertinent data to illustrate conformance to the specification found within.

SD1.03 MATERIALS

- A. The mineral aggregate shall be composed of a coarse aggregate, a fine aggregate, and if required, a mineral filler. Coarse aggregate shall be that part of the aggregate retained on the No. 10 sieve and shall be stone, crushed slag, crushed gravel, or gravel. Fine aggregate shall be that part passing the No. 10 sieve and shall consist of sand or screenings. Mineral filler shall consist of dry stone dust, Portland cement, or fly ash. Mineral aggregate shall meet the requirements of Item 340, Texas Department of Transportation, Standard Specifications for Construction of Highways, Streets and Bridges. The plasticity index of fine aggregate portion passing the No. 40 sieve shall not be more than six (6).

SD1.04 ASPHALTIC MATERIAL

- A. Asphalt for the paving mixture shall meet the requirements of Texas Department of Transportation, Item 300 of the Standard Specifications for Construction of Highways, Streets and Bridges. The grade of asphalt used shall be designated by the Engineer or the City after design tests have been made using the mineral aggregate to be used in the job.

SD1.05 TACK COAT

- A. Tack coat shall be in accordance with Texas Department of Transportation, Item 300 of the Standard Specifications for Construction of Highways, Streets and Bridges. Asphaltic material shall be approved by the Engineer or the City.

SD1.06 TYPES OF ASPHALTIC CONCRETE

- A. The mixture shall be designed and tested in accordance with the current Texas Department of Transportation, Standard Specifications for Construction of Highways, Streets and Bridges, Item 340, Type D, and will have a laboratory density of not less than 94.5% nor more than 97.5%, and a stability of not less than 35.
- B. The asphaltic material shall form from four to eight (4-8) percent of the mixture by weight or from nine to nineteen (9-19) percent of the mixture by volume.

SD1.07 EQUIPMENT

- A. Spreading and Finishing Machine

1. The spreading and finishing machine shall be a type approved by the Engineer, shall be capable of producing a surface that will meet the requirements of the typical cross section and the surface test, when required, and when the mixture is dumped directly into the finishing machine, shall have adequate power to propel the delivery vehicles in a satisfactory manner. The finishing machine shall be equipped with a flexible spring and/or hydraulic-type hitch sufficient in design and capacity to maintain contact between the rear wheels of the hauling equipment and the pusher rollers of the finishing machine while the mixture is being unloaded.
2. The use of any vehicle which requires dumping directly into the finishing machine and which the finishing machine cannot push or propel in such a manner as to obtain the desired lines and grades without resorting to hand-finishing will not be allowed. Unless otherwise permitted by the Plans, vehicles of the semi-trailer type are specifically prohibited from dumping directly into the finishing machine while in contact with the finishing machine. Vehicles dumping directly or indirectly into the finishing machine shall be so designed and equipped that unloading into the finishing machine can be mechanically and/or automatically operated in such a manner that overloading the finishing machine being used cannot occur and the required lines and grades will be obtained without resorting to hand-finishing.
3. Dumping of the asphaltic mixture in a windrow and then placing the mixture in the finishing machine with loading equipment will be permitted, provided that the loading equipment is constructed and operated in such manner that substantially all of the mixture deposited on the roadbed is picked up and loaded in the finishing machine without contamination of foreign material of the mixture, and excessive temperature loss is not encountered. The loading equipment will be so designed and operated that the finishing machine being loaded will obtain the required line, grade, and surface without resorting to hand-finishing. Any operation of the loading equipment resulting in the accumulation and subsequent shedding of this accumulated material into the asphaltic mixture will not be permitted.

B. Rolling Equipment

1. Rolling equipment shall consist of pneumatic tire rollers, two-axle tandem roller weighing not less than eight (8) tons, three-wheel roller weighing not less than 10-tons, three-axle tandem roller weighing not less than 10-tons, and trench rollers having a 20-inch wheeldrive and producing 325 pounds per linear inch of roller width at a speed of 1.8 miles per hour in low gear.

C. Straight Edges and Templates

1. The Contractor shall provide an acceptable 10-foot straight edge for surface testing.

SD1.08

CONSTRUCTION METHODS

- A. The prime coat, tack coat or the asphaltic mixture, when placed with a spreading and finishing machine, shall not be placed when the air temperature is below 50 degrees F and is falling, but it may be placed when the air temperature is above 40 degrees F and is rising. The air temperature shall be taken in the shade away from artificial heat. It is further provided that the prime coat, tack coat or asphaltic mixture shall be placed only when the humidity, general weather conditions and temperature and moisture condition of the base, in the opinion of the Engineer or the City, are suitable.

B. Prime Coat

1. A prime coat is required, and shall be applied at the rate determined by the Engineer but not less than 0.2-gallons per square yard of MC-1 asphalt. The asphaltic concrete shall not be applied on a previously primed flexible base until the primed base has completely cured to the satisfaction of the Engineer and the City.

C. Transporting Asphaltic Concrete

1. The asphaltic mixture, prepared as directed above, shall be hauled to the work site in tight vehicles previously cleaned of all foreign material. The dispatching of the vehicles shall be arranged so that all material delivered may be placed, and all rolling shall be completed during daylight hours. In cool weather, or for long hauls, canvas covers and insulating of the truck bodies may be required. The inside of the truck body may be given a light coating of oil, lime slurry or other material satisfactory to the Engineer and the City, if necessary, to prevent mixture from adhering to the body.

D. Placing

1. Generally, the asphaltic mixture shall be dumped and spread on the approved prepared surface with the specified spreading and finishing machine, in such manner that when properly compacted, the finished pavement will be smooth, of uniform density, and will meet the requirements of the typical cross-sections and the surface tests. During the application of asphaltic material, care shall be taken to prevent splattering of adjacent pavement, curb and gutter, and structures. When the asphaltic mixture is placed in a narrow strip along the edge of an existing pavement, or used to level up small areas of an existing pavement, or placed in small irregular areas where the use of a finishing machine is not practical, the finishing machine may be eliminated when authorized by the Engineer or the City, provided a satisfactory surface can be obtained by other approved methods.

E. Compacting

1. Rolling: The pavement shall be compressed thoroughly and uniformly with the specified roller and/or other approved rollers. Rolling with the three-wheel and tandem rollers shall start longitudinally at the sides and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the rear wheel. Alternate trips of the roller shall be slightly different in length. Rolling with pneumatic-tire roller shall be done as directed by the Engineer. Rolling shall be continued until no further compression can be obtained and all roller marks are eliminated. One (1) tandem roller, one (1) pneumatic-tire roller, and at least one (1) three-wheel roller, as specified above, shall be provided for each job. If the Contractor elects, he may substitute the three-axle tandem roller for the two-axle tandem roller and/or the three-wheel roller; but in no case shall less than three rollers be in use on each job. Additional rollers shall be provided if needed. The motion of the roller shall be slow enough at all times to avoid displacement of the mixture. If any displacement occurs, it shall be corrected at once by the use of rakes and of fresh mixtures where required. The roller shall not be allowed to stand on pavement which has not been fully compacted. To prevent adhesion of the surface mixture to the roller, the wheels shall be kept thoroughly moistened with water, but an excess of water will not be permitted. All rollers must be in good mechanical condition. Necessary precautions shall be taken to prevent the dropping of gasoline, oil, grease, or other foreign matter on the pavement, either when the rollers are in operation or when standing. Regardless of the method used for compaction, all rolling to achieve specified density shall cease when the Hot Mix Asphaltic Mixture drops below 175°F (80°C).

2. In-Place Density: The Hot Mix Asphaltic mixture shall be tested daily at the project site for conformance to specification requirements. Unless directed otherwise by the Engineer or designated representative, a bag sample and a core or section will be obtained for each 2000 square yards or portion of paving each day, with a minimum of three bag samples and three cores for each day's paving.

Bag samples shall be taken during lay-down operations. The primary sampling point for the bag samples shall be from the windrow if a windrow elevator is used. If a windrow elevator is not used, the sample shall be taken from the middle of the paving machine hopper. Gradation, asphalt content and stability value of the hot mix asphaltic mixture shall be reported for each of the bag samples. The stability value reported for each of the bag samples shall be the average of three (3) tests per bag.

Pavement thickness and in-place density shall be determined from the field cores or sections. The average of all hot mix asphaltic concrete pavement core or section thicknesses shall meet the minimum thickness of 2.0". No individual core or section thickness deficiency may be greater than 0.2 inches. Pavement that does not meet the thickness specification shall be removed and replaced as outlined below. The in-place density tests are intended for compaction-control tests and will be tested according to Test Method Tex-207-F. The core or section densities shall average from 91.0% to 96.0% of the maximum theoretical density except that the minimum acceptable density of an individual sample is 89.0% or the maximum acceptable density of an individual sample is 97.0%. There will be no two consecutive core or section densities below 91.0% or above 96.0%. Asphalt pavement represented by a density less than 89.0%, more than 97.0% or two consecutive densities less than 91.0% shall be removed and replaced.

Any pavement to be removed and replaced will be removed and replaced from curb to curb or edge of asphalt to edge of asphalt at the contractor's expense. Additional density tests shall be used to delineate the limits of the in-place hot mix asphaltic pavement that does not meet the density specification and the results of the tests shall not be used in the calculation of the overall average density. Protocol to assess the area of asphalt pavement removal and replacement shall start between the failing density or two consecutive densities that are less than 91.0% and the next passing density to either side of the failing pavement. Additional cores or sections will be required to quantify the area of replacement back to an in-place density of 91.0%. Backscattering (nuclear densities) shall not be used to determine the actual density of asphaltic pavement.

Pavements with low-density results may be retested; but the pavement shall not receive any additional compactive effort.

Final acceptance of the pavements shall be the responsibility of the Engineer.

3. Hand-Tamping: The edges of the pavement along curbs, headers and similar structures, and all places not accessible to the roller or in such position as will not allow thorough compaction with the rollers, shall be thoroughly compacted with lightly oiled tamps.

F. Surface Tests

1. The surface of the pavement, after compaction, shall be smooth and true to the established line, grade, and cross-section, and when tested with a 10-foot straightedge placed parallel to the centerline of the roadway or tested by other equivalent and acceptable means, except as provided herein, the maximum deviation shall not exceed 1/4-inch in 10-feet, and any point in the surface not meeting this requirement shall be corrected.

SD1.09

ROADS DAMAGED BY CONSTRUCTION

- A. The Contractor shall reconstruct existing asphalt paved roads which are damaged as a result of construction of this project at no additional cost to the City. Reconstruction shall consist of reconstructing the road to an "as new condition" to the existing pavement cross section. The Contractor may use existing base material, adding new base material as needed. Contractor shall compact and reshape road subgrade to existing grade. The subbase and base shall be compacted in accordance with these specifications. The Contractor shall install at least two (2) inches of hot-mix asphalt pavement in accordance with these specifications.

SD1.10

MEASUREMENT AND PAYMENT

- A. Payment for furnished and installed hot mix asphaltic concrete pavement shall be paid according to the unit price per square yard in the proper item of the Proposal and Bid Schedule.

- B. All work and materials to complete the hot mix asphaltic concrete shall be subsidiary to this item.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION SD2 – ROADWAY EXCAVATION

SD2.01 SCOPE OF WORK

- A. This specification covers the requirements for shaping and finishing of all earthwork on the entire length of roadway, and approaches to same, in conformity with the required lines, grades and typical cross sections and in accordance with specification requirements herein outlined. Compaction shall conform to the method of “Density Control” and/or “Ordinary Compaction” as shown on the Plans and Specifications.

SD2.02 SUBMITTALS

- A. None required unless specifically called for in the Plans, Standards, or requested by the City or Engineer.

SD2.03 CONSTRUCTION METHODS

- A. All roadway excavation and corresponding embankment construction shall be performed as specified herein and in Section S3- EMBANKMENT, and the completed roadway shall conform to the established alignment, grades and cross sections.
- B. All suitable excavated materials shall be utilized, insofar as practicable, in constructing the required roadway sections. Unsuitable roadway excavation and roadway excavation in excess of that needed for the construction of the roadway shall be disposed of outside the limits of the right-of-way. Unsuitable material encountered below subgrade elevation in roadway cuts, shall be removed and replaced, as directed by the Representative of the City with material from the roadway excavation or with other suitable material.
- C. During construction, the roadbed and ditches shall be maintained in such condition as to insure proper drainage at all times and ditches and channels shall be so constructed and maintained as to avoid damage to the roadway section. Soils with plasticity index (PI) of 20 or more shall be stabilized with an amount of lime adequate to reduce the PI to less than 20. Type A Grade 1 base material may be used with a minimum ratio of 1 to 1, in lieu of lime. If using lime treatment refer to Item 260 in the Texas Department of Transportation’s “Standard Specifications for Construction of Highways, Streets and Bridges”.

NOTE: ALL UNDERGROUND UTILITIES SHALL BE INSTALLED PRIOR TO ANY LIME TREATMENT OR FLEXIBLE BASE PLACEMENT.

NOTE: Blue-tops will be set on the center and crown of the streets or roads at every 50-foot station. These grade stakes will be to finished grade and visible for inspection before flexible base is applied.

SD2.04 PAYMENT

- A. No separate payment will be made for work performed in accordance with this specification. Select back fill shall be paid for according to the unit price per cubic yard according to the appropriate item, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION SD3 – EMBANKMENT AND SUBGRADE

SD3.01 SCOPE OF WORK

- A. This specification covers the requirements for the placement and compaction of all materials obtained from roadway, borrow, channel and structural excavation for utilization in the construction of roadway embankments, subgrade, levees and dikes (berms).

SD3.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the source of the material, equipment and all other pertinent data to illustrate conformance to the specification found within.

SD3.03 CONSTRUCTION METHODS

- A. Prior to placing any embankment, all “Preparing Right of Way” operations shall have been completed on the excavation sources and areas over which the embankment is to be placed. Stump holes or other small excavations in the limits of the embankments shall be backfilled with suitable materials and thoroughly tamped by approved methods before commencing embankment construction. The surface of the ground, including plowed loosened ground or surface roughened by small washes or otherwise shall be restored to approximately its original slope by blading or other methods. Where indicated on the Plans, the ground surface thus prepared shall be compacted by sprinkling and rolling.
- B. The surface of the ground of all unpaved and proposed paved areas, which are to receive embankment, shall be loosened by scarifying or plowing to a depth of not less than six (6) inches. The loosened material shall be recompacted with the new embankment as hereinafter specified.
- C. Where directed the surface of hillsides to receive embankment shall be loosened by scarifying or plowing to a depth of not less than six (6) inches, or cut into steps before embankment materials are placed. The embankment shall then be placed in layers, as hereinafter specified, beginning at the low side in part width layers and increasing the widths as the embankment is raised. The material, which has been loosened, shall be recompacted simultaneously with the embankment material placed at the same elevation.
- D. Where embankments are to be placed adjacent to or over existing roadbeds, the roadbed slopes shall be plowed or scarified to a depth of not less than six (6) inches and the embankment built up in successive layers, as hereinafter specified, to the level of the old roadbed before its height is increased. Then, if directed, the top of the old roadbed shall be scarified and recompacted with the next layer of the new embankment. The total depth of the scarified and added material shall not exceed the permissible depth of layer.
- E. Trees, shrubs, roots, vegetation or other unsuitable materials shall not be placed in embankment.
- F. Except as otherwise required by the plans, all embankment shall be constructed in layers approximately parallel to the finished grade of the roadbed and unless otherwise specified, each layer shall be so constructed as to provide a uniform slope of 1/4-inch per foot from the center line of the roadbed to the outside, except that on superelevated curves each layer shall be constructed to conform to the superelevation required by the governing standard.
- G. Embankments shall be constructed to the grade established by the Engineer or the City and completed embankments shall correspond to the general shape of the typical sections shown on the plans and each section of the embankment shall correspond to the detailed section or slopes established by the Engineer. After completion of the roadway, it shall be continuously maintained to its finished section and grade until the project is accepted.

SD3.04 EARTH EMBANKMENTS

- A. Earth embankments shall be defined as those composed principally of material other than rock, and shall

be constructed of accepted material from approved sources.

- B. Except as otherwise specified, earth embankments shall be constructed in successive layers for the full width of the individual roadway cross section and in such lengths as are best suited to the sprinkling and compaction methods utilized.
- C. Layers of embankment may be formed by utilizing equipment (which will spread the material as it is dumped, or formed by being spread by blading or other acceptable methods from piles or windrows dumped from excavating or hauling equipment in such amounts that material is evenly distributed.)
- D. Minor quantities of rock encountered in constructing earth embankment shall be incorporated in the specified embankment layers, or may be placed in accordance with the requirements for the construction of rock embankments in the deeper fills within the limits of haul shown on the Plans, provided such placement of rock is not immediately adjacent to structures. Also, rock may be placed in the portions of embankments outside the limits of the completed roadbed width where the size of the rock prohibits their incorporation in the normal embankment layers.
- E. Each layer of embankment shall be uniform as to material, density and moisture content before beginning compaction. Where layers of unlike materials abut each other, each layer shall be feather edged for at least 100-feet or the material shall be so mixed as to prevent abrupt changes in the soil. No material placed in the embankment by dumping in a pile or windrow shall be incorporated in a layer in that position, but all such piles or windrows shall be moved by blading or similar methods. Clods or lumps of material shall be broken and the embankment material mixed by blading, harrowing, disking or similar methods to the end that a uniform material of uniform density is secured in each layer.
- F. Water required for sprinkling to bring the material to the moisture content necessary for maximum compaction shall be evenly applied and it shall be the responsibility of the Contractor to secure a uniform moisture content throughout the layer by such methods as may be necessary.
- G. In order to facilitate uniform wetting of the embankment material, the Contractor may apply water at the material source if the sequence and methods used are such as not to cause an undue waste of water. Such procedure shall be subject to the approval of the Representative of the City.
- H. All earth cuts, full width or part width cuts in side hill, which are not required to be excavated below subgrade elevation for base and backfilled, shall be scarified to a uniform depth of at least six (6) inches below grade, and the material shall be mixed and reshaped by blading and then sprinkled and rolled in accordance with the requirements outlined above for earth embankments and to the same density as that required for the adjacent embankment.
- I. Compaction of embankments shall be obtained by the method hereinafter described as "Ordinary Compaction" or the method hereinafter described as the "Density Control" method.

SD3.05

ORDINARY COMPACTION (outside of Roadway Pavement)

- A. When the "Ordinary Compaction" method is specified, the following provisions shall govern: Each layer shall not exceed eight (8) inches of loose depth, and shall be compacted until there is no evidence of further compaction. Prior to and in conjunction with the rolling operation, each layer shall be brought to the moisture content ordered by the Representative of the City, and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

SD3.06

DENSITY CONTROL

- A. When the "Density Control" method compaction is specified, each layer shall be compacted to the required density by any method, type and size of equipment which will give the required compaction. The depth of layers, prior to compaction, shall depend upon the type of sprinkling and compacting equipment used. However, maximum depth 16-inches loose and 12-inches compacted shall not be exceeded unless approved by a representative of the City. Prior to and in conjunction with the rolling operation, each layer shall be brought to the moisture content necessary to obtain the required density and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

- B. For each layer of earth embankment and select material, it is the intent of this specification to provide the density as required herein, unless otherwise shown on the Plans. Swelling soils (soils with plasticity index (PI) of 20 or more) shall have a density of not less than 95% nor more than 102 % of density as determined by Tex-114-E, with moisture content not less than optimum. Non-swelling soils (soils with plasticity index (PI) less than 20) shall have a density of not less than 95% of density as determined by Tex-114-E at $\pm 3\%$ of the optimum moisture content. Determination of the plasticity index shall be the responsibility of the Contractor or Developer. Field density determinations (Tex-114-E) will be taken every 2000 square yards of roadbed surface at the Contractor's expense.
- C. After each layer of earth embankment or select material is complete, tests will be required. If the material fails to meet the density specified, the course shall be reworked as necessary to obtain specified density. Such procedure shall be determined by, and subject to, the approval of the Representative of the City.
- D. The subgrade shall be tested by proof rolling in conformity with Texas Department of Transportation, Item 216, "Rolling (Proof)" in the Standard Specifications for Construction of Highways, Streets and Bridges prior to placement of the first course of flexible base material.
- E. Should the subgrade, due to any reason or cause, lose the required stability, density or finish before the pavement structure is placed, it shall be recompact and refinished at the sole expense of the Contractor. Excessive loss of moisture in the subgrade shall be prevented by sprinkling, sealing or covering with a subsequent layer or granular material. Excessive loss of moisture shall be construed to exist when the subgrade soil moisture content is more than three (3) percent below the optimum for compaction ratio density.

SD3.07

ROCK EMBANKMENTS

- A. Rock Embankments shall be defined as those composed principally of rock, and shall be constructed of accepted material from approved sources.
- B. Except as otherwise specified, rock embankments normally shall be constructed in successive layers for the full width of the individual roadway cross section and of 18-inches or less in depth.
- C. The maximum dimension of any rock used in embankment shall be less than the depth of the embankment layer. All oversized rock which is otherwise suitable for construction shall be broken to the required dimensions and utilized in embankment construction where proposed by Plans.
- D. Unless otherwise provided, the upper or final layer of the embankment shall contain no stones larger than four (4) inches in their greatest dimension, and, insofar as such is available by selection from the excavation, shall be composed of material so graded that the density and uniformity of the surface layer may be secured by the methods and requirements as set forth for "Ordinary Compaction" or "Density Control" method.
- E. When the "Ordinary Compaction" method of compaction is specified, each embankment layer shall be rolled as directed, and where the embankment materials require, shall be sprinkled when and to the extent directed by the Representative of the City.
- F. When the "Density Control" method of compaction is specified, each layer shall be compacted to the required density as outlined for "Earth Embankment", except in those layers where rock will make density testing difficult, the Representative of the City may require the layer to be proof rolled to insure proper compaction.

SD3.08

AT CULVERTS AND BRIDGES

- A. Embankments adjacent to culverts and bridges which cannot be compacted by use of the blading and rolling equipment used in compacting and adjoining sections of embankment shall be compacted in the manner prescribed under Specification Section G9- STRUCTURAL EXCAVATION and Specification Section G4- PIPE EXCAVATION, TRENCHING, EMBEDMENT, ENCASEMENT AND BACKFILLING.
- B. Embankments placed around spill-through type abutments, shall be constructed in six (6)-inch loose layers of uniform suitable material placed in such manner as to maintain approximately the same elevation on

each side of the abutment, and all materials shall be mixed, wetted and compacted as specified above.

- C. As a general rule, embankment material placed adjacent to any portion of any structure and in the first two (2) layers above the top of any culvert or similar structure shall be an earth, free of any appreciable amount of gravel or stone particles more than four (4) inches in greatest dimension and of such gradation as to permit thorough compaction. When, in the opinion of the Representative of the City, such material is not readily available, the use of rock or gravel mixed with earth will be permitted, in which case no particles larger than 12-inches in greatest dimension and six (6) inches in least dimension may be used and the percentage of fines shall be sufficient to fill all voids and insure a uniform and thoroughly compacted mass of proper density.

SD3.09

SELECTION OF MATERIALS

- A. In addition to the requirements in the excavation items of the specifications covering the general selections and utilization of materials to improve the roadbed, embankments shall be constructed in proper sequence to receive the select material layers shown on the plans, with such modifications as may be directed by the Representative of the City. The layer of embankment immediately preceding the upper layer of select material shall be constructed to the proper section and grade within a tolerance of not more than 0.10 foot from the established section and grade when properly compacted and finished to receive the select material layer.

NOTE: ALL UNDERGROUND UTILITIES SHALL BE INSTALLED PRIOR TO ANY LIME TREATMENT OR FLEXIBLE BASE PLACEMENT.

NOTE: Bluetops will be set on the center, crown, and back of curb of the streets or roads every 50-foot station. These grade stakes will be to finished grade and visible for inspection before flexible base is applied.

SD3.10

PAYMENT

- A. No separate payment will be made for work performed in accordance with this specification, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION SD4 – FLEXIBLE BASE

(Crushed Stone)

SD4.01 SCOPE OF WORK

- A. This specification covers the requirements for the use of “Flexible Base (Crushed Stone)” for this project.

SD4.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer for approval, technical product literature including binding material, additives, aggregate source, aggregate type, aggregate gradation and all other pertinent data to illustrate conformance to the specification found within.

SD4.03 GENERAL

- A. “Flexible Base (Crushed Stone)” shall consist of a foundation course for surface course or for other base courses; shall be composed of crusher-run broken stone; and shall be constructed as herein specified in one or more courses in conformity with the typical sections shown on Plans and to the lines and grades as established by the Plans.

SD4.04 MATERIAL

- A. The material shall be crushed and shall consist of durable particles of stone mixed with approved binding material. The material source shall be approved by the Representative of the City, and conform to the requirements as follows:
- B. When properly slaked and tested by standard Texas Department of Transportation laboratory methods, the flexible base material shall meet the following requirements:
- C. Physical requirements

- a. General. All types shall meet the physical requirements for the specified grade(s) as set forth in Table 1.

Additives, such as, but not limited to, lime, cement or fly ash, shall not be used to alter the soil constants or strengths shown in Table 1, unless otherwise shown on the Plans.

Unless otherwise shown on the Plans, the base material shall have a minimum Bar Linear Shrinkage of two (2) percent as determined by Test Method Tex-107-E, Part II.

- b. The flexible base shall be:
1. Type A. Type A material shall be crushed stone produced from oversized quarried aggregate, sized by crushing and produced from a naturally occurring single source. Crushed gravel or uncrushed gravel shall not be acceptable for Type A material. No blending of sources and/or additive materials will be allowed in Type A material.

TABLE 1
PHYSICAL REQUIREMENTS

Grade 1	
Triaxial Class 1: Min. compressive strength, psi: 45 at 0 psi lateral pressure and 175 at 15 psi lateral pressure	
Master Grading	
1- ³ / ₄ "	0
⁷ / ₈ "	10-35
³ / ₈ "	30-50
No. 4	45-65
No. 40	70-85

Grade 1	
Max LL.....	35
Max PI.....	10
Wet Ball Mill	
Max	40
Max increase in passing	
No. 40	20

1. Gradation requirements are percent retained on square sieves.
2. When a magnesium soundness value is shown on the Plans the material will be tested in accordance with Test Method Tex-411-A.

Sieve Analysis	Tex-110-E
Moisture-Density Determination	Tex-113-E
Roadway Density	Tex-115-E
Wet Ball Mill	Tex-116-E
Triaxial Tests (Part I or II as selected by the Engineer)	Tex-117-E
Particle Count	Tex-460-A, Part I

Samples for testing the base material for triaxial class, soil constants, gradation and wet ball mill will be taken prior to the compaction operations.

SD4.05 TOLERANCES

- A. The limits establishing reasonably close conformity with the specified gradation and plasticity index are defined by the following:
- B. The City may accept the material, providing not more than two (2) out of 10 consecutive gradation tests performed are outside the specified limit on any individual or combination of sieves by no more than five (5) percent and where no two (2) consecutive tests are outside the specified limit.
- C. The City may accept the material providing not more than 2 out of 10 consecutive plasticity index samples tested are outside the specified limit by no more than two (2) points and where no two (2) consecutive tests are outside the specified limit.

SD4.06 CONSTRUCTION METHODS

- A. Preparation of Subgrade
 1. The roadbed shall be excavated and shaped in conformity with the typical sections, lines and grades as shown on the Plans. All unstable or otherwise objectionable material shall be removed from the subgrade and replaced with approved material. All holes, ruts and depressions shall be filled with approved material, and if required, the subgrade shall be thoroughly wetted with water and reshaped and rolled to the extent directed in order to place the subgrade in an acceptable condition to receive the base material. The surface of the subgrade

shall be finished to line and grade as established and in conformity with the typical section shown on the Plans, and any deviation in excess of 1/2-inch in cross section and in a length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of work.

B. First Course

1. Immediately before placing the base material, the subgrade shall be checked as to conformity with grade and section.
2. The material shall be delivered in approved vehicles of a uniform capacity and it shall be the charge of the Contractor that the required amount of specified material shall be delivered in each 100-foot station. Material deposited upon the subgrade shall be spread and shaped the same day unless otherwise directed by the City in writing. In the event inclement weather or other unforeseen circumstances render impractical the spreading of the material during the first 24-hour period, the material shall be scarified and spread as directed by the City. The material shall be sprinkled, if directed, and shall then be bladed, dragged and shaped to conform to typical sections as shown on the Plans. The base layer shall be constructed in lifts not exceeding six (6) inches compacted thickness with each course being of equal thickness. All areas and "nests" of segregated coarse or fine material shall be corrected or removed and replaced with well graded material, as directed by the City.
3. The course shall be compacted by the method of compaction hereinafter specified as the "Density Control" method of compaction.
 - a. The course shall be sprinkled as required and compacted to the extent necessary to provide not less than the percent density as hereinafter specified under "Density". In addition to the requirements specified for density, the full depth of flexible base shown on the Plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section of flexible base is completed, density tests shall be taken every 750 square yards of roadbed surface or every 250 linear feet, whichever is the least. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical section shown on the Plans and to the established lines and grades. In that area on which pavement is to be placed, any deviation in excess of 1/4-inch in cross section and in a length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and recompacting by sprinkling and rolling. Should the base course, due to any reason or cause, lose the required stability, density and finish before the surfacing is complete, it shall be recompacted and refinished at the sole expense of the Contractor. The base material shall be placed at the optimum moisture contents to $\pm 3\%$.

C. Succeeding Courses

1. Construction methods shall be the same as prescribed for the first course.

D. Density

1. When the "Density Control" method of compaction is used, each course of flexible base shall be compacted to the percent density indicated below. The testing will be as outlined in TEX 113E. It is the intent of this specification to provide in that part of the base included in the flexbase section as shown on the Plans immediately below the finished surface of the roadway, not less than 100 percent of the density as determined by the compaction ratio method. Field density determination shall be made in accordance with approved methods.

SD4.07

NOTES

- A. Invoices showing total amount of flexible base delivered to each street or road shall be furnished to the City before asphalt is applied.
- B. Bluetops will be set on the center, crown and back of curb of the streets or roads every 50-foot station or sufficient to maintain line and grade. These grade stakes will be to finished grade and visible for inspection before asphalt is applied.

SD4.08

PAYMENT

- A. Payment for furnished and installed flexible base shall be paid according to the unit price per square yard in the proper item of the Proposal and Bid Schedule.
- B. All work and materials to complete the installation of flexible base shall be subsidiary to this item.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION SD5 - STRIPING

SD5.01 SCOPE OF WORK

- A. This specification covers the requirements for furnishing and installing pavement markings as shown on the Plans and specified within.

SD5.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including material type, test data, and all other pertinent data to illustrate conformance to the specification found within.

SD5.03 MATERIALS

- A. All pavement markings shall be thermoplastic type materials that require heating to elevated temperatures for application. They shall conform to Texas Department of Transportation Materials Specification D-9-8220. Each container of thermoplastic material shall be clearly marked to indicate the color, weight, type of material, Manufacturer's name and the lot/batch number.

SD5.04 STREET SIGNS

- A. All signage sheeting shall be high intensity or better. All signage posts shall be 2.375" OD x .095" thin wall steel tubing. All signs shall have breakaway foundations. All signage shall meet the current edition of TMUTCD.

SD5.05 EQUIPMENT

- A. All equipment used to place pavement markings shall be maintained in a satisfactory condition. The equipment shall be able to place markings at a rate that will produce a uniform product meeting all the requirements set within item 666 of the standard specifications for Construction of Highways, Streets and Bridges. It shall be capable of placing linear markings up to eight (8) inches in width in a single pass and able to place a center line and no passing barrier line configuration of one (1) broken line with two (2) solid lines at the same time to the alignment and spacing shown on the Plans. Equipment shall be capable of placing lines with clean edges of a uniform cross section within a tolerance of $\frac{1}{8}$ of an inch per four (4) inches width of marking. It shall have an automatic cut-off device with manual operating capabilities to provide clean, reasonably square marking ends to the satisfaction of the Engineer or the City and provide a method of applying broken line in an approximate stripe-to-gap ratio of 10 to 30. The length of the stripe shall not be less than 10-feet or more than 10.5-feet. The total length of any stripe-gap cycle shall not be less than 39.5-feet or more than 40.5-feet. It shall provide a continuous mixing and agitation of the pavement marking material. The use of pans, aprons or similar appliances will not be permitted for longitudinal striping applications. Beads shall be applied by an automatic bead dispenser that is attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly as the marking is placed on the pavement surface. The bead dispenser shall have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment. A hand held thermometer shall be kept on the project during the placement of pavement markings capable of measuring the temperature of the pavement marking material.

SD5.06 CONSTRUCTION METHODS

- A. Pavement marking shall be applied with an approximate stripe-to-gap ratio of 10 to 30 when the application is broken line striping. The length of the broken stripe shall not be less than 10-feet nor more than 10.50-feet. The total length of any stripe-gap cycle shall not be less than 39.50-feet nor more than 40.50-feet.
- B. With prior approval from the City of Georgetown, pavement markings may be placed on roadways open to traffic. When markings are to be placed under traffic, a minimum of interference to the operation of the traffic flow shall be maintained. Traffic control shall be maintained as shown on the

approved Traffic Control Plan. All markings placed under open-traffic conditions shall be protected from traffic damage and disfigurement.

- C. The deviation rate in pavement marking alignment shall not exceed one (1) inch per 200-feet of roadway and the maximum deviation shall not exceed two (2) inches nor shall any abrupt deviations be acceptable.
- D. Markings shall have a uniform cross section. The density and quality of the markings shall be uniform throughout their thickness. The applied markings shall have no more than five (5) percent, by area, of holes or voids and shall be free of blisters.
- E. Markings shall be reflectorized both internally and externally. Glass beads shall be applied to the materials at a uniform rate sufficient to achieve uniform and distinctive retroreflective characteristics when observed in accordance with Test Method Tex-828-B.
- F. Pavement markings that are not in alignment or sequence, as shown on the Plans or Standards, shall be removed and replaced at the sole expense of the Contractor.

SD5.07

SURFACE PREPARATION

- A. New Portland cement concrete surfaces shall be cleaned to remove curing membrane, dirt, grease, loose and/or flaking existing construction markings and other forms of contamination.
- B. Older Portland cement concrete surfaces and asphalt surfaces that exhibit loose and/or flaking existing markings shall be cleaned to remove all loose and flaking markings.
- C. All pavement on which pavement markings are to be placed shall be completely dry.

SD5.08

APPLICATION

- A. Unless otherwise shown on the Plans, Portland cement concrete surfaces and asphaltic surfaces that are three (3) years old or older shall be sealed by the use of paint type striping. The paint type markings shall be placed a minimum of two (2) and a maximum of 30 calendar days in advance of placing the thermoplastic type pavement markings. If the paint type markings become dirty for any reason prior to placing the thermoplastic type markings, they shall be cleaned by washing, brushing, compressed air or other means approved. The pavement and paint type marking shall both be thoroughly dry before any thermoplastic type markings are placed. The color of the paint type markings shall be the same as the thermoplastic type markings.
- B. Pavement markings shall not be applied when the temperature and moisture limitations are beyond the Manufacturer's recommendation. The minimum thickness for thermoplastic markings shall be 0.060-inches (60-mil) for edgeline markings and 0.090-inches (90-mil) for stop bars, legends, symbols, gore and centerline/no passing barrier line markings, when measured in accordance with Test Method Tex-854-B. The maximum thickness of all thermoplastic type markings shall be 0.180-inches (180 mil).
- C. All markings which do not meet the specifications found within or are not satisfactory to the striping plan, installation of the markings, or do not meet the requirements of the project, shall be removed and replaced at the sole expense of the Contractor. In the event that damage is done to the pavement surface in the replacement operation, the damage shall be corrected to the satisfaction of the City at the sole expense of the Contractor.

SD5.09

MEASUREMENT AND PAYMENT

- A. Payment for furnished and installed pavement markings shall be paid according to the unit price per linear foot in the proper item of the Proposal and Bid Schedule.
- B. All work and materials to complete the pavement markings shall be subsidiary to this item.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION SD6 –STORM SEWER MANHOLES

SD6.01 SCOPE OF WORK

- A. This specification covers the requirements to install precast concrete storm sewer manholes, frames and covers, and appurtenances as shown on the Plans and as specified herein.

SD6.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, shop drawings, product data, materials of construction, and details of installation shall be submitted in accordance with Section CIP10- SUBMITTALS. Submittals shall include the following: base sections, riser sections, eccentric conical top sections, flat slab tops, grade rings with notarized certificate indicating compliance with ASTM C478, pipe connection to manhole, manhole frame and cover with notarized certificate indicating compliance with ASTM A48, Class 30, method of repair for minor damage to precast concrete sections, manhole lining system.

B. Design Data

1. Precast concrete structures:

- a. Six (6) copies of sectional plan(s) and elevations showing dimensions and reinforcing steel placement.
- b. Six (6) copies of concrete design mix.

C. Test Reports

1. Precast concrete structures: Six (6) copies of concrete test cylinder reports from an approved testing laboratory certifying conformance with specifications.

SD6.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A48 - Specification for Gray Iron Castings.
2. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. ASTM C33 - Specification for Concrete Aggregates.
4. ASTM C150 - Standard Specification for Portland Cement.
5. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
6. ASTM D4101 - Specification for Propylene Plastic Injection and Extrusion Materials.

B. American Concrete Institute (ACI)

1. ACI 318 - Building Code Requirements for Reinforced Concrete.
2. ACI 350R - Concrete Sanitary Engineering Structures.

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

1. Standard Specifications for Highway, Streets and Bridges.

- D. Occupational Safety and Health Administration (OSHA)
- E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

SD6.04

QUALITY ASSURANCE

- A. All material shall be new and unused.
- B. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by Engineer or other City representative. Inspection may be made at place of Manufacture, at work site following delivery, or both.
- C. Materials will be examined for compliance with ASTM specifications, these Specifications and approved Manufacturer's drawings. Additional inspection criteria shall include: appearance, dimensions(s), blisters, cracks and soundness.
- D. Materials shall be rejected for failure to meet any Specification requirement. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no cost to City.
- E. Repair minor damage to precast concrete sections by approved method, if repair is authorized by Engineer or the City.

SD6.05

PRODUCTS

- A. Reference to a Manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials/equipment shall be the end products of one Manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and Manufacturer's service.
- C. Provide lifting lugs or holes in each precast section for proper handling.

SD6.06

PRECAST CONCRETE MANHOLE SECTIONS

- A. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478 and meet the following requirements:
 - 1. Bottom slab thickness shall be 12-inches.
 - 2. Top section shall be flat slab with a minimum clear opening of 32 ⁷/₈-inches diameter.
 - 3. Base, riser and transition top sections shall have tongue and groove joints.
 - 4. Sections shall be cured by an approved method.
 - 5. Precast concrete sections shall be shipped after concrete has attained 3,000 psi compressive strength.
 - 6. Design precast concrete base, riser, transition top, flat slab top and grade ring for a minimum HS-20 loading plus earth load. Calculate earth load with a unit weight of 130 pounds per cubic foot.
 - 7. Mark date of manufacture, name and trademark of Manufacturer on the inside of each precast section.
 - 8. Construct and install precast concrete base as shown on the Plans.

9. Provide integrally cast knock-out panels in precast concrete manhole sections at locations, and with sizes shown on Plans. Knock-out panels shall have no steel reinforcing.
- B. Manhole diameter shall be as shown on the Plans, but not less than the diameter of the largest connecting pipe plus two (2) feet.
 - C. Pipe Sections: Pipe sections shall conform to current specifications for Precast Reinforced Manhole Sections, ASTM Designation C478, with the following additions:
 1. Pipe shall be machine made by a process which will provide for uniform placement of zero slump concrete in the form and compaction by mechanical devices which will assure a dense concrete in the finished product.
 2. Aggregates for the concrete shall consist of limestone aggregates in the proportion of at least 75% by weight of the total aggregates.
 3. Minimum wall thickness for the manhole risers shall be as listed under Wall "B" in the "Class Tables" of ASTM C76 for Class III pipe.
 - D. Joints: Joints shall conform to the joint specifications in ASTM C478, C76, and ASTM C443. All manhole sections, including the bottom section, shall be furnished with "O-ring" type rubber gasket joints. The joints shall be furnished and installed with the bell down to resist groundwater infiltration. All joints shall be sealed with mortar or an approved non-shrink grout on the inside and the outside of the manhole. Grade rings shall be mortared to each other and on the inside and outside to provide a waterproof seal.
 - E. Manhole Steps: Unless specifically approved by the City, manhole steps shall not be provided.

SD6.07

MANHOLE FRAME AND COVER

- A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30.
- B. Manhole covers shall have a diamond pattern, pickholes and the words STORM SEWER as appropriate cast in three (3) inch letters. Manhole frame and covers shall be Neenah Foundry, Western Iron Works, Vulcan Foundry, or equal. Model numbers refer to Western Iron works products:
 1. Manhole Frame and cover - WRM-36.

SD6.08

JOINTING PRECAST MANHOLE SECTIONS

- A. Seal tongue and groove joints of precast manhole sections with rubber "O"-ring gasket. O-ring gasket shall conform to ASTM C443.
- B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

PIPE CONNECTIONS TO MANHOLEA. Connect pipe to manhole in the following ways:

1. Flexible sleeve - Integrally cast sleeve in precast manhole section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion. Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.
2. Compression gasket - Integrally cast compression gasket in precast manhole section. Insert pipe into compression gasket. Compression gasket shall be A-Lok, or equal.

INSTALLATIONA. Manhole Installation

1. Manholes shall be constructed to the dimensions shown on the Plans and as specified herein. Protect all work against flooding and flotation.
2. Place manhole base on a bed of screened gravel eight (8) inches in depth as shown on the Plans. Set manhole base so that a maximum grade adjustment of eight (8) inches is required to bring the manhole frame and cover to final grade.

Use precast concrete grade rings to adjust manhole frame and cover to final grade.

3. Set precast concrete barrel sections plumb with a $\frac{1}{4}$ -inch maximum out of plumb tolerance allowed. Seal joints of precast barrel sections with either a rubber "O" ring set in a recess or preformed flexible joint sealant in sufficient quantity to fill 75 percent of the joint cavity. Fill the outside and inside joint with non-shrink mortar and finished flush with the adjoining surfaces. Caulk the inside of any leaking barrel section joint with non-shrink grout to the satisfaction of the Engineer and the City.
4. Allow joints to set for 14 hours before backfilling unless a shorter period is specifically approved by the Engineer or the City.
5. Plug holes in the concrete barrel sections required for handling with a non-shrinking grout or non-shrinking grout in combination with concrete plugs. Finish flush on the inside.
6. Core holes in precast sections to accommodate pipes prior to setting manhole sections in place to prevent jarring which may loosen the mortar joints.
7. Backfill carefully and evenly around manhole sections.

B. Manhole Pipe Connections: Construct manhole pipe connections, including pipe stubs, as specified above. Close or seal pipe stubs for future connections with a gasketed watertight plug.

C. Setting Manhole Frame and Cover: Set manhole covers and frames in a full mortar bed. Utilize precast concrete grade rings, a maximum of eight (8) inches thick, to assure frame and cover are set to the finished grade. Set manhole frame and cover to final grade prior to placement of permanent paving.

TESTS

- A. Test each manhole in accordance with Section CIP12- TESTING OF PIPELINES AND MANHOLES. Engineer or the City's representative shall observe each test.

SD6.12

CLEANING

- A. Thoroughly clean all new manholes of all silt, debris and foreign matter of any kind, prior to final inspections.

SD6.13

PAYMENT

- A. Payment for furnished and installed manholes shall be paid according to the unit price per each in the proper item of the Proposal and Bid Schedule.
- B. All work and materials to complete the reinforced concrete pipe including but not limited to excavation, bedding, backfill, connection to pipe, etc. shall be subsidiary to this item.

END OF SECTION

WATER SPECIFICATIONS

SECTION W

TECHNICAL SPECIFICATIONS

SECTION W1 – DUCTILE IRON PIPE AND FITTINGS

W1.01 SCOPE OF WORK

- A. This specification covers the requirements to furnish and install ductile iron pipe and ductile iron pipe fittings including bracing, pipe laying, jointing, testing, blocking, and any other work that is required or necessary to complete the installation as shown on the Plans and as specified herein.

W1.02 SUBMITTALS

- A. Within 30 days of the Notice to Proceed, the Contractor shall submit to the Engineer for approval, technical product literature including the name of the pipe and fitting suppliers and a list of materials to be furnished, completely detailed working drawings and schedules of all ductile-iron pipe and fittings required, prior to each shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.

W1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.
- B. American Water Works Association (AWWA)
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pressure Pipe and Fittings.
 2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
 3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3-inch Through 48-in for Water and Other Liquids.
 4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 5. AWWA C115 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.
 6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids.
 7. AWWA C153 - Ductile-Iron Compact Fittings, 3-inch Through 16-inch for Water and Other Liquids.
 8. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.
 9. AWWA C651 - Disinfection Water Mains
- C. American National Standards Institute (ANSI)
1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

W1.04 QUALITY ASSURANCE

- A. All ductile-iron pipe and fittings shall be from a single Manufacturer. All ductile-iron pipe to be installed under this Contract may be inspected at the foundry for compliance with these Specifications by an independent testing laboratory provided by the City. The Contractor shall require the Manufacturer's cooperation in these inspections. The cost of foundry inspection of all pipe approved for this Contract, plus the cost of inspection of disapproved pipe will be borne by the Contractor.
- B. Inspection of the pipe will be made by the Engineer or other representatives of the City after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job.

W1.05

MATERIALS

- A. Ductile iron pipe shall conform to AWWA C151, be manufactured from metal having a minimum tensile strength of 60,000 psi, a minimum yield strength of 42,000 psi, and a minimum elongation of 10 percent (60–42–10), and be provided in the following minimum pressure classes:
 - 1. 12-inch and smaller, Class 350.
 - 2. 14-inch through 20-inch, Class 250.
 - 3. 24-inch, Class 200.
 - 4. 30-inch and larger, Class 150.
- B. Ductile iron fittings shall conform to AWWA C110 or C153.
- C. All pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively. All pipe and fittings shall be cement-mortar lined and seal coated in accordance with AWWA C104. Cement mortar lining shall be double thickness.
- D. Ductile iron pipe with push-on or mechanical joints shall be centrifugally cast pipe in accordance with AWWA C150 and C151.
- E. Restrained joints shall be restrained push-on joints, TR Flex by U.S. Pipe and Foundry; Lok-Fast by American Cast Iron Pipe Company, or equal. Joints shall be suitable for 250 psi working pressure and be fabricated of heavy section ductile iron casting. Bolts and nuts shall be low carbon steel conforming to ASTM A307, Grade B.
- F. Sleeve type couplings shall be of steel and shall be Style 38 by Dresser Manufacturing Division, Smith-Blair or equal. Couplings shall be furnished with black steel bolts and nuts and with pipe stop removed. Gaskets shall be of a material suitable for exposure to liquid within the pipe.

W1.06

POLYETHYLENE ENCASEMENT

- A. All buried ductile iron pipe and metallic fittings shall be encased with 8 mil, Type I, Grade E-1, polyethylene film conforming to AWWA C105. Class usage shall be:
 - 1. Class A - Natural Color where exposure to weather (including sunlight) is less than 48 hours total before burial.
 - 2. Class C - Black where exposure to weather (including sunlight) may be more than 48 hours.
- B. Exposure to weather shall be kept to a minimum, and in no case shall it exceed 10 days. The Class of polyethylene used shall be approved by the Engineer.
- C. Polyethylene encasement shall not be paid for separately, but the cost there of shall be included in the appropriate item of the Proposal and Bid Schedule.

W1.07

LAYING DUCTILE IRON PIPE AND FITTINGS

- A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, lining or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying and no piece shall be installed which is found to be defective. Any damage to the pipe linings or coatings shall be repaired as directed by the Engineer. Handling and laying of pipe and fittings shall be in accordance with the Manufacturer's instruction and as specified herein.
- B. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when laid, shall conform to the lines and grades required. Pipe shall not be laid unless the subgrade is free of water and in a satisfactory condition. Ductile iron pipe and fittings shall be installed in accordance with the requirements of AWWA C600 except as otherwise provided herein. All piping on this project regardless of size or class shall be placed in the embedment as shown on the detail sheets in the Plans. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his own expense.
- C. All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed that recommended by the Manufacturer. Fittings, in addition to those shown on the Plans, shall be provided, if required, for crossing utilities which may be encountered upon opening the trench. Solid sleeves shall be used only where approved by the Engineer and the City.
- D. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be joined with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall be undamaged.
- E. Joints shall be protected by eight (8) mil. Polyethylene film prior to placing concrete. Concrete shall be placed against undisturbed material, and shall not cover joints, bolts or nuts, or interfere with the removal of any joint.

W1.08

PUSH-ON JOINTS

- A. Push-on joints shall be made in accordance with AWWA C111 and the Manufacturer's instructions. Pipe shall be laid with bell ends in the direction of trenching. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe to be laid shall then be aligned and inserted in the bell of the pipe to which it is to be joined and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

W1.09

MECHANICAL JOINTS

- A. Mechanical joints shall be made in accordance with Appendix "A" of AWWA C111 and the Manufacturer's instructions. Thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Bolts shall be tightened to the specified torque. Under no conditions shall extension wrenches or pipe over the handle of ordinary ratchet wrench be used to secure greater leverage.

W1.10

RESTRAINED JOINTS

- A. Restrained joints shall be installed where shown on the Plans. The joint assemblies shall be made in accordance with the Manufacturer's recommendations.

W1.11

SLEEVE TYPE COUPLINGS

- A. Couplings shall be installed where shown on the Plans. Couplings shall not be assembled until adjoining push-on joints have been assembled. After installation, apply a heavy bitumastic coating to bolts and nuts.

W1.12

POLYETHYLENE ENCASEMENT

- A. The polyethylene encasement shall be installed in accordance with either method specified in AWWA C105.

W1.13

CONCRETE AND BLOCKING

- A. 2,500 psi concrete shall be placed for blocking at each change in direction in the pipeline, in such manner as will substantially brace the pipe against undisturbed trench walls. Concrete blocking, made from Type I cement, shall have been in place four (4) days prior to testing the pipeline as hereinafter specified. Test may be made in two (2) days after completion of blocking if Type III cement is used.
- B. At all points where wet connections are made to existing lines, the existing lines shall be adequately blocked and the tapping connection fittings shall be supported by blocking up to the spring line with 2,500 psi concrete.
- C. Concrete blocking will not be measured or paid for as a separate item but the cost thereof shall be included in the proper items listed in the Proposal and Bid Schedule.

W1.14

CLEANING

- A. At the conclusion of the work thoroughly clean all of the new pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. If obstructions remain after this cleaning, the obstructions shall be removed.

W1.15

CONNECTIONS AND APPURTENANCES

- A. The Contractor shall make the alterations and the necessary connections to existing water mains as shown on the Plans. Such connection shall be made at such time and in a manner approved by the City; in each case, when the work is started, it shall be prosecuted expeditiously and continuously until completed.
- B. Fittings, bends, plugs and valves shall be of standard manufacture and mechanical joint type to fit AWWA pipe specifications in Classes A, B, C and D, unless otherwise shown on the Plans.
- C. Payment for fittings and gate valves shall be restrained and shall be made separately under the appropriate bid items listed in the Proposal and Bid Schedule.

W1.16

LEAKAGE TESTING AND STERILIZATION

- A. All Ductile Iron Pipe shall be leak tested and sterilized according to Section CIP12 – TESTING OF PIPELINES.

PAYMENT

- A. The pipeline, complete in place, including cleanup, will be measured for payment in linear feet along the centerline of the pipe actually installed. Measurement shall be through all fittings, specials, valves, etc., and no deduction in length shall be made for such appurtenances. Installation of the pipeline will be paid for at the unit contract price per linear foot as provided in the Proposal and Bid Schedule.
- B. Payment of the unit contract price for the items of work performed shall be the total compensation for furnishing all labor, materials, tools, equipment and incidentals and performing all work that is necessary for the installation, testing, and sterilization of the pipe, fittings, connections, blocking, embedment or placing in encasement pipe and all other appurtenances in accordance with the Plans and the provisions of the Specifications.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION W2 – POLYVINYL CHLORIDE (PVC) PIPE-WATER

W2.01 SCOPE OF WORK

- A. This specification covers the requirements to install polyvinyl chloride (PVC) water pipe and ductile iron fittings for the water line, including excavation, sheeting, shoring, dewatering, pipe laying, jointing, testing, backfilling and any other work that is required or necessary to complete the installation as shown on the Plans and as specified herein.

W2.02 SUBMITTALS

- A. Within 30 days of the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the name of the pipe and fittings suppliers, a list of materials to be furnished, shop drawings and schedules of all PVC pipe and fittings required, prior to each shipment of pipe, submit certified test reports that the pipe for this Contract was Manufactured and tested in accordance with the ASTM Standards specified herein.

W2.03 QUALITY ASSURANCE

- A. All PVC pipe and fittings shall be from a single Manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM D3034 or ASTM F789 and/or ASTM F758 as applicable. In addition, all PVC pipe to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the City. The Contractor shall require the Manufacturer's cooperation in these inspections. The cost of plant inspection of all pipe approved for this Contract, plus the cost of inspection of disapproved pipe, will be borne by the Contractor.
- B. Inspections of the pipe may also be made by the Engineer or other representatives of the City after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job at once.

W2.04 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. Polyvinyl chloride pipe for water lines, unless otherwise specifically shown on the Plans, or approved in writing, shall be AWWA C900, C905, or C909 Class 150 psi with a dimension ratio of 18 (DR-18), for water lines and shall be extruded, be of rubber gasket type, and be furnished in 20-foot nominal laying lengths. All such pipe shall bear a mark denoting approval by the Underwriters' Laboratories of Chicago, Illinois, so that it will be acceptable to the Texas State Fire Insurance Commission for use in fire protection lines without penalty. All joints shall be of the type which provides a recession in the bell for the employment of a single rubber gasket to be placed before the insertion of the succeeding spigot. Each size of polyvinyl chloride pipe shall have the same outside diameter as the corresponding size of cast iron pipe.
- B. Fittings shall be ductile iron, mechanical joint or flanged type and shall be Class 250 in accordance with AWWA Specifications C110-77, C-111-80, and C115-75. Flanges shall be faced and drilled in accordance with ASA Standard B16.1, Class 125 unless otherwise shown on the Plans or in the Special Conditions. All fittings shall be tar coated on the outside surface and shall have an interior cement lining with seal coat per AWWA Specifications C104-80 unless otherwise shown or specified.
- C. The Contractor shall obtain installation instructions, including support spacing and solvent welding, from the supplying Manufacturer, shall comply with the instructions, and shall meet the requirements of ASTM D-2855, Standard Recommended Practice for making Solvent Cemented Joints with PVC Pipe and Fittings. The PVC solvent cement shall comply with ASTM D-2564 and shall be furnished by the pipe and fitting Manufacturer for the class and type of pipe supplied to the project.

HANDLING AND CUTTING PIPE

- A. Pipe and fittings are slightly brittle. Care shall be taken in shipping, handling and laying to avoid damaging the pipe and fittings. Extra care will be necessary during cold weather construction.
- B. Any pipe or fitting showing a crack or which has received a blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- C. All pipe ends shall be square after cutting.
- D. While stored, pipe shall be adequately supported from below at not more than three (3) foot intervals to prevent deformation. Pipe shall not be stacked higher than six (6) feet. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures and out of direct sunlight. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

JOINTING POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. PVC pipe and fittings shall be jointed in accordance with the recommendations of the latest ASTM Standards and detailed instructions of the Manufacturer.

INSTALLING POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. Unless otherwise specified on the Plans, polyvinyl chloride pipe shall be installed to clear all utility lines and shall have three (3) feet minimum cover. For water lines to be constructed under a future roadway, the cover may be increased to allow for future paving grades. The depth of cover, where shown on the Plans, is that distance from the top of the pipe to the approximate proposed grade line.
- B. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than $\frac{1}{16}$ -inch per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the Manufacturer shall be explicitly followed.
- C. Any pipe or fittings discovered to be defective after laying shall be removed and replaced with a sound piece.
- D. The Engineer or the City may examine each bell and spigot end to determine whether any preformed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such, and immediately removed from the job site.
- E. All pipe shall be sound and clean before laying. When laying is not in progress, including lunch time, the open ends of the pipe shall be closed by watertight plugs or other approved means. Good alignment shall be preserved in laying.
- F. Pipe and fittings shall be installed in accordance with the instructions of the Manufacturer, ASTM D2321 and as specified herein. As soon as the excavation is complete to normal grade of the bottom of the trench, embedment material shall be placed, compacted and graded to provide firm, uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Plans. The specified embedment shall be accurately shaped and trimmed to receive the pipe barrel and each pipe section, when in place, shall have a uniform bearing on the subgrade for the full length of the pipe barrel. Pipe shall not be laid unless the subgrade is free of water and in a satisfactory condition. Embedment material shall be placed evenly on each side of the pipe to mid-diameter and hand tools shall be used to force the embedment material under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe. Embedment material shall then be placed to 12-inches above the top of the pipe. Next, the varying depths of select material backfill above the embedment material backfill shall be placed according to the Plan Details and carefully compacted. Generally, the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the

pipe until sufficient select material backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. Equipment used in compacting the varying depths of select material backfill shall be approved by the pipe Manufacturer's representative prior to use. Adjustments of the pipe to line and grade shall be made by scraping away or filling in with granular material, and not by wedging or blocking up the bell.

- G. Perforated PVC Pipe and fittings shall be installed in accordance with the instructions of the Manufacturer, ASTM F758 and as specified herein. As soon as the excavation for the trench is complete to normal grade of the bottom of the trench, geotextile fabric shall be laid and then the pea gravel bedding shall be carefully placed (so not to damage the geotextile fabric) and graded to provide uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. Before the perforated pipe is laid on the trench, the perforated pipe shall be wrapped around and closed according to the Manufacturer's closure recommendations with the geotextile fabric. The pipe shall be laid accurately to the lines and grades indicated on the Plans. Blocking under the perforated PVC pipe will not be permitted. Pea gravel shall be placed evenly on each side of the pipe to mid-diameter and hand tools shall be used to gently place the pea gravel under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe. Making sure not to damage the geotextile fabric, pea gravel shall then be carefully placed above the top of the perforated pipe varying from two to three (2-3) feet depending on the Plans. Once the remaining pea gravel has been placed, overlap or close the geotextile fabric according to the Manufacturer's recommendations or six (6) inches minimum overlap. Then one (1) foot of topsoil shall be placed over the pea gravel to the ground level with proper grass sodding on top.
- H. Joints shall not be "pulled" or "cramped". Each joint of pipe shall be completed in compliance with Manufacturer's recommendations.
- I. Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.
- J. Precautions shall be taken to prevent flotation of the pipe in the trench.
- K. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and backfill or embedment material. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, embedment material shall be placed to fill any voids created and the embedment material and backfill shall be recompacted to provide uniform side support for the pipe.

W2.08

CONCRETE AND BLOCKING

- A. 2,500 psi concrete shall be placed for blocking at each change in direction in the pipeline, as shown in the Standard Details and in such manner as will substantially brace the pipe against undisturbed trench walls. In no event shall this quantity of concrete blocking be less than those shown in the Plans. Concrete blocking, made from Type I cement, shall have been in place four (4) days prior to testing the pipeline as hereinafter specified. Tests may be made in two (2) days after completion of blocking if Type III cement is used.
- B. At all points where wet connections are made to existing lines, the existing lines shall be adequately blocked and the tapping connection fittings shall be supported by blocking up to the spring line with 2,500 psi concrete.
- C. Concrete blocking will not be measured or paid for as a separate item but the cost thereof shall be included in the various items listed in the Proposal and Bid Schedule.

W2.09

TESTING AND ALLOWABLE LEAKAGE

- A. All PVC pipe and fittings shall be leak tested and sterilized according to Section CIP12.05- TEST PROCEDURES FOR PRESSURE PIPELINES.

PAYMENT

- A. The pipeline, complete in place, including cleanup, will be measured for payment in linear feet along the centerline of the pipe actually installed. Measurement shall be through all fittings, specials, valves, etc., and no deduction in length shall be made for such appurtenances. Installation of the pipeline will be paid for at the unit contract price per linear foot as provided in the Proposal and Bid Schedule.
- B. Payment of the unit contract price for the items of work performed shall be the total compensation for furnishing all labor, materials, tools, equipment and incidentals and performing all work that is necessary for the installation, testing, and sterilization of the pipe, fittings, connections, blocking, embedment or placing in encasement pipe and all other appurtenances in accordance with the Plans and the provisions of the Specifications.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION W3 – VALVES, HYDRANTS AND APPURTENANCES

W3.01 SCOPE OF WORK

- A. This specification covers the requirements to provide all buried valves, valves in manholes and underground vaults, hydrants and appurtenances complete with actuators and all accessories as shown on the Plans and as specified herein.

W3.02 SUBMITTALS

- A. Within 30 days of the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including Manufacturer's literature, illustrations, specifications and engineering data which includes dimensions, size, materials of construction, weight, protection coating, and all other pertinent data to illustrate conformance to the specification found within. The Contractor shall also submit four (4) copies of all certified shop test results specified herein, complete operation and maintenance manuals including all copies of all approved shop drawings, and certificates of compliance where required by referenced standards: For each valve specified to be manufactured and/or installed in accordance with AWWA and other standards, submit an affidavit of compliance with the appropriate standards, including certified results of required tests, and certification of proper installation.

W3.03 REFERENCE STANDARDS

- A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. American Water Works Association (AWWA)
1. AWWA C515 - Gate Valves, three (3)-inch through 48-inch NPS, for Water and Sewage Systems.
 2. AWWA C502 - Dry-Barrel Fire Hydrants.
 3. AWWA C509 - Resilient-Seated Gate Valves, three (3) inch through 12-inch NPS, for Water and Sewage Systems.
- C. American National Standards Institute (ANSI)
1. ANSI B16.1 - Cast-Iron Pipe Flanges and Flanged Fittings.
 2. ANSI C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- D. American Society for Testing and Materials (ASTM)
1. ASTM A48 - Gray Iron Castings.
 2. ASTM A126 - Gray Iron Castings for Valves, Flanges and Pipe Fittings
 3. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 4. ASTM A276 - Standard Specification for Stainless and Heat Resisting Steel Bars and Shapes.
 5. ASTM A536 - Ductile Iron Castings.
- E. Steel Structures Painting Council (SSPC)
1. SSPC SP-6 - Commercial Blast Cleaning

- F. Where reference is made to one (1) of the above standards, the revision in effect at the time of bid opening shall apply.

W3.04

DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site to ensure uninterrupted progress of the work.
- B. Protect threads and seats from corrosion and damage. Rising stems and exposed stem valves shall be coated with a protective oil film which shall be maintained until time of use.
- C. Provide covers for all openings.
1. All valves three (3) inches and larger shall be shipped and stored on site until time of use with wood or plywood covers on each valve end.
2. All valves smaller than three (3) inches shall be shipped and stored as above except that heavy card board covers may be furnished instead of wood.
- D. Store equipment to permit easy access for inspection and identification. Any corrosion in evidence at the time of City acceptance shall be removed, or the valve shall be removed from the job.
- E. Store all equipment in covered storage off the ground.

W3.05

COORDINATION

- A. Review installation procedures under other Sections and coordinate with the work which is related to this Section including buried piping installation and site utilities.
- B. Contractor shall coordinate the location and placement of concrete thrust blocks when required.

W3.06

GENERAL

- A. All valves shall open counter-clockwise.
- B. The use of a Manufacturer's name and/or model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- C. Valves shall be of the size shown on the Plans or as noted, and as far as possible equipment of the same type shall be identical and from one Manufacturer.
- D. Valves shall have the name of the maker, nominal size, flow directional arrows, working pressure for which they are designed and standard to which they are manufactured cast in raised letters on some appropriate part of the body.
- E. Unless otherwise noted, valves shall have a minimum working pressure of 200 psi or be of the same working pressure as the pipe they connect to, whichever is higher, and suitable for the pressures noted where they are installed.
- F. Valves shall be of the same nominal diameter as the pipe or fittings they are connected to. Except as otherwise noted, joints shall be mechanical joints, with joint restraint where the adjacent piping is required to be restrained.
- G. Valves shall be constructed for buried service.

W3.07

VALVE BOXES

- A. All gate valves shall be provided with extension shafts (where the operating nut is greater than five (5) feet below grade), operating nuts and valve boxes as follows:

1. Extension shafts shall be steel and the operating nut shall be two (2) inches square. Shafts shall be designed to provide a factor of safety of not less than four (4). Operating nuts shall be pinned to the shafts.
2. Valve boxes shall be a heavy-pattern cast iron, three (3) piece, telescoping type box with dome base suitable for installation on the buried valves. Inside diameter shall be at least 5¼-inches. Barrel length shall be adapted to the depth of cover, with a lap of at least six (6) inches when in the most extended position. Covers shall be cast iron with integrally-cast direction-to-open arrow and "WATER" shall be cast in the cover when used on a water line or "SEWER" when used on a wastewater force main. Aluminum or plastic are not acceptable. A means of lateral support for the valve extension shafts shall be provided in the top portion of the valve box. The valve box lid shall be furnished with a pentagon-head bolt for locking.
3. The upper section of each box shall have a bottom flange of sufficient bearing area to prevent settling. The bottom of the lower section shall enclose the stuffing box and operating nut of the valve and shall be oval.
4. An approved operating key or wrench shall be provided.
5. All fasteners shall be Type 304 stainless steel.

W3.08

RESILIENT SEATED GATE VALVES

- A. Valves shall be manufactured in accordance with AWWA C509.

Acceptable Gate Valves are:

1. American Flow Control – Series 2500
2. Mueller – 2360 Series
3. Clow

- B. Valves shall be provided with a minimum of two (2) O-ring stem seals.
- C. Bonnet and gland bolts and nuts shall be either fabricated from a low alloy-steel for corrosion resistance or electroplated with zinc or cadmium. The hot-dip process in accordance with ASTM A153 is not acceptable.
- D. Wedges shall be totally encapsulated with rubber.
- E. Units shall be, in addition, UL and FM approved.
- F. Resilient wedge gate valves shall be furnished and installed in sizes and shall be manufactured in accordance with the latest AWWA C-509 and cast iron shall conform to the latest ASTM A-126 standards. Gate valves furnished under these specifications shall be of the solid wedge, resilient seat type with cast iron/ductile iron body and bronze stem designed for 250 pounds per square inch working pressure. All gate valves shall be tested hydrostatically to 400 pounds per square inch. Gate valves shall meet the latest AWWA standard specifications (C-509).
- G. The seat shall be made of Styrene Butadiene rubber and provide a positive water tight seal. The seat shall be permanently bonded or mechanically attached to the wedge with stainless steel screws. If bonded, ASTM P-429 requirements shall be followed. Non-rising stem gate valves shall be equipped with "O" ring type packing gland consisting of at least two (2) "O" rings. The thrust collar shall work in an "O" ring seal lubricant reservoir or against bearings or washers, above and below constructed of Delrin or approved equal material. Gate valve stems, shall be fabricated from solid bronze rod having a tensile strength of not less than 60,000 pounds per square inch, and a minimum yield strength of 30,000 pounds per square inch.

- H. Cast iron body shall be of iron with an even grain and shall possess a tensile strength of not less than 32,000 pounds per square inch. All bronze castings, except the stem, shall have a tensile strength of not less than 30,000 pounds per square inch. The entire internal valve body surfaces shall be coated with a factory applied two (2) component epoxy system or approved equal. The seating surface shall be machined or otherwise constructed to provide a smooth, even surface for the resilient seat. All valves shall open left (counter clockwise) and have a two (2) inch square wrench nut unless specified otherwise.

W3.09

TAPPING SLEEVES AND TAPPING VALVES

- A. Tapping sleeves shall be of cast iron epoxy coated, designated for working pressure not less than 200 psi. Armored end gaskets shall be provided for the full area of the sleeve flanges. Sleeves shall be as manufactured by A.P. Smith Division of U.S. Pipe, Mueller, Clow, or equal. Nuts and bolts shall be Type 304 stainless steel.
- B. Size-on-Size tapping sleeve shall be ductile iron or cast iron.
- C. Tapping valves shall conform to the requirements specified above for gate valves except that one (1) end shall be flanged and one (1) mechanical. Tapping valves shall be provided with an oversized opening to permit the use of full size cutters. Tapping valves shall be Ford B81-777 or equal.

W3.10

CHECK VALVES

- A. Controlled Closing Swing Check Valves (lever & weight)
1. Check valves shall be of the controlled closing swing type. The controlled closing swing check valves shall be guaranteed to operate under severe conditions as check valves. The valve shall be designed to open smoothly, provide full pipe line flow, permit minimum head loss and close at a controlled rate of speed for the final predetermined portion of its stroke. All bolts and nuts used in the assembly shall be steel, commercial.
 2. The valve body shall be Cast Iron ASTM A126-B/ductile iron ASTM A536. The disc arm and chamber level shall be of heavy steel construction and keyed to the hinge shaft. The hinge shaft shall be of 18-8 stainless steel and of adequate diameter to withstand a complete hydraulic unbalance pressure of 125 psi on the valve disc. A single cushioning device mounted on the external side of the valve shall control the valve closure by way of the interchange of oil to and from an oil reservoir. The use of air or gas pressurized oil reservoir shall not be permitted. The oil plunger assembly shall be rigidly attached to the valve body by shoulder bolts or dowel pins to prevent fretting.
 3. The Manufacturer, if required by the Engineer or the City, shall submit design calculations of principle component stresses to substantiate the integrity of the valve for the working pressure involved.
 4. The valve when closed shall be tight seating by way of a resilient replaceable seat against a bronze seat ring in the body.

5. Valves shall be as manufactured by GA Industries or Series 6000 as manufactured by APCO. The City reserves the right to inspect all valves before shipment is made. Any failure of valves to operate satisfactorily during the first year of installation due to faulty workmanship or defective material shall be replaced and made good by the Manufacturer. Under these specifications, any valve stuffing box that leaks for any reason or because of excessive wear or deterioration of packing, shall be reason for classification as defective material.

B. Slanted / Tilted Check Valves

1. Slanted or tilted check valves shall be furnished and installed where shown on the Plans.
2. The body of the valve shall be ductile iron or cast iron with access ports to the disc. The disc shall be cast iron. The seat and disc rings shall be bronze. Pivot pins and bushings shall be bronze or stainless steel. The valve shall include a localized indicator of the position of the valve.
3. The valves shall include a top mounted oil dash pot to prevent slamming of the disc. The dash pot shall control the last 10% of closure of the disc. The speed of closure within this 10% shall be adjustable.
4. Valves shall be APCO Slanting Disc, Valmatic or Golden Anderson Tilted Disc or approved equal.

W3.11

FLANGES

- A. Flanges shall be cast solid and faced accurately at right angles to the axis of the casting. Dimensions and drilling of flanges shall be in accordance with the American Standard Association for a working pressure of 125 pounds per square inch. Special drilling shall be provided where necessary.

W3.12

FIRE HYDRANTS

- A. Fire hydrants shall be dry-barrel type conforming to the requirements of the latest revision of AWWA C502. Hydrants shall be designed such that the hydrant valve closes with line pressure preventing loss of water and consequent flooding in the event of traffic damage.
- B. Hydrants shall have six (6)-inch mechanical joint inlet connections, two 2½-inch hose connections and one 4½-inch pumper connection. Threads for the hose and pumper connections shall be in accordance with National Standard Thread. Hydrants shall be according to Manufacturer's standard pattern. Hydrants shall be equipped with "O" ring packing. Each nozzle cap shall be provided with a Buna-N rubber washer.
- C. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism or obstructing the discharge from any outlet. The body of the hydrant shall be equipped with a breakable flange, or breakable cast iron flange bolts, just above the grade line.
- D. A bronze or rustproof steel nut and check nut shall be provided to hold the main hydrant valve on its stem.
- E. Hydrant valve opening shall have an area at least equal to that area of a 4½-inch minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gallons minimum through its two 2½-inch hose nozzles when opened together with a loss of not more than two (2) psi in the hydrant.
- F. Hydrants shall be designed for installation in a trench that will provide minimum cover as noted on Plans and for the flange to be 3 ½-inches above ground surface. Hydrant extensions shall be as manufactured by the company furnishing the hydrants and of a style appropriate for the hydrants as furnished.
- G. Hydrants shall be provided with an automatic and positively operating, non-corrodible drain or drip valve so as to drain the hydrant completely when the main valve is shut. A drain valve operating by

springs or gravity is not acceptable.

- H. Operating stems whose threads are located in the barrel or waterway shall be of manganese bronze, everdur, or other high-quality non-corrodible metal, and all working parts in the waterway shall be bronze to bronze.
- I. Hydrants shall open by turning operating nut to left (counter-clockwise) and shall be marked with a raised arrow and the word "open" to indicate the direction to turn stem to open hydrant.
- J. Hydrants shall be furnished with caps, double galvanized steel hose cap chain, galvanized steel pumper hose cap chain, a galvanized steel chain holder and any other hooks and/or appurtenances required for proper use.
- K. Hydrant operating nut shall be AWWA Standard pentagonal type measuring 1½-inch point to flat.
- L. Hydrants shall be hydrostatically tested as specified in AWWA C502.
- M. Hydrants shall be of the following:
 - 1. Kennedy – K81
 - 3. American Darling – B84B
 - 2. Clow Medallion
- N. All iron work to be set below ground, after being thoroughly cleaned, shall be painted with two (2) coats of asphalt varnish specified in AWWA C502. Iron work to be left above ground shall be factory primed and painted silver using a high grade enamel paint of quality and color to correspond to the present standard of the City.
- O. Fire hydrants shall be installed on the same side of the street or roadway as the water main and shall be installed plumb and true.
- P. Heel and thrust blocks shall be placed in undisturbed soil as shown in the details of the Plans.
- Q. Double blue reflector "HYE – LITES" brand as manufactured by pavement markers ink shall be installed at the centerline of the street or roadway perpendicular to the hydrant.

W3.13

CORPORATION STOPS

- A. Corporation stops shall be brass, not less than 1-inch in diameter and shall be installed where shown, specified or required.
- B. Provide corporation stops as manufactured by the following:
 - 1. Ford Company

W3.14

COMBINATION AIR-VACUUM RELIEF VALVES

- A. The air-vacuum release valves shall be installed as shown on the Plans. The valve body shall be of cast iron ASTM A126-B; the floats, float guide, and stem shall be of Type 316 stainless steel. The resilient seat shall be of Buna N. The valve shall be suitable for 150 psig working pressure. Valve shall have standard NPT inlets and outlet ports with diameters as indicated on the Plans. Valve shall be Model 200A Series by APCO Valve and Primer Corporation, Schaumburg, IL, or approved equal.

W3.15

SURFACE PREPARATION AND SHOP COATINGS

- A. The interior ferrous metal surfaces, except finished or bearing surfaces, shall be blast cleaned in accordance with SSPC SP-6 and painted with two (2) coats of an approved two (2) component coal tar

epoxy coating specifically formulated for potable water use. The coating used must appear on the current edition of the United States Environmental Protection Agency's list entitled "Accepted Categories and Subcategories of Coatings, Liners and Paints for Potable Water Usage."

- B. Exterior ferrous metal surfaces of all buried valves and hydrants shall be blast cleaned in accordance with SSPC SP-6 and given two (2) shop coats of a heavy coat tar enamel or an approved two (2) component coat tar epoxy paint.

W3.16

INSPECTION AND PREPARATION

- A. During installation of all valves and appurtenances, the Contractor shall verify that all items are clean, free of defects in material and workmanship and function properly.
- B. All valves shall be closed and kept closed until otherwise directed by the Engineer or the City.

W3.17

INSTALLATION OF BURIED VALVES AND VALVE BOXES

- A. Buried valves shall be cleaned and manually operated before installation. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the valve box. Valves shall be set on a firm foundation and supported by tamping pipe bedding material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade. The valve box shall be set so as not to transmit traffic loads to the valve.
- B. Before backfilling, all exposed portions of any bolts shall be coated with two (2) coats of bituminous paint.

W3.18

INSTALLATION OF TAPPING SLEEVES AND VALVES

- A. The City of Georgetown shall be contacted and their permission granted prior to tapping a line. The required procedures and time table shall be followed exactly.
- B. Installation shall be made under pressure and flow shall be maintained. The diameters of the tap shall be a minimum of $\frac{1}{4}$ -inch less than the inside diameter of the branch line.
- C. The entire operation shall be conducted by workers experienced in the installation of tapping sleeves and valves. The tapping machine shall be furnished by the Contractor.
- D. Determine the location of the line to be tapped to confirm that the proposed location will be satisfactory and that no interference will be encountered such as joints or fittings. No tap or sleeve will be made closer than three (3) feet from a pipe joint.
- E. A tapping sleeve and valve with boxes shall be set squarely centered on the line to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Thrust blocks or other permanent restraint acceptable to the Engineer and the City shall be provided behind all tapping sleeves. Proper tamping of supporting pipe bedding material around and under the valve and sleeve is mandatory for buried installations.
- F. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean. All proper regulatory procedures (including disinfection) shall be followed exactly.

W3.19

INSTALLATION OF FIRE HYDRANTS

- A. Fire hydrants shall be set at the locations as shown on the Plans and bedded on a firm foundation. Hydrants and connecting pipe shall have at least the same depth of cover as the distributing pipe. A drainage pit as detailed on the Plans shall be filled with $\frac{3}{4}$ -inch washed rock gravel and compacted. The hydrants shall be set upon a slab of concrete not less than four (4)-inches thick and 15-inches square. During backfilling, additional screened gravel shall be brought up around and six (6) inches over the drain port. Each hydrant shall be set in true vertical alignment and properly braced.

- B. 2,500 psi concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the Plans. Eight (8) mil. Polyethylene film shall be placed around the hydrant elbow before placing concrete. CARE SHALL BE TAKEN TO ENSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS.
- C. All connections from the main to the fire hydrants shall be anchoring mechanical joints designed to prevent movement due to thrust or pressure.
- D. The hydrant shall be tied to the pipe with suitable rods or clamps, and shall be coated with Koppers 300 or approved equal at a minimum of 8 mil. thick. Bolts shall have a zinc bolt cover per AWWA. Hydrant paint shall be touched up as required after installation.
- E. Fire hydrants shall be factory primed and painted silver using a high grade enamel.
- F. Fire sprinkler lines shall be protected by a reduced pressure zone (RPZ). All fire lines shall be ductile iron pipe. All private fire lines shall be separated by double detecta check.

W3.20

FIELD TESTS AND ADJUSTMENTS

- A. Conduct a functional field test of each valve, including actuators and valve control equipment, in presence of Engineer or the Representative of the City to demonstrate that each part and all components together function correctly. All testing equipment required shall be provided by the Contractor at his/her sole expense.

W3.21

PAYMENT

- A. Gate valves, tapping sleeves and tapping valves, fire hydrants, and air and vacuum relief valves complete in place as shown on the Plans and as specified, will be paid for at the unit contract price per each as provided in the Proposal and Bid Schedule.
- B. The unit price per each installation shall be the total compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to complete the work including excavation, base blocking, disposal of surplus materials and backfill in conformance with the Plans and these specifications. The six (6) inch connection pipe, six (6) inch gate valve, test station, concrete collar, thrust block, drain pit, concrete pad, rods, bolts, paint, protective coatings, and fittings for fire hydrants shall not be paid for separately.
- C. Fire hydrants shall be furnished with the proper length of barrel to comply with these specifications. Barrel extensions will not be measured and paid for separately.
- D. No separate payment shall be made for work performed in accordance with this specification, other than that listed in Parts A-C of this subsection, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION W4 – ENCASEMENT PIPE

W4.01 SCOPE OF WORK

- A. This specification covers the requirements for furnishing and installing encasement pipe complete in place including any required spacers and end plugs as shown on the plans and specified herein.

W4.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer for approval, technical product literature including type and Manufacturer of pipe, spacers, and end plugs, and all other pertinent data to illustrate conformance to the specification found within.

W4.03 GENERAL

- A. Where pipe is required to be installed under highways, streets, or other facilities, construction shall be made in such a manner that will not interfere with the operation of the street, highway, or other facility, and shall not weaken or damage any embankment or structure.
- B. All carrier pipe shall be laid to the required line and grade within the specified limits through the encasement pipe. Carrier pipe shall be handled and placed in the encasement pipe by use of proper skids, wedges, guide fails or other approved means. Care shall be taken that once the pipe is in place to line and grade, it shall not be disturbed or become displaced. All carrier pipe shall have restrained joints.

W4.04 MATERIALS

- A. Encasement pipe shall be smooth steel 35,000 psi yield strength with thickness according to the following table:

Carrier Size (Inner Diameter)	Minimum Encasement Steel Casing Size (Inner Diameter)	Minimum Casing Thickness (Inches)
4"	14"	0.2500
6"	16"	0.2500
8"	18"	0.2500
10"	20"	0.3125
12"	24"	0.3175
14"	24"	0.375
16"	30"	0.4375
18"	30"	0.4375
20"	36"	0.500
24"	42"	0.500
27"	42"	0.500
30"	48"	0.500
33"	48"	0.500
36"	54"	0.500
39"	60"	0.500
42"	60"	0.500

- B. Casing spacers shall be bolt-on style with a shell made in two (2) sections of Heavy T-304 stainless steel. Connecting flanges shall be ribbed for extra strength. Casing spacers shall have runners made of ultra high molecular weight polymer, with a minimum height of two (2) inches. Wedges shall not be used between the top of the carrier pipe and the inside of the encasement pipe. Casings spacers shall have a minimum of one (1) inch clear distance between the runners on top of the casing spacers and the inside of the encasement pipe. Prior to inserting the carrier pipe, all water shall be pumped out of the encasement pipe to at least a point where no more than two (2) inches of water remains. Spacers shall be required within at least three (3) feet from both openings of the encasement pipe and spaced no greater than six (6) feet through out the encasement pipe. Casing spacers will not be paid for directly but shall be considered subsidiary to the bid item of encasement pipe. . Casing spacers shall be made by Cascade Waterworks MFG Company or approve equal.
- C. End Plugs shall be provided as required and as specified by the pipe manufacturer.

W4.05

PAYMENT

- A. Separate payment will be made for Steel Encasement Pipe per linear foot as called for on the Plans and set forth in the Proposal and Bid Schedule.
- B. All costs incurred for furnishing and installing encasement pipe shall include all labor, materials, tools, equipment and incidentals necessary to perform all work or whatever nature required to complete the specific operation.

END OF SECTION

WASTEWATER SPECIFICATIONS

SECTION WW

TECHNICAL SPECIFICATIONS

SECTION WW1 – CONCRETE MANHOLES (WASTEWATER)

WW1.01 SCOPE OF WORK

- A. This specification covers the requirements to install precast concrete manholes, frames and covers, and appurtenances as shown on the Plans and as specified herein.

WW1.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, shop drawings, product data, materials of construction, and details of installation shall be submitted in accordance with Section CIP10- SUBMITTALS. Submittals shall include the following: base sections, riser sections, eccentric conical top sections, flat slab tops, grade rings with notarized certificate indicating compliance with ASTM C478, pipe connection to manhole, manhole frame and cover with notarized certificate indicating compliance with ASTM A48, Class 30, method of repair for minor damage to precast concrete sections, manhole lining system.

B. Design Data

1. Precast concrete structures:

- a. Six (6) copies of sectional plan(s) and elevations showing dimensions and reinforcing steel placement.
- b. Six (6) copies of concrete design mix.

C. Test Reports

1. Precast concrete structures:

- a. Six (6) copies of concrete test cylinder reports from an approved testing laboratory certifying conformance with specifications.

WW1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

- 1. ASTM A48 - Specification for Gray Iron Castings.
- 2. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- 3. ASTM C33 - Specification for Concrete Aggregates.
- 4. ASTM C150 - Standard Specification for Portland Cement.
- 5. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
- 6. ASTM D4101 - Specification for Propylene Plastic Injection and Extrusion Materials.

B. American Concrete Institute (ACI)

- 1. ACI 318 - Building Code Requirements for Reinforced Concrete.
- 2. ACI 350R - Concrete Sanitary Engineering Structures.

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

1. Standard Specifications for Highway, Streets and Bridges.

D. Occupational Safety and Health Administration (OSHA)

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

WW1.04

QUALITY ASSURANCE

A. All material shall be new and unused.

B. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by Engineer or other City representative. Inspection may be made at place of Manufacture, at work site following delivery, or both.

C. Materials will be examined for compliance with ASTM specifications, these Specifications and approved Manufacturer's drawings. Additional inspection criteria shall include: appearance, dimensions(s), blisters, cracks and soundness.

D. Materials shall be rejected for failure to meet any Specification requirement. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no cost to City.

E. Repair minor damage to precast concrete sections by approved method, if repair is authorized by Engineer or the City.

WW1.05

PRODUCTS

A. Reference to a Manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. Like items of materials/equipment shall be the end products of one Manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and Manufacturer's service.

C. Provide lifting lugs or holes in each precast section for proper handling.

WW1.06

PRECAST CONCRETE MANHOLE SECTIONS

A. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478 and meet the following requirements:

1. Bottom slab thickness shall be 12-inches.

2. Top section shall be flat slab with a minimum clear opening of 32 ⁷/₈-inches diameter.

3. Base, riser and transition top sections shall have tongue and groove joints.

4. Sections shall be cured by an approved method.

5. Precast concrete sections shall be shipped after concrete has attained 3,000 psi compressive strength.

6. Design precast concrete base, riser, transition top, flat slab top and grade ring for a minimum HS-20 loading plus earth load. Calculate earth load with a unit weight of 130 pounds per cubic foot.

7. Mark date of manufacture, name and trademark of Manufacturer on the inside of each precast section.

8. Construct and install precast concrete base as shown on the Plans.
 9. Provide integrally cast knock-out panels in precast concrete manhole sections at locations, and with sizes shown on Plans. Knock-out panels shall have no steel reinforcing.
- B. Manhole diameter shall be as shown on the Plans, but not less than the diameter of the largest connecting pipe plus two (2) feet.
- C. Pipe Sections
- Pipe sections shall conform to current specifications for Precast Reinforced Manhole Sections, ASTM Designation C478, with the following additions:
1. Pipe shall be machine made by a process which will provide for uniform placement of zero slump concrete in the form and compaction by mechanical devices which will assure a dense concrete in the finished product.
 2. Aggregates for the concrete shall consist of limestone aggregates in the proportion of at least 75% by weight of the total aggregates.
 3. Minimum wall thickness for the manhole risers shall be as listed under Wall "B" in the "Class Tables" of ASTM C76 for Class III pipe.
- D. Joints
1. Joints shall conform to the joint specifications in ASTM C478, C76, and ASTM C443. All manhole sections, including the bottom section, shall be furnished with "O-ring" type rubber gasket joints. The joints shall be furnished and installed with the bell down to resist groundwater infiltration. All joints shall be sealed with mortar or an approved non-shrink grout on the inside and the outside of the manhole. Grade rings shall be mortared to each other and on the inside and outside to provide a waterproof seal.
- E. Manhole Steps
1. Unless specifically approved by the City, manhole steps shall not be provided.

WW1.07

MANHOLE FRAME AND COVER

- A. Manhole frames and covers shall be of good quality, strong, tough, even grained cast iron, smooth, free from scale, lumps, blisters, sand holes and defects of any kind which render them unfit for the service for which they are intended. Manhole covers and frame seats shall be machined to a true surface. Castings shall be thoroughly cleaned and subject to hammer inspection. Cast iron shall conform to ASTM A48, Class 30.
- B. Manhole covers shall have a diamond pattern, pickholes and the word SEWER as appropriate cast in three (3) inch letters. Manhole frame and covers shall be Neenah Foundry, Western Iron Works, Vulcan Foundry, or equal. Model numbers refer to Western Iron works products:
1. Manhole Frame and cover - WRM-36.

WW1.08

JOINTING PRECAST MANHOLE SECTIONS

- A. Seal tongue and groove joints of precast manhole sections with rubber "O"-ring gasket. O-ring gasket shall conform to ASTM C443.
- B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

WW1.09

PIPE CONNECTIONS TO MANHOLE

- A. Connect pipe to manhole in the following ways:
 - 1. Flexible sleeve - Integrally cast sleeve in precast manhole section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion. Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.
 - 2. Compression gasket - Integrally cast compression gasket in precast manhole section. Insert pipe into compression gasket. Compression gasket shall be A-Lok, or equal.

WW1.10

INSTALLATION

- A. Manhole Installation
 - 1. Manholes shall be constructed to the dimensions shown on the Plans and as specified herein. Protect all work against flooding and flotation.
 - 2. Place manhole base on a bed of screened gravel eight (8) inches in depth as shown on the Plans. Set manhole base so that a maximum grade adjustment of eight (8) inches is required to bring the manhole frame and cover to final grade.

Use precast concrete grade rings to adjust manhole frame and cover to final grade.
 - 3. Set precast concrete barrel sections plumb with a $\frac{1}{4}$ -inch maximum out of plumb tolerance allowed. Seal joints of precast barrel sections with either a rubber "O" ring set in a recess or preformed flexible joint sealant in sufficient quantity to fill 75 percent of the joint cavity. Fill the outside and inside joint with non-shrink mortar and finished flush with the adjoining surfaces. Caulk the inside of any leaking barrel section joint with non-shrink grout to the satisfaction of the Engineer and the City.
 - 4. Allow joints to set for 14 hours before backfilling unless a shorter period is specifically approved by the Engineer or the City.
 - 5. Plug holes in the concrete barrel sections required for handling with a non-shrinking grout or non-shrinking grout in combination with concrete plugs. Finish flush on the inside.
 - 6. Core holes in precast sections to accommodate pipes prior to setting manhole sections in place to prevent jarring which may loosen the mortar joints.
 - 7. Backfill carefully and evenly around manhole sections.
- B. Manhole Pipe Connections
 - 1. Construct manhole pipe connections, including pipe stubs, as specified above. Close or seal pipe stubs for future connections with a gasketed watertight plug.

C. Setting Manhole Frame and Cover

1. Set manhole covers and frames in a full mortar bed. Utilize precast concrete grade rings, for a maximum adjustment of twelve (12) inches, to assure frame and cover are set to the finished grade. Set manhole frame and cover to final grade prior to placement of permanent paving.

WW1.11 TESTS

- A. Test each manhole in accordance with Section CIP12- TESTING OF PIPELINES AND MANHOLES. Engineer or the City's representative shall observe each test.

WW1.12 CLEANING

- A. Thoroughly clean all new manholes of all silt, debris and foreign matter of any kind, prior to final inspections.

WW1.13 PAYMENT

- A. Payment for furnished and installed manholes shall be paid according to the unit price per each in the proper item of the Proposal and Bid Schedule.
- B. All work and materials to complete the reinforced concrete pipe including but not limited to excavation, bedding, backfill, connection to pipe, etc. shall be subsidiary to this item.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION WW2 – POLYVINYL CHLORIDE (PVC) PIPE-WASTEWATER

WW2.01 SCOPE OF WORK

- A. This specification covers the requirements to install and test polyvinyl chloride (PVC) pipe and fittings, including excavation, sheeting, storing, dewatering, pipe laying, jointing, testing, backfilling, and any other work that is required or necessary to complete the installation as shown in the Plans as specified herein, complete as shown on the Plans and as specified herein.

WW2.02 SUBMITTALS

- A. Within 30 days of the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the names of the pipe and fittings suppliers, a list of materials to be furnished, shop drawings on required pipes and fittings, certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein, and all other pertinent data to illustrate conformance to the specification found within.

WW2.03 QUALITY ASSURANCE

- A. All PVC pipe and fittings shall be from a single Manufacturer. The Supplier shall be responsible for the provisions of all test requirements specified in ASTM D3034 or ASTM F789 as applicable. In addition, all PVC pipe to be installed under this Contract may be inspected at the plant for compliance with these specifications by an independent testing laboratory provided by the City. The Contractor shall require the Manufacturer's cooperation in these inspections. The cost of plant inspection of all pipe approved for this Contract, plus the cost of inspection of disapproved pipe, will be borne by the Contractor.
- B. Inspections of the pipe may also be made by the Engineer or other representatives of the City after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job at once.

WW2.04 POLYVINYL CHLORIDE (PVC) WASTEWATER PIPE AND FITTINGS

- A. Pipe and fittings shall be Type PSM, PVC SDR 26 with full diameter dimensions and shall conform to ASTM D3034, or Type PS-46 PVC conforming to ASTM F789, for sizes 4 through 15-inch and shall conform to ASTM F679 for sizes 18 through 27-inch. Straight pipe shall be furnished in lengths of not more than 13-feet and wyes shall be furnished in lengths of not more than three (3) feet. Saddle wyes will not be allowed.
- B. PVC pipe and fittings shall have bell and spigot push-on joints. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. Elastomeric gaskets shall conform to ASTM F477.
- C. All fittings and accessories shall have bell and/or spigot configurations compatible with the pipe.
- D. For Force Main, all pipe shall be C-900, DR-18 pipe or epoxy coated ductile iron encased with brown 8 mil. polyethylene film.

WW2.05 HANDLING AND CUTTING PIPE

- A. Pipe and fittings are slightly brittle. Care shall be taken in shipping, handling and laying to avoid damaging the pipe and fittings. Extra care will be necessary during cold weather construction.

- B. Any pipe or fitting showing a crack or which has received a blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.
- C. All pipe ends shall be square after cutting.
- D. While stored, pipe shall be adequately supported from below at not more than three (3) foot intervals to prevent deformation. Pipe shall not be stacked higher than six (6) feet. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures and out of direct sunlight. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted.

WW2.06

JOINTING POLYVINYL CHLORIDE (PVC) WASTEWATER PIPE AND FITTINGS

- A. PVC wastewater pipe and fittings shall be jointed in accordance with the recommendations of the latest ASTM Standards and detailed instructions of the Manufacturer.
- B. All manhole connections shall be as shown on the Plans.

WW2.07

INSTALLING POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than $\frac{1}{16}$ -inch per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the Manufacturer shall be explicitly followed.
- B. Any pipe or fittings discovered to be defective after laying shall be removed and replaced with a sound piece.
- C. The Engineer or the City may examine each bell and spigot end to determine whether any preformed joint has been damaged prior to installation. Any pipe having defective joint surfaces shall be rejected, marked as such, and immediately removed from the job site.
- D. All pipe shall be sound and clean before laying. When laying is not in progress, including lunch time, the open ends of the pipe shall be closed by watertight plugs or other approved means.
- E. Pipe and fittings shall be installed in accordance with the instructions of the Manufacturer, ASTM D2321 and as specified herein. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding shall be placed, compacted and graded to provide firm, uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Plans. The specified embedment shall be accurately shaped and trimmed to receive the pipe barrel and each pipe section, when in place, shall have a uniform bearing on the subgrade for the full length of the pipe barrel. Pipe shall not be laid unless the subgrade is free of water and in a satisfactory condition. Adjustments of the pipe to line and grade shall be made by scraping away or filling in with granular material, and not by wedging or blocking up the bell. Blocking under the pipe will not be permitted. The bedding as shown in the details of the Plans, shall be placed evenly on each side of the pipe to mid-diameter and hand tools shall be used to force the bedding under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe. The bedding shall then be placed to 12-inches above the top of the pipe. The initial three (3) feet of backfill above the bedding backfill shall be placed in eight (8) inch layers and carefully compacted. Generally, the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. Equipment used in compacting the initial three (3) feet of backfill shall be approved by the pipe Manufacturer's representative prior to use.
- F. Joints shall not be "pulled" or "cramped". Each joint of pipe shall be completed in compliance with Manufacturer's recommendations.

- G. Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.
- H. Precautions shall be taken to prevent flotation of the pipe in the trench.
- I. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, screened material shall be placed to fill any voids created and the screened material and backfill shall be re-compacted to provide uniform side support for the pipe.
- J. Pipe stubs for manhole connections shall not exceed 3.25-feet in length unless directed otherwise by the Engineer or the City. Install caps where required. When connecting to an existing manhole, the opening for the connection of the wastewater pipe and the manhole shall be cored using an approved coring machine to the dimensions and size required to install the flexible "SEAL BOOT" resilient connector that meets the requirements of ASTM C-923. The connection shall be watertight when complete and meet the requirements of Section WW1- CONCRETE MANHOLES.
- K. Wastewater mains shall be installed in straight trenches from manhole to manhole or manhole to cleanout. There will be no curvilinear installations of wastewater mains.

WW2.08

TESTING

- A. Testing and cleaning of pipe shall be as specified in Specification Section CIP12- TESTING OF PIPELINES AND MANHOLES.

WW2.09

PAYMENT

- A. The wastewater line, complete in place, will be measured for payment in linear feet along the centerline of the pipe actually installed. Measurement shall be through all manholes and no deduction in length will be made for such appurtenances. Installation of the wastewater line will be paid for at the unit contract price per linear foot as provided in the Proposal and Bid Schedule.
- B. Payment of the unit contract price for the items of work performed shall be the total compensation for furnishing all labor, materials, tools, testing equipment and incidentals and performing all work that is necessary for the installation of the pipe, fittings, embedment or encasement, and all other appurtenances in accordance with the Plans and the provisions of these specifications.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION WW3 – CONNECTIONS TO AND WORK ON THE EXISTING WASTEWATER SYSTEM

WW3.01 SCOPE OF WORK

- A. This specification covers the requirements to maintain flow in existing sewers, handle existing wastewater flow, construct and maintain all temporary connections and diversions and construct the permanent connections to the new system as shown on the Plans and as directed by the Engineer.

WW3.02 SUBMITTALS

- A. None required unless specifically called for in the Plans, details, or requested by the Engineer.

WW3.03 GENERAL

- A. The Contractor shall supply all materials, equipment and labor required for plugging existing wastewater lines, all work on existing manholes (including all work and materials required to reshape existing manhole inverts with concrete and connecting new wastewater lines to existing manholes) and all additional work required.
- B. Should damage of any kind occur to the existing wastewater line, the Contractor shall at his/her own expense, as part of the work under this Section, make repairs to the satisfaction of the Engineer.
- C. The Contractor shall notify the Engineer immediately of any discrepancies in elevations of existing wastewater lines and manholes between those shown on the Plans and those established during construction in order that the Engineer can make the necessary modifications.
- D. All new wastewater pipe for connection shall conform to the pipe specifications in Section WW2-POLYVINYL CHLORIDE (PVC) PIPE - WASTEWATER.

WW3.04 HANDLING WASTEWATER FLOWS

- A. The Contractor shall provide all labor, equipment and materials necessary to maintain existing flows, including temporary diversions and all pumping of sewage that may be required to prevent backing up of wastewater lines and shall immediately remove all offensive matter at his/her own expense.
- B. The Contractor shall not be permitted to overflow, bypass, pump or by any other means convey sewage to any stream, or other water course.
- C. All procedures for maintaining flows must meet the approval of the Engineer and the Contractor shall be required to submit to the Engineer, for approval, a detailed written plan of all methods of flow maintenance 10 days in advance of flow interruption.

WW3.05 PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

CONCRETE SPECIFICATIONS

SECTION C

TECHNICAL SPECIFICATIONS

SECTION C1 – CONCRETE STRUCTURES

C1.01 SCOPE OF WORK

- A. This specification covers the requirements for the construction of all types of structures involving the use of structural concrete, except where the requirements are waived or revised by other governing specifications.
- B. All concrete structures shall be constructed in accordance with the design requirements and details shown on the Plans; in conformity with the pertinent provisions of the items contracted for; the incidental items referred to; and in conformity with the requirements herein.

C1.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the type of concrete, concrete mix design, concrete type and Manufacturer of precast structures, a description of curing methods used, and all other pertinent data to illustrate conformance to the specification found within.

C1.03 MATERIALS

A. Concrete

- 1. All concrete shall conform to the provisions of Section C2, CONCRETE FOR STRUCTURES. The class of concrete for each type of structure or unit shall be as specified on the Plans, or by pertinent governing specifications.

B. Expansion Joint Material

- 1. Preformed Fiber Material - Preformed fiber expansion joint material shall be one-half (½) inch or as shown on the Plans. At the Contractor's option, the material shall be one of the following types, unless otherwise noted on the Plans:
 - a. "Preformed Bituminous Fiber Material" shall meet the requirements of the Standard Specifications for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction, ASTM Designation: D1751.
 - b. "Preformed Non-Bituminous Fiber Material": shall meet the requirements of the Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction ASTM Designation: D1751, except that the requirements pertaining to bitumen content, density and water absorption shall be voided.
- 2. Joint Sealing Material - Unless otherwise noted on the Plans, the sealer shall be synthetic polymer Sikaflex – ICSL or equivalent.
- 3. Asphalt Board - Asphalt Board shall consist of two liners of 0.016 inches asphalt impregnated paper, filler with a mastic mixture of asphalt and vegetable fiber and/or mineral filler. Boards shall be smooth, flat and sufficiently rigid to permit installation. When tested in accordance with Test Method Tex-524-C, the asphalt board shall not deflect from the horizontal more than one (1) inch in three and one half (3 ½) inches.
- 4. Rebonded Neoprene Filler - Rebonded neoprene filler shall consist of ground closed-cell neoprene particles, rebonded and molded into sheets of uniform thickness of the dimensions shown on Plans.

Filler material shall meet the requirements of ASTM Designations: D1752 Type 1 where applicable.

- C. Expansion Joints - Joints and devices to provide for expansion and contraction shall be constructed as indicated herein or on the Plans.
- D. Placing Reinforcements - Reinforcement in concrete structures shall be placed carefully and accurately and rigidly supported as provided in the Section C7 – REINFORCING STEEL.
- E. Placing Concrete-General - The minimum temperature of all concrete at the time of placement shall not be less than 50°F.
- F. The consistency of the concrete as placed should allow the completion of all finishing operations without the addition of water to the surface. When conditions are such that additional moisture is needed for finishing, the required water shall be applied to the surface by Fog Spray Only, and shall be held to a minimum amount. Fog spray for this purpose may be applied with hand operated fogging equipment.
- G. The maximum time interval between the addition of cement to the batch, and the placing of concrete in the forms shall not exceed the following:

Air or Concrete Temperature	Maximum Time (Without Retarding Agent)	Maximum Time (With Retarding Agent)
Non-Agitated Concrete		
Up to 80° F	30 Minutes	45 Minutes
Over 80° F	15 Minutes	30 Minutes
Agitated Concrete		
90° F or above	45 Minutes	75 Minutes
Above 75° F to 89° F	60 Minutes	90 Minutes
75° F and below	90 Minutes	120 Minutes

- H. Upon completion of the final finish, interim curing will be required for slab concrete in bridge decks and top slabs of direct traffic culverts as follows:
 - 1. Unless otherwise shown on the Plans, Type 1 membrane curing compound (Resin Base Only) shall be applied to the slab surface.
- I. Required water curing shall begin as soon as it can be done without damaging the concrete finish.
- J. The Contractor shall notify the City two (2) days in advance before placing concrete in any unit of the structure to permit the inspection of forms, reinforcing steel placement, and other preparations. Concrete shall not be placed in any unit prior to the completion of form work and placement of reinforcement therein.
- K. Concrete mixing, placing and finishing shall be done in daylight, hours, unless adequate provisions are made to light the entire site of all operations.
- L. Concrete placement will not be permitted when impending weather conditions will impair the quality of the finished work. If rainfall should occur after placing operations are started, the Contractor shall provide ample coverage to protect the work. In case of drop in temperature, the provisions set forth in Section C1.04- PLACING CONCRETE IN COLD WEATHER shall apply.
- M. The sequence of placing concrete shall be as provided on the Plans or as required herein. The placing shall be regulated so the pressures caused by the plastic concrete shall not exceed the loads used in the form design. Form design shall be the sole responsibility of the Contractor.

- N. The method of handling, placing, and consolidation of concrete shall minimize segregation and displacement of the reinforcement, and produce a uniformly dense and compact mass. Concrete shall not have a free fall of more than 5 feet, except in the case of thin walls such as in culverts. Any hardened concrete splatter ahead of the plastic concrete shall be removed.
- O. The method and equipment used to transport concrete to the forms shall be capable of maintaining the rate of placement approved by the City. Concrete may be transported by bucket, chutes, buggies, belt conveyors, pumps or other acceptable methods.
- P. Each part of the forms shall be filled by depositing concrete as near its final position as possible. The coarse aggregate shall be worked back from the face and the concrete forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point and running or working it along the forms will not be allowed.
- Q. Concrete shall be deposited in the forms in layers of suitable depth but not more than 36-inches in thickness, unless otherwise directed by the City.
- R. The sequence of successive layers or adjacent portions of concrete shall be such that they can be vibrated into a homogeneous mass with the previously placed concrete without a cold joint. Not more than one hour shall elapse between adjacent or successive placements of concrete. Unauthorized construction joints shall be avoided by placing all concrete between the authorized joints in one continuous operation.
- S. An approved retarding agent shall be used to control stress cracks, and/or unauthorized cold joints in mass placements where differential settlement and/or setting time may induce stress cracking, such as on false work, in deep girder stems, etc.
- T. Openings in forms shall be provided, if needed, for the removal of laitance or foreign matter of any kind.
- U. All forms shall be wetted thoroughly before the concrete is placed therein.
- V. All concrete shall be well consolidated and the mortar flushed to the form surfaces by continuous working with immersion type vibrators. Vibrators which operate by attachment to forms or reinforcement will not be permitted, except on steel forms.
- W. The concrete shall be vibrated immediately after deposit. Prior to the beginning of work, a systematic spacing of the points of vibrations shall be established to insure complete consolidation and thorough working of the concrete around the reinforcement, embedded fixtures, and into the corners and angles of the forms. Immersion type vibrators shall be inserted vertically, at points 18 to 30-inches apart, and slowly withdrawn. The vibrator may be inserted in a sloping or horizontal position in shallow slabs. The entire depth of each lift shall be vibrated, allowing the vibrator to penetrate several inches into the preceding lift. Concrete along construction joints shall be thoroughly consolidated by operating the vibrator along and close to but not against the joint surface. The vibration shall continue until thorough consolidation, and complete embedment of reinforcement and fixtures is produced, but not long enough to cause segregation. Vibration may be supplemented by hand spading or rodding, if necessary, to insure the flushing of mortar to the surface of all forms.

C1.04

PLACING CONCRETE IN COLD WEATHER

- A. Cast-in-Place Concrete - Concrete may be placed when the atmospheric temperature is not less than 35° F. Concrete shall not be placed in contact with any material coated with frost or having a temperature less than 32° F.
- B. Aggregates shall be free from ice, frost and frozen lumps. When required, in order to produce the minimum specified concrete temperature, the aggregate and/or the water shall be heated uniformly, in accordance with the following:

The water temperature shall not exceed 180° F nor shall the aggregate temperature exceed 150° F. The heating apparatus shall heat the mass of aggregate uniformly. The temperature of the mixture of aggregates and water shall be between 50° F and 85° F before introduction of the cement.

C. All concrete shall be effectively protected as follows:

1. The temperature of slab concrete of all unformed surfaces shall be maintained at 50° F or above for a period of 72 hours from time of placement and above 40° F for an additional 72 hours.
 2. The temperature at the surface of all concrete in bents, piers, culvert walls, retaining walls, parapets, wingwalls, bottom of slabs, and other similar formed concrete shall be maintained at 40° F or above for a period of 72 hours from time of placement.
 3. The temperature of all concrete, including the bottom slabs of culverts placed on or in the ground, shall be maintained above 32° F for a period of 72 hours from time of placement.
- D. Protection shall consist of providing additional covering, insulated forms or other means, and if necessary, supplementing such covering with artificial heating. Curing as specified under Section C1.10-CURING CONCRETE, shall be provided during this period until all requirements for curing have been satisfied.
- E. When impending weather conditions indicate the possibility of the need for such temperature protection, all necessary heating and covering material shall be on hand ready for use before permission is granted to begin placement.

C1.05 PLACING CONCRETE IN HOT WEATHER

- A. When the temperature of the air is above 85° F, an approved retarding agent will be required in all concrete used in superstructures, top slabs of direct traffic culverts, and will be required in all cased drilled shafts regardless of temperature. No concrete will be placed any time the temperature of the concrete at placement, exceeds 90° F. Ice will be used to decrease the temperature of concrete. The general formula will be, five (5) pounds of ice per yard of concrete per degree of temperature drop.

C1.06 PLACING CONCRETE IN WATER

- A. Concrete shall be deposited in water only when specified on the Plans or with written permission of the City. The forms, cofferdams or caissons shall be sufficiently tight to prevent any water current passing through the space in which the concrete is being deposited. Pumping will not be permitted during concrete placing, nor until it has set for at least 36 hours.
- B. The concrete shall be placed with a tremie, closed bottom-dump bucket, or other approved method, and shall not be permitted to fall freely through the water nor shall it be disturbed after it has been placed. Its surface shall be kept approximately level during placement.
- C. The tremie shall consist of a water-tight tube 14-inches or less in diameter. It shall be constructed so that the bottom can be sealed and opened after it is in place and fully charged with concrete. It shall be supported so that it can be easily moved horizontally to cover all the work area and vertically to control the concrete flow.
- D. The placing operations shall be continuous until the work is complete.

C1.07 PLACING CONCRETE IN BOX CULVERTS

- A. In general, construction joints will be permitted only where shown on the Plans.
- B. Where the top slab and walls are placed monolithically in culverts more than four (4) feet in clear height, an interval of not less than one (1) nor more than two (2) hours shall elapse before placing the top slab to allow for shrinkage in the wall concrete.
- C. The base slab shall be finished accurately at the proper time to provide a smooth uniform surface. Top slabs which carry direct traffic shall be finished as specified under Item 360 "Concrete Pavement" of the Standard Specifications for the Construction of Highways Streets and Bridges of Texas Department of Transportation, latest addition. Top slab of fill type culverts shall be given a reasonable smooth float finish.

PLACING CONCRETE IN FOUNDATIONS AND SUBSTRUCTURE

- A. Concrete shall not be placed in footings until the depth and character of the foundation has been inspected by the City and permission has been given to proceed.
- B. Placing of concrete footings upon seal courses will be permitted after the caissons of cofferdams are free from water and the seal course cleaned. Any necessary pumping or bailing during the concrete operation shall be done from a suitable pump located outside the forms.
- C. All temporary walls or braces inside cofferdams or caissons shall be constructed or adjusted as the work proceeds to prevent unauthorized construction joints in footings or shafts.
- D. When footings can be placed in a dry excavation without the use of cofferdams or caissons, forms may be omitted, if desired by the Contractor and approved by the City, and the entire excavation filled with concrete to the elevation of the top of footing.

TREATMENT AND FINISHING OF HORIZONTAL SURFACES

- A. All unformed upper surfaces shall be struck off to grade and finished. The use of mortar topping for surfaces under this classification will not be permitted.

CURING CONCRETE

- A. The Contractor shall inform the City fully of the methods and procedures proposed for curing; shall provide the proper equipment and material in adequate amounts, and shall have the proposed method, equipment and material approved prior to placing concrete.
- B. Inadequate curing and/or facilities therefore shall be cause for the City to stop all construction on the job until remedial action is taken.
- C. All concrete shall be cured for a period of four (4) curing days except as noted herein.

EXCEPTIONS TO 4-DAY CURING

- A. When the air temperature is expected to drop below 35° F, the water curing mats shall be covered with polyethylene sheeting, burlap-polyethylene blankets or other material to provide the protection required by Section C1.04- PLACING CONCRETE IN COLD WEATHER.
- B. A curing day is defined as a calendar day when the temperature, taken in the shade away from artificial heat, is above 50° F for at least 19 hours, (or colder days are satisfactory if provisions are made to maintain the temperature at all surfaces of the concrete above 40° F for the entire 24 hours). The required curing period shall begin when all concrete therein has attained its initial set.
- C. The following methods are permitted for curing concrete subject to the restrictions and the following requirements for each method of curing.
 - 1. Form Curing - When forms are left in contact with the concrete, other curing methods will not be required except for cold weather protection.
 - a. Wet Mat - Cotton mats shall be used for this curing method. They shall be placed as soon as possible after the surface has sufficiently hardened to prevent damage to the concrete. Damp burlap blankets made from nine (9) ounce stock may be placed on the damp concrete surface for temporary protection prior to the application of the cotton mats which may be placed dry and wetted down after placement.

The mats shall be weighted down adequately to provide continuous contact with all concrete surfaces where possible. The surfaces of the concrete shall be kept wet for the required curing time. Surfaces which cannot be cured by contact shall be enclosed with mats, anchored positively to the forms, or to the ground, so that outside air cannot enter the enclosure. Sufficient moisture shall be provided inside the enclosure to keep all surfaces of the concrete wet.

- b. Water Spray - This method shall consist of overlapping sprays or sprinklers that keep all unformed surfaces continuously wet.
 - c. Ponding - This method required the covering of the surfaces with a minimum of two (2) inches of clean granular material, kept wet at all times, or a minimum of one (1) inch depth of water. Satisfactory provisions shall be made to provide a dam to retain the water or saturated sand.
- 2. Membrane Curing - Unless otherwise provided herein or shown on the Plans, either Type 1 or Type 2 membrane curing compound may be used where permitted.
 - a. For substructure concrete, only one (1) type of curing compound will be permitted on any one (1) structure. (Material requirements and construction methods shall be as required by Section C6 – MEMBRANE CURING except as changed herein.) Membrane shall be applied in a single, uniform coating at the rate of coverage recommended by the Manufacturer and as approved by the City, but not less than one (1) gallon per 180 square feet of area. Tests for acceptance shall be at this specified rate.
 - b. Membrane curing shall not be applied to dry surfaces, but shall be applied just after free moisture has disappeared. Formed surfaces and surfaces which have been given a first rub shall be dampened and shall be moist at the time of applications of the membrane.
 - c. When membrane is used for complete curing, the film shall remain unbroken for the minimum curing period specified. Membrane which is damaged shall be corrected immediately by reapplication of membrane. Unless otherwise noted herein or on the Plans, the choice of membrane type shall be at the option of the Contractor, except that the City may require the same curing method for like portions of a single structure.

C1.12 REMOVAL OF FORMS AND FALSEWORK

- A. Except as herein provided, forms for vertical surfaces may be removed when the concrete has aged not less than one (1) day when Type I or Type II cement is used, and not less than one-half ($\frac{1}{2}$) day when Type III cement is used, provided it can be done without damage to the concrete.

C1.13 DEFECTIVE WORK

- A. Any defective work discovered after the forms have been removed shall be repaired as soon as possible in accordance with Section C1.14- FINISHING EXPOSED SURFACES.
- B. If the surface of the concrete is bulged, uneven or shows excess honeycombing or form marks, which in the opinion of the City, cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

C1.14 FINISHING EXPOSED SURFACES

- A. Ordinary Surface Finish - An Ordinary Surface Finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher grade or class of finish. Higher grades and classes of finish shall be in accordance with the Plans, Standards or Special Conditions. Where neither a grade nor class of finish is specified, and Ordinary Surface Finish, only, will be required.
- B. Ordinary Surface Finish shall be provided as follows:
 - 1. After form removal, all porous or honeycombed areas and spalled areas shall be corrected by chipping away all loose or broken material to sound concrete.
 - 2. Feathered edges shall be eliminated by cutting a face perpendicular to the surface. Shallow cavities shall be repaired using adhesive grout or epoxy grout. If judged repairable by the Engineer or the City, large defective areas shall be corrected using concrete or other material approved by the City.

3. Holes and spalls caused by removal of metal ties, etc., shall be cleaned and filled with adhesive grout or epoxy grout. Exposed parts of metal chairs on surfaces to be finished by rubbing, shall be chipped out to a depth of one-half ($1/2$) inch and the surface repaired.
4. All fins, runs, dips or mortar shall be removed from surfaces which remain exposed. Form marks and chamfer edges shall be smoothed by grinding and/or dry rubbing.

C1.15

PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION C2 – CONCRETE FOR STRUCTURES

C2.01 SCOPE OF WORK

- A. This specification covers the requirements for concrete related materials used for the storing and handling of concrete related materials; and for the proportioning and mixing of concrete for bridges, culverts, pre-stressed concrete, and incidental concrete construction.

C2.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the type of concrete, concrete mix design, concrete type and Manufacturer of precast structures, a description of curing methods used, and all other pertinent data to illustrate conformance to the specification found within.

C2.03 GENERAL

- A. The concrete shall be composed of Portland cement, aggregates (fine and coarse), admixtures if desired or required, and water, proportioned and mixed as hereinafter provided.
 - 1. Cement - The cement shall be either Type, I, II, or III Portland Cement conforming to ASTM Designation : C150
 - 2. Mortar (Grout) - Mortar for repair of concrete, shall consist of 1 part cement, two (2) parts finely graded sand, and enough water to make the mixture plastic. When required to prevent color difference, white cement shall be added to produce the color required. When required by the City, latex adhesive shall be added to the mortar.
 - 3. Admixtures - Calcium Chloride will not be permitted. Unless otherwise noted, Air-entraining, retarding and water reducing admixtures may be used in all concrete and shall conform to the requirements of the Standard Specification for Construction of Highways, Streets, and Bridges of the Texas Department of Transportation, latest edition.

C2.04 CLASSIFICATION AND MIX DESIGN

- A. It shall be the responsibility of the Contractor to furnish the mix design, using a Coarse Aggregate Factor acceptable to the City, for the class (es) of concrete specified. The mix shall be designed by a qualified concrete technician to conform with the requirements contained herein and in accordance with current Texas Department of Transportation standards. The Contractor shall perform, at his own expense, the work required to substantiate the design. Complete concrete design data shall be submitted to the City for approval.
- B. It shall also be the responsibility of the Contractor to determine and measure the batch quantity of each ingredient, including all water, so that the mix conforms to these specifications and any other requirements shown on the Plans.
- C. In lieu of the above mix design responsibility, the Contractor may accept a design furnished by the City, however, this will not relieve him of providing concrete meeting the requirements of these specifications.

C2.05 QUALITY OF CONCRETE, GENERAL

- A. The concrete shall be uniform and workable. The cement content, maximum allowable water cement ratio, the desired and maximum slump and the strength requirements of the various classes of concrete shall conform to the requirements of Tables 1 - 4 and as required herein.

Table 1

Concrete Designation	Desired Slump	Max. Slump
Structural Concrete		
(1) All Drill Shaft	6	7
(2) Uncased Drilled Shafts, Thin-Walled Sections (9" or less), and Prestressed Concrete Members	4	5
(3) Slabs, Caps, Columns, Piers, Wall Sections Over 9", etc.	3	4
Underwater or Seal Concrete	6	7
Riprap, Curb, Gutter and Other Miscellaneous Concrete	As specified by City	

NOTE: NO CONCRETE WILL BE PERMITTED WITH SLUMP IN EXCESS OF THE MAXIMUMS SHOWN.

B. Coarse Aggregate

Coarse aggregate shall be washed and shall consist of durable particles of gravel, crushed blast furnace slag, crushed stone, or combinations thereof and shall be free from frozen material or injurious amounts of salt, alkali, vegetable matter, or other objectionable material either free or as an adherent coating. When white portland cement is specified, the coarse aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout. Coarse aggregate shall not contain more than 0.25 percent by weight of clay lumps, or more than one (1) percent by weight of shale, or more than five (5) percent by weight of laminated and/or friable particles when tested in accordance with Test Method Tex-413-A. Coarse aggregate from each source shall have a wear of not more than 40 percent when tested in accordance with Test Method Tex-410-A.

Unless otherwise shown on the Plans, coarse aggregate from each source will be subjected to five (5) cycles of both the sodium sulfate and the magnesium sulfate soundness test in accordance with Test Method

Tex-411-A. When the loss is greater than 12-percent with sodium sulfate and/or 18 percent with magnesium sulfate, further testing will be required prior to acceptance or rejection of the material. A satisfactory record under similar conditions of service and exposure will be considered in the evaluation of material failing to meet these requirements.

When tested in accordance with Test Method Tex-401-A, the coarse aggregate, including combinations of aggregates when used, shall conform to the gradation requirements shown in Table 2.

Table 2
COARSE AGGREGATE GRADATION CHART

Percent Retained on Each Sieve										
Aggregate Grade No.	Nominal Size in.	2-1/2 in.	2 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 8
1	2	0	0-20	15-50		60-80			95-100	
2 (467)*	1-1/2		0	0-5		30-65		70-90	95-100	
3	1-1/2		0	0-5		10-40	40-75		95-100	
4 (57)*	1			0	0-5		40-75		90-100	95-100
5 (67)*	1/4				0	0-10		45-80	90-100	95-100
6 (7)*	1/2					0	0-10	30-60	85-100	95-100
7	3/8						0	5-30	75-100	
8	3/8						0	0-5	35-80	90-100

* Numbers in parenthesis indicate that these gradations conform to corresponding ASTM gradation in ASTM C33.

C. Fine Aggregate

Fine Aggregate shall be washed and consist of clean, hard, durable and uncoated particles of natural or Manufactured sand or a combination thereof, with or without a mineral filler. When white Portland cement is specified the fine aggregate used in the concrete shall be light colored. It shall be free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material and it shall not contain more than 0.5-percent by weight of clay lumps. When the aggregate is subjected to the color test for organic impurities in accordance with Test Method Tex-408-A, the test result shall not show a color darker than standard.

Unless otherwise shown on the Plans, the acid insoluble residue of fine aggregate used in concrete subject to direct traffic shall be not less than 60 percent by weight when tested in accordance with Test Method Tex-612-J.

When tested in accordance with Test Method Tex-401-A, the fine aggregate or combinations of aggregates, including mineral filler shall conform to the gradation requirements shown in Table 3.

Table 3
FINE AGGREGATE GRADATION CHART

Percent Retained on Each Sieve								
Aggregate Grade No.	3/8 in.	No. 4	No. 8	No. 16	No. 30	No.50	No. 100	No. 200
1	0	0-5	0-20	15-50	35-75	65-90	90-100	97-100

- Where manufactured sand is used in lieu of natural sand, the percent retained on the No. 200 sieve shall be 94 to 100.
- Where the sand equivalent value is greater than 85, the retainage on the No. 50 sieve may be 65 to 94 percent.
- Fine aggregate will be subjected to the Sand Equivalent Test (Test Method Tex-203-F). The sand equivalent shall not be less than 80 unless otherwise shown on the Plans.
- For all classes of concrete, except class K, the fineness modulus shall be between 2.30 and 3.10 as determined by Test Method Tex-402-A. The fineness modulus for class K shall be 2.6 to 2.8 unless otherwise shown on the Plans.

Table 4

SLUMP REQUIREMENTS

Class of Conc.	Sacks of Cement per C.Y.	Min. Comp Strength 28 (f' c) 28 Day psi	Min Beam Strength 7 Day	Max. Water Cement Ratio gal/sack	Coarse Aggr. No.
A	5.0	3000	425 390 (3)	6.5	1-2-3-4-8 (1) (4)
B	4.5	2500	300	8.0	2-3-4-5-6-7
C	6.0	3600	510	6.0	1-2-3-4-5-
D	3.0	1500	215	11.0	2-3-4-5-6-7
E	6.0	3000	425	6.0	2-3-4-5
S	6.5	4000	570 525 (3)	5.0	2-3-4-5
P	5.0	NA	555 (2)	6.25	2-3
DC	8.75	5500	720	3.6	6
CO	7.0	4600	640	4.5	6
SS	7.0	3600	510	5.5	3-4-5

1. Grade 8 aggregate for use in extended course, unless a larger size is approved by the Engineer or City.
2. Minimum running average of concrete pavement.
3. When Type II or Type I / II is cement is used.
4. Unless otherwise permitted by the Engineer, Grade I coarse aggregate may only be used in massive foundations with four (4) inch minimum clear spacing between reinforcing steel bars. Grade I aggregate may not be used in Drill Shafts.

CLASS OF CONCRETE	TYPICAL USAGE
A	Drill Shafts, Culverts, (except top of slab of Direct Traffic Culverts), Inlets, Manholes, Headwalls, Approach Slabs, Curb, Gutter, Curb and Gutter, Concrete Retards, Sidewalks, Driveways, Concrete Pavement, Back-up Walls and Anchors.
B	Rip Rap, Small Roadside Signs, and Anchors
C	Drilled Shafts, Bridge Substructures, Bridge Railing, Culverts (except top of slab of Direct Traffic Culverts), Wing Walls, Approach Slabs, Concrete Traffic Barriers
D	Rip Rap
E	Seal Concrete
S	Bridge Slab, Top Slab of Direct Traffic Culvert, Bridge Sub-structure
P	Concrete Pavement
DC	Dense Concrete Overlay
CO	Concrete Overlay
SS	Slurry Displacement Shafts, Underwater Drill Shafts

- A. The concrete shall be mixed in quantities required for immediate use. Retempering of concrete will not be permitted.
- B. In threatening weather, which may result in conditions that will adversely affect quality of the concrete to be placed, the City may order postponement of the work. Where work has been started and changes in weather conditions require protective measures, the Contractor shall furnish adequate shelter to protect the concrete against damage from rainfall, or freezing temperatures. If necessary to continue operations during rainfall, the Contractor shall also provide protective coverings for the material stock piles. Aggregate stock piles need to be covered only to the extent necessary to control the moisture conditions in the aggregates to adequately control the consistency of the concrete.

C2.07

PLACING, CURING AND FINISHING

- A. The placing of concrete, including construction of forms and falsework, curing and finishing, shall be in accordance with Section C1- CONCRETE STRUCTURES, and Section C1.14- FINISHING EXPOSED SURFACES.

C2.08

PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION C3 – RIPRAP

C3.01 SCOPE OF WORK

- A. This specification covers the requirements for the furnishing and placing of riprap concrete of the type indicated on the Plans.
 - 1. Bar reinforcement shall conform to the requirements of Section C7- REINFORCING STEEL. Wire reinforcement shall consist of welded fabric meeting the requirements of the Section C7- REINFORCING STEEL.
- B. Pre-molded expansion joint material shall conform to the requirements of Section C1- CONCRETE STRUCTURES.

C3.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including concrete mix design, expansion joint material, curing method, and all other pertinent data to illustrate conformance to the specification found within.

C3.03 CONSTRUCTION METHODS

- A. The slopes and other areas to be protected shall be dressed to the line and grade shown on the Plans prior to the placing of riprap.

C3.04 CONCRETE RIPRAP

- A. Concrete for riprap shall be placed in accordance with the details and to the dimensions shown on the Plans or as established by the City. Unless otherwise shown by a note on the Plans, concrete riprap shall be reinforced using wire or bar reinforcement.
- B. The class of concrete shall be “Class B”, and shall be in accordance with Section C2- CONCRETE FOR STRUCTURES.
- C. If wire reinforcement is used, it shall be a six-inch by six-inch (6” x 6”) No. 6 plain electric welded reinforcing fabric or its equal. A minimum lap of six (6) inches shall be used at all splices. At the edge of the riprap, the wire fabric shall not be less than one (1) inch or more than three (3) inches from the edge of the concrete and shall have no wires projecting beyond the last member parallel to the edge of the concrete.
- D. If bar reinforcement is used, the sectional area of steel in each direction shall not be less than the sectional area of the wire fabric described above. The spacing of bar reinforcement shall not exceed 18-inches in each direction and the distance from the edge of concrete to the first parallel bar shall not exceed six (6) inches.
- E. Reinforcement shall be supported properly throughout the placement to maintain in position approximately equidistant from the top and bottom surface of the slab.
- F. If the slopes and/or bottom of the trench for tow walls are dry and not consolidated properly, the City may require the entire area to be sprinkled, or sprinkled and consolidated before the concrete is placed. All surfaces shall be moist when concrete is placed.
- G. After the concrete has been placed, compacted and shaped to conform to the dimensions shown on the Plans, and after it has set sufficiently to avoid slumping, the surface shall be finished with a wooden float to secure a reasonably smooth surface. The concrete shall require a broomed finish in areas of pedestrian traffic.
- H. Immediately following the finishing operation the riprap shall be cured in accordance with Section C1- CONCRETE STRUCTURES.

PAYMENT

- A. Payment for concrete riprap shall be according to the square yard unit price of concrete placed as shown in the Plans or details. All work and materials involved in preparing forming reinforcing, finishing, etc. shall be subsidiary to the bid item.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION C4 – CONCRETE CURB AND GUTTER

C4.01 SCOPE OF WORK

- A. This specification covers the requirements for constructing concrete curb and gutter as shown on the Plans and specified herein.

C4.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including concrete mix design, expansion joint material, curing method, and all other pertinent data to illustrate conformance to the specification found within.

C4.03 GENERAL

- A. “Concrete Curb and Gutter” shall consist of Portland cement combined concrete curb and gutter or separate concrete approved subgrade or foundation material in accordance with these specifications, in conformity with the lines and grades and details shown on the Plans.

C4.04 MATERIALS

- A. Unless otherwise specified on the Plans, materials and proportions for concrete used in construction under this item shall conform to the requirements as specified for Class “A” concrete under Section C2- CONCRETE FOR STRUCTURES. Reinforcing steel shall conform to the requirements as specified in Section C7- REINFORCING STEEL. Expansion joint filler shall be pre-molded material meeting the requirements specified in Section C1- CONCRETE STRUCTURES.

C4.05 EQUIPMENT

- A. If either, required by the Plans or Details, requested by the City or chosen by the Contractor, the curb and gutter shall be machine laid by an extrusion machine approved by the City. When machine laid curb and gutter is used for a project, the line for the top of curb shall be maintained from a guideline set by the Contractor from survey points as established by the Plans, details or contract. The forming tube of the extrusion machine shall be readily adjustable vertically during the forward motion of the machine, to provide the required variable height of the curb and gutter necessary to conform to the established grade line. In order to provide a continual monitor to the proposed grade of the curb and gutter, a pointer or gauge shall be attached to the machine in such a manner that a comparison can be made between the curb and the guideline. Other methods may be used if prior approval is granted by the City.

C4.06 CONSTRUCTION METHODS

- A. The subgrade or foundation shall be excavated and shaped to line, grade and cross section, and, if considered necessary in the opinion of the City, hand tamped and sprinkled. If dry, the subgrade or foundation material shall be sprinkled lightly immediately before concrete is deposited thereon.
- B. Outside forms shall be of wood or metal, of a section satisfactory to the City, straight, free of warp and of a depth equal to the depth of the curb and gutter. They shall be securely staked to line and grade, and maintained in a true position during the depositing of concrete. Inside forms for the curb shall be of approved material, shall be of such design as to provide the curb required and shall be rigidly attached to the outside forms. Where specifically permitted by the City in writing, the Contractor may place concrete curb and gutter with an extrusion machine.
- C. The reinforcing steel shall be placed in position as shown on the typical sections. Care shall be exercised to keep all steel in its proper locations. Reinforcing steel shall be adequately supported and approved by the City of Georgetown to assure proper placement when poured.
- D. Concrete for curb and gutter shall be mixed in a manner satisfactory to the City. The curb and gutter shall

be poured in sections of the length indicated on the Plans, and each section shall be separated by a pre-molded or board joint of cross section specified of the curb and gutter and of the thickness indicated on the Plans. In the event the curb and gutter is placed by an extrusion machine the approved mix shall be fed into the machine in such a manner and consistency that the finished curb and gutter will present a well compacted mass with a surface free from voids and honeycombs. It shall be true to the established shape, line and grade. Any additional surface finishing specified and/or required shall be performed immediately after extrusion.

- E. After the concrete has been struck off and after it has become sufficiently set, the exposed surfaces shall be thoroughly worked with a wooden float. The exposed edges shall be rounded by the use of an edging tool to the radius indicated on Plans. Unless specified otherwise on the Plans, when the concrete in the curb and gutter has become sufficiently set, the inside form shall be carefully removed and the surface shall be plastered with a mortar consisting of one part of Portland cement and two (2) parts fine aggregate. The mortar shall be applied with a template or "mule" made to conform to curb and gutter dimensions as shown on the Plans. All exposed surfaces of curb and gutter, or gutter, shall be brushed to a smooth and uniform surface.
- F. The completed curb and gutter shall be cured in accordance with the requirements of Section C6- MEMBRANE CURING, Type 2, white pigmented, unless shown otherwise on the Plans. Other methods of curing as outlined in Section C1- CONCRETE STRUCTURES will be acceptable with a required curing period of 72 hours.
- G. The curb and gutter shall be backfilled, to the full height of the concrete, tamped and sloped as directed. The curb shall not be backfilled until proper curing time has elapsed to prevent structural damage to the curb.
- H. Any damage to the curb or gutter shall be replaced or repaired at the option of the Engineer or the City at the sole expense of the Contractor.

C4.07

PAYMENT

- A. Payment for furnished and installed concrete curb and gutter shall be paid according to the unit price per linear foot in the proper item of the Proposal and Bid Schedule. All work and materials to complete the concrete curb and gutter shall be subsidiary to this bid item.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION C5 – CONCRETE SIDEWALKS, DRIVEWAYS AND FLATWORK

C5.01 SCOPE OF WORK

- A. This specification covers the requirements for the construction of sidewalks and driveways on an approved subgrade with or without reinforcing steel, composed of Portland cement concrete, in conformity with the lines and grades established by the Engineer, and the details shown on the Plans.

C5.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer for approval, technical product literature including concrete mix design, expansion joint material, curing method, and all other pertinent data to illustrate conformance to the specification found within. TDLR approvals shall be submitted by the Engineer of Record.

C5.03 MATERIALS

- A. Materials and proportions used in construction under this item shall conform to the requirements as specified for Class “A” Concrete under Section C2- CONCRETE FOR STRUCTURES unless otherwise shown on the Plans. Reinforcing steel, if required, shall conform to the requirements as specified in Section C7- REINFORCING STEEL. Expansion joint filler shall be pre-molded material meeting the requirements specified in Section C1- CONCRETE STRUCTURES.

C5.04 CONSTRUCTION METHODS

- A. The subgrade shall be excavated and shaped to line, grade and cross section and if considered necessary in the opinion of the City hand tamped and sprinkled. The subgrade shall be moist at the time the concrete is placed.
- B. Forms shall be of wood or metal, of a section satisfactory to the City, straight, free from warp, and of a depth equal to the thickness of the finished work. They shall be securely staked to line and grade and maintained in a true position during the depositing of concrete.
- C. The reinforcing steel, if required, shall be placed in position as shown on the Plans. Care shall be exercised to keep all steel in its proper locations. Reinforcing steel shall be adequately supported and approved by the City of Georgetown to assure proper placement when poured.
- D. Sidewalks shall be constructed in sections of the lengths shown on the Plans. The different sections shall be separated by a pre-molded or board joint of the thickness shown on the Plans, placed vertically and at right angles to the longitudinal axis of the sidewalk. Where the sidewalk or driveways abut a curb or retaining wall, approved expansion material shall be placed along their entire length. Similar expansion material shall be placed around all blockouts and obstructions protruding through sidewalks or driveways.
- E. Concrete shall be mixed in a manner satisfactory to the City, placed in the forms to the depth specified and shaped and tamped until thoroughly compacted and mortar entirely covers the surface. The top surface shall be finished with a wooden float to a rough texture. The outer edges and joints shall then be finished with approved tools to the radii shown on the Plans.
- F. Sidewalks shall be marked into separate sections, each five (5) feet in length, by the use of approved jointing tools.
- G. Sidewalks may be placed with Fibrous Concrete in lieu of reinforced concrete. All concrete for Fibrous Concrete shall conform to the requirements of Specification Section C2- CONCRETE FOR STRUCTURES. Unless otherwise shown on the Plans the concrete shall be Class “A” as shown in Table 3 in Specification Section C2- CONCRETE FOR STRUCTURES. Reinforcing shall be 100% virgin

polypropylene fibrillated fibers specially manufactured for use as concrete reinforcement and meeting the requirements of ASTM C-1116. The fibrous material shall not contain reprocessed olefia. Each container of fibrous material shall bear the Manufacturer's name and its trademark and the net weight of fibrous material in the package. The specific gravity of the fibrous material shall be 0.91 plus or minus 0.05. The lengths of fibrous material shall be ½, ¼, 1 ½, and 2 inches in length. Each cubic yard of concrete shall contain no less than 1.5 pounds of fibrous material unless otherwise shown on the Plans. The fibrous material shall be added to the concrete mix at the time the mix is batched.

C5.05

PAYMENT

- A. Payment for work performed in accordance with this section of the specifications shall be made at the unit bid price per square yard under the proper items of the Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION C6 – MEMBRANE CURING

C6.01 SCOPE OF WORK

- A. This specification covers the requirements for curing concrete pavement, concrete pavement (base), curbs, curb and gutters, retards, sidewalks, driveways, medians, islands, concrete riprap, cement stabilized riprap, concrete structures and other concrete as indicated on the plans by impervious membrane method.

C6.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the type of membrane curing, the Manufacturer of the method used, a description of the water retention test to be used, and all other pertinent data to illustrate conformance to the specification found within.

C6.03 MATERIALS

- A. The membrane curing compound shall comply with the “Standard Specification for Liquid Membrane-forming Compounds for Curing Concrete”, ASTM Designation: C 309, Type 1 clear or translucent, or Type 2 white pigmented. The material shall have a minimum flash point of 80° F when tested by the “Pensky-Martin Closed Cup Method”.
- B. It shall be of such consistency that it can be satisfactorily applied as a fine mist through an atomizing nozzle by means of approved pressure spraying equipment at atmospheric temperatures above 40° F.
- C. It shall be of such nature that it will not produce permanent discoloration of concrete surfaces nor react deleteriously with the concrete or its components. Type 1 compound shall contain a fugitive dye that will be distinctly visible for not less than four (4) hours or more than seven (7) days after application.
- D. The compound shall produce a firm, continuous, uniform moisture impermeable film free from pinholes and shall adhere satisfactorily to the surfaces of damp concrete. It shall, when applied to the damp concrete surface at the rate of coverage specified herein, dry to touch in not more than four (4) hours and shall adhere in a tenacious film without running off or appreciably sagging. It shall not disintegrate, check, peel or crack during the required curing period.
- E. The compound shall not peel or pick up under traffic and shall disappear from the surface of the concrete by gradual disintegration.
- F. The compound shall be delivered to the job only in the Manufacturer’s original containers, which shall be clearly labeled with the Manufacturer’s name, the trade name of the material, and a batch number or symbol with which test samples may be correlated.
- G. The water retention test shall be in accordance with Test Method Tex-219-F. Percentage loss shall be defined as the water lost after the application of the curing material was applied. The permissible percentage moisture loss (at the rate of coverage specified herein) shall not exceed the following:

24 hours after application.....2 percent
72 hours after application.....4 percent

CONSTRUCTION METHODS

- A. The membrane curing compound shall be applied after the surface finishing has been completed, and immediately after the free surface moisture has disappeared. The surface shall be sealed with a single uniform coating of the specified type of curing compound applied at the rate of coverage recommended by the Manufacturer and directed by the City, but not less than one (1) gallon per 180 square feet of area. The Contractor shall provide satisfactory means and facilities to properly control and check the rate of applications of the compound.
- B. The compound shall be thoroughly agitated during its use and shall be applied by means of approved mechanical power pressure sprayers. The sprayers used to apply the membrane to concrete pavement or concrete pavement (base) shall travel at uniform speed along the forms and be mechanically driven. The equipment shall be of such design that it will insure uniform and even application of the membrane material. The sprayers shall be equipped with satisfactory atomizing nozzles. Only on small miscellaneous items will the Contractor be permitted to use hand powered spray equipment. For all spraying equipment, the Contractor shall provide facilities to prevent the loss of the compound between the nozzle and the concrete surface during the spraying operations.
- C. The compounds shall not be applied to a dry surface and if the surface of the concrete has become dry, it shall be thoroughly moistened prior to application of membrane by fogging or mist application. Sprinkling or coarse spraying will not be allowed.
- D. At locations where the coating shows discontinuities, pinholes, or other defects; or if rain falls on the newly-coated surface before the film has dried sufficiently to resist damage, an additional coat of the compound shall be applied immediately at the same rate of coverage specified herein.
- E. To insure proper coverage, the City shall inspect all treated areas after application of the compound for the period of time designated in the governing specification for curing, either of membrane curing or for other methods. Dry areas are identifiable because of the lighter color of dry concrete as compared to damp concrete. All suspected areas shall be tested by placing a few drops of water on the suspected areas. If the water stands in rounded beads or small pools which can be blown along the surface of the concrete without wetting the surface, the water-impervious film is present. If the water wets the surface of the concrete as determined by obvious darkening of the surface, or by visible soaking into the surface, no water-impervious film is present. Should the foregoing test indicate that any area during the curing period is not protected by the required water-impervious film, additional coat or coats of the compound shall be applied immediately, and the rate of application of the membrane compound shall be increased until all areas are uniformly covered by the required water-impervious film.
- F. When temperatures are such as to warrant protection against freezing, curing by this method shall be supplemented with an approved insulating material capable of protecting the concrete for the specified curing period.
- G. If at any time there is reason to believe that this method of curing is unsatisfactory or is detrimental to the work, the Contractor, when notified, shall immediately cease the use of this method and shall change to curing by one (1) of the other methods specified under this contract.

PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATIONS

SECTION C7 – REINFORCING STEEL

C7.01 SCOPE OF WORK

- A. This specification covers the requirements for the furnishing and placing of reinforcing steel, deformed and smooth, of the size and quantity designated on the Plans and in accordance with these specifications.

C7.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including the type of steel, mill test results, cut list as required by Contract, Plans or Details, type and Manufacturer of spacers and/or chairs, and all other pertinent data to illustrate conformance to the specification found within.

C7.03 MATERIALS

- A. Unless otherwise designated on the Plans, all bar reinforcement shall be deformed, and shall conform to one of the following:

1. ASTM A 615, Grades 40 or 60 open hearth, basic oxygen, or electric furnace new billet steel.
2. ASTM A617, Grades 40 or 60, axle steel.
3. ASTM A616, Grade 60, rail steel will be permitted in concrete pavement only. ASTM A616 bars shall be furnished as straight bars only and bending is prohibited. Bend tests will not be required.
4. ASTM A706, Grade 60, weldable reinforcing steel.
5. Smooth Bars for concrete pavement shall have a minimum yield strength of 60 ksi.

All other smooth bars, larger than No. 4, may be steel conforming to the above or may be furnished in any steel that meets the physical requirements of ASTM A36.

6. Spiral reinforcement shall be in accordance with TxDOT Item 440 of the Standards Specifications for Construction of Highways, Streets and Bridges and be either smooth or deformed bars, or wire, of the minimum size or gage shown on the plans, or as specified herein.

Bars for spiral reinforcement shall comply with ASTM A675, Grade 80 (reference to ASTM A29 is voided) A615 or A617, Grade 40, unless otherwise shown on the plans. Smooth wire shall comply with ASTM A82 and deformed wire shall comply with ASTM A496.

7. Wire for fabric reinforcement shall be in accordance with TxDOT Item 440 of the Standard Specifications for Construction of Highways, Streets and Bridges and conform to ASTM A82 or A496. Wire fabric shall conform to ASTM A185 or A497.
8. Epoxy coating material and the material used for the repair of the coating shall be in accordance with TxDOT Item 440 of the Standard Specifications for Construction of Highways, Streets and Bridges.

C7.04

BENDING

- A. The reinforcement shall be bent cold, true to the shapes shown on the plans. Fabrication shall preferably be done in the shop. Field fabrication, if permitted, shall be done with equipment approved by the Engineer. Misfabricated, damaged or broken bars shall be rejected and replaced at the Contractor's expense. Damaged or broken bars imbedded in a previous concrete placement may be repaired with the approval of the Engineer. The inside diameter, unless otherwise shown on the plans, shall be in accordance with TxDOT Item 440 of the Standard Specifications for Construction of Highways, Streets and Bridges.

C7.05

TOLERANCES

- A. Fabricating tolerances for bars, from plan dimensions, shall not be greater than shown in Figure 1 of TxDOT Item 440 of the Standard Specifications for Construction of Highways, Streets and Bridges.

C7.06

STORING

- A. Steel reinforcement shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected as far as practical from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, reinforcement shall be free from dirt, paint, grease, oil, or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross-sectional area and tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel specified.

C7.07

SPLICES

- A. The splicing of bars, except when provided on the Plans, or specified herein, will not be permitted without written approval of the City.
- B. Splices not provided for on the plans will be permitted in slabs 15 inches or less in thickness, columns, walls and parapets, but will not be included for measurement, and subject to the following:
- C. Unless otherwise approved by the City, splices will not be permitted in bars 30 feet or less in plan length. For bars exceeding 30 feet in plans length, the distance center to center of splices shall not be less than 30 feet minus one splice length, with no more than one individual bar length less than 10 feet. Lap splices no shown on the plans, but permitted herein, shall be made in accordance with TABLE C7-1. The specified concrete cover and proper spacing shall be maintained at such splices and the lap spliced bars placed in contact and securely tied together.

TABLE C7-1 – Minimum Lap Requirements for Bar Sizes Through No. 11

SIZE	LAP LENGTH	
	UNCOATED	COATED
No. 3	1'-0"	1'-6"
No. 4	1'-6"	2'-3"
No. 5	1'-10"	2'-9"
No. 6	2'-3"	3'-4"
No. 7	3'-0"	4'-6"
No. 8	3'-9"	5'-7"
No. 9	4'-8"	7'-0"
No. 10	5'-7"	8'-4"
No. 11	6'-7"	9'-10"

Spiral steel shall be lapped a minimum of one turn. Bar sizes No. 14 and No. 18 may not be lapped.

- D. Welded splices shall conform to the requirements of the plans and TxDOT Item 448, "Structural Field Welding", of the Standard Specifications for Construction of Highways, Streets and Bridges. End preparation for butt welding reinforcing bars shall be done in the field. Delivered bars shall be of

sufficient length to permit weld preparation.

- E. Welded wire fabric shall be spliced using a lap length that will include the overlap of a minimum of two (2) cross wires plus two (2) inches on each sheet or roll. Splices using bars which develop equivalent strength and lapped in accordance with TABLE 7-1 will be permitted.
- F. For box culvert extensions with less than one (1) foot of fill, the existing longitudinal bars shall have a lap with the new bars as shown in Table 1. For extensions with more than one (1) foot of fill, a minimum of six (6) inch lap will be required.

C7.08

MECHANICAL COUPLERS

- A. When shown on the plans, or approved by the City, mechanical splices may be made in the reinforcing steel bars in accordance with TxDOT Item 440 of the Standard Specifications for Construction of Highways, Streets and Bridges.

C7.09

PLACING

- A. Reinforcement shall be placed as near as possible in the position shown on the Plans. Unless otherwise shown on the Plans, dimensions shown for reinforcement are to the centers of the bars. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than one-twelfth ($\frac{1}{12}$) of the spacing between bars. In the plane of the steel perpendicular to the nearest surface of concrete, bars shall not vary from plan placement by more than one-quarter inch. Cover of concrete to the nearest surface of steel shall meet the above requirements but shall never be less than one and a half (1 ½) inches.
- B. Vertical stirrups shall always pass around the main tension members and be attached securely thereto. The reinforcing steel shall be spaced its required distance from the form surface by means of approved galvanized metal spacers, metal spacers with plastic coated tips, stainless steel spacers, plastic spacers, or approved pre-cast mortar or concrete blocks. For approval of plastic spacers on a project, representative samples of the plastic shall show no visible indications of deterioration after immersion in a five (5) percent solution of sodium hydroxide for 120 hours.
- C. All reinforcing steel shall be tied at all intersections, except that where spacing is less than one (1) foot in each direction in which case reinforcing steel shall be tied at alternate intersections. For reinforcing steel cages for other structural members, the steel shall be tied at a sufficient number of intersections to provide a rigid cage of steel.
- D. Before any concrete is placed, all mortar, mud, dirt, etc. shall be cleaned from the reinforcement. Precast mortar or concrete blocks to be used for holding steel in position adjacent to formed surfaces shall be cast in molds meeting the approval of the City and shall be cured by covering with wet burlap or cotton mats for a period of 72 hours. Mortar for blocks shall contain approximately one (1) part portland cement to three (3) parts sand. Concrete for blocks shall contain nine (9) sacks of portland cement per cubic yard of concrete.
- E. The blocks shall be cast in the form of a frustum of a cone or pyramid with the smaller face placed against the forms.
- F. A suitable tie wire shall be provided in each block, to be used for anchoring to the steel. Except in unusual cases, and when specifically otherwise authorized by the City, the size of the surface to be placed adjacent to the forms shall not exceed two and one-half (2½) inches square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be cast accurately to the thickness required, and the surface to be placed adjacent to the forms shall be a true plane free of surface imperfections.
- G. Reinforcement shall be supported and tied in such manner that a sufficiently rigid cage of steel is provided. If the cage is not adequately supported to resist settlement or floating upward of the steel, overturning of truss bars, or movement in any direction during concrete placement, permission to continue concrete placement will be withheld until corrective measures are taken. Sufficient measurements shall be made during concrete placement to insure compliance with the first paragraph of the Article.

- H. Mats of wire fabric shall overlap each other sufficiently to maintain a uniform strength and shall be fastened securely at the ends and edges.
- I. No concrete shall be deposited until the City has inspected the placement of the reinforcing steel and given permission to proceed. If the reinforcement is not adequately supported or tied to resist settlement, floating upward, overturning of truss bars, or movement in any direction during concrete placement, concrete placement will be halted until corrective measures are taken.

C7.10

EPOXY COATING OF REINFORCING STEEL

- A. When shown on the plans, coating with epoxy of reinforcing bars, plain wire, deformed wire or welded wire fabric to be used as reinforcement of concrete shall conform to the requirements of TxDOT Item 440 of the Standard Specifications for Construction of Highways, Streets and Bridges.

C7.11

PAYMENT

- A. No separate payment shall be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the proper items of the Proposal and Bid Schedule.

END OF SECTION

TECHNICAL SPECIFICATION

SECTION C8 - REINFORCED CONCRETE PIPE

C8.01 SCOPE OF WORK

- A. This specification covers the requirements for the placing of reinforced concrete pipe and for the material and incidental construction requirements for reinforced concrete pipe sewers. The culvert pipe shall be installed in accordance with the requirements of these specifications to the lines and grades shown on the Plans, and shall be of the classes, sizes and dimensions shown thereon. The installation of pipe shall include all joints or connections to new or existing pipe, headwalls, etc., as may be required to complete the work. The locations of private driveway and side road pipe may be varied as deemed necessary by the Engineer or the City.

C8.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including pipe Manufacturer, joint material, bedding material, fittings, geotextile fabric, and all pertinent data to illustrate conformance to the specification found within.

C8.03 MATERIALS

- A. The pipe shall be of the Class specified on the Plans. The shell thickness, the amount of circumferential reinforcement and the strength of the pipe shall conform to the specified Class as summarized in ASTM Designation: C76 for Circular Pipe: C506 for Arch Pipe or C507 for Horizontal Elliptical Pipe.

1. All precast concrete pipe shall be machine made or cast by a process which will provide for uniform placement of the concrete in the form and compaction by mechanical devices which will assure a dense concrete. Concrete shall be mixed in a central batch plant or other approved batching facility from which the quality and uniformity of the concrete can be assured. Transit mixed concrete will not be acceptable for use in precast pipe.
2. Unless otherwise approved by the City, not more than two (2) holes may be placed in the top section of precast pipe for lifting and placing. The holes may be cast, cut, or drilled in the wall of the pipe. The holes shall not exceed three (3) inches in diameter at the inside of surface of the pipe wall. Not more than one (1) longitudinal wire or two (2) circumferential wires may be cut per layer of reinforcing steel when locating lift holes in the pipe wall. After the pipe is in place, lift holes shall be filled with concrete or mortar or precast concrete plugs to the satisfaction of the Engineer.
3. The Contractor has the option of using portland cement or portland cement plus fly ash. When fly ash is used, then "cement" shall also be defined as "cement plus fly ash". "Cement plus fly ash" shall be composed of portland cement of the type specified and 20 to 35 percent fly ash by absolute volume. Type B fly ash shall not be used when Type II cement is shown on the plans. When portland cement is partially replaced, blended or otherwise modified by a pozzolan, the pozzolan is defined and limited to fly ash conforming to TxDOT Department Materials Specification D-9-8900, "Fly Ash".

B. Jointing Materials

1. Cold Applied, Plastic Asphalt Sewer Joint Compound shall be suitable for jointing concrete pipe. It shall consist essentially of natural and/or processed asphalt base, suitable volatile solvents, and inert filler. The consistency is to be such that the ends of the pipe can be coated with a layer of the compound up to one-half ($\frac{1}{2}$) inch thick by means of a trowel. It shall cure to a firm, stiff plastic condition after application. The material shall be of a uniform mixture and any small separation occurring in the container before use must be readily stirred back to form a uniform mix.

2. Mortar for joints shall consist of one (1) part cement, two (2) parts sand and sufficient water to make a plastic mix. The sealing of joints with mortar shall be in accordance with TxDOT Item 464 of the Standard Specifications for Construction of Highways, Streets and Bridges.
 3. Rubber gaskets shall conform to ASTM C361 or C443. The design of the joints and permissible variations in dimensions shall be in accordance with ASTM C443. The Contractor shall furnish the Engineer the Manufacturer's Certificate of Analysis. Rubber gaskets shall be installed according to the recommendations of the Manufacturer. Water tight joints will be required when using rubber gaskets. Backfilling may begin when approved by the City.
 4. Cold applied preformed plastic gaskets shall be suitable for sealing joints of tongue and groove concrete pipe in accordance with TxDOT Item 464 of the Standard Specifications for Construction of Highways, Streets and Bridges.
- C. Rubber Gaskets shall conform to ASTM Designation: C361 or C443, with the provision that the Contractor shall furnish the City the Manufacturer's Certificate of Analysis.
- D. Cold Applied Preformed Plastic Gaskets shall be suitable for sealing joints of tongue and groove concrete pipe. The gasket sealing the joint shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes or obnoxious odors. The gasket joint sealer shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength, and shall be supplied in extruded rope-form of suitable cross-section. The size of the plastic gasket joint sealer shall be in accordance with the Manufacturer's recommendations and sufficient to obtain the squeeze-out as described under "Jointing", The gasket joint sealer shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that one-half may be removed longitudinally without disturbing the other half.
- E. All fittings and wyes shall be manufactured and not constructed on the project unless prior approval is granted by the City.
- F. All joints that are not sealed with a watertight connection shall be wrapped with MARFI-140-N geotextile fabric or equivalent. The joint shall be wrapped with 18-inch wide fabric splitting the joint (nine (9) inches on each side).

C8.04

CONSTRUCTION METHODS

- A. Excavation. All excavation shall be in accordance with the requirements of Section G9-STRUCTURAL EXCAVATION. Before pipe is laid in a trench, the completed and shaped trench to receive the pipe shall be of sufficient width to provide free working space for satisfactory bedding and jointing and thorough tamping of the backfill and bedding material under and around the pipe. The Contractor shall make such temporary provisions as may be necessary to insure adequate drainage of the trench and bedding during the construction operation.
- B. Bedding. The pipe shall be bedded in accordance with the details shown on the Plans. Where the soil encountered at the established grade is quicksand, muck, or similar unstable material, unless special construction methods are called for on the Plans or in the special provisions, such unstable soil shall be removed and replaced in accordance with the requirements of Section G9-STRUCTURAL EXCAVATION.
- C. Laying Pipe. Unless otherwise authorized by the City, the laying of pipe on the prepared foundation shall be started at the outlet end with the spigot or tongue end pointing downstream and shall proceed toward the inlet. Where bell and spigot pipe are used, cross trenches shall be cut in the foundation to allow the barrel of the pipe to rest firmly upon the prepared bed. These cross trenches shall be not more than two (2) inches larger than the bell ends of the pipe. Proper facilities shall be provided for hoisting and lowering the sections of pipe into the trench without disturbing the prepared foundation and the trench. The ends of the pipe shall be carefully cleaned before the pipe is placed. As each length of pipe is laid, the mouth of the pipe shall be protected to prevent the entrance of earth or bedding material. The pipe shall be fitted and matched so that when laid in the bed shall form a smoother, uniform conduit. When elliptical pipe with circular reinforcing or

circular pipe with elliptical reinforcing is used, the pipe shall be laid in the trench in such position that the markings "Top" or "Bottom", shall not be more than five (5) degrees from the vertical plane through the longitudinal axis of the pipe.

Multiple installations of reinforced concrete pipe shall be laid with the centerlines of individual barrels parallel. When not otherwise indicated on the Plans, the following clear distances between outer surfaces of adjacent pipe shall be used.

Diameter of Pipe	18"	24"	30"	36"	42"	48"	54"	60" - 84"
Clear Distance Between Pipes	0' -9"	0' -11"	1' -1"	1' -3"	1' -5"	1' -7"	1' -11"	2' -0"

D. Jointing. All piping, if specified by the Plans, Details, or the City,

1. Joints sealed with Portland cement mortar shall be made as follows: mortar, composed of one (1) part portland cement and two (2) parts sand, so placed as to form a durable water-tight joint. The ends of the pipe shall be cleaned thoroughly and wetted before making the joint. After any section of pipe is laid and before any succeeding section is laid the lower half of the bell or groove of the pipe last laid shall be plastered thoroughly by troweling on an even layer of mortar. Next, mortar shall be applied to the upper portion of the tongue or spigot of the pipe section being laid.

The spigot or tongue end of the next section of pipe shall then be inserted and the joint pulled up tight, taking care that the inner surfaces of the abutting pipe section are flush and even. After the section is laid and uniformly matched and the sections have been fitted as close as the construction of the pipe will permit, the lower half of the inner circumference of the joints of pipe over 18-inches in diameter shall be sealed and packed with mortar and finished smooth and even with the adjacent section of pipe. Before this mortar has attained initial set, additional mortar then shall be applied from the outside and forced into the unfilled portion of the bell or grooved to fill completely the annular space around the spigot or tongue. For bell and spigot pipe, a bead shall be formed on the outside by troweling on mortar downward at an angle of 45 degrees from the outer edge of the bell to the spigot of the last laid section. For tongue and groove pipe, a bead shall be formed extending at least one (1) inch on either side of the joint and of approximately semicircular cross-section or triangular cross-section. If the triangular cross-section is used, it shall be formed by placing the mortar approximately 45 degrees outward from the extreme edges of the bead. For pipe too small to permit finishing of the inside surface of the joint, a tight stopper of burlap or other equivalent materials shall be dragged through the pipe past the new joint to remove any fins of mortar. Special care shall be exercised in placing adjacent pipe sections to avoid movement of the pipe in place and the breaking of the mortar bond at completed joints. After the initial set, the mortar on the outside shall be protected from air and sun with a thoroughly wetted earth or burlap cover or acceptable equivalent which shall be kept wet for a minimum of 48 hours or until the backfill has been completed. No jointing shall be done when the atmospheric temperature is at or below 40° F, and when necessary, because of a sudden drop in temperature, joints shall be protected against freezing for at least 24 hours. After placing, any pipe which is not in true alignment or which shows any undue settlement after laying or is damaged, shall be taken up and relaid or replaced without extra compensation.

At the Contractor's option, and with the approval of the City for pipes which are large enough for a man to enter and perform the required work efficiently, pipe may be furnished with the groove not less than one-half ($\frac{1}{2}$) of an inch and not more than three-fourths ($\frac{3}{4}$) of an inch longer than the tongue. Such pipe may be laid without mortar joints and backfilled. Care shall be exercised to avoid displacing the joints during the backfilling operations. After the backfilling has been completed, the space between the end of the tongue and the groove shall be cleaned of all foreign material, thoroughly wetted and filled with mortar around the entire circumference of the pipe. Mortar for this use shall be of such consistency that it can be packed in the joint completely filling the space between adjacent pipes. The City will inspect this process to ascertain that the joints are being

completely filled. If the City finds that this is not being accomplished, he may void this process and require that for the remainder of the project the pipe be jointed and backfilled in accordance with the provisions of the first paragraph of this section.

The Contractor shall make available for the use of the City an appropriate rolling device similar to an automobile mechanic's "Creeper" for conveyance through the small size pipe structures.

No mortar banding on the outside of pipe will be required for side drain culverts. No joint material will be required for temporary culverts.

Mortar joints will be required for irrigation wells, vents and similar vertical structures.

2. Joints using Cold Applied, Plastic Asphalt Sewer joint compound shall be made as follows: Both ends of the pipes shall be clean and dry and shall be coated with a suitable primer of the type recommended by the Manufacturer where they will be in contact with the joint material. Under no circumstance shall this type of joint be attempted on wet pipe. After the pipe has been set to proper line and grade in the trench, a one-half ($\frac{1}{2}$) of an inch thick layer of the compound shall be troweled or otherwise placed on the groove end of the pipe covering not less than two-thirds ($\frac{2}{3}$) of the joint face around the entire circumference. Next the tongue end of the next pipe shall be shoved home with sufficient pressure to make a tight joint. After the joint is made, any excess mastic projecting into may proceed as soon as the joint has been inspected and approved by the City. Special precautions shall be taken in placing and compacting backfill to avoid damage to the joints.
3. Joints using rubber gaskets shall be made as follows: Where rubber gasket pipe joints are required by the Plans, the joint assembly shall be made according to the recommendations of the gasket Manufacturer. Watertight joints will be required when using rubber gaskets.
4. Joints using cold applied preformed plastic gaskets shall be made as follows: A suitable primer of the type recommended by the Manufacturer of the gasket joint sealer shall be brush applied to the tongue and groove joint surfaces and the end surfaces and allowed to dry and harden. No primer shall be applied over mud, sand or dirt or sharp cement protrusions. The surface to be primed must be cleaned and dry when primer is applied.

Before laying the pipe in the trench, the plastic gasket sealer shall be attached around the tapered tongue or tapered groove near the shoulder or hub of each pipe joint. The paper wrapper shall be removed from one (1) side only of the two (2) piece wrapper on the gasket and pressed firmly to the clean, dry pipe joint surface. The outside wrapper shall not be removed until immediately before pushing the pipe into its final position.

When the tongue is correctly aligned with the flare of the groove, the outside wrapper on the gasket shall be removed and the pipe shall be set with sufficient force and power, (Back hoe shovel, chain hoist, ratchet hoist or winch), to cause the evidence of squeeze-out of the gasket material on the inside or outside around the complete pipe that would tend to obstruct the flow shall be removed. (Pipe shall be set in a straight line with all parts of the pipe on line and grade at all times). Backfilling of pipe laid with plastic gasket joints may proceed as soon as the joint has been inspected and approved by the City. Special precautions shall be taken in placing and compacting backfill to avoid damage to the points.

When the atmospheric temperature is below 60° F, plastic joint seal gaskets shall either be stored in an area warmed to above 70° F, or artificially warmed to this temperature in a manner satisfactory to the City. Gaskets shall then be applied to pipe joints immediately prior to placing pipe in trench, followed by connection to previously laid pipe.

- E. Backfilling. After the pipe has been placed, bedded and jointed as specified, filling and/or backfilling shall be done in accordance with the applicable requirements of Section G9-STRUCTURAL EXCAVATION. When mortar joints are specified, no fill or backfill shall be placed until the jointing material has been cured for at least six (6) hours. Special precautions shall be taken in placing and compacting the backfill to avoid any movement of the pipe or damage to the joints. Joints consisting of material other than mortar may be backfilled immediately.

- F. Protection of Pipe. Unless otherwise shown on the Plans or permitted in writing by the City, no heavy earth moving equipment will be permitted to haul over the structure until a minimum of four (4) feet of permanent or temporary, compacted fill has been placed thereon. Pipe damaged by the Contractor's equipment shall be removed and replaced by the Contractor at no additional cost.

C8.05

PAYMENT

- A. Payment for furnished and installed reinforced concrete pipe shall be paid according to the unit price per linear foot in the proper item of the Proposal and Bid Schedule. All work and materials to complete the reinforced concrete pipe including, but not limited to, excavation, bedding, backfill, connection to structures, etc., shall be subsidiary to this item.

END SECTION

TECHNICAL SPECIFICATIONS

SECTION C9 – FLOWABLE BACKFILL

C9.01 SCOPE OF WORK

- A. This specification covers the requirements for the furnishing and placing of flowable backfill as indicated on the Plans.

C9.02 SUBMITTALS

- A. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer or the City for approval, technical product literature including flowable backfill mix design, curing method, and all other pertinent data to illustrate conformance to the specification found within.

C9.03 CONSTRUCTION METHODS

- A. All trenches to be backfilled shall be properly prepared according to the Plans and Specifications prior to placement of flowable backfill.

C9.04 FLOWABLE BACKFILL

- A. Flowable backfill shall be placed in accordance with the details and to the dimensions shown on the Plans or as established by the City.
- B. The mixture shall consist of 188 pounds of Type III Portland cement, 94 pounds of fly ash and 3,000 pounds of sand per cubic yard of flowable backfill.
- C. The minimum allowable slump for flowable backfill is 6-inches.
- D. Immediately following the placement of flowable backfill, it shall be cured in accordance with Section C1- CONCRETE STRUCTURES.

C9.05 PAYMENT

- A. Payment for flowable backfill shall be subsidiary to the appropriate bid items of the Proposal and Bid Schedule.

END OF SECTION

APPENDIX “A”

STANDARDS

TABLE OF CONTENTS

APPENDIX A –CONSTRUCTION STANDARDS

<u>Detail Number</u>	<u>Title</u>
----------------------	--------------

EROSION CONTROL STANDARDS

EC- 01	Temporary Erosion and Sedimentation Guidelines
EC- 01A	Erosion/Sedimentation and Tree Protection Notes
EC- 02	Silt Fence Standard
EC- 03	Rock Berm Standard
EC- 04	High Service Rock Berm Standard
EC- 05	Triangular Filter Dike
EC- 06	Stabilized Construction Entrance
EC- 07	Sediment Trap Standard
EC- 08	Sediment Basin Baffle Design
EC- 09	Tree Protection – Chain Link Fence
EC- 10	Tree Protection – Wood Slats

STREETS AND DRAINAGE STANDARDS

SD- 01	Typical Half Cross – Sections for HMAC Surfaced Streets
SD- 02	Typical Rural Paving Standard
SD- 02A	Typical Rural (Collector) Paving Standard
SD- 03	Concrete Valley Gutter Standard
SD- 04	Typical “Non-Single Family” & “Non-Two Family” Cul-de-Sac Plan
SD- 05	Curb Stamp Standard
SD- 06	Curb and Gutter Standard
SD- 07	Mountable Curb and Gutter Standards
SD- 08	Ribbon Curb Standards
SD- 09	Curb Inlet Standard
SD- 10	Curb Drain Inlet Typical Section
SD- 11	Standard Storm Sewer Manhole Cover (24”)
SD-11A	Bolted Storm Sewer Manhole Set
SD- 12	Standard Storm Sewer Manhole Frame (32”)
SD- 13	Standard Storm Sewer Manhole Set (38” Cover)
SD- 14	Sidewalk Section and Joint Standard
SD- 15	Concrete Driveway Approach Typical
SD- 16	Concrete Dip Driveway Approach
SD- 17	Rural Residential Driveway Approach with Culvert Pipe
SD- 18	Rural Non-Residential Undivided Driveway Approach with Culvert Pipe

SD- 19	Typical Concrete Rip-Rap at Pipe
SD- 20	Energy Dissipater Standard
SD- 21	Permanent End-of-Road Barricade
SD- 22	Type III Construction Barricade
SD- 23	Universal Anchor System
SD- 24	Poz-Loc (Breakaway Foundation)
SD- 25	Standard Street Sign Detail
SD- 26	Project Sign Type II
SD- 27	Standard Street Sign Detail II
SD- 28	Pedestrian Ramps General Notes
SD- 29	Typical Intersection Layout
SD- 30	Curb Ramp Placements at Intersections
SD- 31	Sidewalk Ramp Details Type 1-3
SD- 32	Sidewalk Ramp Detail Type 4
SD- 33	Sidewalk Ramp Detail Types 5-6
SD- 34	Driveway Apron Type 10
SD- 35	Driveway Aprons Types 12-13
SD- 36	Curb Ramps at Median Islands
SD- 37	Curb Ramp Textures Type A
SD- 38	Curb Ramp Textures Type B
SD- 39	Concrete Trench Cap Detail for Storm Sewer
SD- 40	Trench and Embedment and Pavement Replacement Detail under Existing Roadway for Storm Sewer
SD- 41	Trench and Embedment Detail Under Proposed Roadway for Storm Sewer
SD- 42	Trench and Embedment Detail (Profile) for Storm Sewer
SD- 43	Temporary All Weather Driving Surface
SD- 44	Temporary All Weather Driving Surface Turn Around
SD-45	Downtown Overlay District – Type III and IV Sidewalk Details

WATER STANDARDS

W- 01A	Utility Assignments for Local Streets, Residential Collectors and Major Collectors
W- 01B	Utility Assignments for Minor Arterial and Major Arterial Roadways
W- 02	Trench and Embedment Standard Under Non-Paved Areas
W- 02A	Concrete Trench Cap Standard
W- 03	Typical Water Service - Elevation
W- 04	Single Water Service - Plan
W- 05	Double Water Service - Plan
W- 06	Quadruple Water Service - Plan
W- 07	Typical Valve Setting
W- 08	Standard Riser Box for Corporation Stop

W- 09	Standard Blow - Off
W- 10	Typical Fire Hydrant Installation
W- 11	Typical Thrust Blocks for Water and Force Mains
W- 12	Standard Air Release Valve for Water Main
W- 13	Standard Air Release Valve for Water Main
W- 14	Installation of PVC Pipe Through Casing
W- 15	Concrete Encasement Standard
W- 16	Concrete Encasement Standard
W- 17	Trench and Embedment and Pavement Replacement Standard Under Existing Roadway
W- 18	Tracer Wire Installation and Test Station Location
W- 19	Fire Hydrant Sampling Point
W- 20	Customer's Cut-Off
W- 21	Inline Valve Installation
W- 22	Trench and Embedment Standard Under Proposed Roadway
W- 23	Meter Box (Non-Traffic Areas)

WASTEWATER STANDARDS

WW- 01A	Utility Assignments for Local Streets, Residential Collectors and Major Collectors
WW- 01B	Utility Assignments for Minor Arterial and Major Arterial Roadways
WW- 02	Standard Manhole - Plan
WW- 03	Standard Manhole – Section
WW- 04	Drop Connection – Precast Manhole Type “A”
WW- 05	Drop Connection – Precast Manhole Type “B”
WW- 06	Flow Patterns for Invert Channels
WW- 07	Standard Wastewater Manhole Set
WW-07A	Bolted Wastewater Manhole Set
WW- 08	48” x 5” to 33” x 8” x 36” Tall Eccentric Concrete Section
WW- 09	48” Manhole Flat Lid
WW- 10	Flexible “Seal Boot” Connector
WW- 12	Sewer Clean – Out Standard
WW- 13	Sewer Service Connections
WW- 13A	Gasketed Sewer Fitting for Sewer Service Connections to Existing Mains
WW- 14	Standard Air Release Valve for Force Main
WW- 15	Standard Air Release Valve for Force Main
WW- 16	Trench and Embedment Standard Under Non-Paved Areas
WW- 17	Trench and Embedment and Pavement Replacement Standard Under Existing Roadways
WW- 18	Trench and Embedment Standard Under Proposed Roadway
WW-19	Typical Manhole with Vent
WW-20	Precast Manhole on Cast-in-Place Foundation
WW-21	Concrete Casting Manhole Detail

ELECTRIC STANDARDS

GEO-117	35' Streetlight Pole and Mast Arm (Dark Bronze Powder Coat)
GEO-117A	35' Streetlight Pole and Mast Arm (Dark Bronze Powder Coat)
GEO-118	Streetlight Pole and Mast Arm (Brushed Aluminum Round Tapered)
GEO-118A	Streetlight Pole and Mast Arm (Brushed Aluminum Round Tapered)
GEO-122	Decorative Streetlight Pole (Dark Green)
GEO-122A	Decorative Streetlight Pole (Dark Green)
GEO-206	24.9/14.4 kV Primary 600V Secondary – (Junction Box, Cover, and Extension)
GEO-206A	24.9/14.4 kV Primary 600V Secondary – (Junction Box, Cover, and Extension)
GEO-207	24.9/14.4 kV Primary Single-Phase Concrete Pad (Transformer, Vacuum Switch, or Junction Box)
GEO-207A	24.9/14.4 kV Primary Single-Phase Concrete Pad (Transformer, Vacuum Switch, or Junction Box)
GEO-208	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Junction Box)
GEO-208A	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Junction Box)
GEO-209	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Switchgear 82" x 90")
GEO-209A	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Switchgear 82" x 90")
GEO-210	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Transformer)
GEO-210A	24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Transformer)
GEO-225	Miscellaneous UG Conduit Installation
GEO-225A	Miscellaneous UG Conduit Installation
GEO-225B	Miscellaneous UG Conduit Installation
GEO-227	36" Frame, Cover, and Grade Rings for Manhole Entry
GEO-227A	36" Frame, Cover, and Grade Rings for Manhole Entry
GEO-229	Quickset Pull Box (4' x 8' x 4')
GEO-229A	Quickset Pull Box (4' x 8' x 4')
GEO-230	Quickset Manhole (8' x 10' 8')
GEO-230A	Quickset Manhole (8' x 10' 8')
GEO-231	Quickset Manhole (8' x 12' x 8')
GEO-231A	Quickset Manhole (8' x 12' x 8')
GEO-235	Concrete Foundation Streetlight Pole (18" Diameter x 48" Depth)
GEO-235A	Concrete Foundation Streetlight Pole (18" Diameter x 48" Depth)
GEO-236	Concrete Foundation Streetlight Pole (18" Diameter x 72" Depth)
GEO-236A	Concrete Foundation Streetlight Pole (18" Diameter x 72" Depth)
GEO-238	Junction Box and Pull Box Combination Detail

GEO-238A	Junction Box and Pull Box Combination Detail
UGDEM1.1	Conduit Stub-out and Electronic Marker Installation
UGG1.1	Alternate Grounding System for Pad-Mount Transformers and Switchgear (Single Phase)
UGG1.2	Alternate Grounding System for Pad-Mount Transformers and Switchgear (Three Phase)
UGPB1.1	Protective Bollard Installation for Pad-Mount Transformers, Junction Boxes and Switchgear

EROSION CONTROL STANDARDS

GUIDELINES FOR DESIGN AND INSTALLATION OF TEMPORARY EROSION AND SEDIMENTATION CONTROLS

TYPE OF STRUCTURE	REACH LENGTH	MAXIMUM DRAINAGE AREA	SLOPE
SILT FENCE	N/A	2 ACRES	0 – 10%
	200 FEET	2 ACRES	10 – 20%
	100 FEET	1 ACRE	20 – 30%
	50 FEET	1/2 ACRE	> 30%
TRIANGLE FILTER DIKE	100 FEET	1/2 ACRE	< 30% SLOPE
	50 FEET	1/4 ACRE	> 30% SLOPE
ROCK BERM *, **	500 FEET	< 5 ACRES	0 – 10%

* FOR ROCK BERM DESIGN WHERE PARAMETERS ARE OTHER THAN STATED, DRAINAGE AREA CALCULATIONS AND ROCK BERM DESIGN MUST BE SUBMITTED FOR REVIEW.

** HIGH SERVICE ROCK BERMS MAY BE REQUIRED IN AREAS OF ENVIRONMENTAL SIGNIFICANCE AS DETERMINED BY THE CITY OF GEORGETOWN.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TEMPORARY EROSION AND
SEDIMENTATION CONTROL GUIDELINES

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: EC01	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

NOTE: THIS SECTION IS INTENDED TO ASSIST THOSE PERSONS PREPARING WATER POLLUTION ABATEMENT PLANS (WPAP) OR STORM WATER POLLUTION PREVENTION PLANS (SW3P) THAT COMPLY WITH FEDERAL, STATE AND/OR LOCAL STORM WATER REGULATIONS.

1. THE CONTRACTOR TO INSTALL AND MAINTAIN EROSION/SEDIMENTATION CONTROLS AND TREE/NATURAL AREA PROTECTIVE FENCING PRIOR TO ANY SITE PREPARATION WORK (CLEARING, GRUBBING, GRADING, OR EXCAVATION). CONTRACTOR TO REMOVE EROSION/SEDIMENTATION CONTROLS AT THE COMPLETION OF PROJECT AND GRASS RESTORATION.
2. ALL PROJECTS WITHIN THE RECHARGE ZONE OF THE EDWARD'S AQUIFER SHALL SUBMIT A BEST MANAGEMENT PRACTICES AND WATER POLLUTION AND ABATEMENT PLAN TO THE TNRCC FOR APPROVAL PRIOR TO ANY CONSTRUCTION.
3. THE PLACEMENT OF EROSION/SEDIMENTATION CONTROLS TO BE IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENTATION CONTROL PLAN AND WATER POLLUTION ABATEMENT PLAN. DEVIATIONS FROM THE APPROVED PLAN MUST BE SUBMITTED TO AND APPROVED BY THE OWNER'S REPRESENTATIVE.
4. ALL PLANTING SHALL BE DONE BETWEEN MAY 1 AND SEPTEMBER 15 EXCEPT AS SPECIFICALLY AUTHORIZED IN WRITING. IF PLANTING IS AUTHORIZED TO BE DONE OUTSIDE THE DATES SPECIFIED, THE SEED SHALL BE PLANTED WITH THE ADDITION OF WINTER FESCUE (KENTUCKY 31) AT A RATE OF 100lb/ACRE. GRASS SHALL BE COMMON BERMUDA GRASS, HULLED, MINIMUM 82% PURE LIVE SEED. ALL GRASS SEED SHALL BE FREE FROM NOXIOUS WEED, GRADE "A" RECENT CROP, RECLEANED AND TREATED WITH APPROPRIATE FUNGICIDE AT TIME OF MIXING. SEED SHALL BE FURNISHED IN SEALED, STANDARD CONTAINERS WITH DEALER'S GUARANTEED ANALYSIS.
5. ALL DISTURBED AREAS TO BE RESTORED AS NOTED IN THE WATER POLLUTION ABATEMENT PLAN.
6. THE PLANTED AREA TO BE IRRIGATED OR SPRINKLED IN A MANNER THAT WILL NOT ERODE THE TOPSOIL, BUT WILL SUFFICIENTLY SOAK THE SOIL TO A DEPTH OF FOUR (4) INCHES. THE IRRIGATION TO OCCUR AT 10-DAY INTERVALS DURING THE FIRST TWO MONTHS TO INSURE GERMINATION AND ESTABLISHMENT OF THE GRASS. RAINFALL OCCURRENCES OF 1/2 INCH OR GREATER TO POSTPONE THE WATERING SCHEDULE ONE WEEK.
7. RESTORATION TO BE ACCEPTABLE WHEN THE GRASS HAS GROWN AT LEAST 1-1/2 INCHES HIGH WITH 95% COVERAGE, PROVIDED NO BARE SPOTS LARGER THAN 25 SQUARE FEET EXIST.
8. A MINIMUM OF FOUR (4) INCHES OF TOPSOIL TO BE PLACED IN ALL AREAS DISTURBED BY CONSTRUCTION.
9. THE CONTRACTOR TO HYDROMULCH OR SOD (AS SHOWN ON PLANS) ALL EXPOSED CUTS AND FILLS UPON COMPLETION OF CONSTRUCTION.
10. EROSION AND SEDIMENTATION CONTROLS TO BE INSTALLED OR MAINTAINED IN A MANNER WHICH DOES NOT RESULT IN SOIL BUILDUP WITHIN TREE DRIPLINE.
11. TO AVOID SOIL COMPACTION, CONTRACTOR SHALL NOT ALLOW VEHICULAR TRAFFIC, PARKING, OR STORAGE OF EQUIPMENT OR MATERIALS IN THE TREE DRIPLINE AREAS.
12. WHERE A FENCE IS CLOSER THAN FOUR (4) FEET TO A TREE TRUNK, PROTECT THE TRUNK WITH STRAPPED-ON PLANKING TO A HEIGHT OF EIGHT (8) FEET (OR TO THE LIMITS OF LOWER BRANCHING) IN ADDITION TO THE FENCING.
13. TREES TO BE REMOVED IN A MANNER WHICH DOES NOT IMPACT TREES TO BE PRESERVED.
14. ANY ROOT EXPOSED BY CONSTRUCTION ACTIVITY TO BE PRUNED FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH GOOD QUALITY TOPSOIL AS SOON AS POSSIBLE. IF EXPOSED ROOT AREAS ARE NOT BACKFILLED WITHIN TWO DAYS, COVER THEM WITH ORGANIC MATERIAL IN A MANNER WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION.
15. CONTRACTOR TO PRUNE VEGETATION TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC, AND EQUIPMENT BEFORE DAMAGE OCCURS (RIPPING OF BRANCHES, ETC.). ALL FINISHED PRUNING TO BE DONE ACCORDING TO RECOGNIZED, APPROVED STANDARDS OF THE INDUSTRY (REFERENCE THE "NATIONAL ARBORIST ASSOCIATION PRUNING STANDARDS FOR SHADE TREES").
16. THE CONTRACTOR IS TO INSPECT THE CONTROLS AT WEEKLY INTERVALS AND AFTER EVERY RAINFALL EXCEEDING 1/4 INCH TO VERIFY THAT THEY HAVE NOT BEEN SIGNIFICANTLY DISTURBED. ANY ACCUMULATED SEDIMENT AFTER A SIGNIFICANT RAINFALL TO BE REMOVED AND PLACED IN THE OWNER DESIGNATED SPOIL DISPOSAL SITE. THE CONTRACTOR TO CONDUCT PERIODIC INSPECTIONS OF ALL EROSION/SEDIMENTATION CONTROLS AND TO MAKE ANY REPAIRS OR MODIFICATIONS NECESSARY TO ASSURE CONTINUED EFFECTIVE OPERATION OF EACH DEVICE.
17. WHERE THERE IS TO BE AN APPROVED GRADE CHANGE, IMPERMEABLE PAVING SURFACE, TREE WELL, OR OTHER SUCH SITE DEVELOPMENT IMMEDIATELY ADJACENT TO A PROTECTED TREE, ERECT THE FENCE APPROXIMATELY TWO TO FOUR FEET (2'-4') BEHIND THE AREA IN QUESTION.
18. NO ABOVE AND/OR BELOW GROUND TEMPORARY FUEL STORAGE FACILITIES TO BE STORED ON THE PROJECT SITE.
19. IF EROSION AND SEDIMENTATION CONTROL SYSTEMS ARE EXISTING FROM PRIOR CONTRACTS, OWNER'S REPRESENTATIVE AND THE CONTRACTOR TO EXAMINE THE EXISTING EROSION AND SEDIMENTATION CONTROL SYSTEMS FOR DAMAGE PRIOR TO CONSTRUCTION. ANY DAMAGE TO PREEXISTING EROSION AND SEDIMENTATION CONTROLS NOTED TO BE REPAIRED AT OWNERS EXPENSE.
20. INTENTIONAL RELEASE OF VEHICLE OR EQUIPMENT FLUIDS ONTO THE GROUND IS NOT ALLOWED. CONTAMINATED SOIL RESULTING FROM ACCIDENTAL SPILL TO BE REMOVED AND DISPOSED OF PROPERLY.

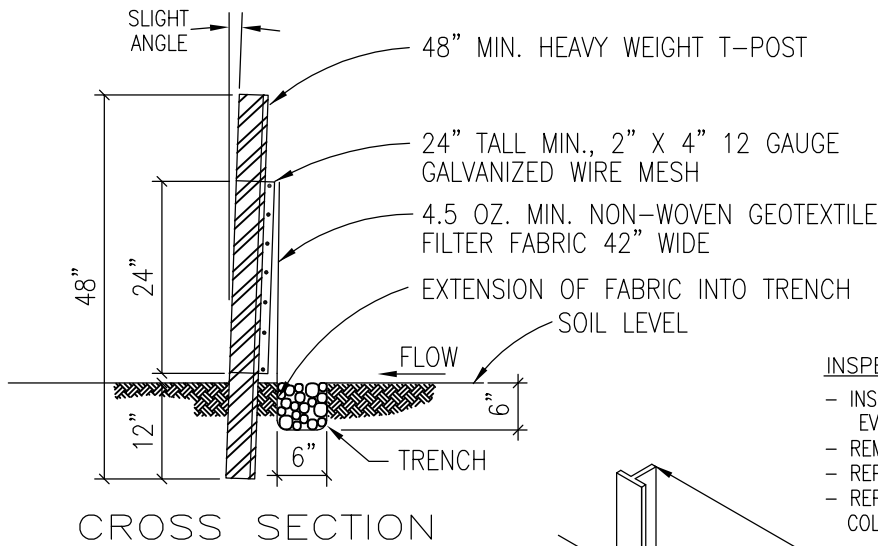
The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
EROSION AND SEDIMENTATION AND
TREE PROTECTION NOTES

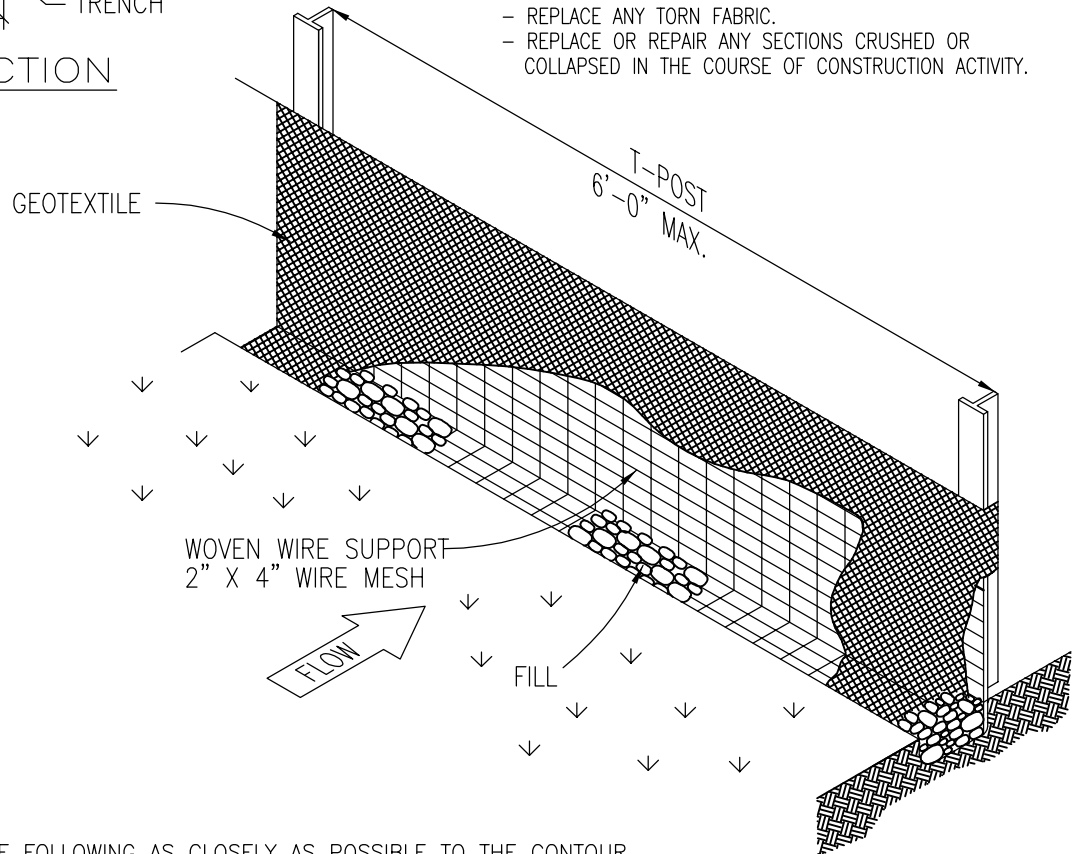
REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: EC01A	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

The Architect/Engineer assumes responsibility for appropriate use of this standard.



INSPECTION AND MAINTENANCE GUIDELINES:

- INSPECT ALL FENCING WEEKLY, AND AFTER ANY RAINFALL EVENT.
- REMOVE SEDIMENT WHEN BUILDUP REACHES 6 INCHES.
- REPLACE ANY TORN FABRIC.
- REPLACE OR REPAIR ANY SECTIONS CRUSHED OR COLLAPSED IN THE COURSE OF CONSTRUCTION ACTIVITY.



INSTALLATION:

- LAYOUT THE SILT FENCE FOLLOWING AS CLOSELY AS POSSIBLE TO THE CONTOUR.
- CLEAR THE GROUND OF DEBRIS, ROCKS, PLANTS (INCLUDING GRASSES TALLER THAN 2") TO PROVIDE A SMOOTH FLOW APPROACH SURFACE. EXCAVATE 6" DEEP X 6" WIDE TRENCH ON UPSTREAM SIDE OF FACE PER PLANS.
- DRIVE THE HEAVY DUTY T-POST AT LEAST 12 INCHES INTO THE GROUND AND AT A SLIGHT ANGLE TOWARDS THE FLOW.
- ATTACH THE 2" X 4" 12 GAUGE WELDED WIRE MESH TO THE T-POST WITH 11 1/2 GAUGE GALVANIZED T-POST CLIPS. THE TOP OF THE WIRE TO BE 24" ABOVE GROUND LEVEL. THE WELDED WIRE MESH TO BE OVERLAPPED 6" AND TIED AT LEAST 6 TIMES WITH HOG RINGS.
- THE SILT FENCE TO BE INSTALLED WITH A SKIRT A MINIMUM OF 6" WIDE PLACED ON THE UPHILL SIDE OF THE FENCE INSIDE EXCAVATED TRENCH. THE FABRIC TO OVERLAP THE TOP OF THE WIRE BY 1".
- ANCHOR THE SILT FENCE BY BACKFILLING WITH EXCAVATED DIRT AND ROCKS (NOT LARGER THAN 2").
- GEOTEXTILE SPLICES SHOULD BE A MINIMUM OF 18" WIDE ATTACHED IN AT LEAST 6 PLACES. SPLICES IN CONCENTRATED FLOW AREAS WILL NOT BE ACCEPTED.
- SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

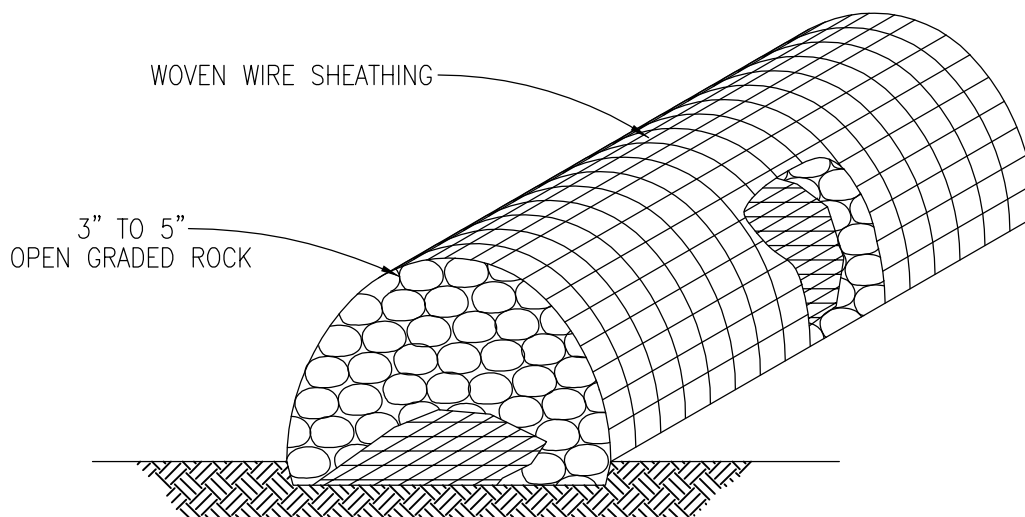
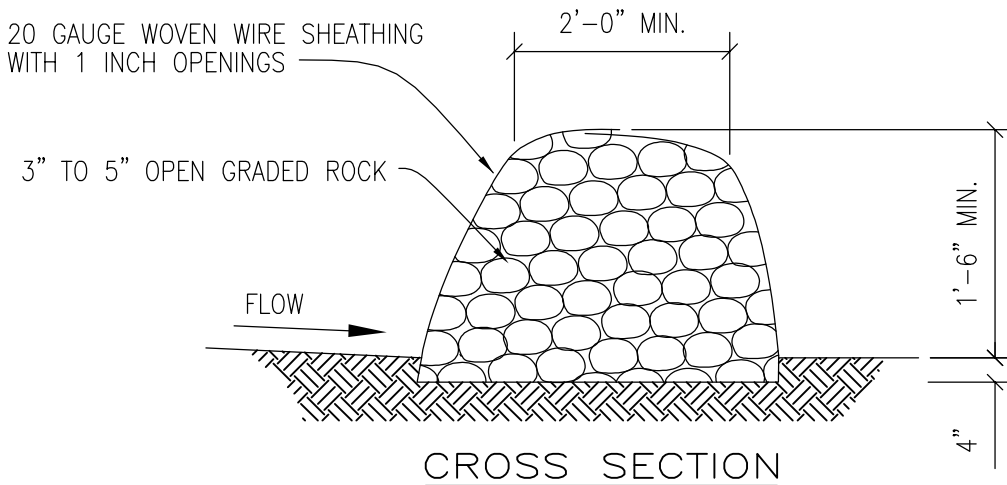
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME: **EC02**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SILT FENCE DETAIL

SCALE:	DATE:
NTS	1/2003
DRAWN BY:	APPROVED BY:
MRS	TRB



INSTALLATION:

- LAYOUT THE ROCK BERM FOLLOWING AS CLOSELY AS POSSIBLE TO THE CONTOUR.
- CLEAR THE GROUND OF DEBRIS, ROCKS OR PLANTS THAT WILL INTERFERE WITH INSTALLATION.
- PLACE WOVEN WIRE FABRIC ON THE GROUND ALONG THE PROPOSED INSTALLATION WITH ENOUGH OVERLAP TO COMPLETELY ENCIRCLE THE FINISHED SIZE OF THE BERM.
- PLACE THE ROCK ALONG THE CENTER OF THE WIRE TO THE DESIGNATED HEIGHT.
- WRAP THE STRUCTURE WITH THE PREVIOUSLY PLACED WIRE MESH SECURE ENOUGH SO THAT WHEN WALKED ACROSS THE STRUCTURE RETAINS IT'S SHAPE.
- SECURE WITH TIE WIRE.
- THE ENDS OF THE BERM SHOULD BE TIED INTO EXISTING UPSLOPE GRADE AND THE BERM SHOULD BE BURIED IN A TRENCH APPROX. 4 INCHES DEEP TO PREVENT FAILURE OF THE CONTROL.
- THE ROCK BERM SHOULD BE LEFT IN PLACE UNTIL ALL UPSTREAM AREAS ARE STABILIZED AND ACCUMULATED SILT REMOVED.

INSPECTION AND MAINTENANCE GUIDELINES:

- INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL EVENT BY THE RESPONSIBLE PARTY. FOR INSTALLATIONS IN STREAMBEDS, ADDITIONAL DAILY INSPECTIONS SHOULD BE MADE.
- REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6 INCHES AND DISPOSE OF THE ACCUMULATED SILT IN AN APPROVED MANNER.
- REPAIR ANY LOOSE WIRE SHEATHING.
- THE BERM SHOULD BE RESHAPED AS NEEDED DURING INSPECTION.
- THE BERM SHOULD BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.

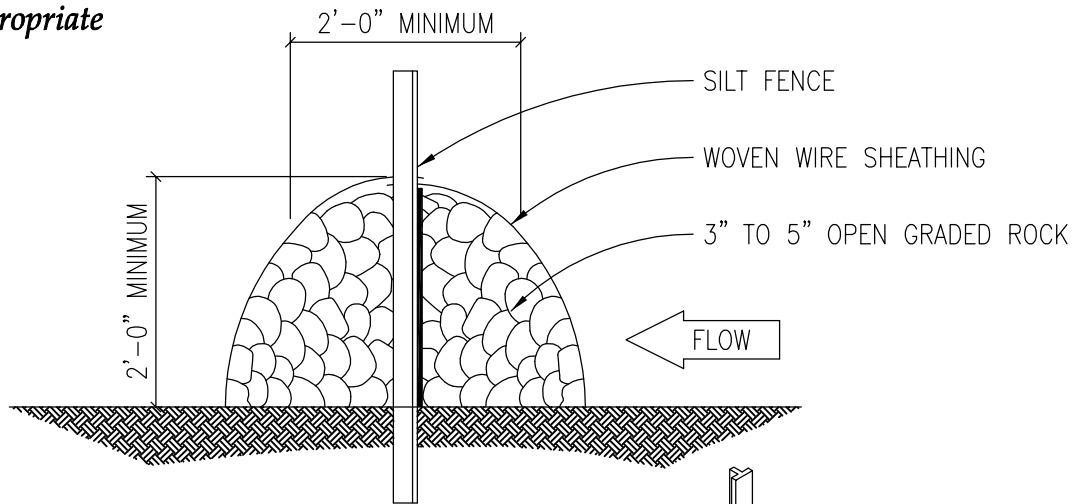
***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



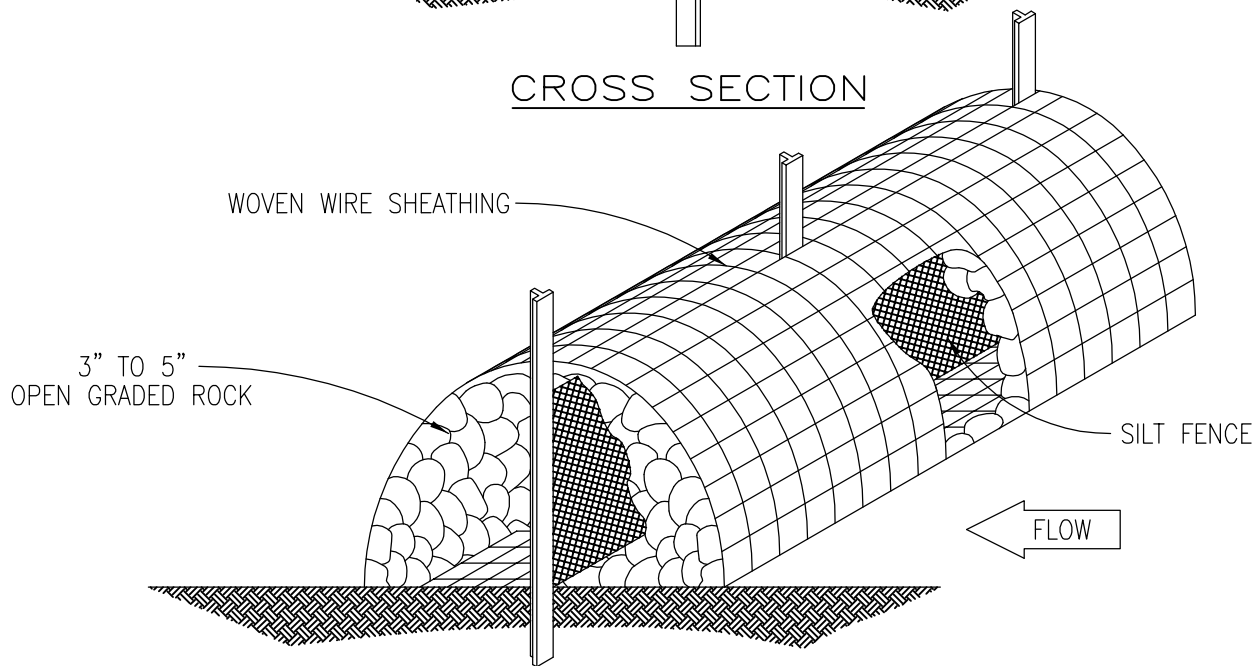
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
ROCK BERM DETAIL

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		EC03	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CROSS SECTION



INSTALLATION:

- LAYOUT THE ROCK BERM FOLLOWING AS CLOSELY AS POSSIBLE TO THE CONTOUR.
- CLEAR THE GROUND OF DEBRIS, ROCKS OR PLANTS THAT WILL INTERFERE WITH INSTALLATION.
- PLACE WOVEN WIRE FABRIC ON THE GROUND ALONG THE PROPOSED INSTALLATION WITH ENOUGH OVERLAP TO COMPLETELY ENCIRCLE THE FINISHED SIZE OF THE BERM.
- INSTALL THE SILT FENCE ALONG THE CENTER OF THE PROPOSED BERM PLACEMENT. INSTALLATION SHOULD BE AS DESCRIBED IN DRAWING NO. EC-02 "SILT FENCE DETAIL".
- PLACE THE ROCK ALONG THE CENTER OF THE WIRE AND ON BOTH SIDES OF THE SILT FENCE TO THE DESIGNATED HEIGHT.
- WRAP THE STRUCTURE WITH THE PREVIOUSLY PLACED WIRE MESH SECURE ENOUGH SO THAT WHEN WALKED ACROSS THE STRUCTURE RETAINS IT'S SHAPE.
- SECURE WITH TIE WIRE.
- THE ROCK BERM SHOULD BE LEFT IN PLACE UNTIL ALL UPSTREAM AREAS ARE STABILIZED AND ACCUMULATED SILT REMOVED.

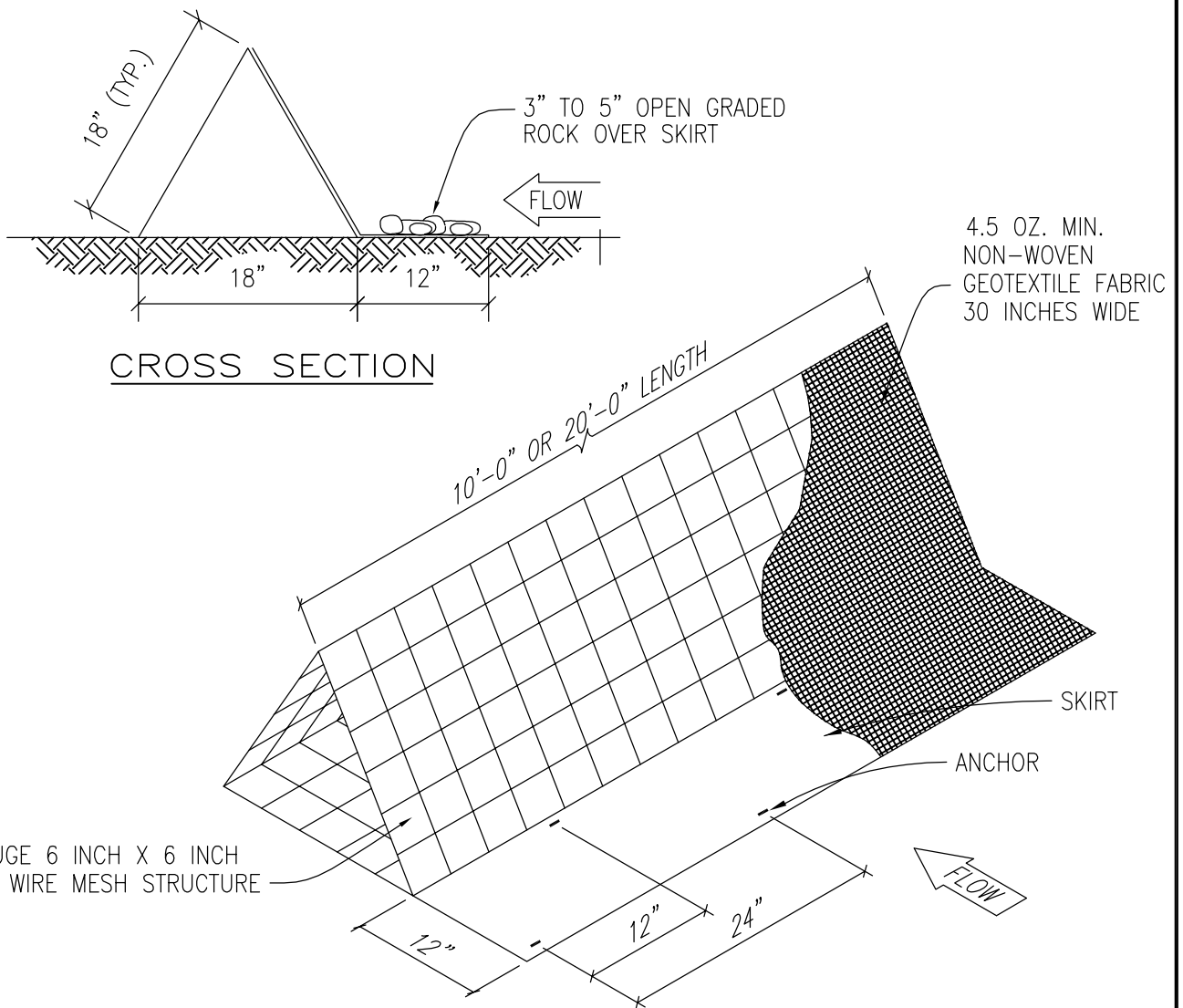
INSPECTION AND MAINTENANCE GUIDELINES:

- INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL EVENT BY THE CONTRACTOR. FOR THE INSTALLATIONS IN STREAMBEDS, ADDITIONAL DAILY INSPECTIONS SHOULD BE MADE ON ROCK BERM.
- REMOVE SEDIMENT AND OTHER DEBRIS WHEN BUILDUP REACHES 6 INCHES AND DISPOSE OF THE ACCUMULATED SILT IN AN APPROVED MANNER.
- REPAIR ANY LOOSE WIRE SHEATHING.
- THE BERM SHOULD BE RESHAPED AS NEEDED DURING INSPECTION.
- THE BERM SHOULD BE REPLACES WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		EC04	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
HIGH SERVICE ROCK BERM DETAIL



INSTALLATION:

- LAYOUT THE FILTER DIKE FOLLOWING AS CLOSELY AS POSSIBLE TO THE CONTOUR.
- CLEAR THE GROUND OF DEBRIS, ROCKS OR PLANTS THAT WILL INTERFERE WITH INSTALLATION.
- PLACE THE FILTER DIKE SECTIONS ONE AT A TIME, WITH THE SKIRT ON THE UPHILL SIDE TOWARDS THE DIRECTION OF FLOW, ANCHORING EACH SECTION TO THE GROUND BEFORE THE NEXT SECTION IS PLACED.
- ANCHORS SHOULD BE PLACED ON 2'-0" CENTERS ALTERNATING FROM FRONT TO BACK SO THAT THERE IS ACTUALLY ONLY 1'-0" IN BETWEEN ANCHORS.
- SECURELY FASTEN THE SKIRT FROM ONE SECTION OF FILTER DIKE TO THE NEXT.
- FILTER DIKES MUST MAINTAIN CONTINUOUS CONTACT WITH THE GROUND.
- AFTER THE SITE IS COMPLETELY STABILIZED, THE DIKES AND ANY REMAINING SILT SHOULD BE REMOVED. SILT SHOULD BE DISPOSED OF IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.

INSPECTION AND MAINTENANCE GUIDELINES:

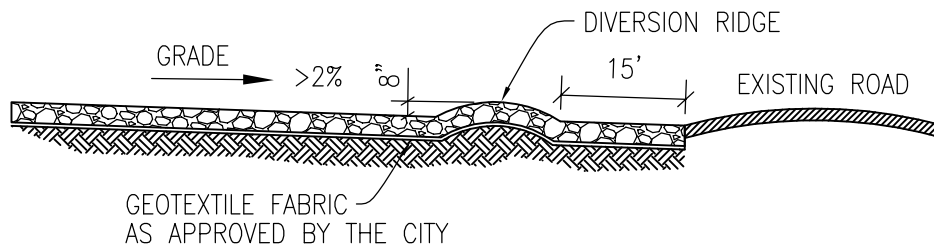
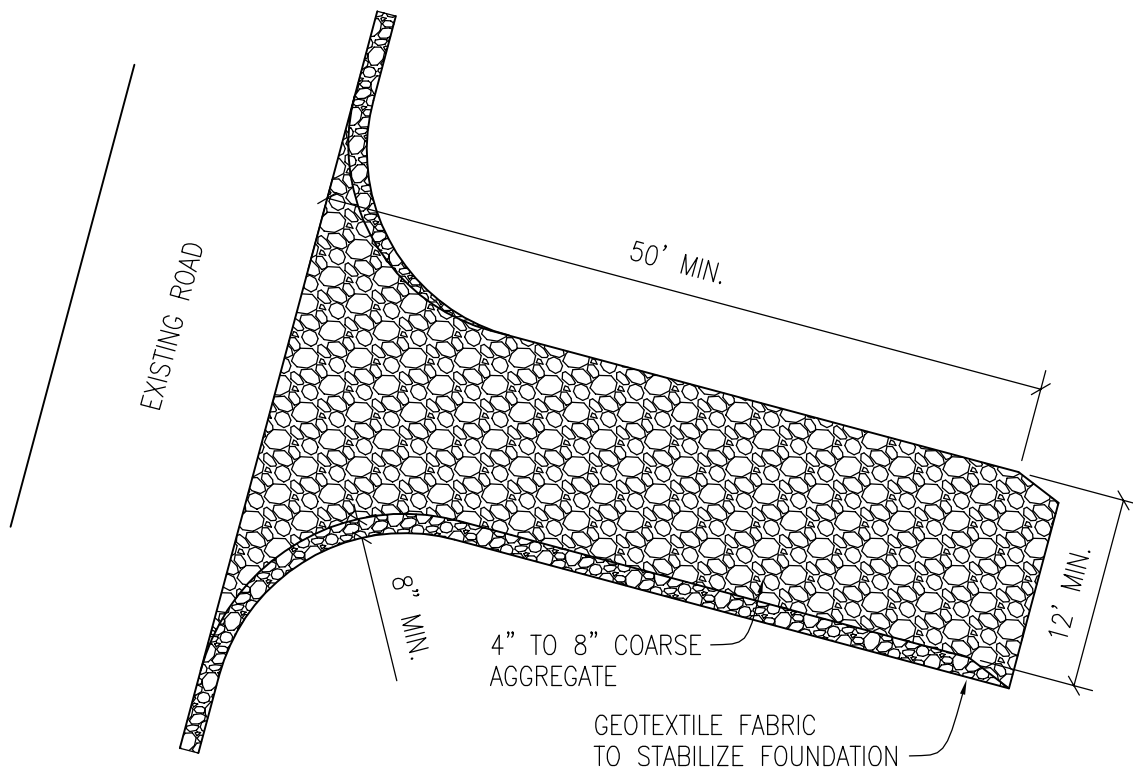
- INSPECTION SHOULD BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
- INSPECT AND REALIGN BERMS AS NEEDED TO PREVENT GAPS BETWEEN THE SECTIONS.
- ACCUMULATED SILT SHOULD BE REMOVED AFTER EACH RAINFALL EVENT, AND DISPOSED OF IN A MANNER WHICH WILL NOT CAUSE ADDITIONAL SILTATION.

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRIANGULAR FILTER DIKE

REVISION NOTE:		ADOPTED 6/21/2006
DRAWING NAME:		EC05
SCALE:	DATE:	
NTS	1/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	



INSTALLATION:

- CLEAR THE AREA OF DEBRIS, ROCKS OR PLANTS THAT WILL INTERFERE WITH INSTALLATION.
- GRADE THE AREA FOR THE ENTRANCE TO FLOW BACK ON TO THE CONSTRUCTION SITE. RUNOFF FROM THE STABILIZED CONSTRUCTION
- PLACE GEOTEXTILE FABRIC AS APPROVED BY THE CITY.
- PLACE ROCK AS APPROVED BY THE CITY.

INSPECTIONS AND MAINTENANCE GUIDELINES:

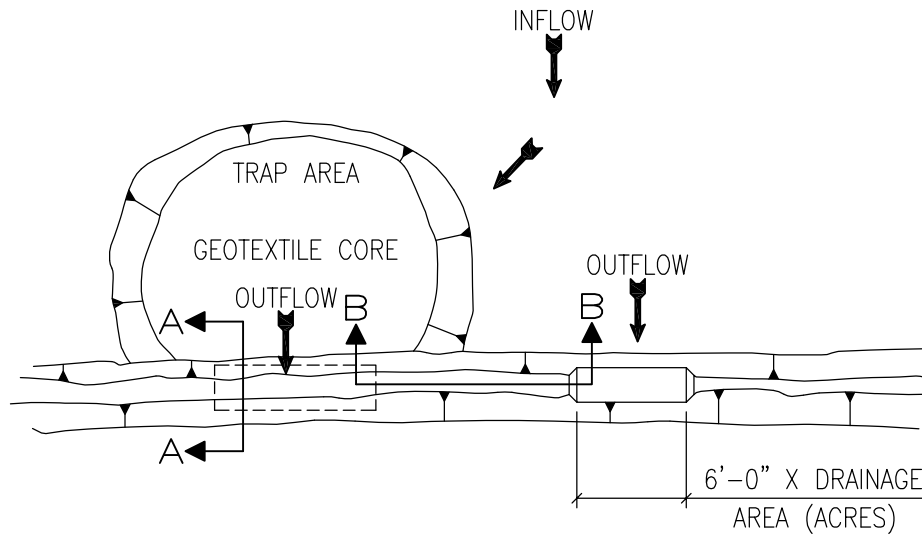
- THE ENTRANCE SHOULD BE MAINTAINED IN A CONDITION, WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
- ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ON TO PUBLIC RIGHTS-OF-WAY SHOULD BE REMOVED IMMEDIATELY BY CONTRACTOR.
- WHEN NECESSARY, WHEELS SHOULD BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY.
- WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
- ALL SEDIMENT SHOULD BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATER COURSE BY USING APPROVED METHODS.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***

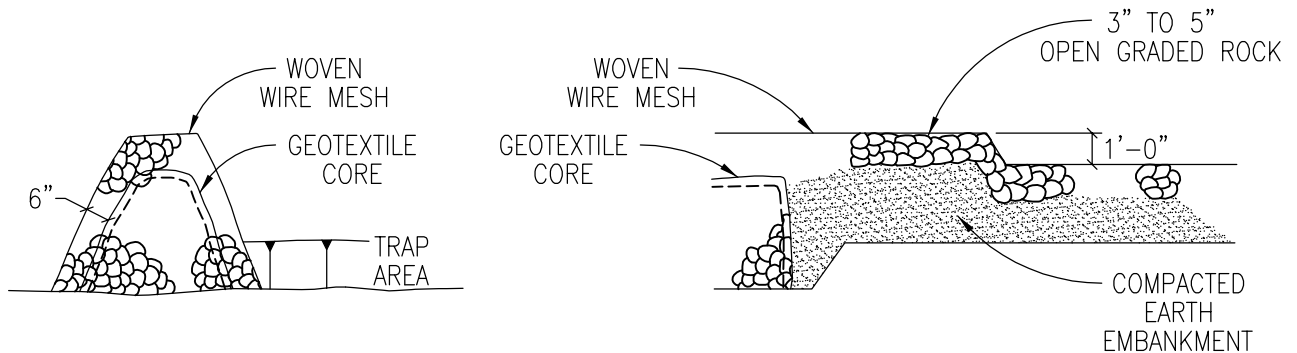
REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: EC06	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STABILIZED CONSTRUCTION ENTRANCE



PLAN VIEW



SECTION A-A

SECTION B-B

INSTALLATION:

- LOCATE THE SEDIMENT TRAP SO AS TO DISTURB AS FEW TREES AS POSSIBLE.
- CLEAR AND GRUB THE AREA UNDER THE EMBANKMENT OF ALL VEGETATION AND ROOT MATS.
- LAYOUT THE WIRE MESH AND THEN THE GEOTEXTILE FABRIC.
- CONSTRUCT THE GEOTEXTILE CORE AND CORRESPONDING ROCK EMBANKMENT TO THE DESIGNATED HEIGHT AND CONFIGURATION.
- WRAP THE STRUCTURE WITH THE PREVIOUSLY PLACED WIRE MESH SECURE ENOUGH SO THAT WHEN WALKED ACROSS THE STRUCTURE RETAINS IT'S SHAPE. SECURE WITH TIE WIRE.
- PLACE THE EMBANKMENT MATERIAL IN 8 TO 12 INCH LIFTS AND MACHINE COMPACT.

INSPECTION AND MAINTENANCE GUIDELINES:

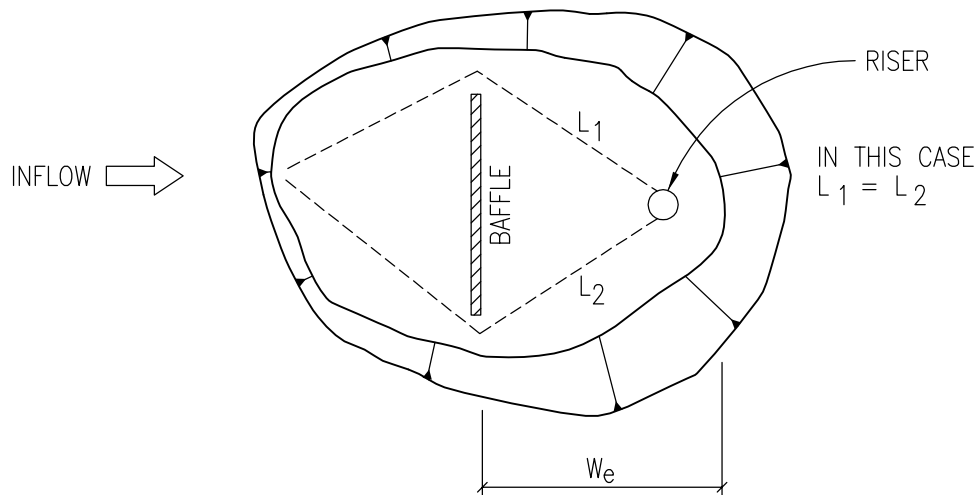
- INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. REPAIR SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
- TRASH AND OTHER DEBRIS SHOULD BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO HALF OF THE DESIGN DEPTH OF THE TRAP.
- SEDIMENT REMOVED FROM THE TRAP SHOULD BE DEPOSITED IN AN APPROVED SPOILS AREA AND IN SUCH A MANNER THAT IT WILL NOT CAUSE ADDITIONAL SILTATION.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***

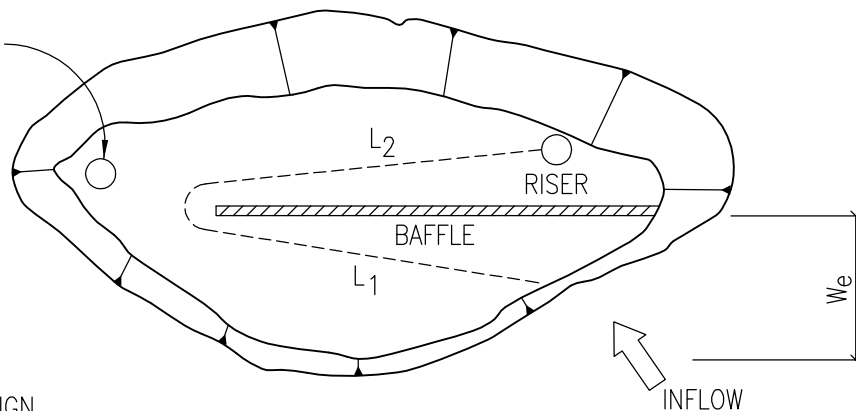


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SEDIMENT TRAP DETAIL

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		EC07	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



IF RISER IS PLACED HERE
NO BAFFLE IS REQUIRED



SEDIMENT BASIN BAFFLE DESIGN

$$W_e = A / (L_1 + L_2)$$

W_e = EFFECTIVE WIDTH OF BASIN

A = SURFACE AREA OF BASIN WHEN FILLED TO RISER CREST

L_1, L_2 = SHORTEST TRAVEL DISTANCE AROUND THE BAFFLE FROM INLET TO OUTLET

INSPECTION AND MAINTENANCE GUIDELINES:

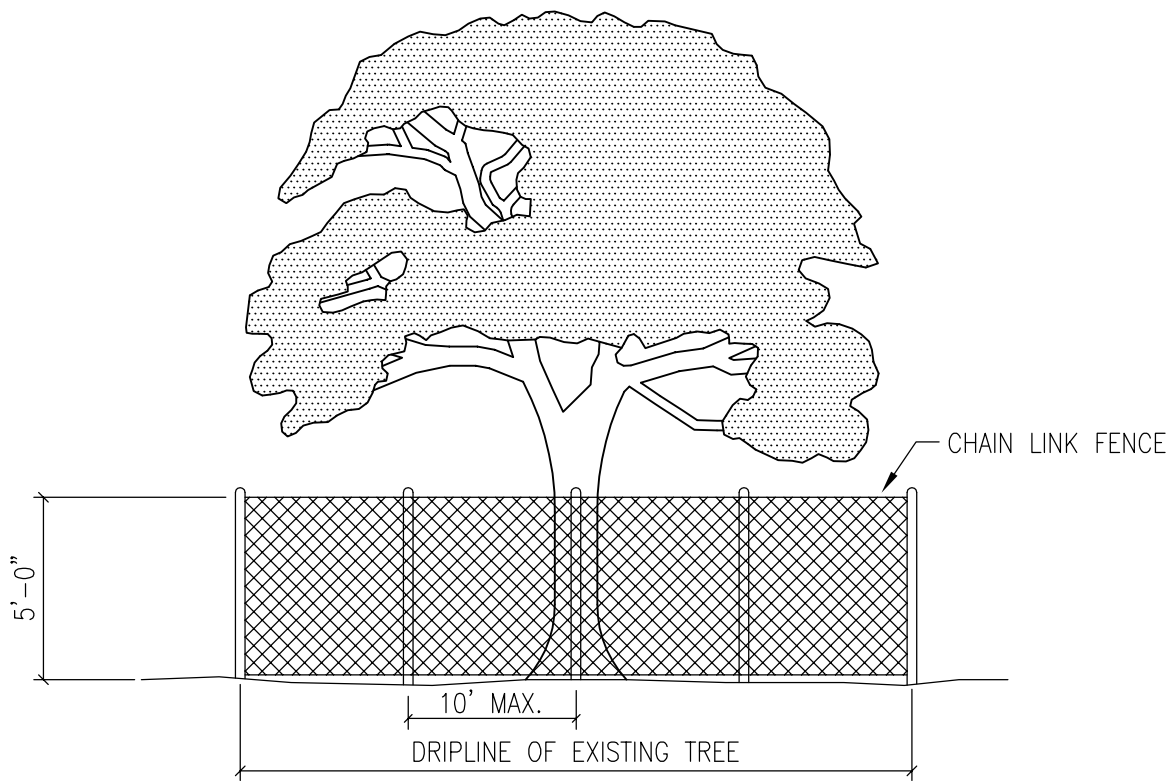
- INSPECTION SHOULD BE MADE WEEKLY AND AFTER EACH RAINFALL. CHECK THE EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. REPAIR SHOULD BE MADE PROMPTLY AS NEEDED BY THE CONTRACTOR.
- TRASH AND OTHER DEBRIS SHOULD BE REMOVED AFTER EACH RAINFALL TO PREVENT CLOGGING OF THE OUTLET STRUCTURE.
- ACCUMULATED SILT SHOULD BE REMOVED AND THE BASIN SHOULD BE RE-GRADED TO ITS ORIGINAL DIMENSIONS AT SUCH POINT THAT THE CAPACITY OF THE IMPOUNDMENT HAS BEEN REDUCED TO 1/2 OF ITS ORIGINAL STORAGE CAPACITY.
- THE REMOVED SEDIMENT SHOULD BE STOCKPILED OR REDISTRIBUTED IN AREAS THAT ARE PROTECTED FROM EROSION.

**The Architect/Engineer assumes
responsibility for appropriate
use of this standard.**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SEDIMENT BASIN BAFFLE DESIGN

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		EC08	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



NOTES:

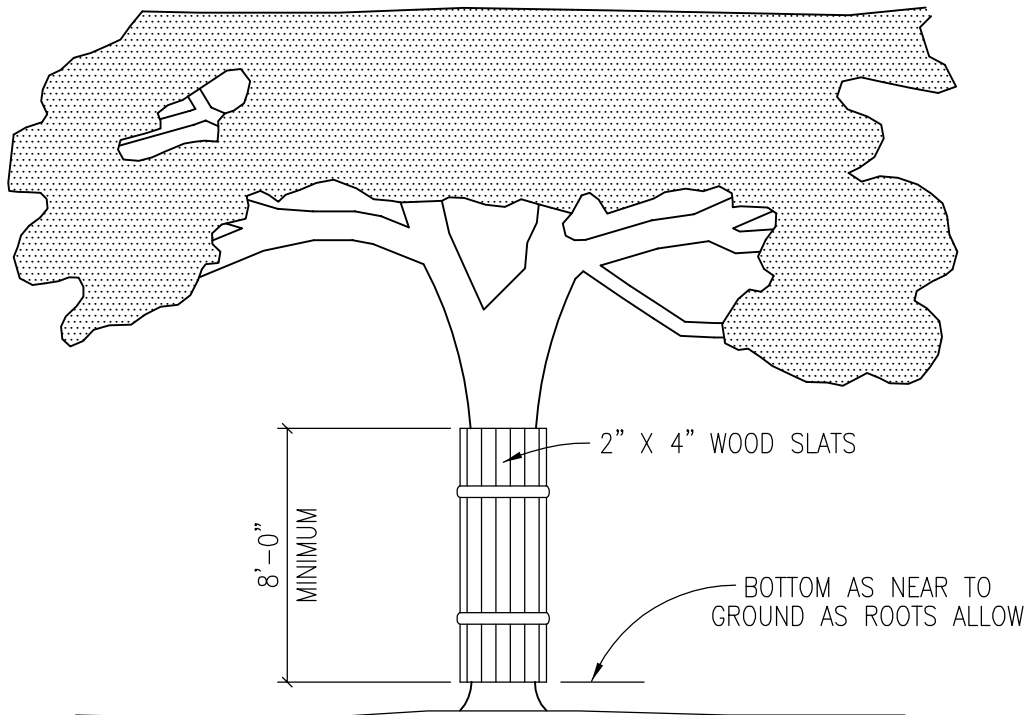
1. TREE PROTECTION FENCES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING OR GRADING).
2. FENCES SHALL COMPLETELY SURROUND THE TREE, OR CLUSTERS OF TREES; WILL BE LOCATED AT THE OUTERMOST LIMIT OF THE TREE BRANCHES (DRIPLINE), AND WILL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROJECT IN ORDER TO PREVENT THE FOLLOWING:
 - A. SOIL COMPACTION IN THE ROOT ZONE AREA RESULTING FROM VEHICULAR TRAFFIC, OR STORAGE OF EQUIPMENT OR MATERIALS.
 - B. ROOT ZONE DISTURBANCES DUE TO GRADE CHANGES (GREATER THAN SIX INCHES (6") CUT OR FILL, OR TRENCHING NOT REVIEWED AND AUTHORIZED BY THE CITY.
 - C. WOUNDS TO EXPOSED ROOTS, TRUNKS OR LIMBS BY MECHANICAL EQUIPMENT.
 - D. OTHER ACTIVITIES DETRIMENTAL TO TREES, SUCH AS CHEMICAL STORAGE, CEMENT TRUCK CLEANING AND FIRE.
3. EXCEPTIONS TO INSTALLING FENCES AT TREE DRIPLINES MAY BE PERMITTED IN THE FOLLOWING CASES:
 - A. WHERE PERMEABLE PAVING IS TO BE INSTALLED, ERECT THE FENCE AT THE OUTER LIMITS OF THE PERMEABLE PAVING AREA.
 - B. WHERE TREES ARE CLOSE TO PROPOSED BUILDINGS, ERECT THE FENCE NO CLOSER THAN SIX FEET (6'-0") TO BUILDING.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**TREE PROTECTION –
CHAIN LINK FENCE**

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		EC09	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



NOTES:

1. WHERE ANY EXCEPTIONS RESULT IN A FENCE BEING CLOSER THAN FOUR FEET (4'-0") TO A TREE TRUNK; PROTECT THE TRUNK WITH STRAPPED-ON-PLANKING TO A HEIGHT OF EIGHT FEET (8'-0"), OR TO THE LIMITS OF LOWER BRANCHING IN ADDITION TO THE REDUCED FENCING PROVIDED.
2. ANY ROOTS EXPOSED BY CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH GOOD QUALITY TOP SOIL AS SOON AS POSSIBLE. IF EXPOSED ROOT AREAS ARE NOT BACKFILLED WITHIN TWO (2) DAYS, COVER THEM WITH ORGANIC MATERIAL IN A MANNER WHICH REDUCES SOIL TEMPERATURE, AND MINIMIZES WATER LOSS DUE TO EVAPORATION.
3. PRIOR EXCAVATION OR GRADE CUTTING WITHIN TREE DRIPLINE. MAKE A CLEAN CUT BETWEEN THE DISTURBED AND UNDISTURBED ROOT ZONES WITH A ROCK SAW OR SIMILAR EQUIPMENT, TO MINIMIZE DAMAGE TO REMAINING ROOTS.
4. TREES MOST HEAVILY IMPACTED BY CONSTRUCTION ACTIVITIES SHOULD BE WATERED DEEPLY ONCE A WEEK DURING PERIODS OF HOT, DRY WEATHER. TREE CROWNS SHOULD BE SPRAYED WITH WATER PERIODICALLY TO REDUCE DUST ACCUMULATION ON THE LEAVES.
5. ANY TRENCHING REQUIRED FOR THE INSTALLATION OF LANDSCAPE IRRIGATION SHALL BE PLACED AS FAR FROM EXISTING TREE TRUNKS AS POSSIBLE.
6. NO LANDSCAPE TOPSOIL DRESSING GREATER THE FOUR INCHES (4") SHALL BE PERMITTED WITHIN THE DRIPLINE OF A TREE. NO SOIL IS PERMITTED ON THE ROOT FLARE OF ANY TREE.
7. PRUNING TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC AND EQUIPMENT SHALL TAKE PLACE BEFORE CONSTRUCTION BEGINS.

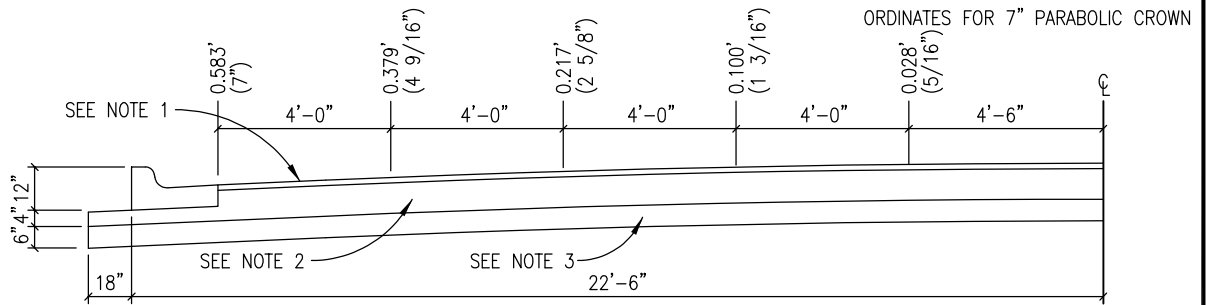
***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



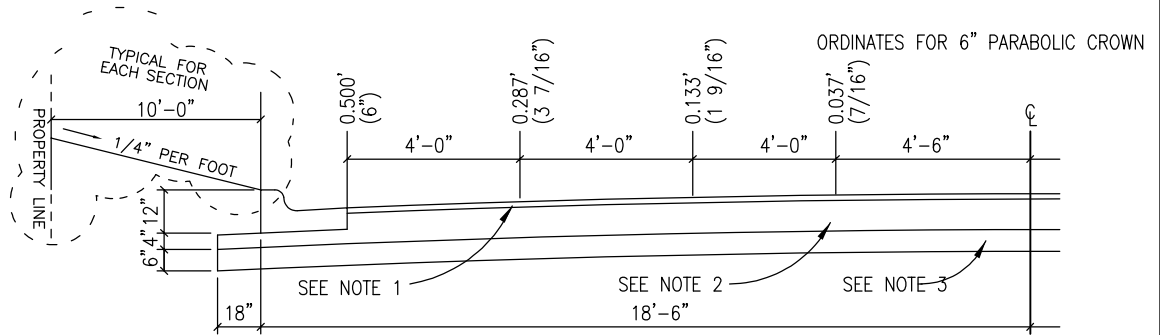
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TREE PROTECTION – WOOD SLATS

REVISION NOTE:		ADOPTED 6/21/2006
DRAWING NAME:		EC10
SCALE:	DATE:	
NTS	1/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	

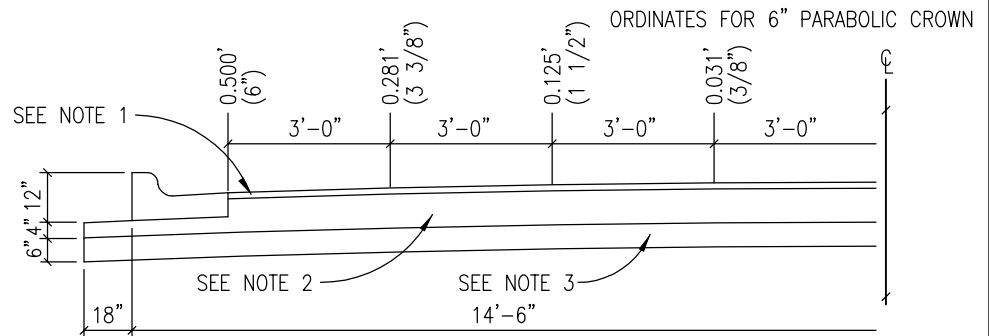
STREETS AND DRAINAGE **STANDARDS**



45 FOOT STREET (BACK TO BACK)



37 FOOT STREET (BACK TO BACK)



28 FOOT STREET (BACK TO BACK)

NOTES:

1. 2" HOT MIX ASPHALTIC CONCRETE.
2. 8" FLEXBASE SHALL BE PLACED IN LIFTS NOT EXCEEDING 6" COMPACTED DEPTH AND TO 100% OF MAXIMUM DENSITY AS DETERMINED BY TEX-113E AT $\pm 3\%$ OF OPTIMUM MOISTURE CONTENT.
3. LIME STABILIZATION MAY BE USED IF A QUALIFIED GEOTECHNICAL REPORT INDICATES THAT THE SULFATE LEVELS ARE LOW ENOUGH.

STREET AND ROADWAY DESIGN CRITERIA

STREET
CLASSIFICATION

TOTAL EQUIVALENT 18K AXLE LOAD
APPLICATIONS (20 YEAR FLEXIBLE DESIGN)

LOCAL

ALLEY	20,000
RESIDENTIAL LANE	20,000
LOCAL STREET	20,000

COLLECTORS

RESIDENTIAL	80,000
MAJOR NEIGHBORHOOD	290,000

ARTERIALS

MINOR ARTERIAL	1,020,000
MAJOR ARTERIAL	5,200,000

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

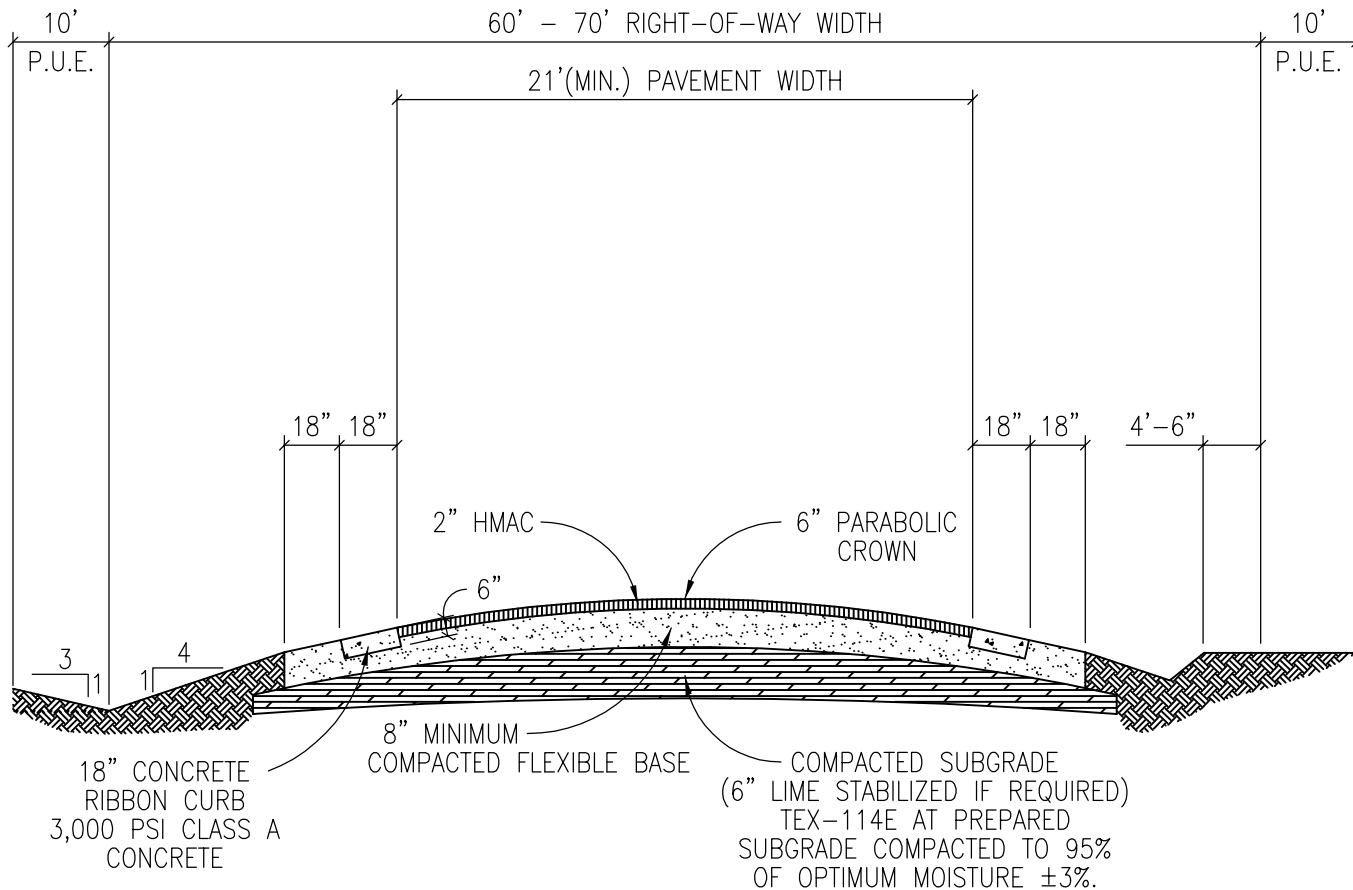
SD01

SCALE: NTS DATE: 1/2003

DRAWN BY: MRS APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL HALF CROSS - SECTIONS
FOR H.M.A.C. SURFACED STREETS



NOTE:

AT MINIMUM, ALL RURAL STREETS SHALL BE PAVED WITH A MINIMUM OF 8" OF FLEXIBLE BASE COMPACTED TO 100% MAXIMUM DENSITY IN ACCORDANCE WITH TEX-113E AT OPTIMUM MOISTURE ±3%, AND 2" OF HMAC TYPE D.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

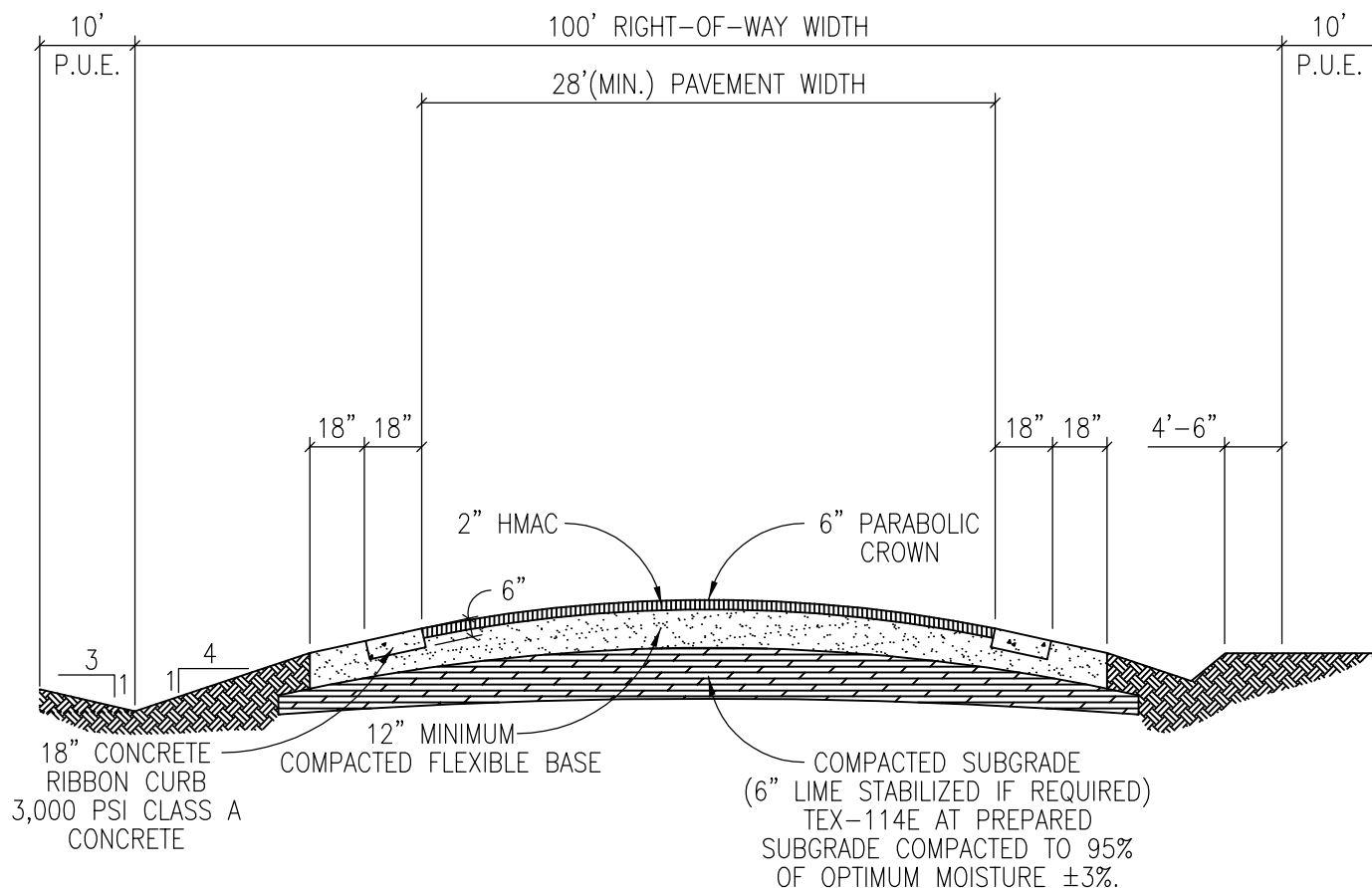


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL RURAL PAVING DETAIL

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD02

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTE:

AT MINIMUM, ALL RURAL STREETS SHALL BE PAVED WITH A MINIMUM OF 12" OF FLEXIBLE BASE COMPACTED TO 100% MAXIMUM DENSITY IN ACCORDANCE WITH TEX-113E AT OPTIMUM MOISTURE ±3%, AND 2" OF HMAC TYPE D.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

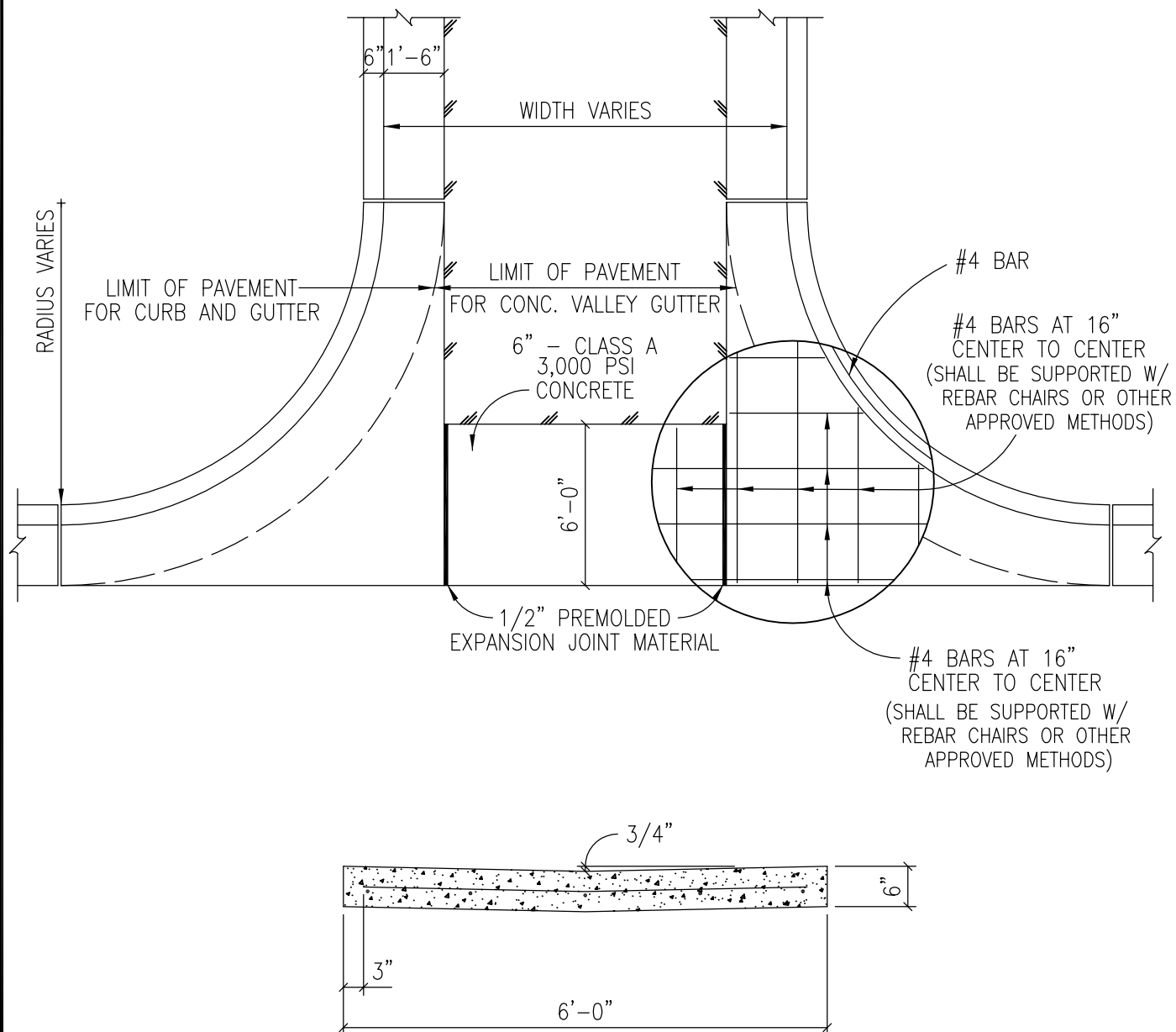


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL RURAL (COLLECTOR)
PAVING DETAIL

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD02A

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



The Architect/Engineer assumes responsibility for appropriate use of this standard.

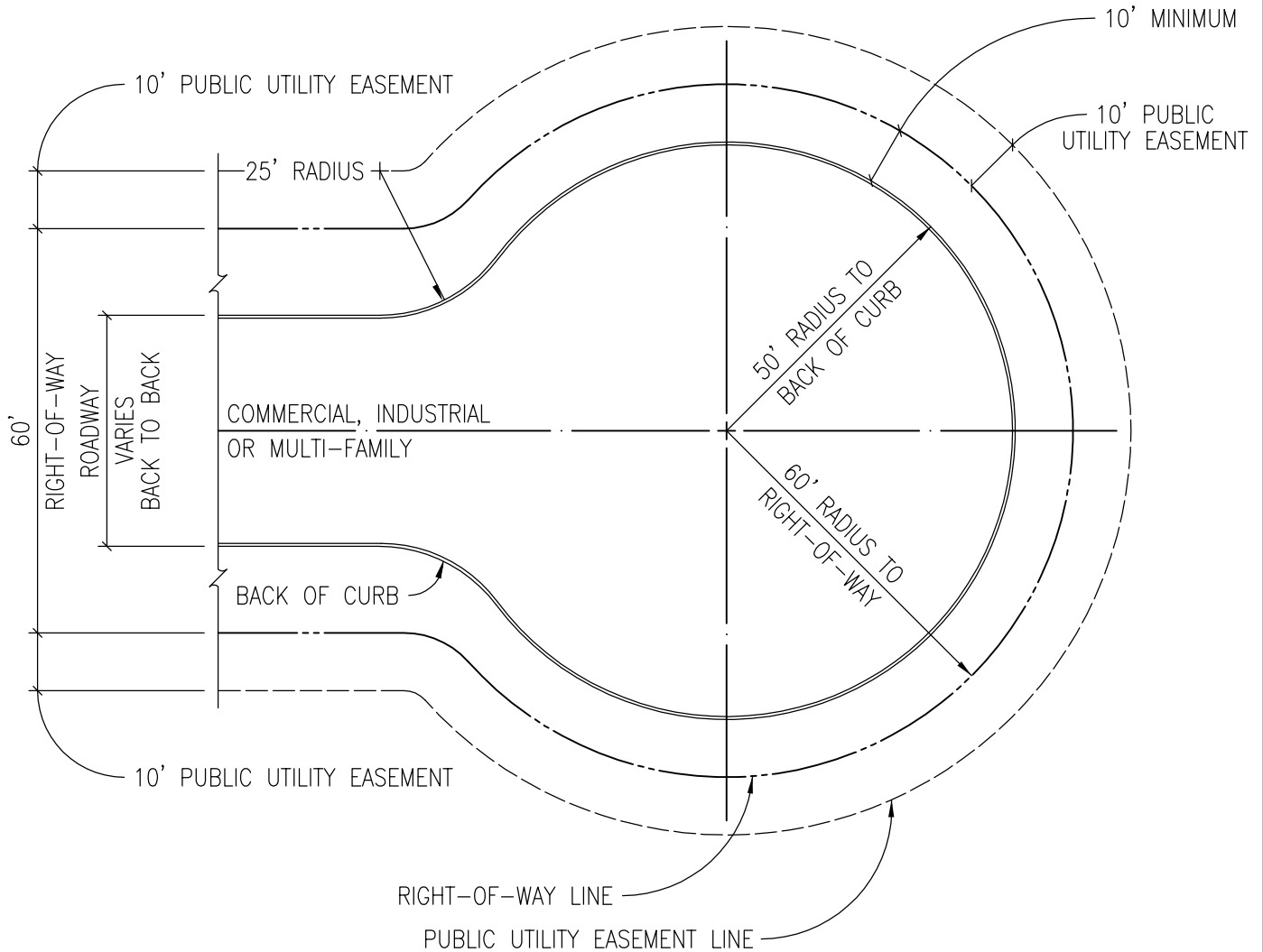


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE VALLEY GUTTER DETAIL

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD03

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTE:

1. CUL-DE-SAC SHALL BE CONSTRUCTED WITH A 9-INCH CROWN, GIVING A 1.5% CROSS SLOPE.

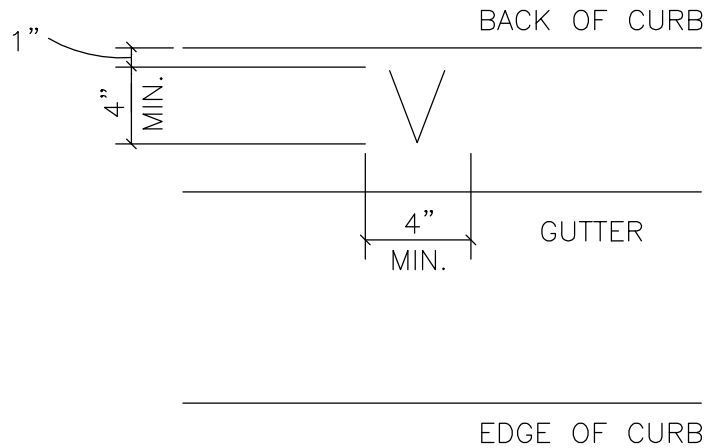
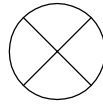
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL "NON SINGLE FAMILY OR
NON TWO FAMILY" CUL- DE-SAC PLAN

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD04	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

(EX. WATER VALVE)



PLAN VIEW
(TYPICAL)

NOTES:

1. ALL WATER SERVICE, WASTE WATER SERVICE AND VALVE LOCATIONS SHALL BE APPROXIMATELY MARKED AS FOLLOWS:

WATER SERVICE	"W"	TOP OF CURB
WASTE WATER SERVICE	"S"	TOP OF CURB
VALVE	"V"	TOP OF CURB

2. LETTERS SHALL HAVE A 1/2" MAX. WIDTH.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

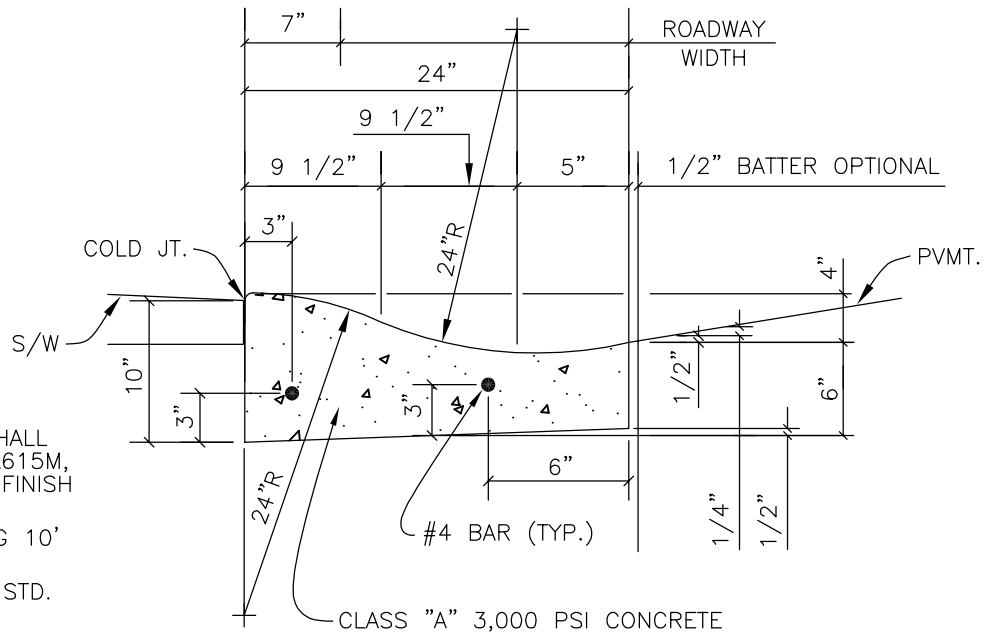


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB STAMP DETAIL

REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
SD05

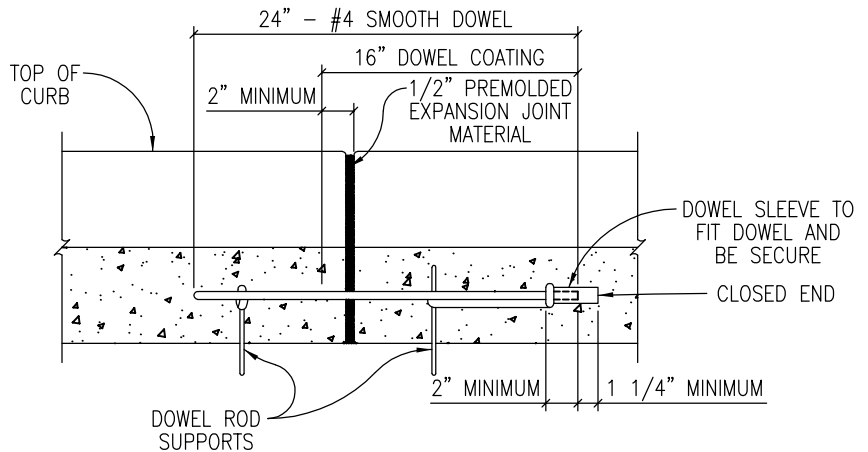
SCALE:	DATE:
NTS	1/2003
DRAWN BY:	APPROVED BY:
MRS	TRB



MOUNTABLE CURB

NOTES:

1. ALL WORK AND MATERIAL SHALL CONFORM TO ASTM A615, A615M, C309, AND D1752. BROOM FINISH EXPOSED SURFACE.
2. CONTRACTION JOINT SPACING 10' MAX.
3. EXPANSION JOINTS AS PER STD. ASTM D-1752.
4. 1/2" EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB IS ADJACENT TO SIDEWALK OR RIP-RAP.
5. TRANSITIONS BETWEEN CURBS OR DIFFERING CROSS SECTIONS SHALL OCCUR OVER A 20 FOOT LENGTH AS APPROVED BY THE ENGINEER OR TH CITY OF GEORGETOWN.
6. ALL CONCRETE SHALL BE CLASS A, 3000 PSI.
7. ALL SURFACES THAT ARE CHIPPED OR OTHERWISE DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED.
8. ONE OF THE FOLLOWING SCHEMES OF REINFORCEMENT SHALL BE REQUIRED. THE MANNER OF PLACEMENT AND LOCATION SHALL BE TO THE SATISFACTION OF THE ENGINEER OR THE CITY OF GEORGETOWN.
 - A. CURB AND GUTTER (REINFORCED) SHALL HAVE LONGITUDINAL REINFORCING BARS AS FOLLOWS: THREE #4,
 - B. ALL TYPES OF CURB (REINFORCED) SHALL HAVE #4 BAR FOR LONGITUDINAL REINFORCEMENT.
9. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 15 INCH.
10. REINFORCING BARS SHALL BE SUPPORTED WITH REBAR CHAIRS OR OTHER APPROVED METHODS.
11. REBAR SUPPORTS ARE NOT REQUIRED ON MACHINE PLACED CURB PROVIDED THAT REBAR IS PROPERLY GUIDED INTO THE CURB SECTION.



NOTE:

EXPANSION JOINT INTERVALS NOT TO EXCEED 40'-0".

CURB DOWEL DETAIL

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**MOUNTABLE CURB
AND GUTTER DETAILS**

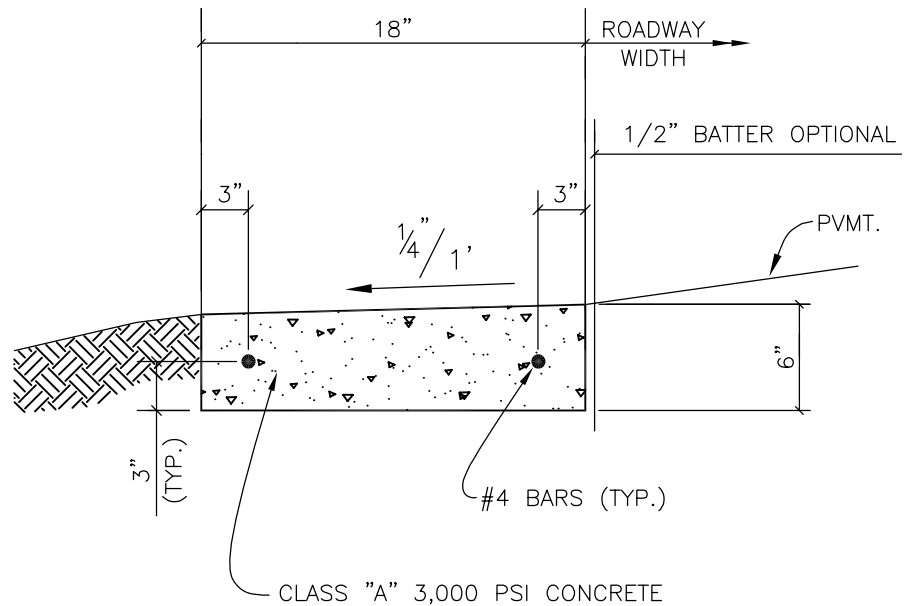
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME: **SD07**

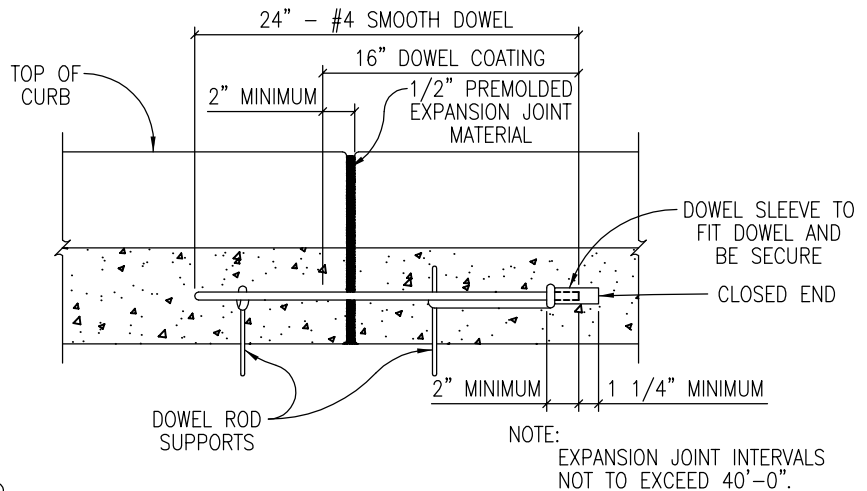
SCALE: **NTS**
DATE: **1/2003**
DRAWN BY: **MRS**
APPROVED BY: **TRB**

NOTES:

1. ALL WORK AND MATERIAL SHALL CONFORM TO ASTM A615, A615M, C309, AND D1752. BROOM FINISH EXPOSED SURFACE.
2. CONTRACTION JOINT SPACING 10' MAX.
3. EXPANSION JOINTS AS PER STD. ASTM D-1752.
4. 1/2" EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB IS ADJACENT TO SIDEWALK OR RIP-RAP.
5. TRANSITIONS BETWEEN CURBS OR DIFFERING CROSS SECTIONS SHALL OCCUR OVER A 20 FOOT LENGTH AS APPROVED BY THE ENGINEER OR TH CITY OF GEORGETOWN.
6. ALL CONCRETE SHALL BE CLASS A, 3000 PSI.
7. ALL SURFACES THAT ARE CHIPPED OR OTHERWISE DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED.
8. ONE OF THE FOLLOWING SCHEMES OF REINFORCEMENT SHALL BE REQUIRED. THE MANNER OF PLACEMENT AND LOCATION SHALL BE TO THE SATISFACTION OF THE ENGINEER OR THE CITY OF GEORGETOWN.
 - A. CURB AND GUTTER (REINFORCED) SHALL HAVE LONGITUDINAL REINFORCING BARS AS FOLLOWS: THREE #4,
 - B. ALL TYPES OF CURB (REINFORCED) SHALL HAVE #4 BAR FOR LONGITUDINAL REINFORCEMENT.
9. REINFORCING BARS SHALL BE LAPPED A MINIMUM OF 15 INCH.
10. REINFORCING BARS SHALL BE SUPPORTED WITH REBAR CHAIRS OR OTHER APPROVED METHODS.
11. REBAR SUPPORTS ARE NOT REQUIRED ON MACHINE PLACED CURB PROVIDED THAT REBAR IS PROPERLY GUIDED INTO THE CURB SECTION.



RIBBON CURB



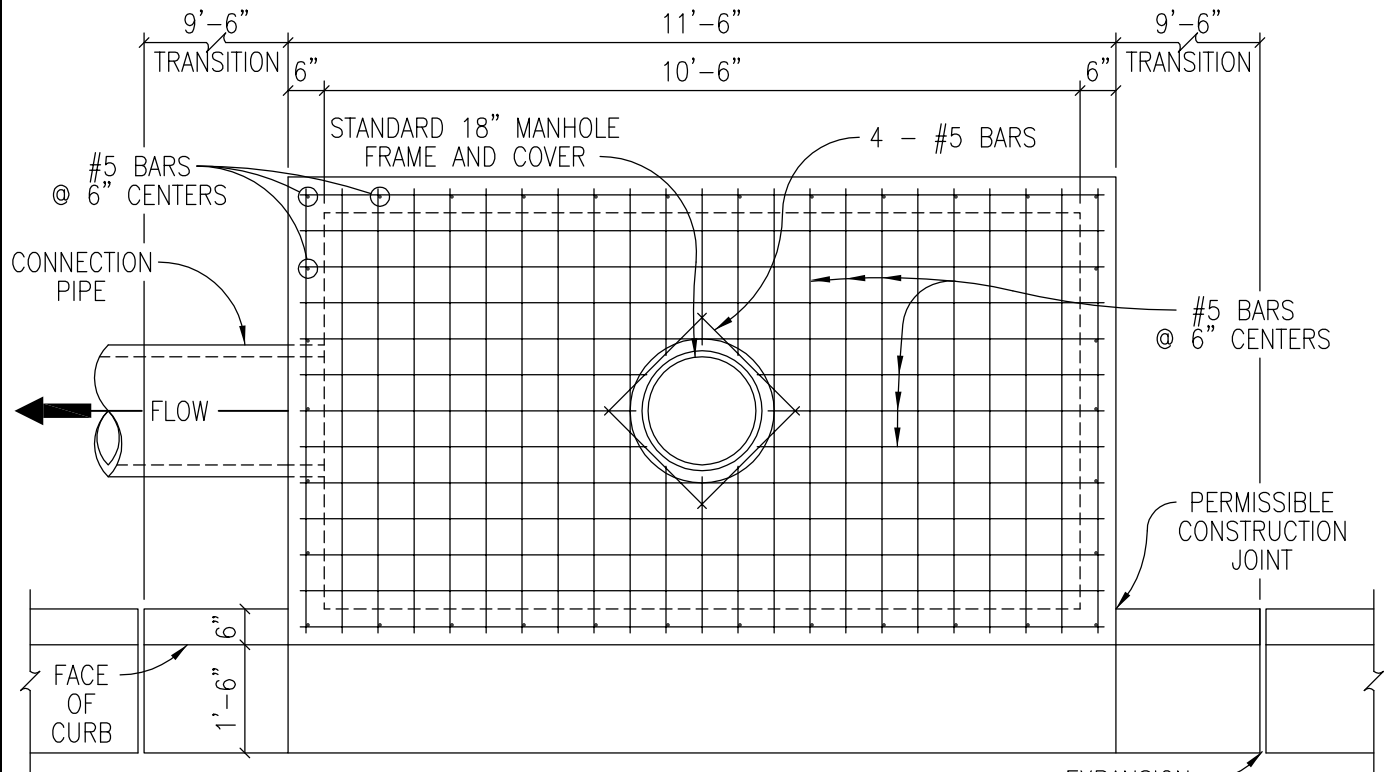
CURB DOWEL DETAIL

The Architect/Engineer assumes responsibility for appropriate use of this standard.

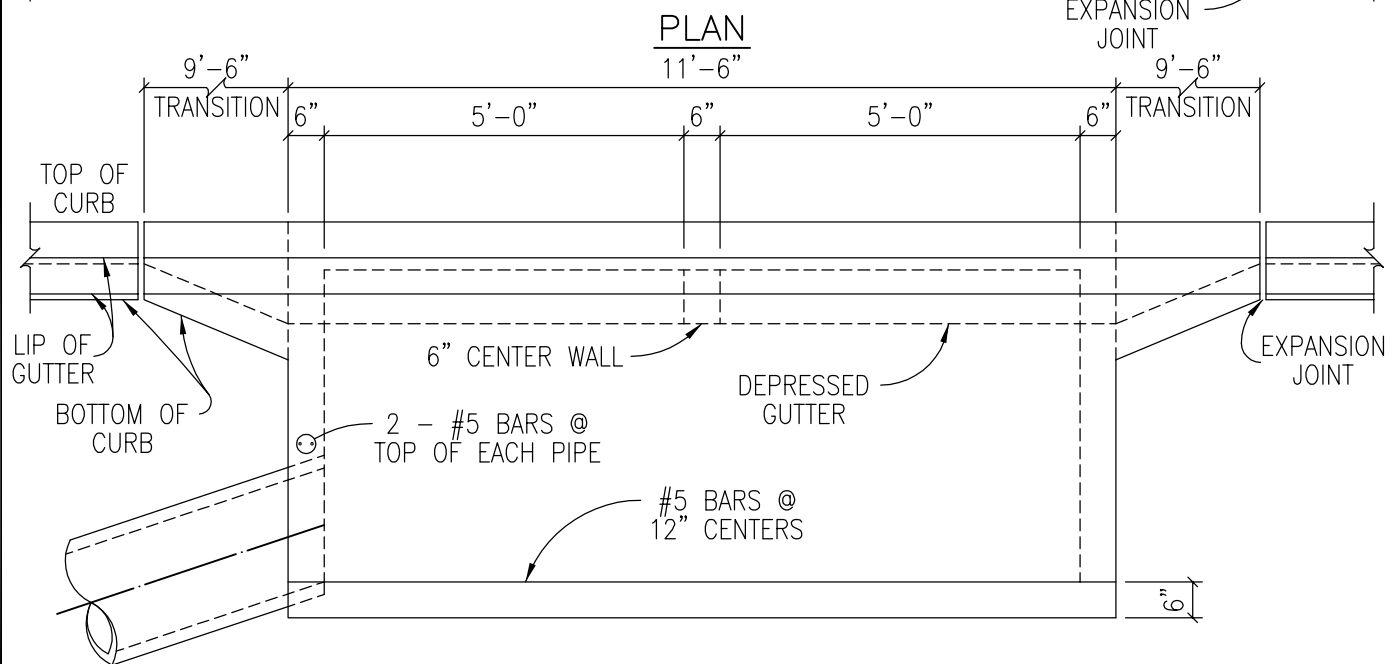


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
RIBBON CURB DETAILS

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD08	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



PLAN



FRONT ELEVATION

NOTES:

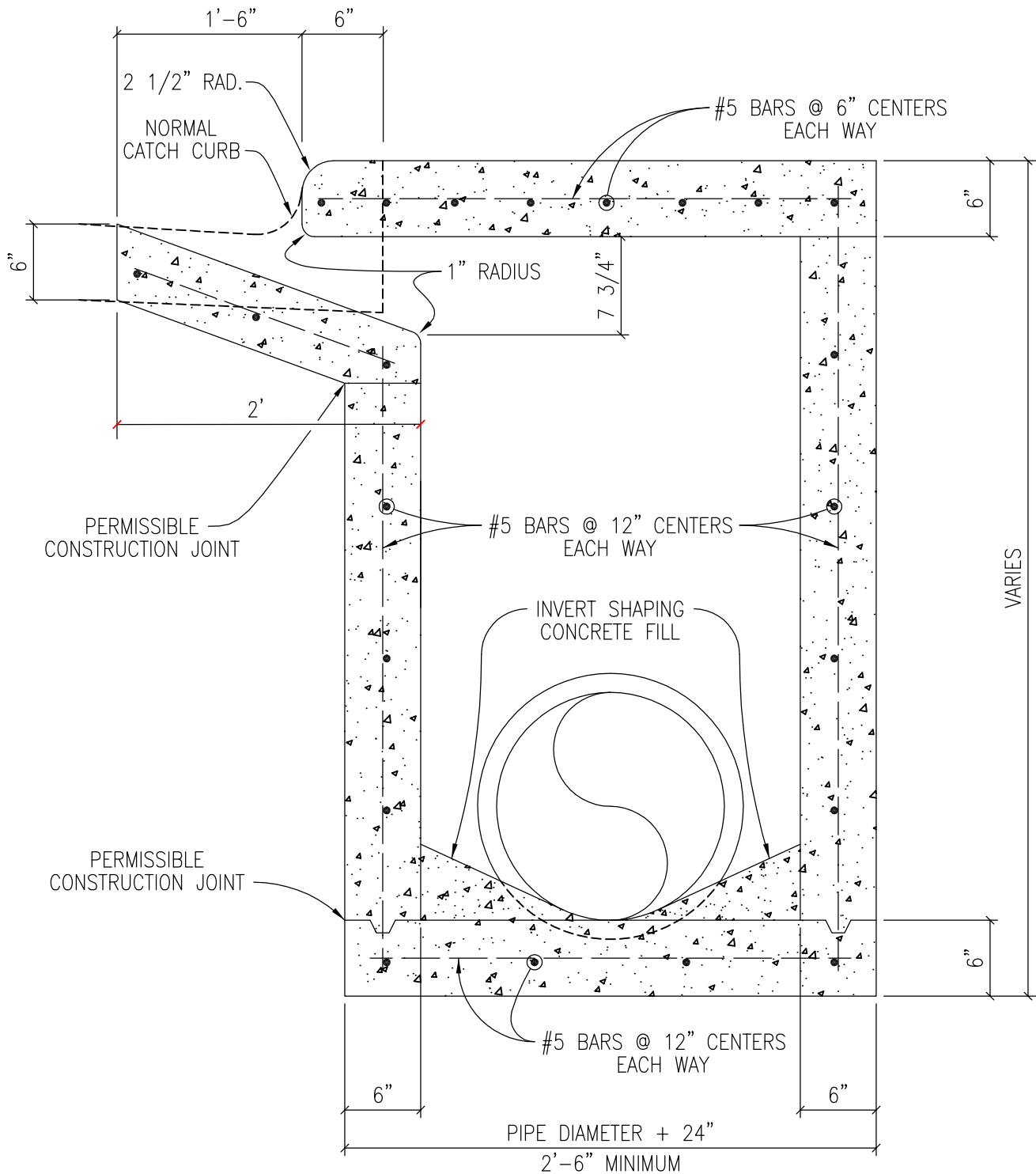
1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB INLET DETAIL

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD09	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



NOTES:

1. ALL CONCRETE SHALL BE CLASS "A" 3,000 PSI CONCRETE.
2. STORM SEWER PIPE MATERIAL TO BE R.C.P. (CLASS III) UNLESS OTHERWISE APPROVED BY THE CITY OF GEORGETOWN.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



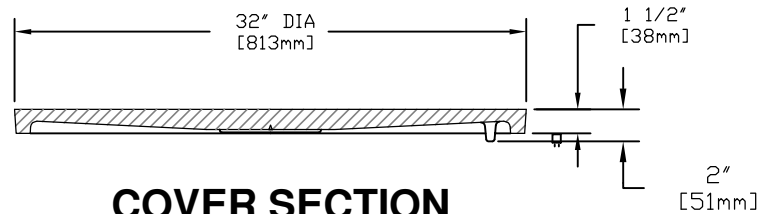
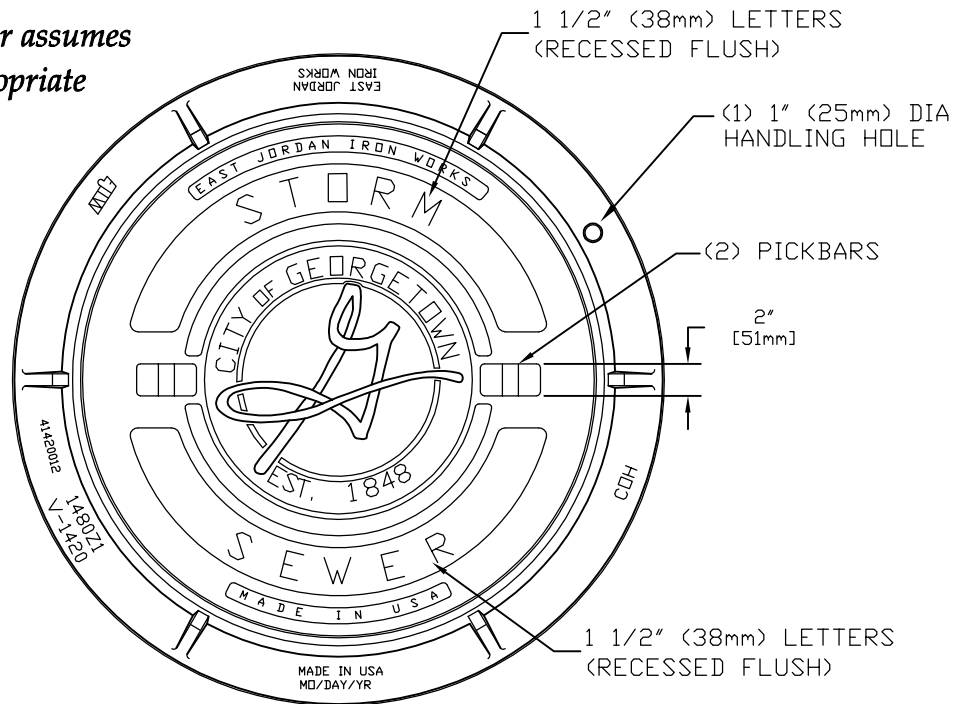
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB DRAIN INLET
TYPICAL SECTION

REVISION NOTE: ADOPTED 6/21/2006

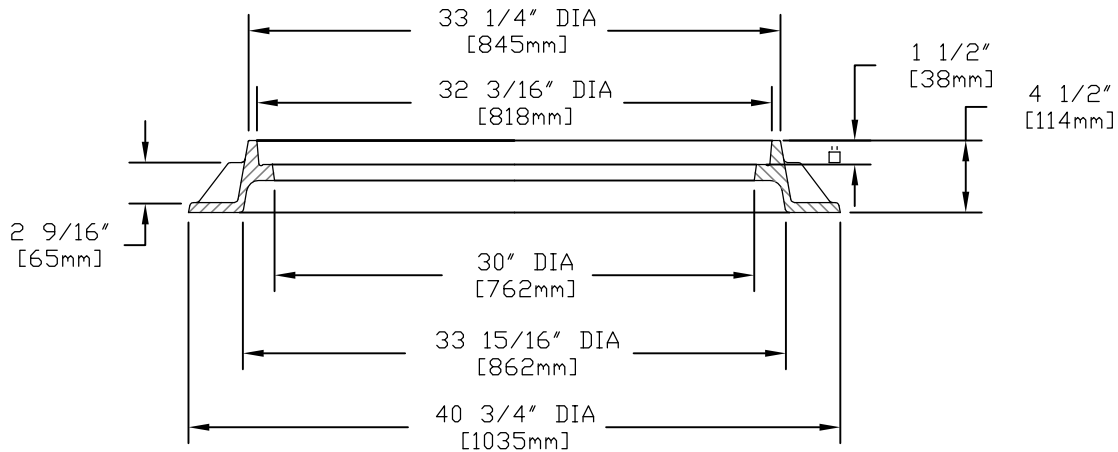
DRAWING NAME: SD10

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB

The Architect/Engineer assumes responsibility for appropriate use of this standard.



COVER SECTION



FRAME SECTION

NOTES:

1. STANDARD STORM SEWER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480A V-1420\1480Z1, COVER TO BE STAMPED WITH "STORM SEWER".
2. STANDARD STORM SEWER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 41420012 00148391.
4. FOR BOLTED STORM SEWER MANHOLE SET REFER TO DETAIL SD11A.

REVISION NOTE: **ADOPTED 6/21/2006**

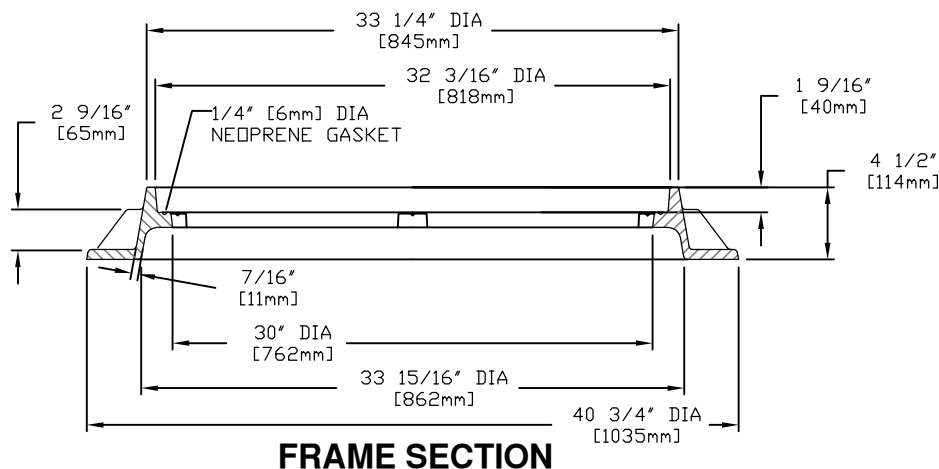
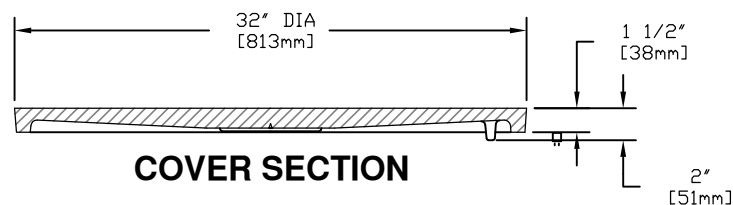
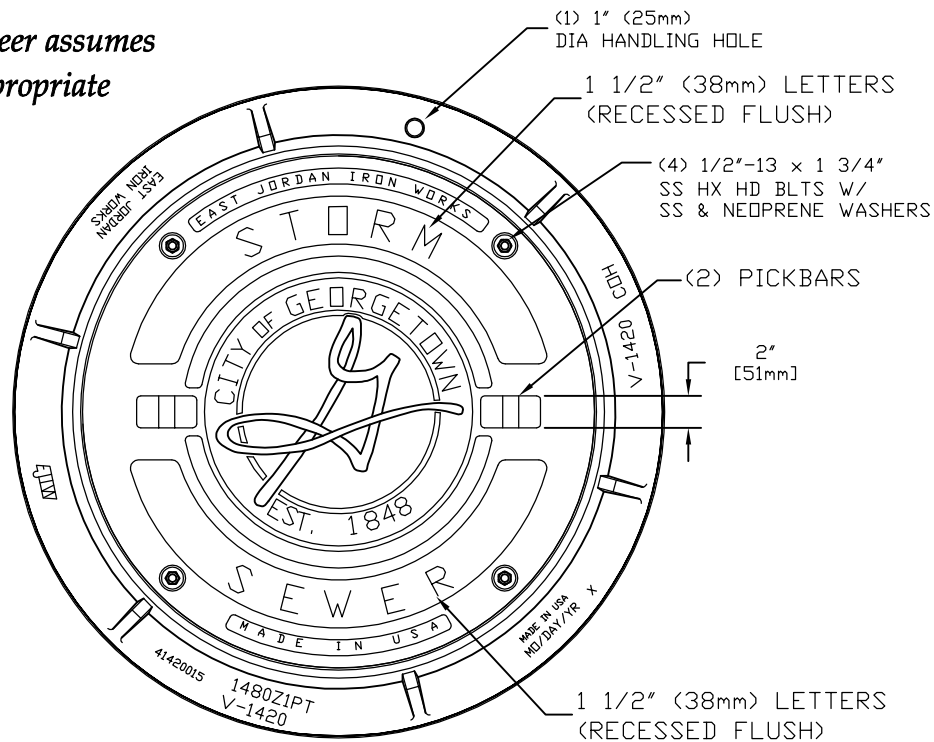
DRAWING NAME: **SD11**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**STANDARD STORM SEWER
MANHOLE SET**

SCALE: **NTS**
DATE: **1/2003**
DRAWN BY: **MRS**
APPROVED BY: **TRB**

The Architect/Engineer assumes responsibility for appropriate use of this standard.



NOTES:

1. BOLTED STORM SEWER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480APT V-1420\1480Z1PT. COVER TO BE STAMPED WITH "STORM SEWER"
2. BOLTED STORM SEWER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 00148393 41420015.
4. FOR STANDARD STORM SEWER MANHOLE SET REFER TO DETAIL SD11.

REVISION NOTE: **ADOPTED 6/21/2006**

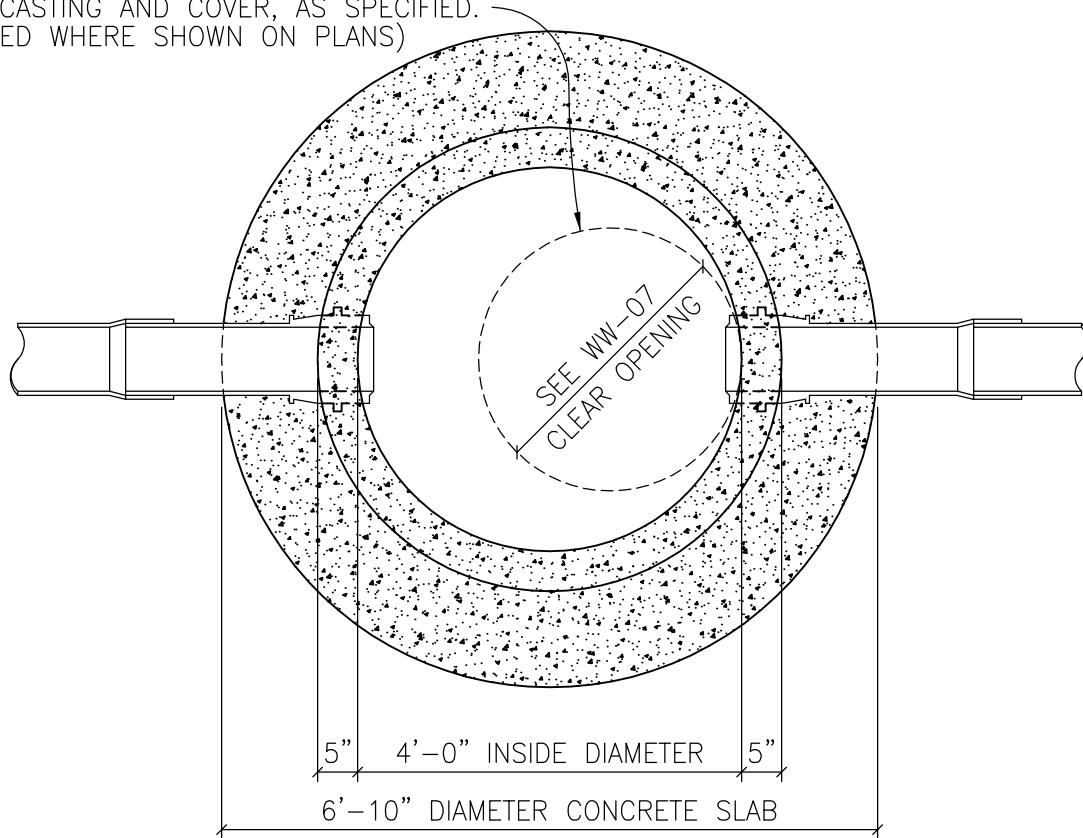
DRAWING NAME: **SD11A**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**BOLTED STORM SEWER
MANHOLE SET**

SCALE: **NTS**
DATE: **1/2006**
DRAWN BY: **MRS**
APPROVED BY: **TRB**

STANDARD CASTING AND COVER, AS SPECIFIED.
(BOLTED WHERE SHOWN ON PLANS)



MANHOLE PLAN

CITY OF GEORGETOWN NOTES:

MANHOLE DETAILS SHALL REFLECT THE CITY'S MINIMUM SPECIFICATIONS, AS STATED BELOW:

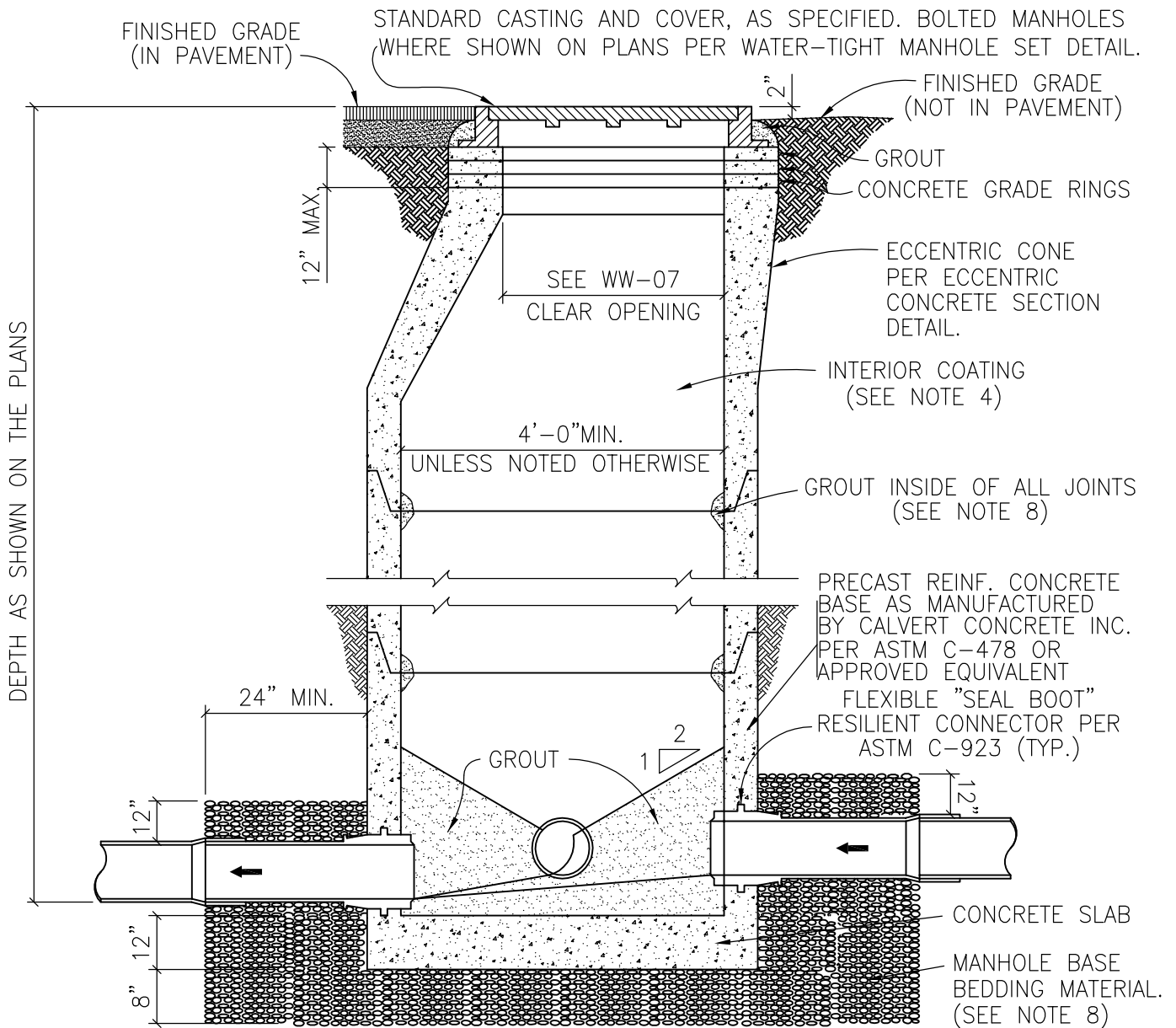
- A. ALL MANHOLES SHALL BE 48" I.D., R.C.P., CLASS III, WITH RUBBER O-RING GASKET JOINTS CONFORMING TO ASTM C478, C433 AND C76.
- B. ALL MANHOLES SHALL HAVE FRAME AND COVER, AS MANUFACTURED BY EAST JORDAN IRON WORKS (AS PER DETAIL # WW-07) OR APPROVED EQUIVALENT.
- C. ALL MANHOLES SHALL BE CONCRETE WITH CAST IRON FRAME AND COVER.
- D. ALL MANHOLES SHALL HAVE AN ECCENTRIC CONE.
- E. MANHOLES MAY HAVE A FLAT LID, IF APPROVED BY CITY OF GEORGETOWN, BEING 12" THICK WITH A MINIMUM 30" OPENING, AS MANUFACTURED BY CALVERT CONCRETE OR APPROVED EQUAL M.F.G. CONFORMING TO ASTM C478, 5000 P.S.I. CONCRETE, TRAFFIC BEARING, AND O-RING JOINT CONFORMING TO ASTM C443.
- F. INVERTS AND FLEXIBLE SEAL BOOTS, PER ASTM C-923, SHALL BE CAST INTO BASE SECTION.
- G. MINIMUM DROP BETWEEN INVERTS SHALL BE ONE-TENTH OF A FOOT (0.1').
- H. GRADE RINGS WITH AN I.D. TO MATCH FRAMES CLEAR OPENING WITH A MAXIMUM OF FIVE (5) GRADE RINGS ARE ALLOWED.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**STANDARD STORM SEWER
MANHOLE PLAN**

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD12	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



NOTES:

- MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET - SINGLE OFF-SET JOINTS.
- SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
- SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.
- AN 80 MIL COAT OF RAVEN LINING SYSTEMS, RAVEN 405 ULTRA HIGH BUILD EPOXY COATING, OR SPRAY WALL EPOXY COATING, OR APPROVED EQUAL, TO BE APPLIED TO ENTIRE INTERIOR OF EACH STORM SEWER MANHOLE AND UNDERSIDE OF FLAT TOPS.
- ALL MANHOLE COVERS SHALL BE BOLTED AND GASKETTED WHEN MANHOLES ARE LOCATED OUT FROM PAVEMENT.
- MANHOLES TO BE VENTED ARE IDENTIFIED ON MANHOLE SCHEDULE. REFERENCE MANHOLE VENT DETAIL.
- MANHOLES ARE TO BE DESIGNED TO RESIST LATERAL AND VERTICAL SOIL FORCES RESULTING FROM MANHOLE DEPTH. ADDITIONALLY, MANHOLES LOCATED IN PAVEMENT TO BE DESIGNED FOR HS-20 TRAFFIC LOADS.
- GROUT SHALL MEET THE REQUIREMENTS AS STATED BY THE COATING MANUFACTURER.
- MANHOLE BASE BEDDING MATERIAL SPECS. FOR 3/4" WASHED GRAVEL: SIEVE SIZE 2", PERCENT (%) RETAINED 0 SIEVE SIZE 1 1/2", % RETAINED 0-10 SIEVE SIZE 1", % RETAINED 45-80 SIEVE SIZE 3/4", % RETAINED 85-100 SIEVE SIZE 3/8", % RETAINED 95-100

The Architect/Engineer assumes responsibility for appropriate use of this standard.

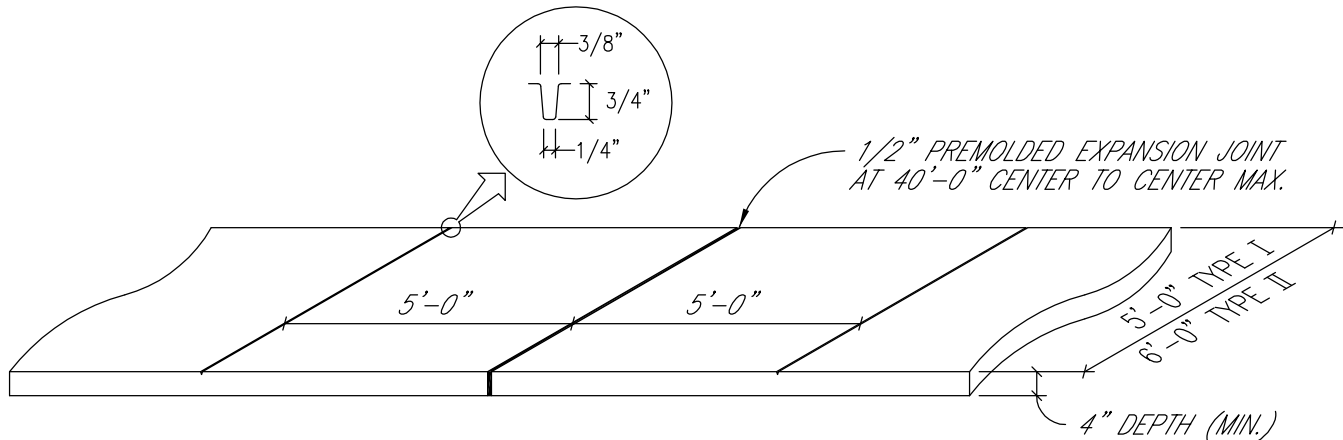
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD13

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB

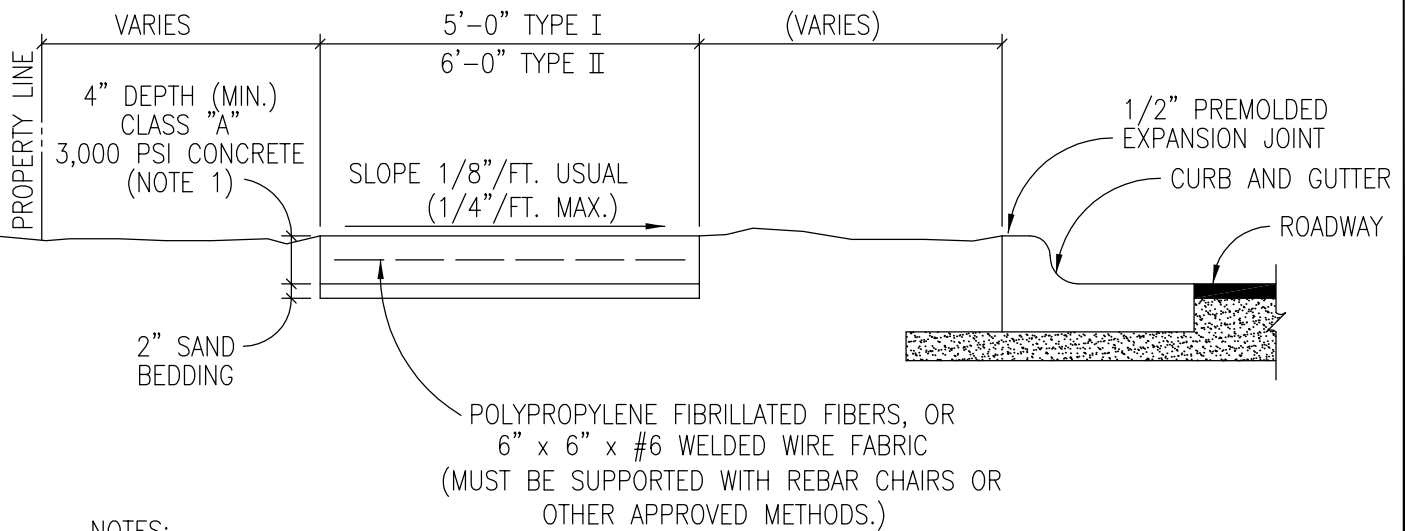


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD STORM SEWER
MANHOLE - SECTION



TYPE I - AS REQUIRED FOR SINGLE FAMILY, DUPLEXES AND TOWNHOUSES.

TYPE II - AS REQUIRED FOR APARTMENTS, OFFICE AND PARKING LOTS, COMMERCIAL AND INDUSTRIAL.



NOTES:

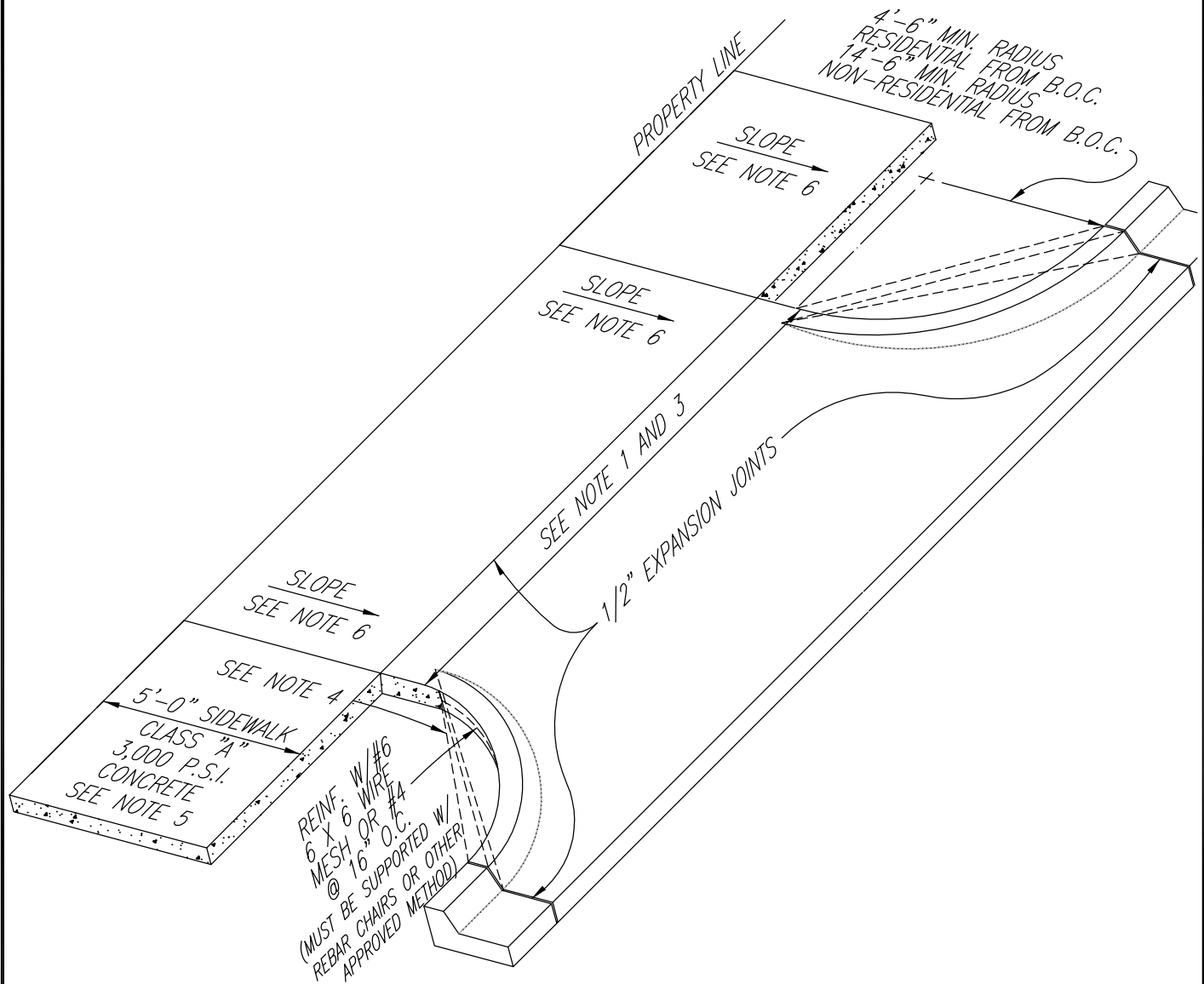
1. FOR ROLLER STAMPED SIDEWALK: MATCH TO SPECIFICATIONS.
2. STANDARD LOCATION OF SIDEWALK IS OFF BACK OF CURB. SPECIAL DESIGNS MAY BE APPROVED BY THE CITY ENGINEER, PRIOR TO FINAL DESIGN.
3. SIDEWALK SHALL CONFORM TO CURRENT AMERICANS WITH DISABILITIES ACT STANDARDS.
4. IF REQUIRED ALL SIDEWALKS SHALL BE SUBMITTED AND APPROVED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION BY THE ENGINEER RECORD.
5. ANY VARIANCE IN TEXTURE, GRADE OR ALIGNMENT MUST BE APPROVED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION.

**The Architect/Engineer assumes
responsibility for appropriate
use of this standard.**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SIDEWALK SECTION AND JOINT DETAIL

REVISION NOTE:		ADOPTED 6/21/2006
DRAWING NAME:		SD14
SCALE:	DATE:	
NTS	1/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	



NOTES:

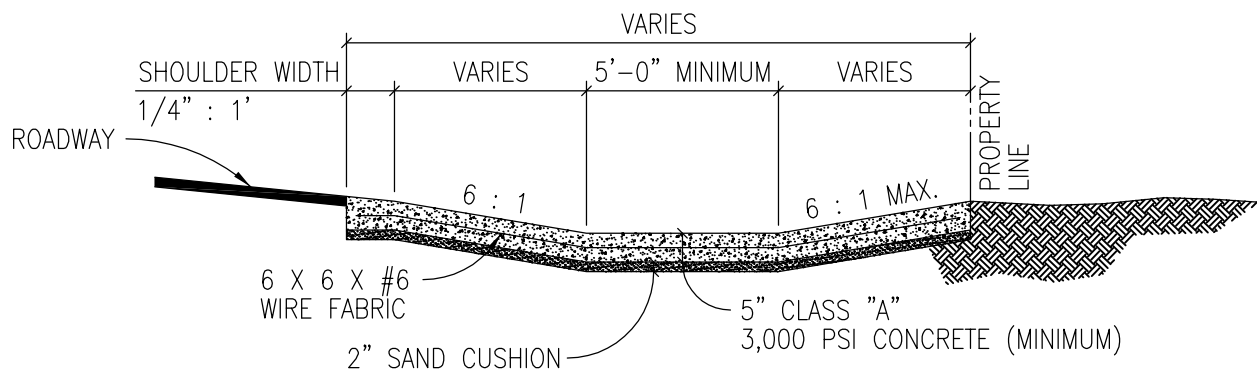
1. MAXIMUM WIDTH OF APPROACH SHALL BE 24'-0" FOR RESIDENTIAL, 30'-0" FOR NON-RESIDENTIAL UNDIVIDED AND 45'-0" FOR NON-RESIDENTIAL DIVIDED.
2. DRIVEWAY PERMITS TO BE ACQUIRED FROM CITY INSPECTION OFFICE.
3. MINIMUM WIDTH OF APPROACH SHALL BE 10'-0" FOR RESIDENTIAL AND 15'-0" FOR NON-RESIDENTIAL.
4. LINEAR "RADIUS" AT CORNERS, PERMITTED FOR "SINGLE FAMILY" OR "TWO FAMILY" RESIDENTIAL DRIVEWAY APPROACH.
5. SIDEWALK LOCATION TO BE APPROVED BY CITY ENGINEER PRIOR TO FINAL DESIGN.
6. SLOPE 1/8" PER FOOT USUAL, NOT TO EXCEED 1/4" PER FOOT.
7. DRIVEWAY APPROACH THICKNESS TO BE A MIN. OF 6".

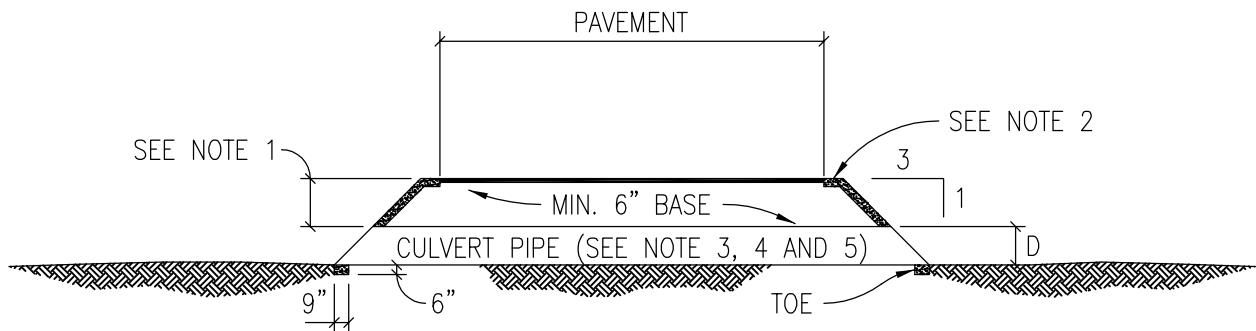
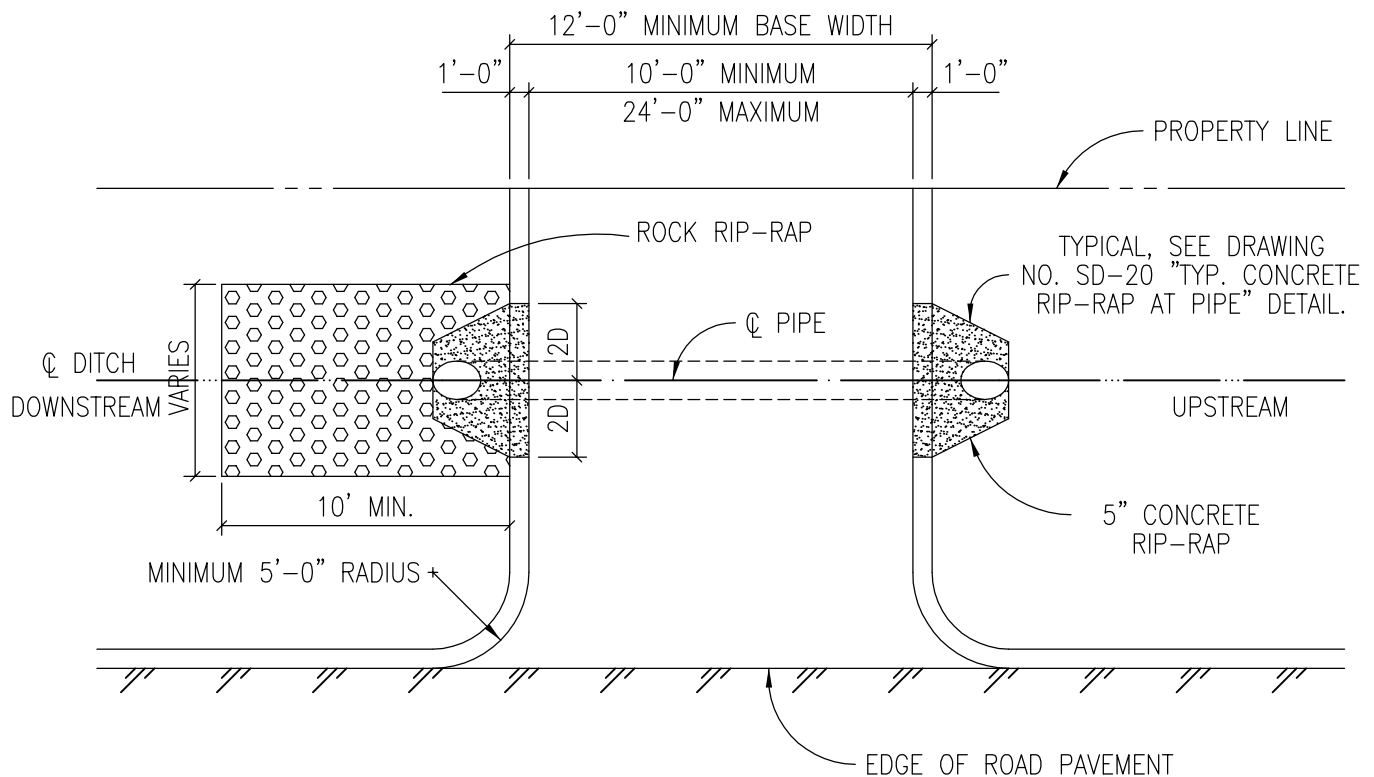
The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE DRIVEWAY APPROACH
TYPICAL

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD15	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB





NOTES:

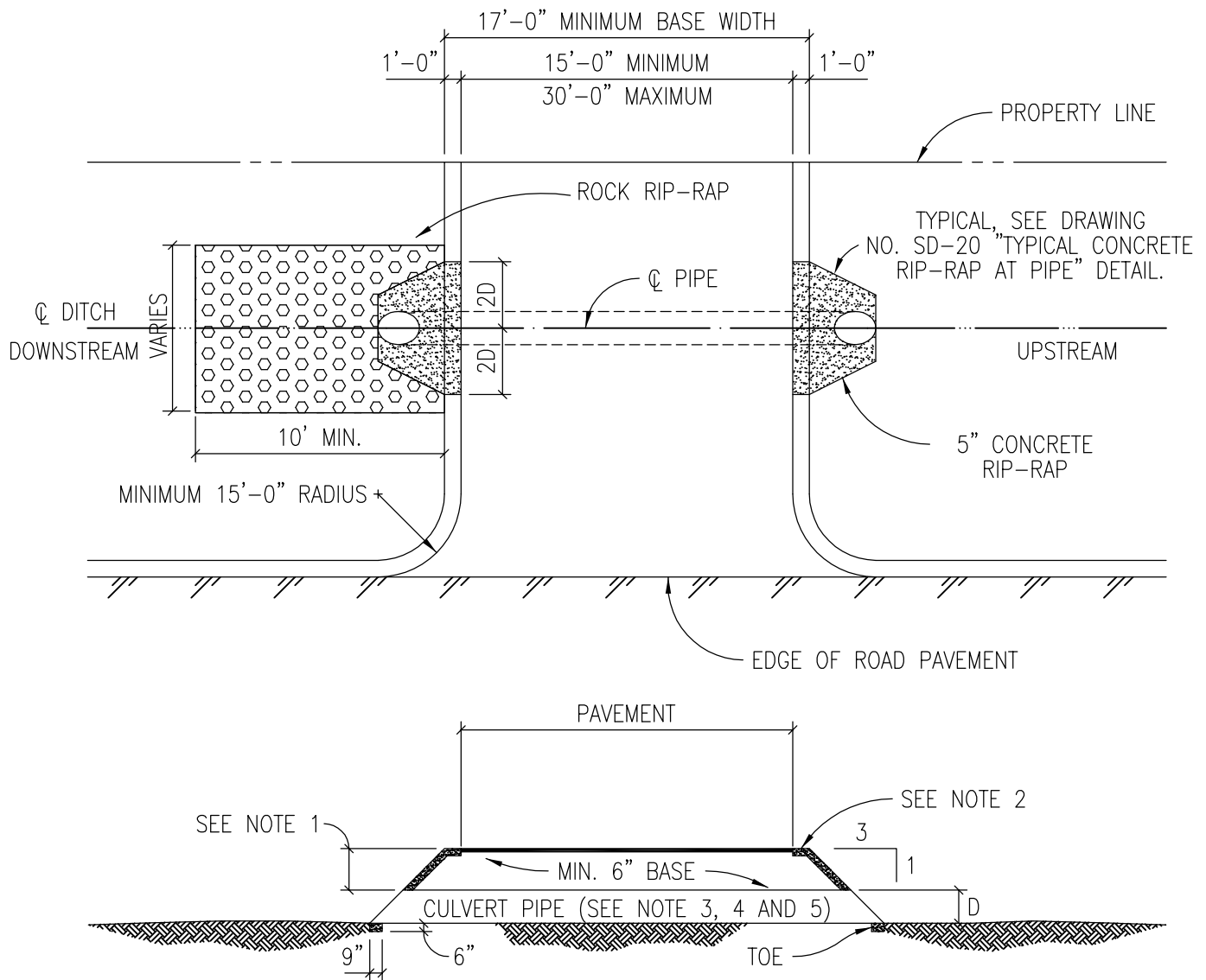
1. MINIMUM COVER OVER CULVERT PIPE SHALL BE 6" (SEE NOTE 5).
2. 5" CONCRETE RIP-RAP SHALL BE INSTALLED.
3. CULVERT PIPE TO BE MINIMUM OF 12" DIAMETER.
4. CULVERT PIPE MATERIAL TO BE R.C.P. (CLASS III), UNLESS PRIOR APPROVAL IS GRANTED BY THE CITY OF GEORGETOWN.
5. MINIMUM COVER OVER CULVERT PIPE SHALL PROVIDE H2O LOADING.
6. BACKFILL AROUND CULVERT PIPE SHALL BE SELECT MATERIAL TO BE PLACED AND COMPACTED TO 95% TEX-114E.
7. RIP-RAP SHALL EXTEND 10' FROM THE DOWN STREAM SIDE USING THE NOMINAL STONE SIZE DIA. OF 8" TO A DEPTH OF 16" (MINIMUM).
8. MINIMUM CHANNEL SIDE SLOPE SHALL BE 4:1.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
RURAL RESIDENTIAL DRIVEWAY
APPROACH WITH CULVERT PIPE

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD17	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



NOTES:

1. MINIMUM COVER OVER CULVERT PIPE SHALL BE 6" (SEE NOTE 5).
2. 5" CONCRETE RIP-RAP SHALL BE INSTALLED.
3. CULVERT PIPE TO BE MINIMUM OF 12" DIAMETER.
4. CULVERT PIPE MATERIAL TO BE R.C.P. (CLASS III), UNLESS PRIOR APPROVAL IS GRANTED BY THE CITY OF GEORGETOWN.
5. MINIMUM COVER OVER CULVERT PIPE SHALL PROVIDE H2O LOADING.
6. BACKFILL AROUND CULVERT PIPE SHALL BE SELECT MATERIAL TO BE PLACED AND COMPACTED TO 95% TEX-114E.
7. ROCK RIP-RAP SHALL EXTEND 10' FROM THE DOWN STREAM SIDE USING THE AVERAGE STONE SIZE DIA. OF 8" AT A DEPTH OF 16" (MINIMUM).
8. MINIMUM CHANNEL SIDE SLOPE SHALL BE 4:1.

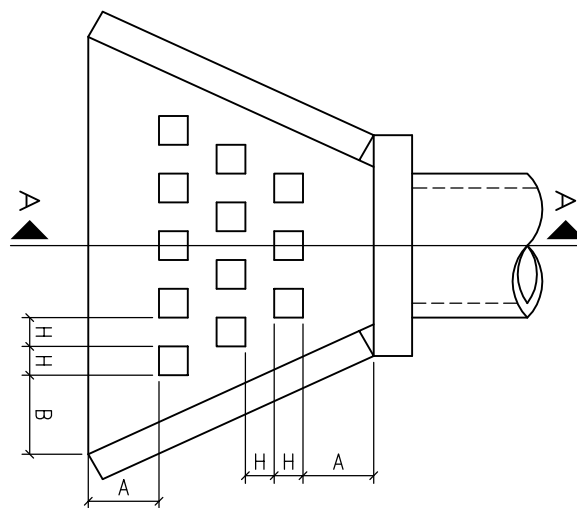
***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



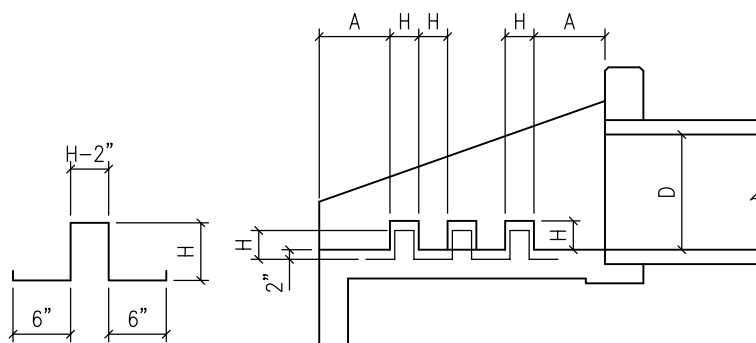
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
RURAL NON-RESIDENTIAL UNDIVIDED
DRIVEWAY APPROACH WITH
CULVERT PIPE

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD18	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

The Architect/Engineer assumes responsibility for appropriate use of this standard.



PLAN VIEW



BARS

SECTION "A-A"

NOTES:

1. USE CLASS "A" CONCRETE, 3,000 PSI AT 28 DAYS, UNLESS NOTED.
2. REINFORCING STEEL – ASTM A615, GRADE 40, UNLESS NOTED.
3. LAP REINFORCING 30 BAR DIAMETERS MIN. AT SPLICES, UNLESS NOTED.
4. CHAMFER EXPOSED EDGES OF CONCRETE 3/4", UNLESS NOTED.
5. PLACE REINFORCING WITH THE CENTER OF THE OUTSIDE BARS 2 INCHES FROM THE SURFACE OF THE CONCRETE.

TABLE OF DIMENSIONS FOR ENERGY DISSIPATOR DETAIL

<u>D PIPE DIAMETER (INCHES)</u>	<u>NUMBER OF ROWS OF DISSIPATORS</u>	<u>NUMBER OF DISSIPATORS IN FRONT ROW</u>	<u>H (INCHES)</u>	<u>A (INCHES)</u>	<u>B (INCHES)</u>
12	1	3	4	4	9.1875
18	2	4	4 1/2	9 1/2	15.5625
24	2	5	6	14 3/4	16 1/2
30	3	6	7 1/2	12 1/2	14 3/8
36	3	6	9	16 1/4	18 5/16
42	3	6	10 1/2	20	22 1/4
48	3	6	12	23 3/4	26 1/4
54	3	6	13 1/2	27 1/2	27 3/4
60	3	6	15	31 1/4	31 5/8

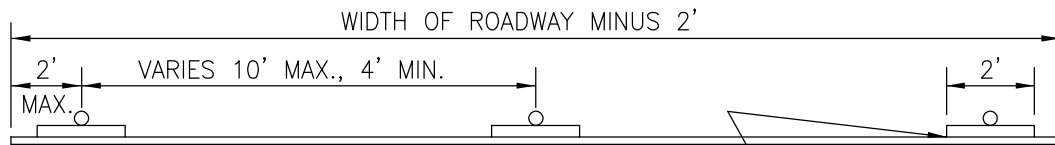
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME: **SD20**

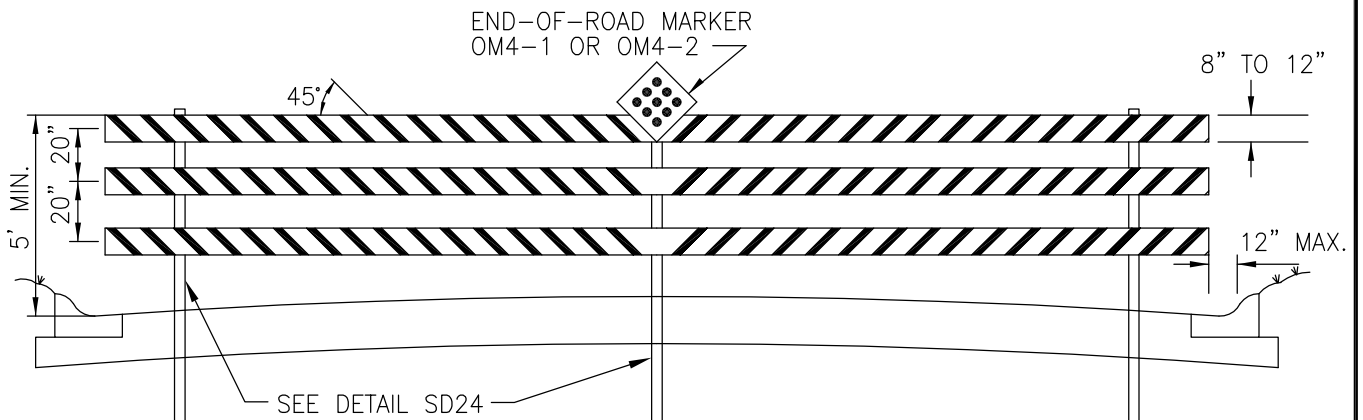


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
ENERGY DISSIPATOR DETAIL

SCALE: **NTS**
DATE: **1/2003**
DRAWN BY: **MRS**
APPROVED BY: **TRB**



TOP VIEW



FRONT VIEW

GENERAL NOTES FOR THIN WALL TUBE TYPE SIGN SUPPORT:

1. THE BASE SOCKET IS FORMED FROM 2 7/8 " O.D. X 12 GAUGE GALVANIZED PIPE.
2. THE WEDGE IS FORMED FROM 11 GAUGE STEEL GALVANIZED PER ASTM A525.
3. THE SIGN POST IS 2.375" O.D. X 0.095" THIN WALL STEEL TUBING.
4. STEEL SUPPORTS SHALL BE MADE FROM NEW MATERIAL AND SHALL BE CORROSION RESISTANT. STEEL SUPPORTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM DESIGNATIONS A123 OR A525 (G-90 OR BETTER).
5. SUPPORTS SHALL BE STRAIGHT WITHIN 1/4 " PER 5 FEET OF LENGTH AND SHALL HAVE A SMOOTH, UNIFORM FINISH FREE FROM DEFECTS AFFECTING STRENGTH OR APPEARANCE. ANY BOLT HOLES AND SHEARED ENDS SHALL BE FREE FROM BURRS. BASES OF MULTISECTION SUPPORTS SHALL NOT EXTEND MORE THAN 5 INCHES ABOVE GROUND WHEN INSTALLED.
6. BOLTS, NUTS, SCREWS, WASHERS AND OTHER MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE TO ASTM DESIGNATION: A153 CLASS C OR D, OR B695 CLASS 50.
7. BARRICADE SUPPORTS SYSTEMS USED ON THIS SHEET MAY BE SUITABLE FOR ONLY CERTAIN SOIL TYPES. THE CONTRACTOR IS RESPONSIBLE FOR SELECTING THE APPROPRIATE SUPPORT SYSTEM FOR SOIL CONDITIONS ON EACH PROJECT.
8. ALL BARRICADES TO BE IN CONFORMANCE WITH THE CURRENT EDITION OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
9. RAIL-HIGH DENSITY POLYETHYLENE OR HOLLOW PROFILE PLASTIC LUMBER AND SHEETING SHALL BE RETROREFLECTIVE, INCLUDING SPLICE BLOCKS.

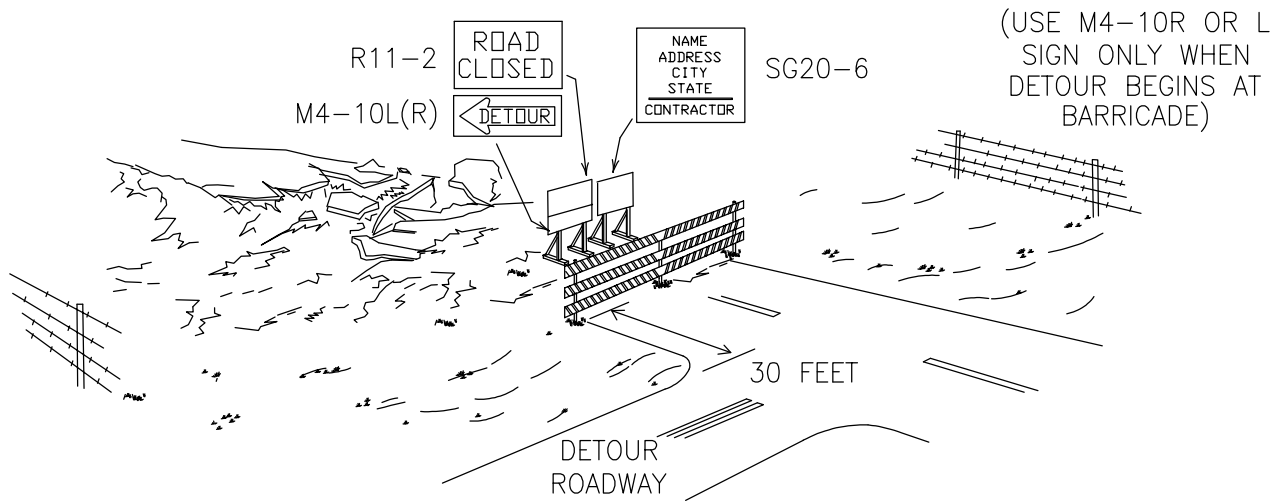
The Architect/Engineer assumes responsibility for appropriate use of this standard.



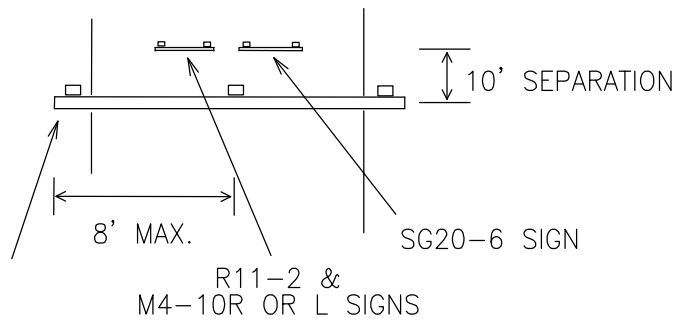
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
PERMANENT END-OF-ROAD
BARRICADE

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD21	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

EACH ROADWAY OF DIVIDED HIGHWAY
SHALL BE BARRICADED, IN THE SAME MANNER.



PERSPECTIVE VIEW



PLAN VIEW

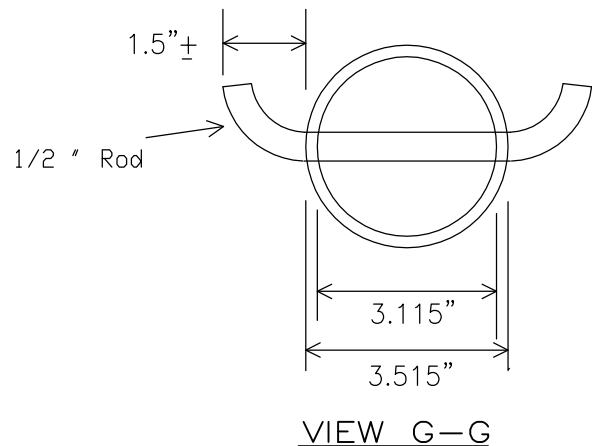
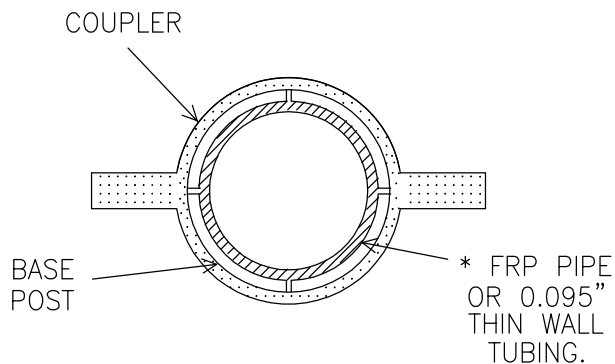
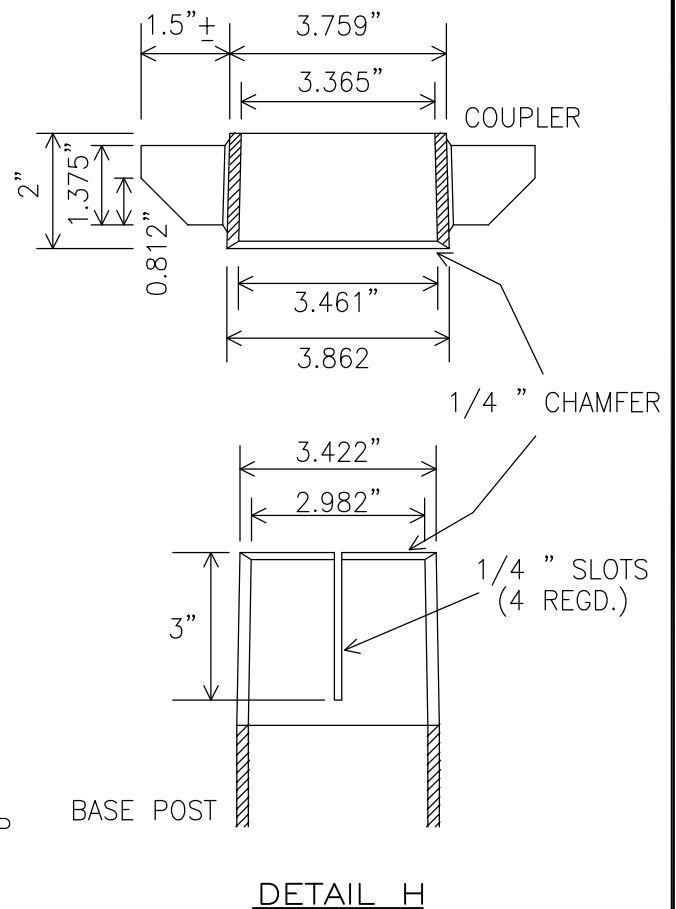
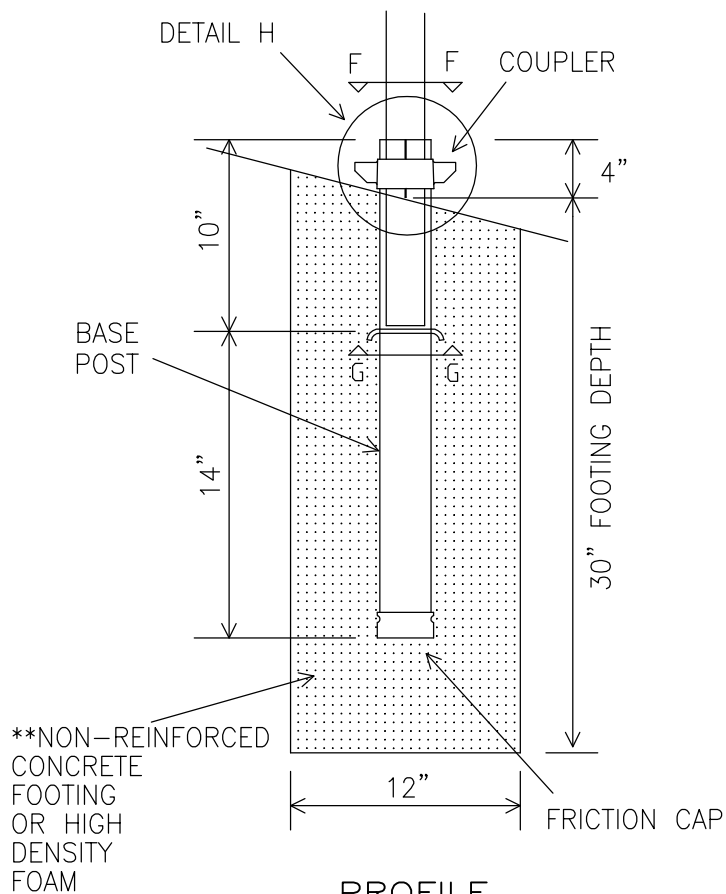
- 1). R11-2 AND M4-10 SIGNS SHOULD BE MOUNTED ON INDEPENDENT SUPPORTS AT 7' MOUNTING HEIGHT IN CENTER OF ROADWAY.
- 2). ADVANCE SIGNING, INCLDYE CONSTRUCTION WARNING, SIGNS AND DETOUR SIGNING SHALL BE AS SPECIFIED ELSEWHERE IN THE PLANS.
- 3). THE THREE RAILS ON TYPE III BARRICADES SHALL BE REFLECTIVE ORANGE AND REFLECTIVE WHITE STRIPES ON ONE SIDE FACING ONE-WAY TRAFFIC AND BOTH SIDES FOR TWO-WAY TRAFFIC.
- 4). BARRICADE STRIPING SHOULD SLANT DOWNWARD IN THE DIRECTON OF DETOUR.
- 5). ALL SIGNS TO BE IN CONFORMANCE WITH THE CURRENT EDITION OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPE III CONSTRUCTION BARRICADE

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD22	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



* PLASTING INSERT MUST BE USED WITH 1/16" THIN WALL TUBING.

** FOOTING SHALL BE REMOVED AND BACKFILLED WHEN BARRICADE IS REMOVED.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

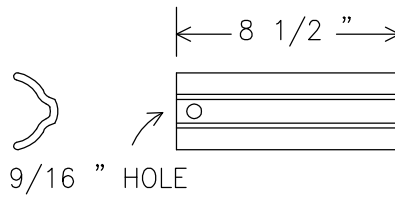


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UNIVERSAL ANCHOR SYSTEM

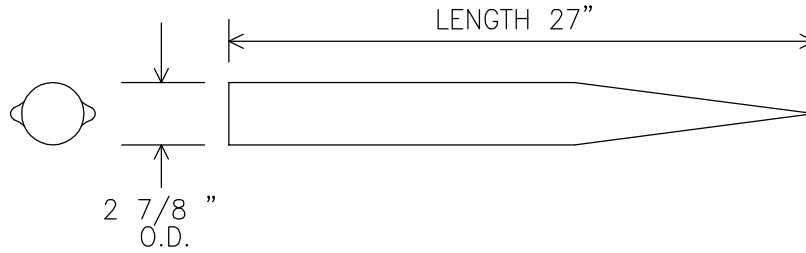
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD23

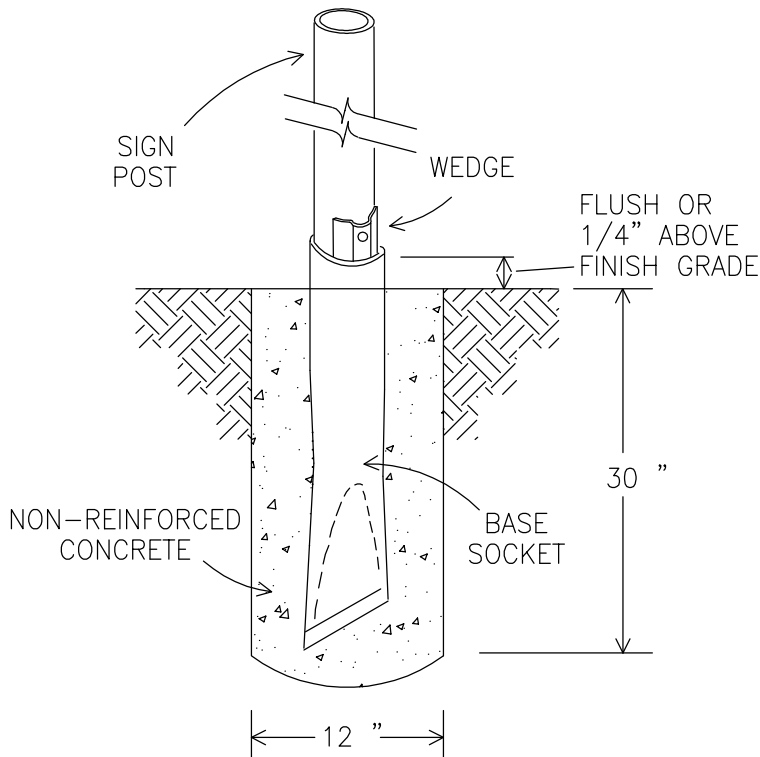
SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



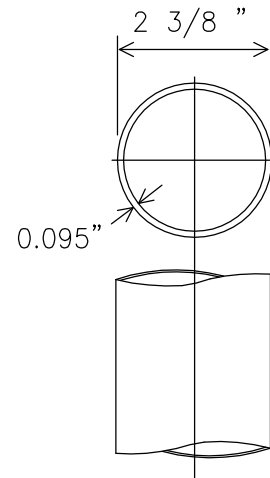
WEDGE



BASE SOCKET



TYPICAL
ASSEMBLY



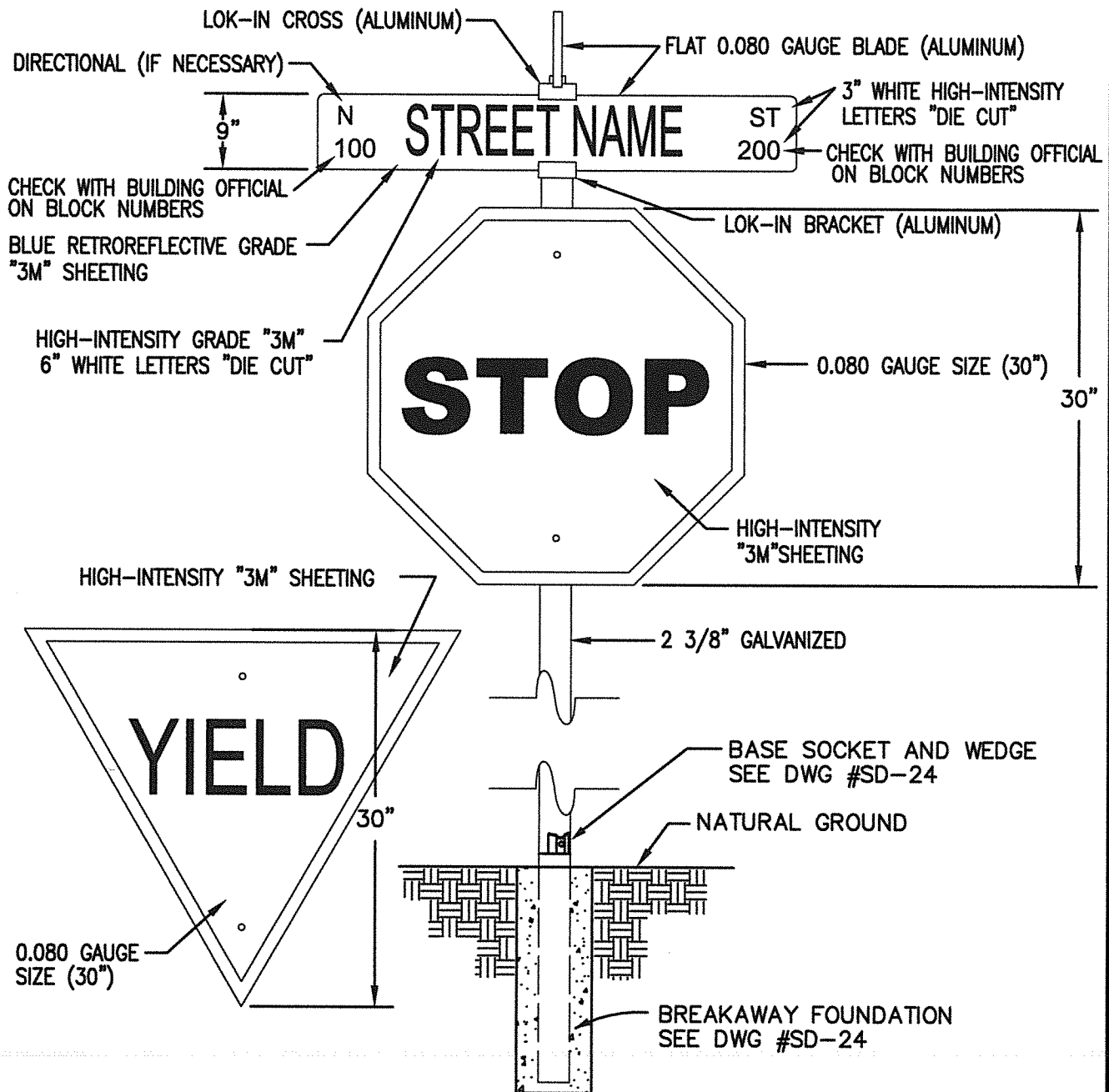
SIGN
POST

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
POZ-LOC (BREAKAWAY FOUNDATION)

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD24	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



NOTES:

1. 7-FOOT MIN. HEIGHT FROM GROUND TO BOTTOM OF SIGN.
2. ALL SIGNS TO BE IN CONFORMANCE WITH THE CURRENT EDITION OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
3. ALL SIGNAGE SHEETINGS SHALL BE HIGH-INTENSITY "3M" SHEETING.

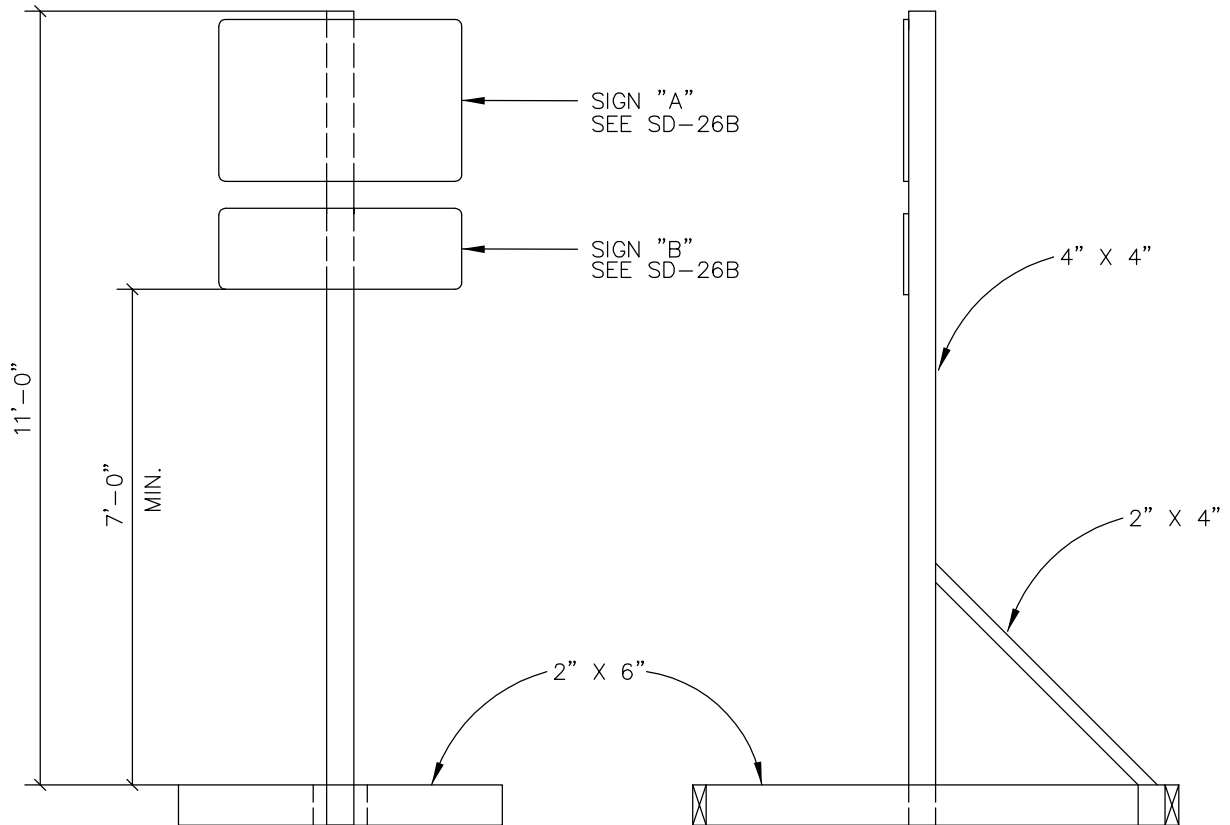
The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS

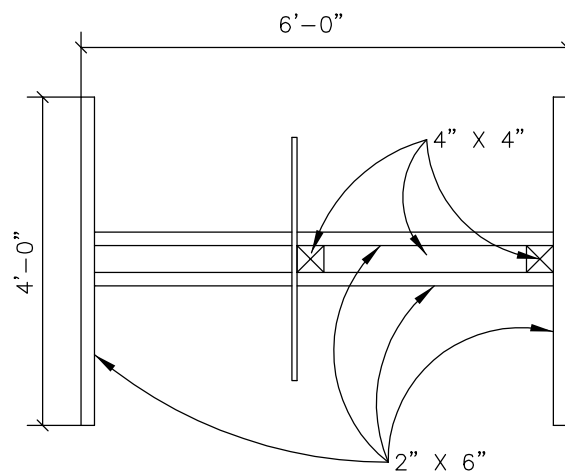
STANDARD STREET SIGN DETAIL

REVISION NO:		REVISED 1/14/2014 WBD	
REVISION NO:		ADOPTED 6/21/2006 TRB	
DRAWING NO:		SD25	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS/AP	TRB		



FRONT VIEW

SIDE VIEW



TOP VIEW

NOTES:

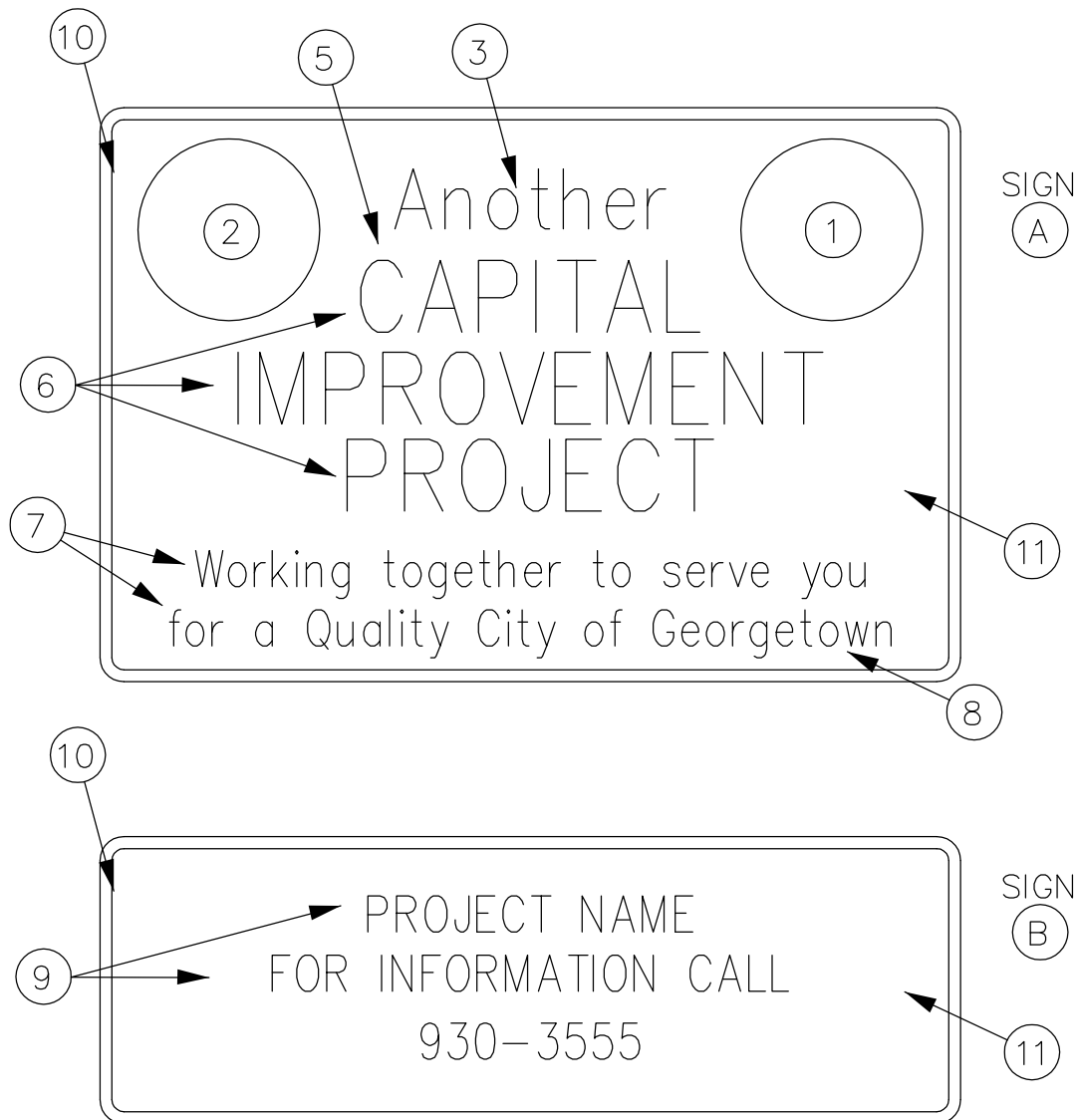
1. ALL MATERIALS SHALL BE FURNISHED BY THE CONTRACTOR WITH THE EXCEPTION OF THE CITY OF GEORGETOWN G.U.S. LOGO WHICH WILL BE FURNISHED BY THE CITY.
2. ALL SIGNS TO BE IN CONFORMANCE WITH THE CURRENT EDITION OF THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
PROJECT SIGN TYPE II

REVISION NOTE:		ADOPTED 6/21/2006
DRAWING NAME:		SD26
SCALE:	DATE:	
NTS	1/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	



NOTES:

1. CITY SEAL (FURNISHED BY THE CITY)
2. G.U.S. LOGO (FURNISHED BY THE CITY)
3. (1 3/4") BLUE LETTERS
4. (2 1/2") BLUE LETTERS
5. (1 1/4") SPACE
6. (3") BLUE LETTERS
7. (2") RED UPPER, (1 1/2") RED LOWER CASE LETTERS
8. (2") BLUE UPPER, (1 1/2") BLUE LOWER CASE LETTERS (City of Georgetown)
9. (10") LETTERS
10. (1 3/8") BLUE BORDER
11. REFLECTIVE SILVER SHEETING .080 ALUMINUM 2290, TRANSPARENT RED PAINT 712, BLUE PAINT 710, 3M CO. OR APPROVED EQUIVALENT.
12. REFER TO SHEET SD-26A

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD STREET SIGN DETAIL II

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: SD27		
SCALE: NTS	DATE: 1/2003	
DRAWN BY: MRS	APPROVED BY: TRB	

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

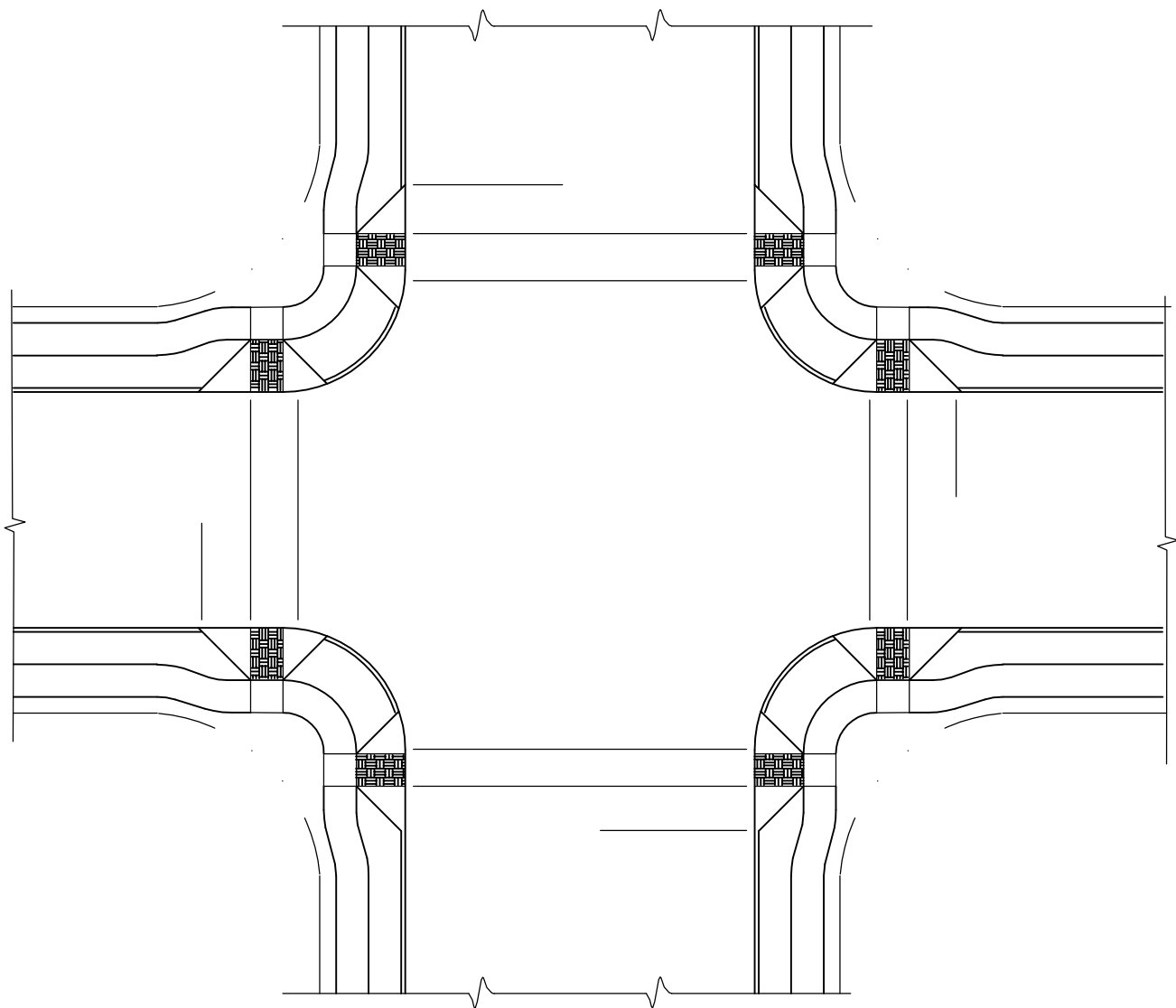
NOTES:

1. COMMERCIAL SIDEWALKS WIDTHS - 6'
RESIDENTIAL SIDEWALKS WIDTHS - 5'
2. ALL SLOPES ARE MAXIMUM ALLOWABLE. FLATTER SLOPES THAT WILL STILL DRAIN PROPERLY ARE ENCOURAGED.
3. ALL CONCRETE SURFACES SHALL RECEIVE A LIGHT BROOM FINISH UNLESS NOTED OTHERWISE IN THE PLANS.
4. FOR PURPOSES OF WARNING, THE CURB RAMPS SHALL HAVE A LIGHT REFLECTIVE VALUE AND TEXTURE THAT SIGNIFICANTLY CONTRASTS WITH THAT OF ADJOINING PEDESTRIAN ROUTES.
5. TEXTURES MAY CONSIST OF PAVERS WITH TRUNCATED DOMED SURFACES OR GROOVES. TEXTURES ARE REQUIRED TO BE DETECTABLE UNDERFOOT. SURFACES THAT WOULD ALLOW WATER TO ACCUMULATE ARE PROHIBITED.
6. COLOR CONTRAST, FOR EXAMPLE, CAN BE ACCOMPLISHED WITH COLORED CONCRETE PAVERS THAT HAVE TRUNCATED DOMES OR BY COLORED STAINED CONCRETE WITH GROOVES, EITHER OF WHICH WOULD PROVIDE A CONTRAST WITH TYPICALLY LIGHT COLORED CONCRETE.
7. ADDITIONAL INFORMATION ON CURB RAMP LOCATION, DESIGN, VISIBILITY AND TEXTURE MAY BE FOUND IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS) PREPARED AND ADMINISTERED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR).
8. RAISED MEDIANS SEPARATE OPPOSING DIRECTIONS OF TRAFFIC AND PROVIDE A REFUGE AREA FOR PEDESTRIANS IF THEY ARE UNABLE TO CROSS THE ENTIRE ROADWAY IN THE ALLOTTED SIGNAL PHASE. TO SERVE AS A REFUGE AREA, THE MEDIAN SHOULD BE A MINIMUM OF 4 FEET WIDE. MEDIANS SHOULD BE DESIGNED TO PROVIDE ACCESSIBLE PASSAGE OVER OR THROUGH THEM.
9. ALL SIDEWALK PLANS AND DETAILS SHALL BE SUBMITTED AND APPROVED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR).
10. ANY PART OF THE ACCESSIBLE ROUTE WITH A SLOPE GRATER THAN 1:20 (5%) SHALL BE CONSIDERED A RAMP. IF A RAMP HAS A RISE GREATER THAN 6 INCHES OR A HORIZONTAL PROJECTION GREATER THAN 72 INCHES, THEN IT SHALL HAVE HANDRAILS ON BOTH SIDES. THE ONLY EXCEPTION IS AT CURB RAMPS. HANDRAILS ARE NOT REQUIRED ON CURB RAMPS. CURB RAMPS SHALL BE PROVIDED WHERE EVER AN ACCESSIBLE ROUTE CROSSES (PENETRATES) A CURB. CURB RAMPS ARE GENERALLY INTERPRETED AS ONLY THE PORTION TYING DIRECTLY INTO THE ROADWAY.
11. TRAFFIC SIGNAL OR ILLUMINATION POLES, GROUND BOXES, CONTROLLER BOXES, SIGNS, DRAINAGE FACILITIES AND OTHER ITEMS SHALL BE PLACED SO NOT TO OBSTRUCT THE ACCESSIBLE ROUTE.
12. ALL SIDEWALKS WILL BE DOWELED INTO EXISTING SIDEWALKS, DRIVEWALKS, DRIVEWAYS, INLET BOXES, RETAINING WALLS, ETC.
13. ALL SIDEWALK CROSS-SLOPES SHALL NOT EXCEED 1:50, UNLESS A VARIANCE IS PROVIDED BY TDLR.

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD28	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
PEDESTRIAN RAMPS GENERAL NOTES



OFFSET SIDEWALKS

NOTE: CURB RAMPS WITH RETURNED CURBS
INSTEAD OF SIDE FLARES ARE PERMITTED
WHERE PEDSTRIANS WOULD NOT NORMALLY
WALK ACROSS THE RAMP

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL INTERSECTION LAYOUT

REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
SD29

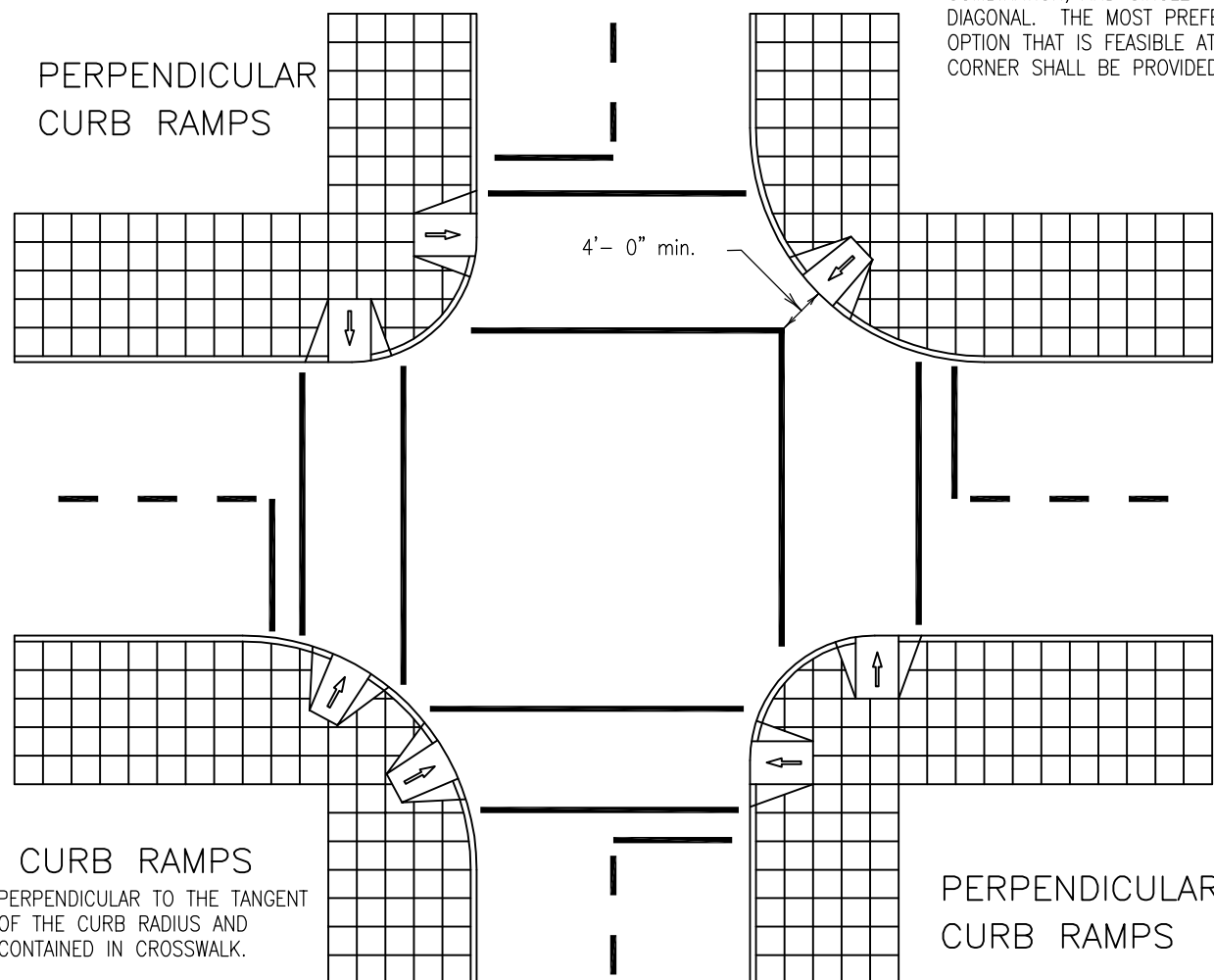
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

SINGLE DIAGONAL CURB RAMP

FOR ON-SYSTEM NEW
CONSTRUCTION, RECONSTRUCTION
AND REHABILITATION PROJECTS
WHERE PEDESTRIAN FACILITIES ARE
NEWLY CONSTRUCTED OR
SUBSTANTIALLY ALTERED,
CONSTRUCTION OF SINGLE
DIAGONAL RAMP IS NOT
PERMITTED.

FOR ON-SYSTEM PROJECTS SUCH
AS RESTORATION, SEAL COAT AND
OVERLAY PROJECTS, PLACEMENT
OF CURB RAMP SHOULD BE
EVALUATED IN THE FOLLOWING
ORDER OF PREFERENCE:
PERPENDICULAR, PARALLEL OR
COMBINATION, AND SINGLE
DIAGONAL. THE MOST PREFERABLE
OPTION THAT IS FEASIBLE AT EACH
CORNER SHALL BE PROVIDED.



REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
SD30

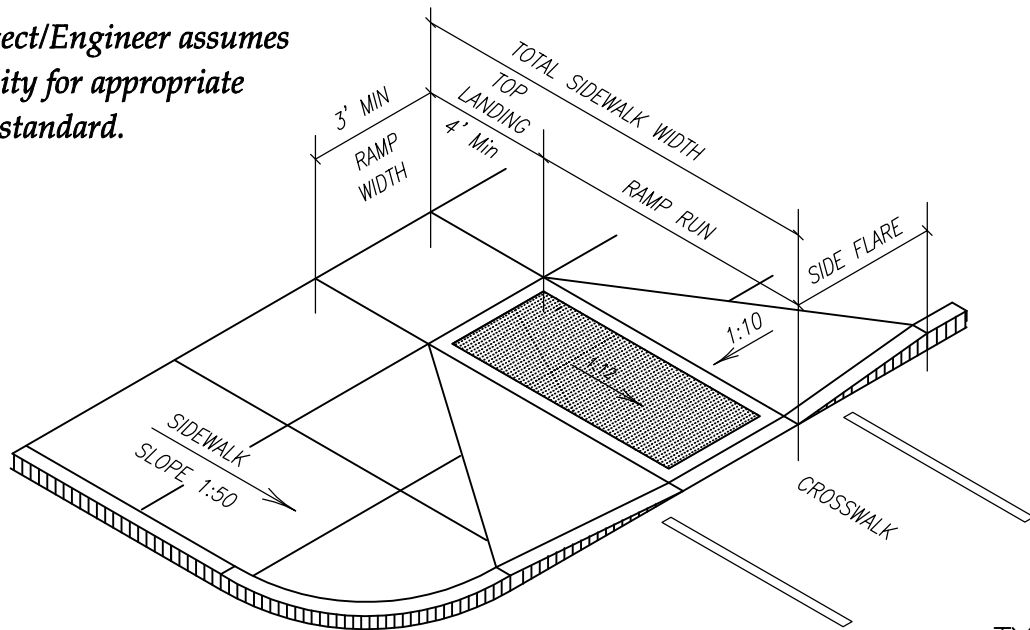
SCALE: NTS DATE: 1/2003

DRAWN BY: MRS APPROVED BY: TRB



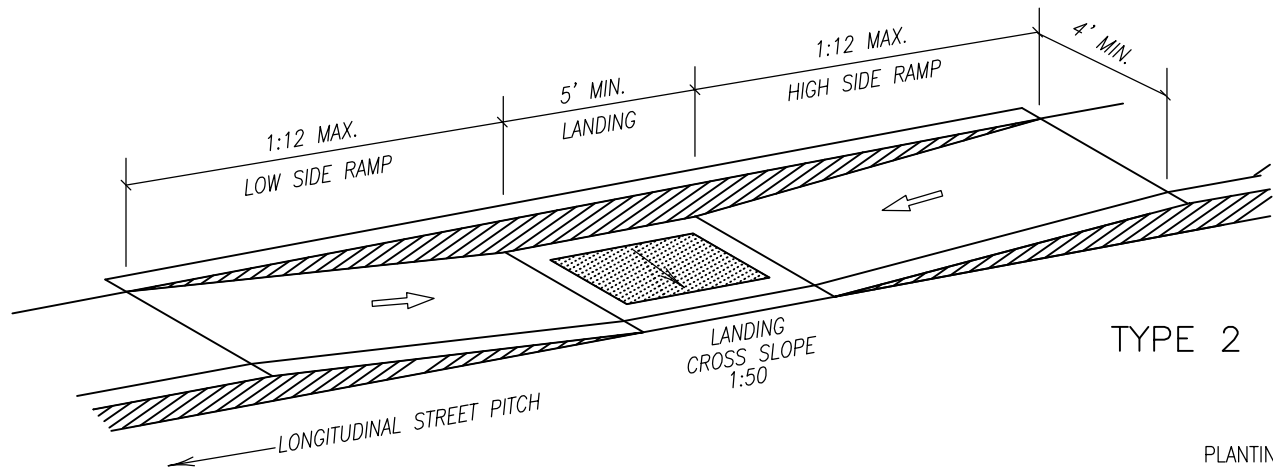
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**CURB RAMP PLACEMENTS AT
INTERSECTIONS**

The Architect/Engineer assumes responsibility for appropriate use of this standard.

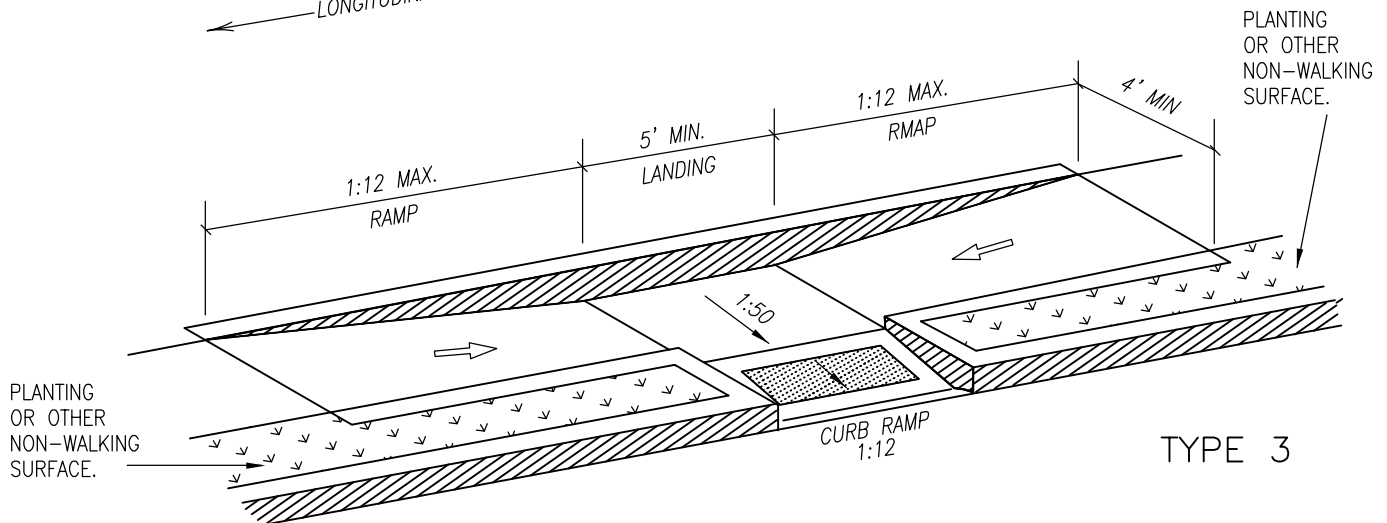


TYPE 1

PERPENDICULAR CURB RAMPS



TYPE 2



TYPE 3

PARALLEL CURB RAMPS



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SIDEWALK RAMP DETAILS
TYPE 1-3

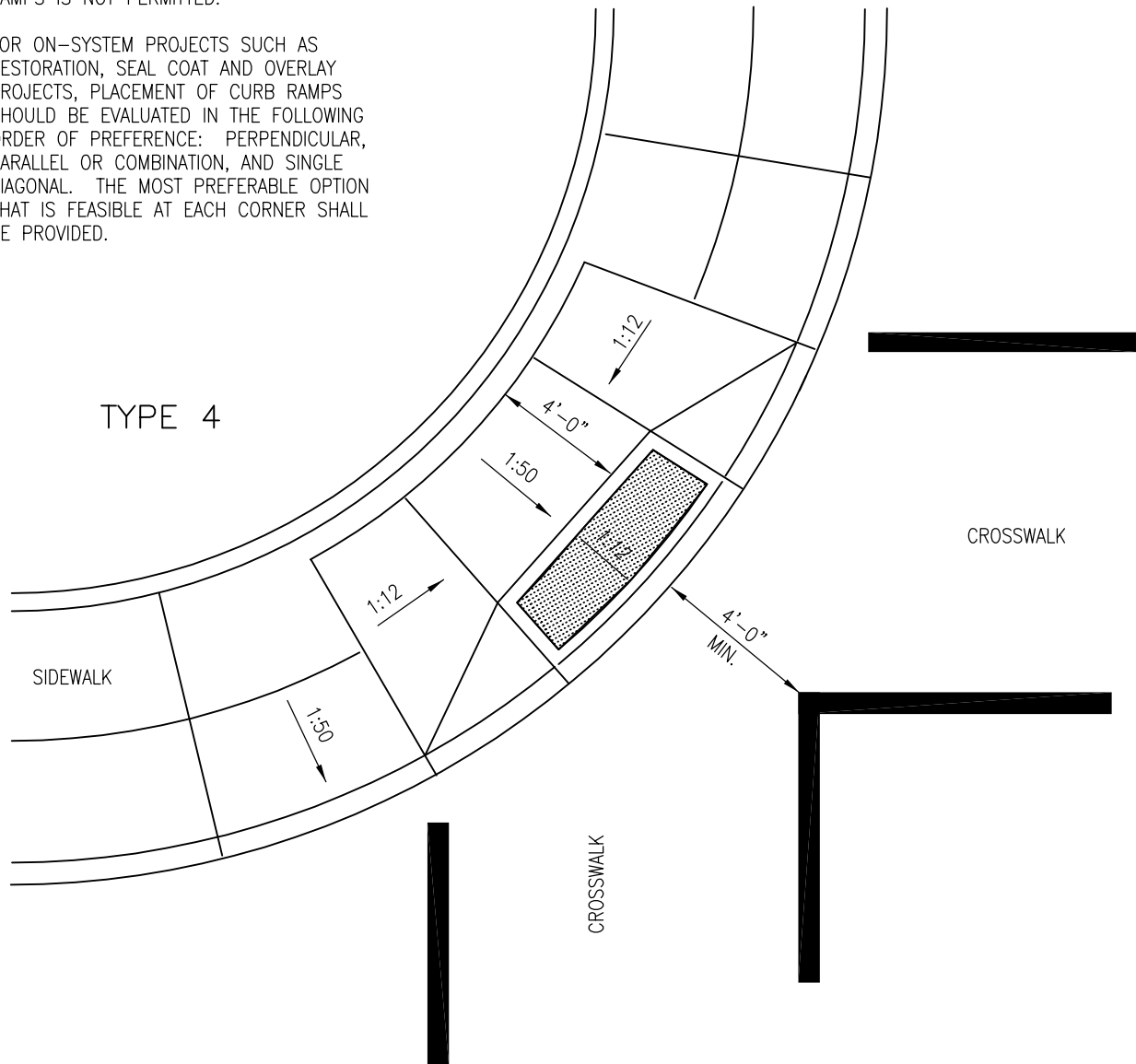
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD31

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB

FOR ON-SYSTEM NEW CONSTRUCTION, RECONSTRUCTION AND REHABILITATION PROJECTS WHERE PEDESTRIAN FACILITIES ARE NEWLY CONSTRUCTED OR SUBSTANTIALLY ALTERED, CONSTRUCTION OF SINGLE DIAGONAL RAMPS IS NOT PERMITTED.

FOR ON-SYSTEM PROJECTS SUCH AS RESTORATION, SEAL COAT AND OVERLAY PROJECTS, PLACEMENT OF CURB RAMPS SHOULD BE EVALUATED IN THE FOLLOWING ORDER OF PREFERENCE: PERPENDICULAR, PARALLEL OR COMBINATION, AND SINGLE DIAGONAL. THE MOST PREFERABLE OPTION THAT IS FEASIBLE AT EACH CORNER SHALL BE PROVIDED.



SINGLE DIAGONAL CURB RAMP

PERPENDICULAR TO THE TANGENT OF THE CURB RADIUS AND CONTAINED IN CROSSWALK.

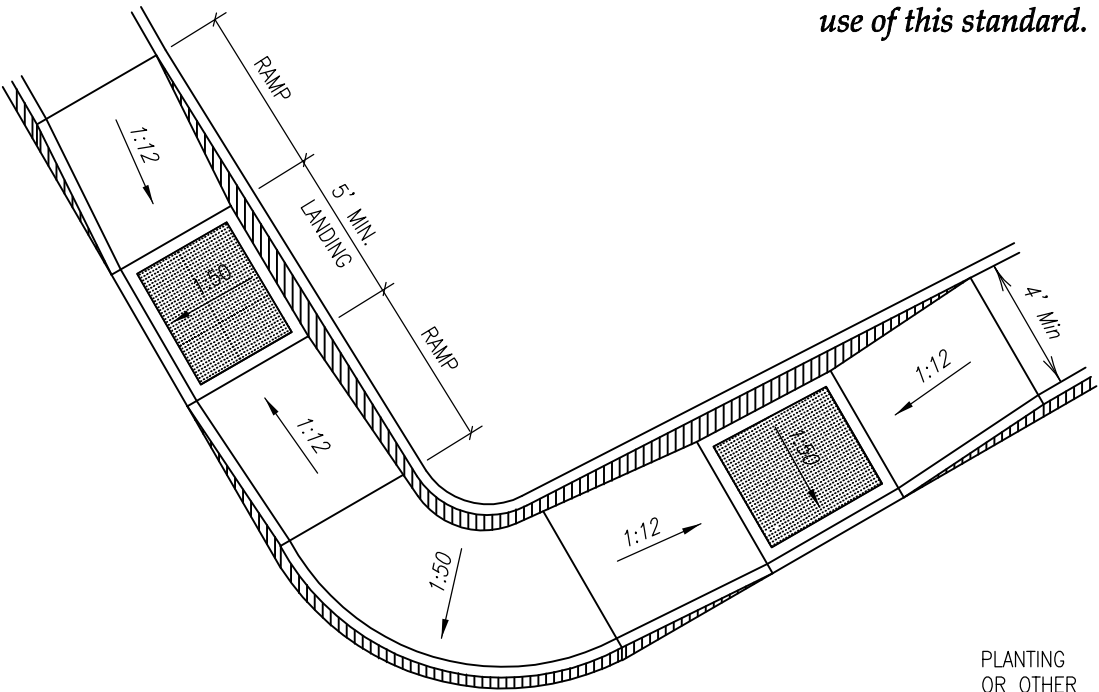
The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SIDEWALK RAMP DETAIL TYPE 4

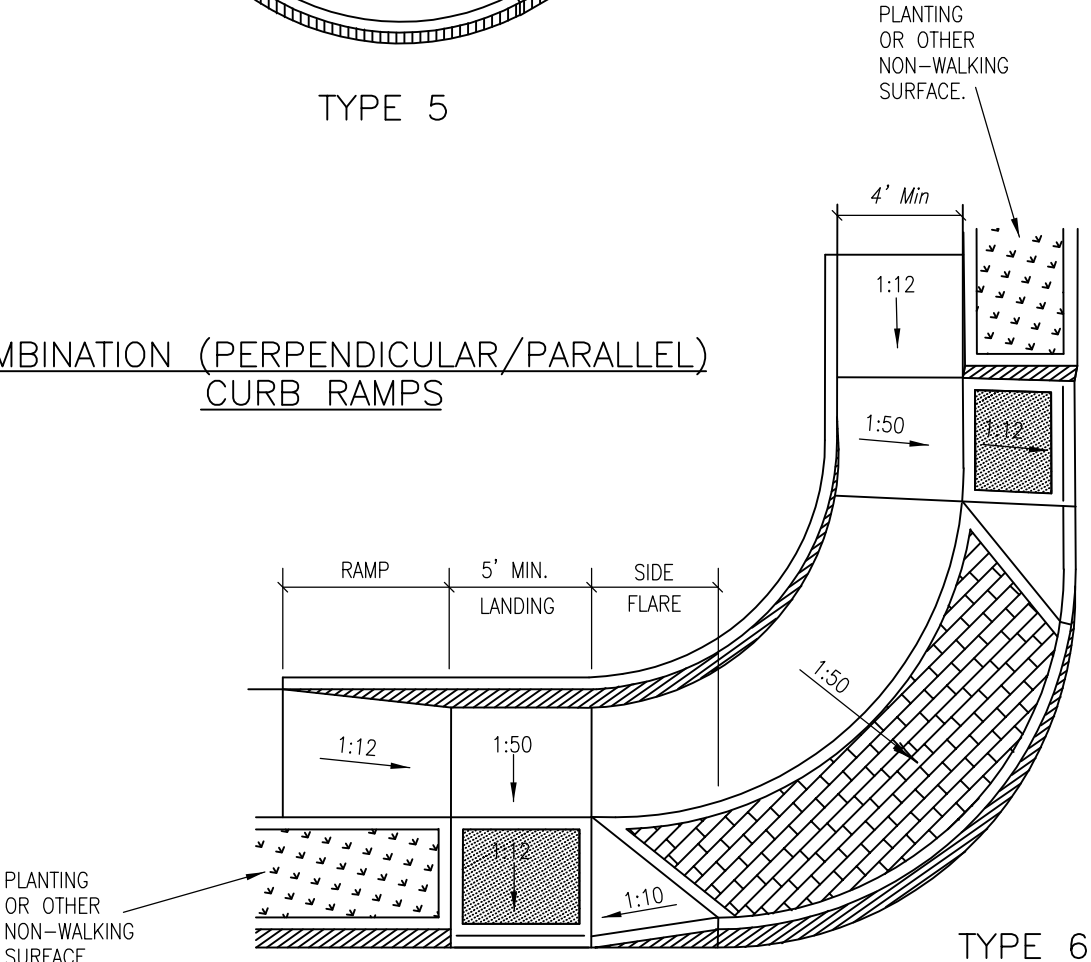
REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD32	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

The Architect/Engineer assumes responsibility for appropriate use of this standard.



TYPE 5

COMBINATION (PERPENDICULAR/PARALLEL)
CURB RAMPS



TYPE 6

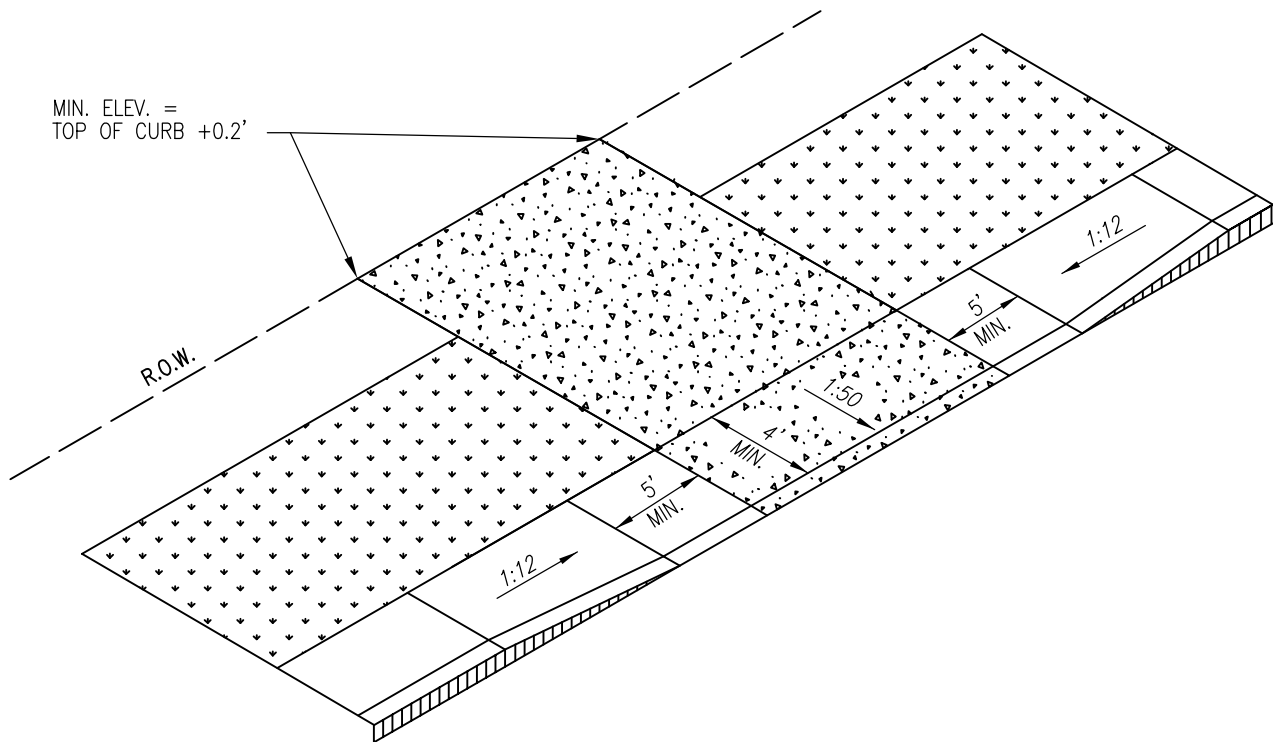


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SIDEWALK RAMP DETAIL TYPES 5 & 6

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD33

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



RAMP SIDEWALK
TYPE 10

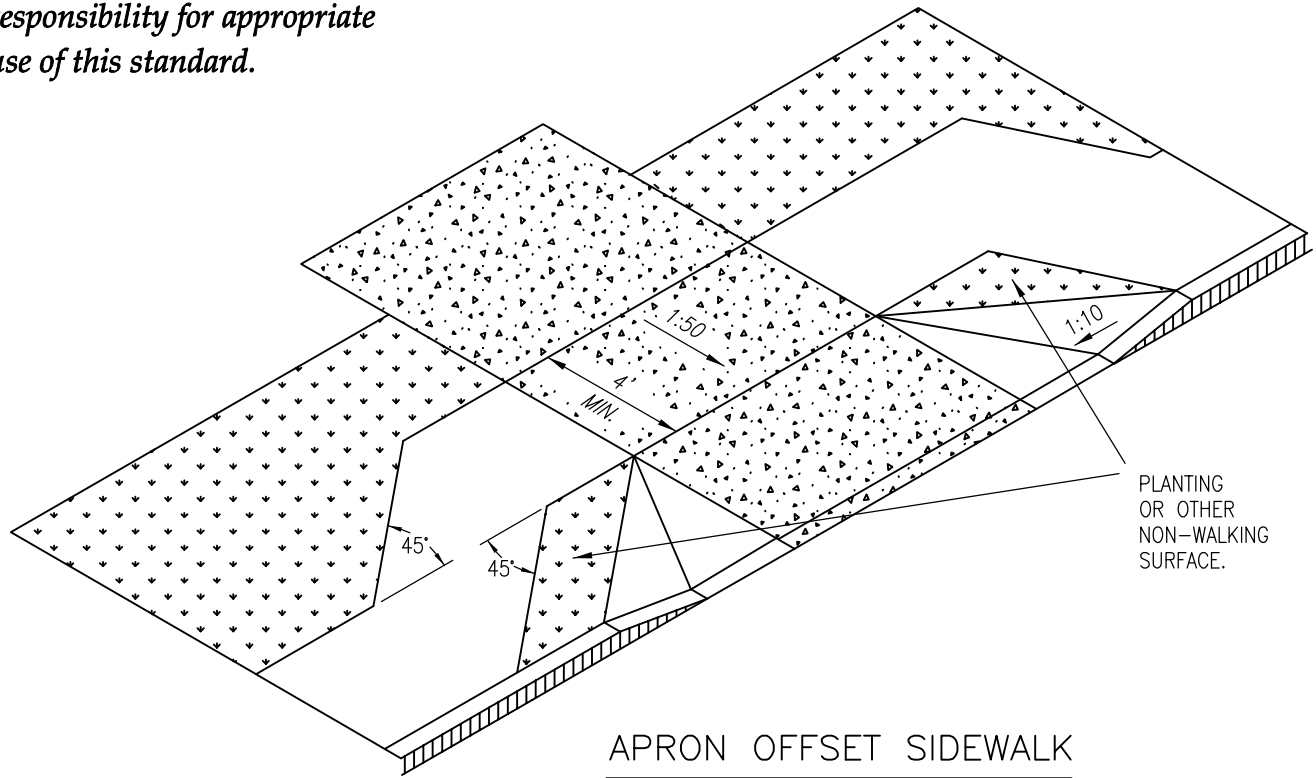
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



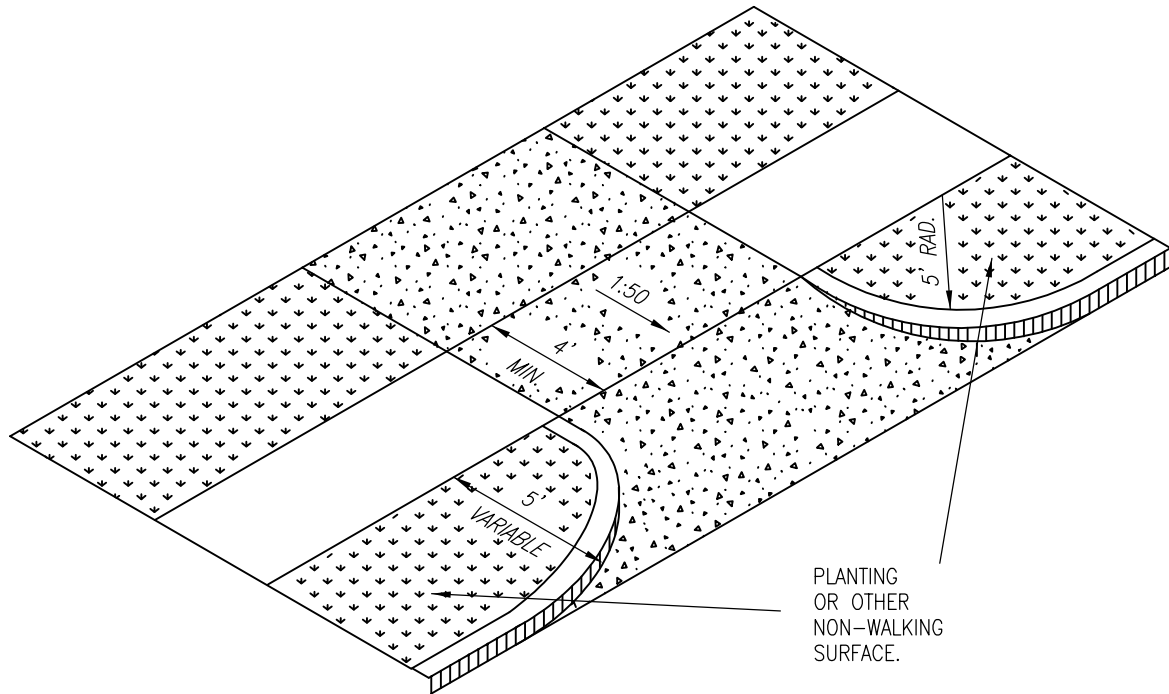
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DRIVEWAY APRON TYPE 10

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: SD34		
SCALE: NTS	DATE: 1/2003	
DRAWN BY: MRS	APPROVED BY: TRB	

The Architect/Engineer assumes responsibility for appropriate use of this standard.



APRON OFFSET SIDEWALK
TYPE 12



SETBACK SIDEWALK
TYPE 13

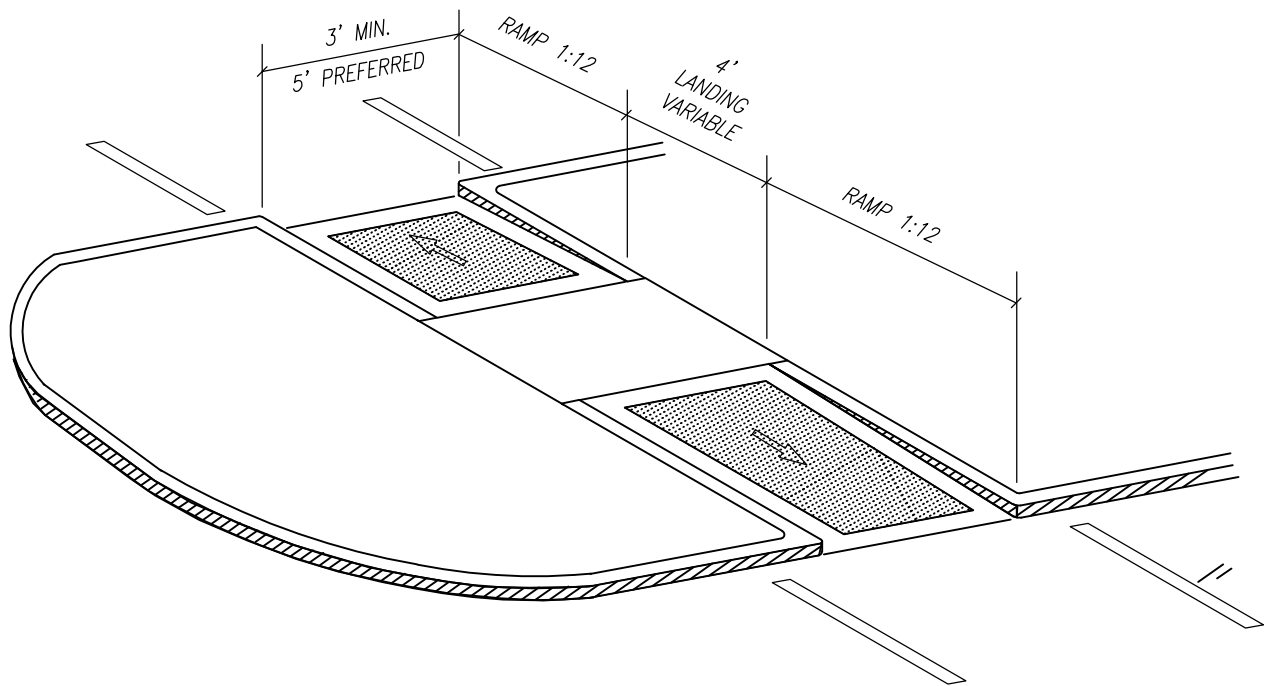


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DRIVEWAY APRONS TYPES 12 & 13

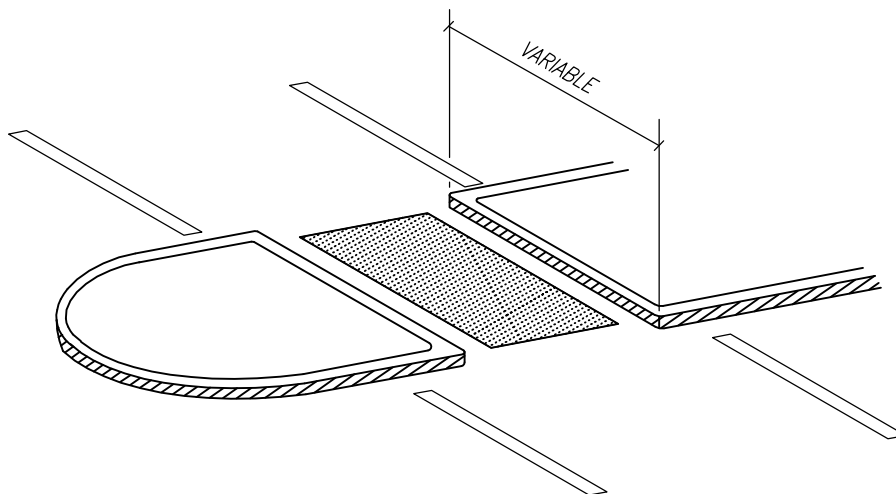
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: SD35

SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



TYPE 20



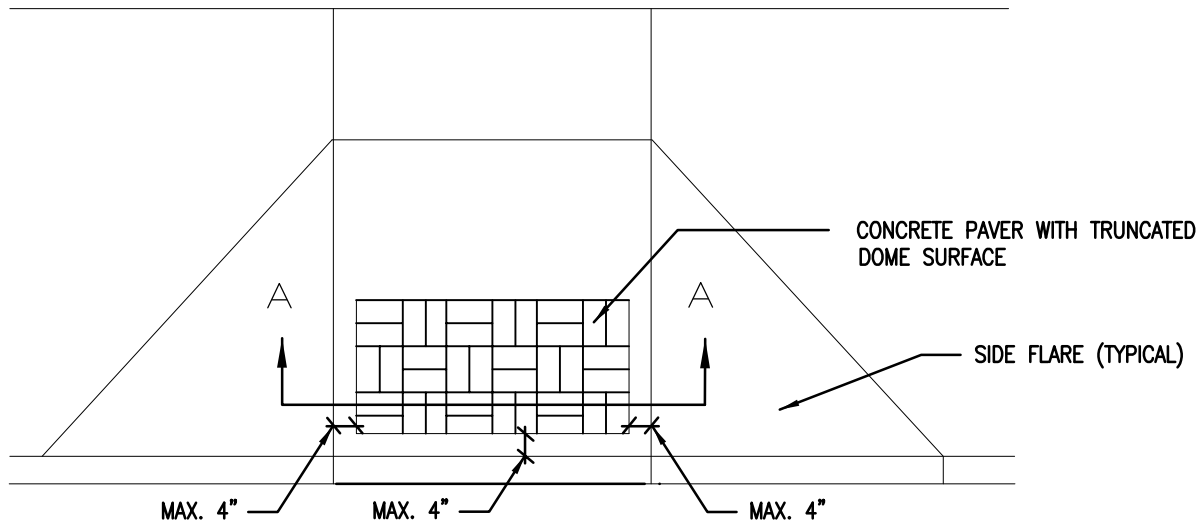
TYPE 21

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB RAMPS AT MEDIAN ISLANDS

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD36	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



TRUNCATED DOME PATTERN CURB RAMP

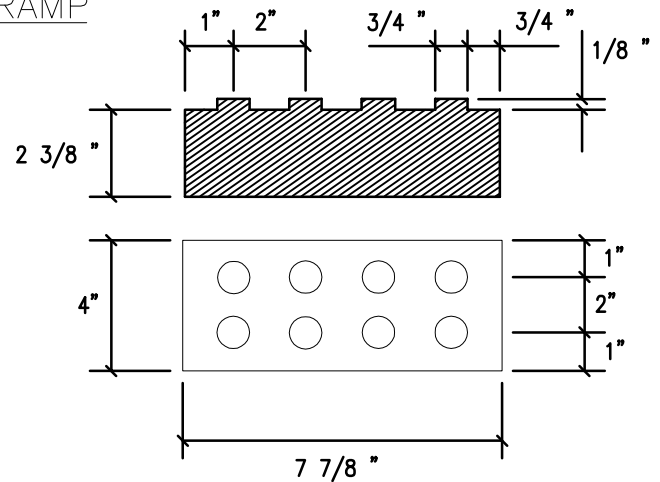
GENERAL NOTES

CONCRETE PAVER UNITS SHALL MEET ALL REQUIREMENTS OF ASTM C-936, C-33, AND SHALL BE LAID IN A TWO BY TWO UNIT BASKET WEAVE PATTERN, UNLESS SHOWN OTHERWISE IN THE PLANS.

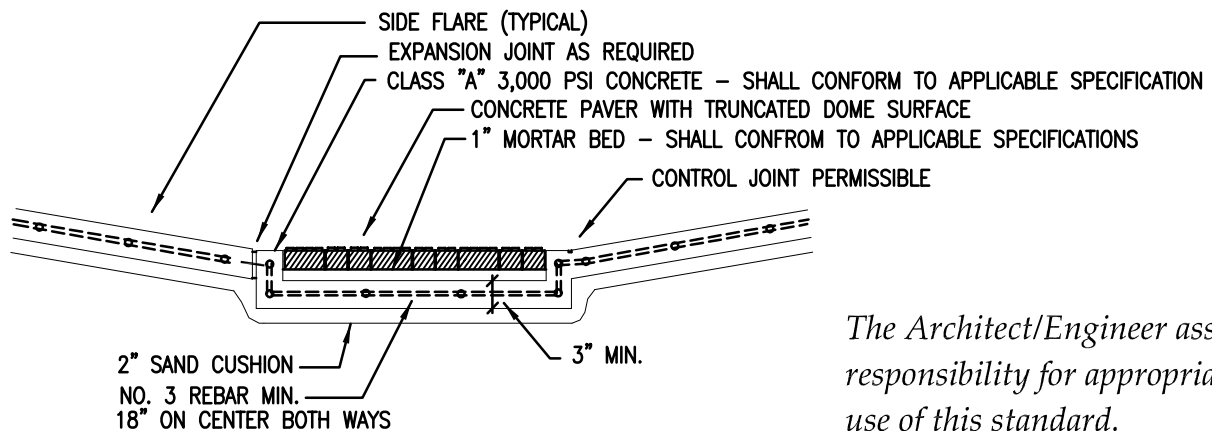
CONCRETE PAVER UNIT SHALL HAVE A TRUNCATED DOME TOP SURFACE FOR DETECTABLE WARNING TO PEDESTRIANS.

CONCRETE PAVER UNIT COLOR FOR THE RAMP SHALL BE A CONTRASTING COLOR TO THE ADJACENT SURFACES. THE COLOR OF THE CONCRETE PAVER UNITS SHALL BE SHOWN ELSEWHERE IN THE PLANS. (ADJACENT SURFACES INCLUDE SIDE FLARES).

CONCRETE PAVER UNITS SHALL BE SAW CUT ONLY AND ANY CUT UNIT SHALL BE NOT LESS THAN 25 PERCENT OF A FULL UNIT.



CONCRETE PAVER WITH TRUNCATED DOME SURFACE



SECTION A-A

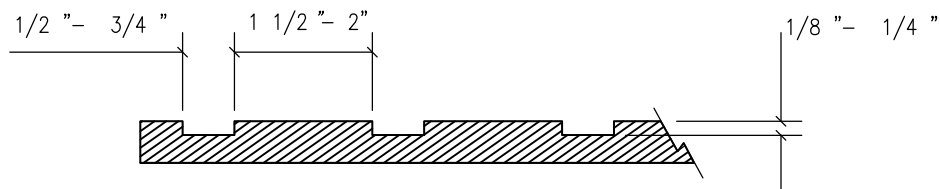
The Architect/Engineer assumes responsibility for appropriate use of this standard.



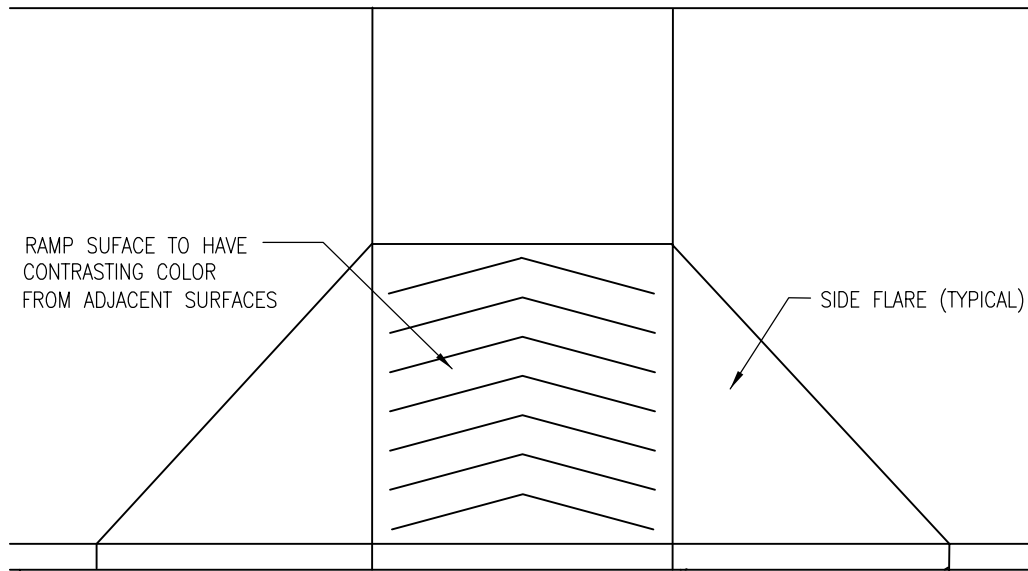
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS

CURB RAMP TEXTURES TYPE A

REVISION NOTE: REVISED 3/14/2014 WBD	
REVISION NOTE: ADOPTED 6/21/2006 TRB	
DRAWING NAME: SD37	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS/AP	APPROVED BY: TRB



GROOVE PATTERN



GROOVE PATTERN CURB RAMP
(15 DEGREES TO HORIZONTAL)

GENERAL NOTES

CONCRETE SURFACE AREAS THAT ARE IDENTIFIED IN THE PLANS TO RECEIVE SEALER / STAIN TREATMENT, SHALL NOT BE TREATED W/CURING COMPOUND (RETARDANT) AND SHALL BE ALLOWED TO CURE A MINIMUM OF 30 DAYS PRIOR TO APPLICATION OF THE SEALER / STAIN.

THE SEALER / STAIN FOR THE RAMP SHALL BE A CONTRASTING COLOR TO THE ADJACENT SURFACES (ADJACENT SURFACES INCLUDE THE SIDE FLARES). THE COLOR OF THE SEALER / STAIN SHALL BE SHOWN ELSEWHERE IN THE PLANS.

SEALER / STAIN SHALL BE APPLIED IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS.

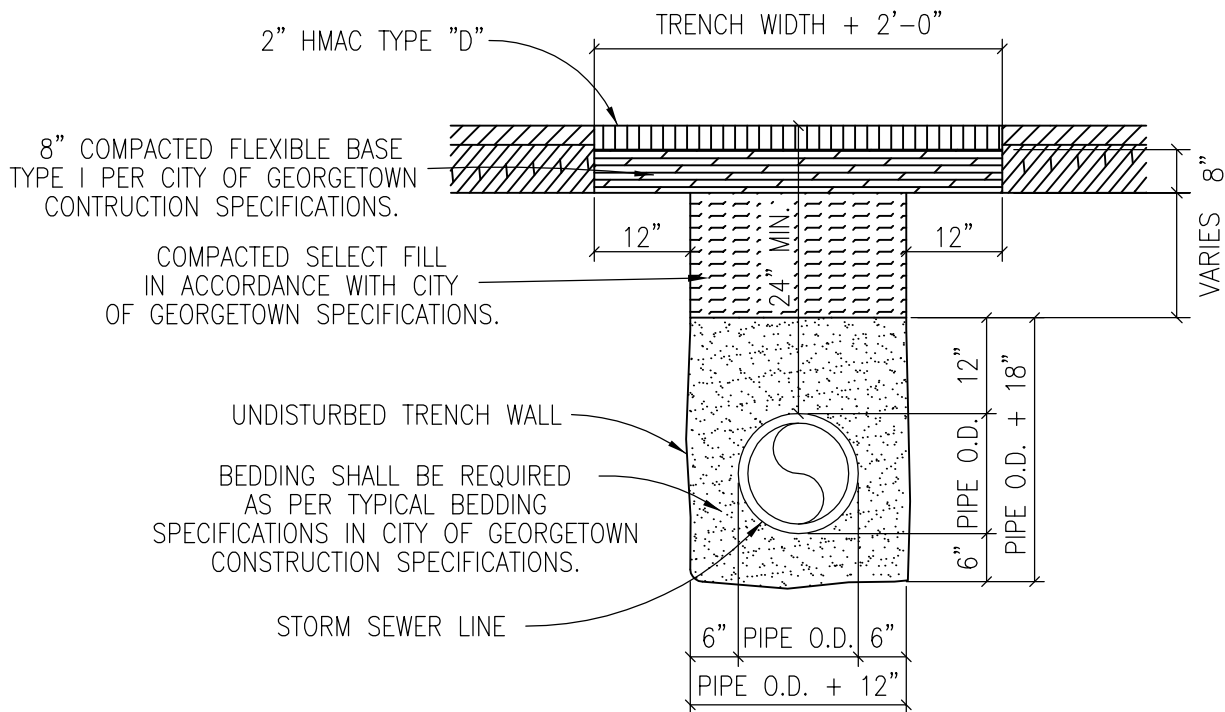
AREAS RECEIVING SEALER / STAIN TREATMENT SHALL BE CLEANED USING A "DRY" (SAND) BLAST CLEANING METHOD IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CURB RAMP TEXTURE TYPE B

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: SD38		
SCALE: NTS	DATE: 1/2003	
DRAWN BY: MRS	APPROVED BY: TRB	



TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

NOTES:

1. REPLACED BASE MATERIAL OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE.
2. BASE MATERIAL SHALL BE IN LIFTS NOT TO EXCEED 6" AND EACH LIFT THOROUGHLY ROLLED OR TAMPED TO SPECIFIED MAXIMUM DENSITY.
3. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
4. SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE.
5. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
6. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

The Architect/Engineer assumes responsibility for appropriate use of this standard.

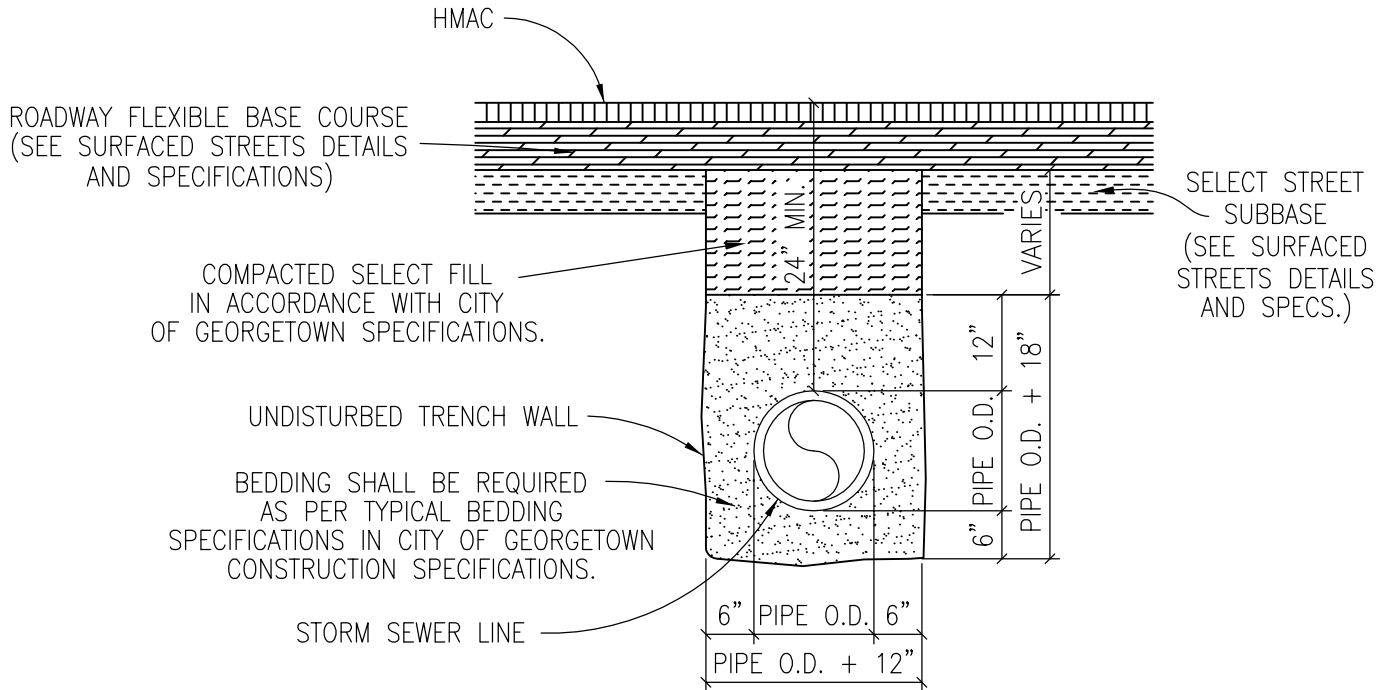
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME: **SD40**

SCALE: **NTS**
DATE: **1/2003**
DRAWN BY: **MRS**
APPROVED BY: **TRB**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**TRENCH, EMBEDMENT AND PAVEMENT
REPLACEMENT DETAIL UNDER EXISTING
ROADWAY FOR STORM SEWER**



NOTES:

1. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

TRENCH WIDTHS

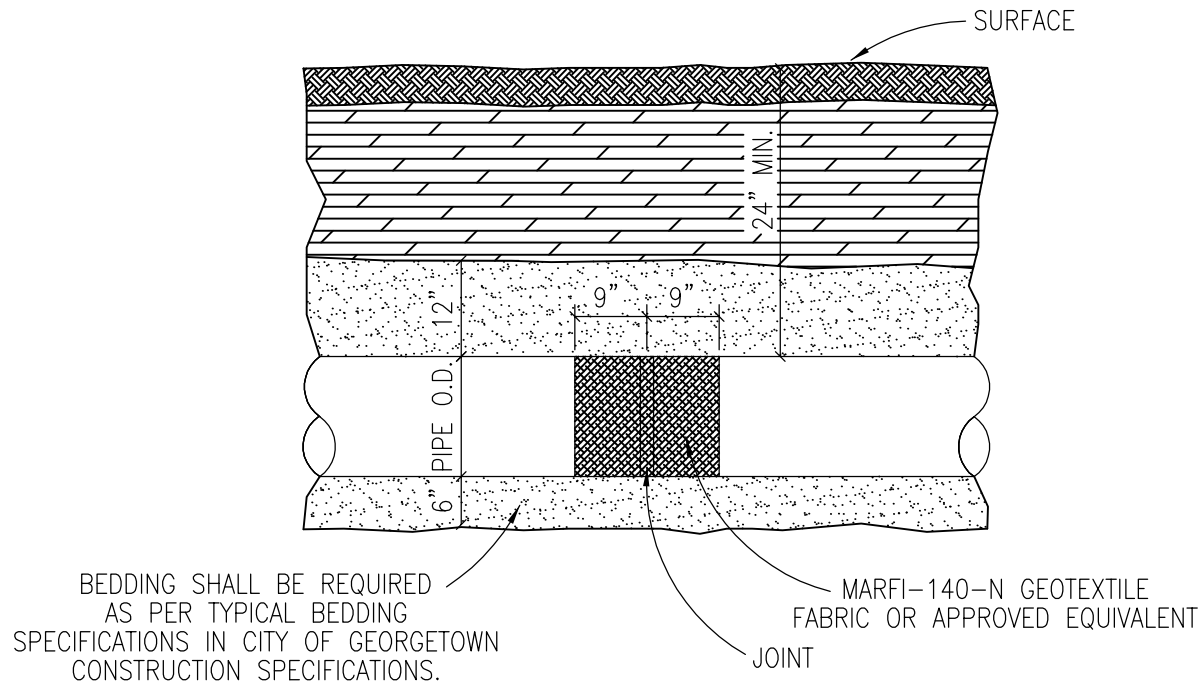
- *PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.
- *20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL
UNDER PROPOSED ROADWAY
FOR STORM SEWER

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD41	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



NOTES

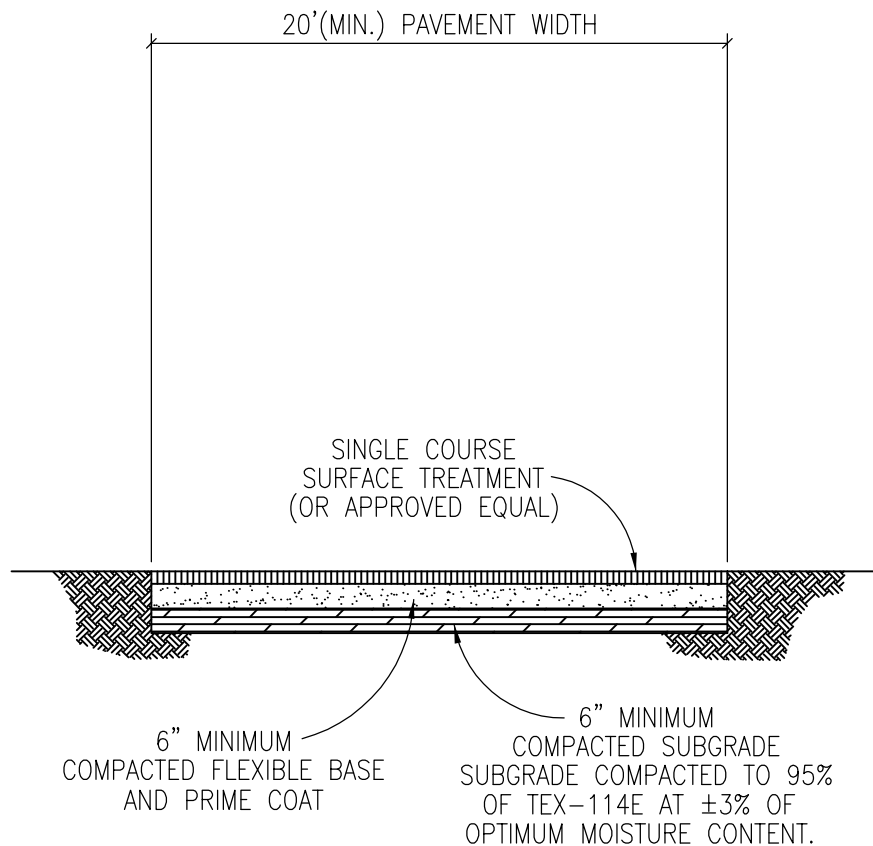
1. PIPE SHALL BE REINFORCED CONCRETE PIPE CLASS III UNLESS THE DEPTH OF PIPE REQUIRES A STRONGER CLASS.
2. ALL FITTINGS AND WYES SHALL BE MANUFACTURED AND NOT CONSTRUCTED ON THE PROJECT WITHOUT PRIOR APPROVAL FROM THE CITY.
3. ALL JOINTS SHALL BE WRAPPED WITH MARFI-140-N GEOTEXTILE FABRIC OR APPROVED EQUIVALENT. EACH JOINT SHALL BE WRAPPED WITH 18" WIDE FABRIC CENTERED ON THE JOINT.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL
(PROFILE) FOR STORM SEWER

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD42	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



NOTES:

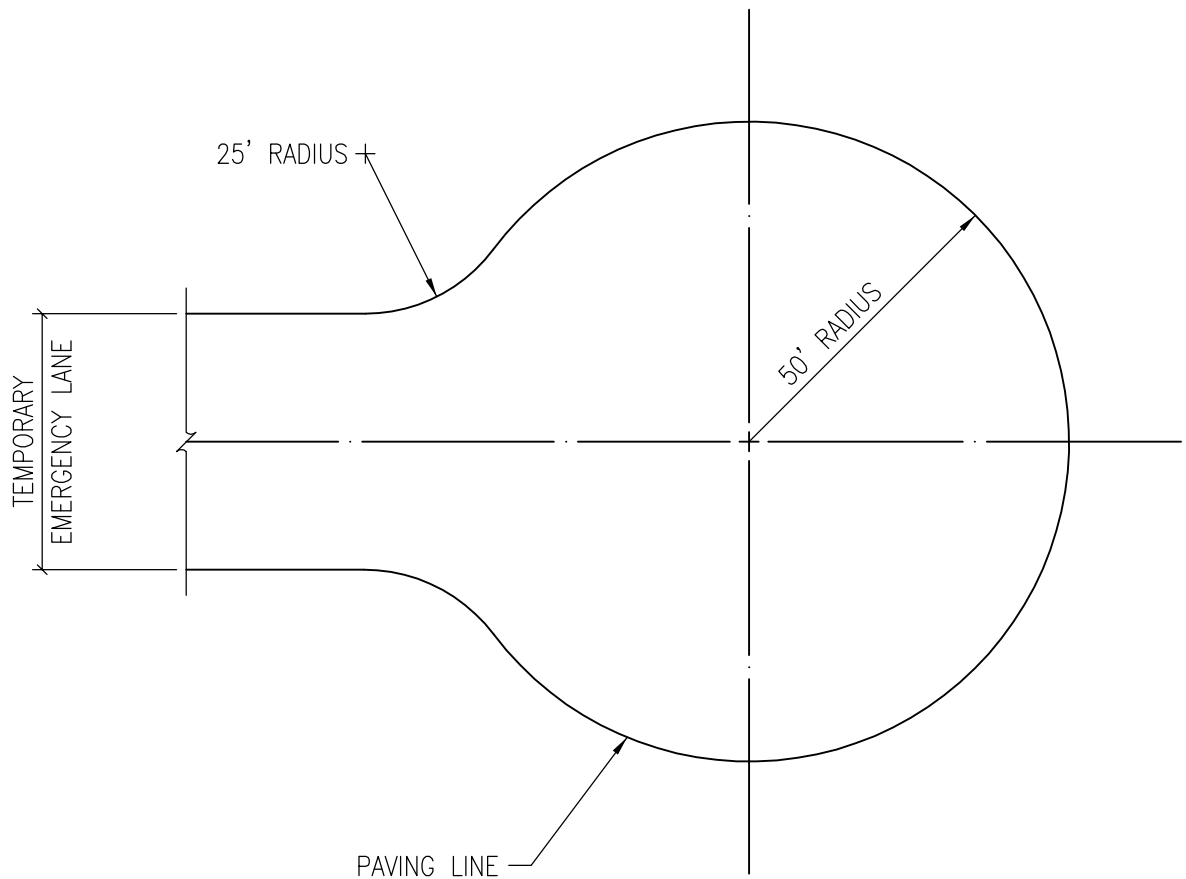
1. EVERY BUILDING CONSTRUCTED SHALL BE ACCESSIBLE TO EMERGENCY APPARATUS BY WAY OF TEMPORARY ALL WEATHER DRIVING SURFACES.
2. A TEMPORARY ALL WEATHER DRIVING SURFACE SHALL EXTEND TO WITHIN 150' OF ALL EXTERIOR PORTIONS OF BUILDINGS
3. TEMPORARY ALL WEATHER DRIVING SURFACES SHALL BE CONSTRUCTED AS SHOWN ON CONSTRUCTION PLANS AND IN ACCORDANCE WITH ITEM 316 SURFACE TREATMENTS OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES.
4. TEMPORARY ALL WEATHER DRIVING SURFACES SHALL BE CAPABLE OF SUPPORTING A DESIGN WHEEL LOAD OF 16,000 LB. (H-20 LOADING) IN ORDER TO SUPPORT A GROSS VEHICLE WEIGHT OF 80,000 LB. IF SUBGRADE CONDITIONS CHANGE OR ARE VERY UNSTABLE, AN ADDITIONAL GEOTECHNICAL AND/OR ENGINEERING DESIGN MAY REQUIRE A GREATER CROSS SECTION.
5. CONTRACTOR OR DEVELOPER SHALL MAINTAIN TEMPORARY ALL WEATHER DRIVING SURFACE THROUGHOUT CONSTRUCTION.
6. APPLICABLE SIGNAGE SHALL BE INSTALLED BY THE CONTRACTOR TO DISALLOW PARKING (NO PARKING – FIRE LANE).
7. TEMPORARY ALL WEATHER DRIVING SURFACES SHALL BE INSTALLED PRIOR TO THE ERECTION OF ANY STRUCTURAL FRAMING ABOVE THE FOUNDATION SLAB. CONTACT FIRE SERVICES FOR THE COORDINATION OF TEMPORARY ALL WEATHER DRIVING SURFACES FOR CONSTRUCTION.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**TEMPORARY ALL WEATHER
DRIVING SURFACE**

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		SD43	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

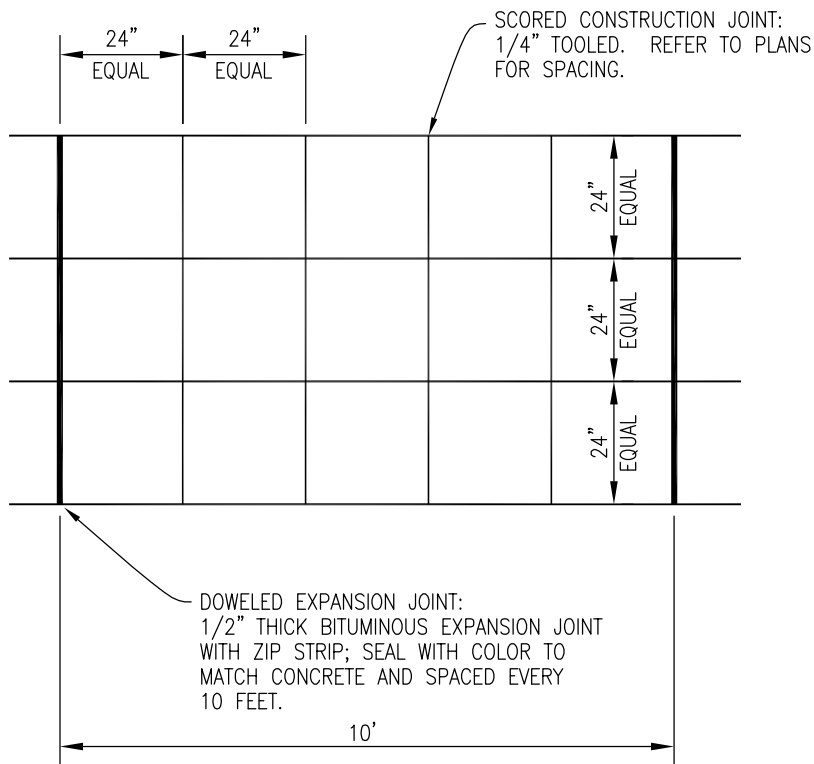


*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

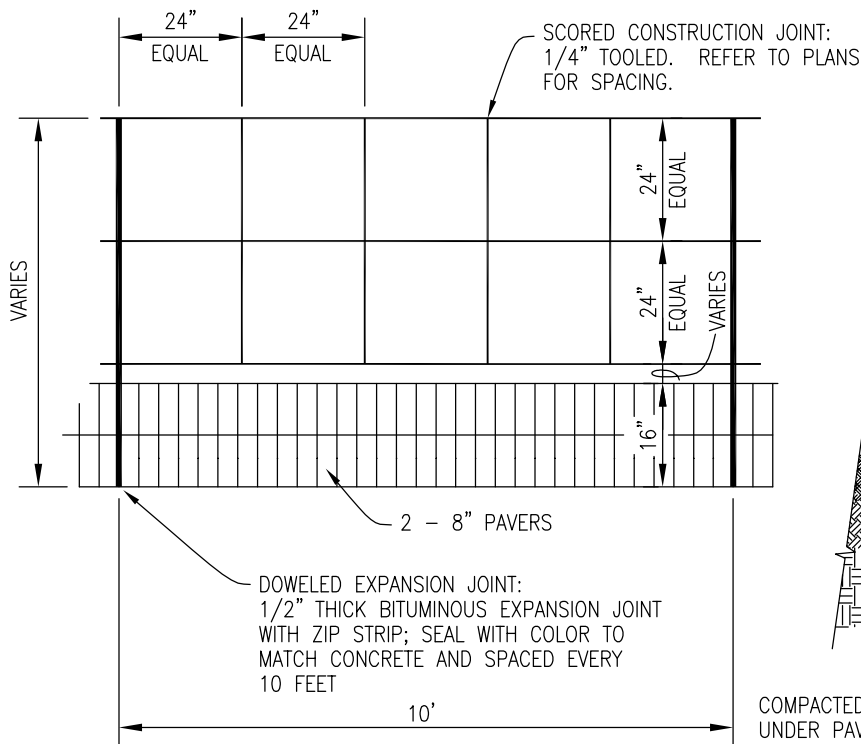
REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: SD44	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



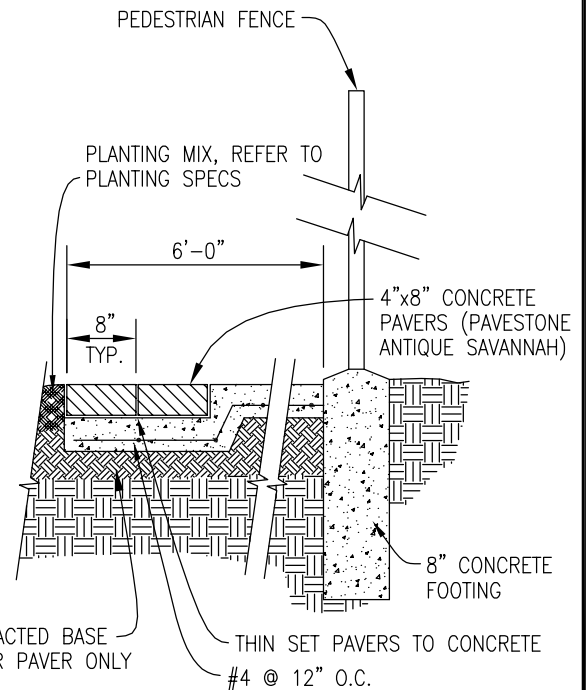
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**TEMPORARY ALL DRIVING SURFACE
TURN AROUND**



TYPE III



TYPE IV



TYPE IV SECTION

REVISION NOTE: ADOPTED 6/21/2006

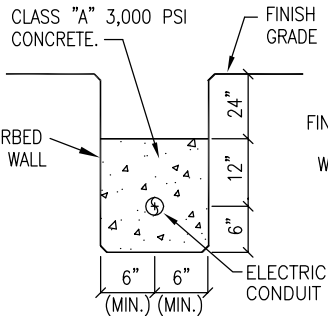
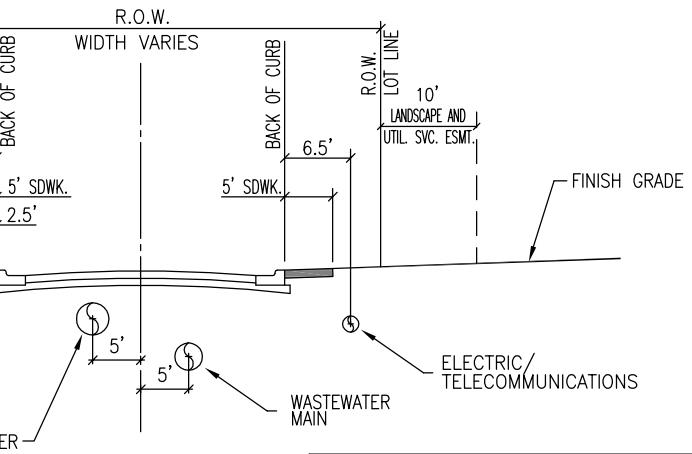
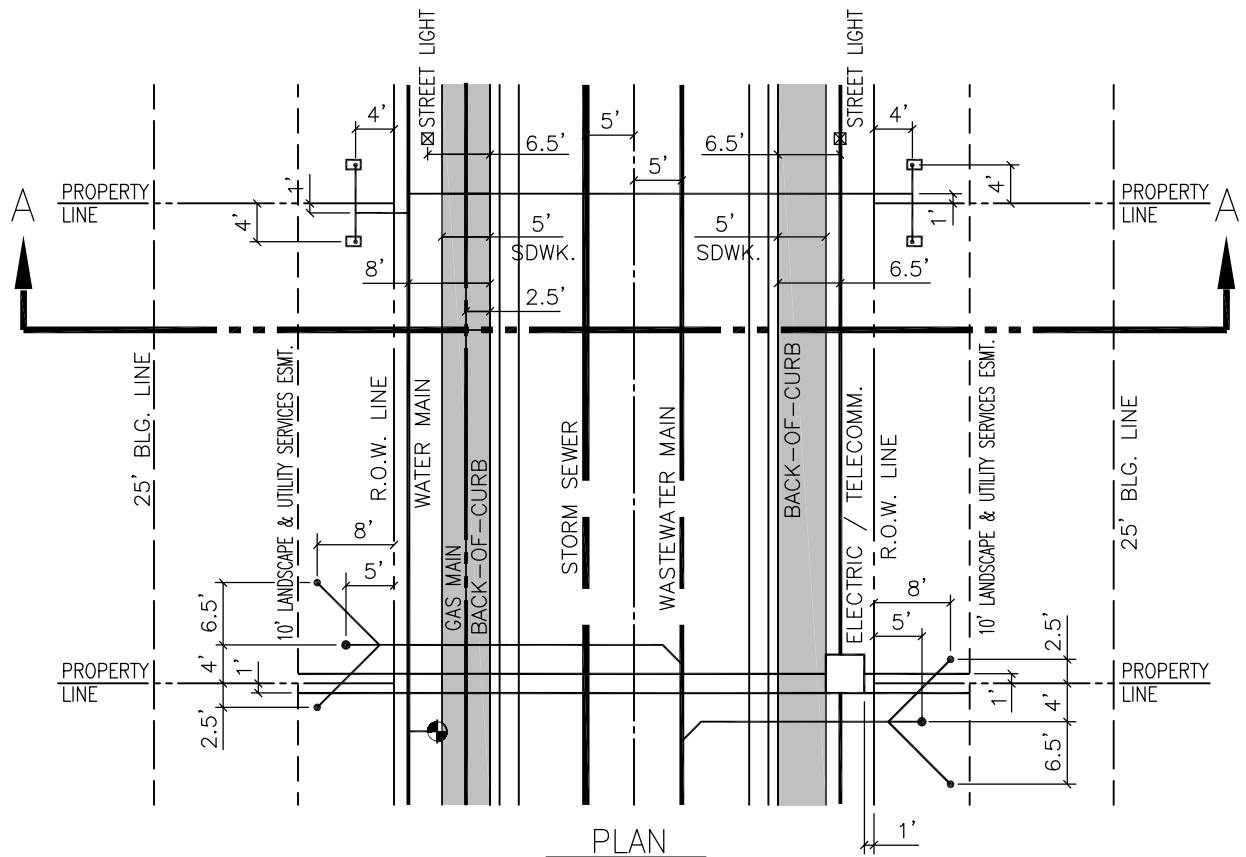
DRAWING NAME: SD45

SCALE: NTS DATE: 4/2006
DRAWN BY: MRS APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DOWNTOWN OVERLAY DISTRICT
TYPE III AND IV SIDEWALK DETAILS

WATER STANDARDS



NOTE: WHEN CROSSING A WATER MAIN, THE ELECTRIC CONDUIT MUST BE ENCASED WITH 3,000 PSI RED CONCRETE FOR FIVE (5) FEET BOTH SIDES FROM THE CROSSING POINT.

ELECTRIC CONDUIT
CONCRETE ENCASEMENT DETAIL

SECTION A-A

MINIMUM COVER BELOW FINISH-GRADE ALL UTILITIES UNDER ROADWAY - 36"	
ELECTRIC PRIMARY	36"
ELECTRIC SECONDARY	24"
WATER	36"
WASTEWATER	48"
STORM SEWER	36"
GAS	36"
TELECOMMUNICATIONS	36"

CLASSIFICATION	ROW	B-B	PVMT.
LOCAL STREET	50'	28'	24'
RESIDENTIAL STREET	65'	37'	33'
MAJOR COLLECTOR	73'	45'	41'

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006

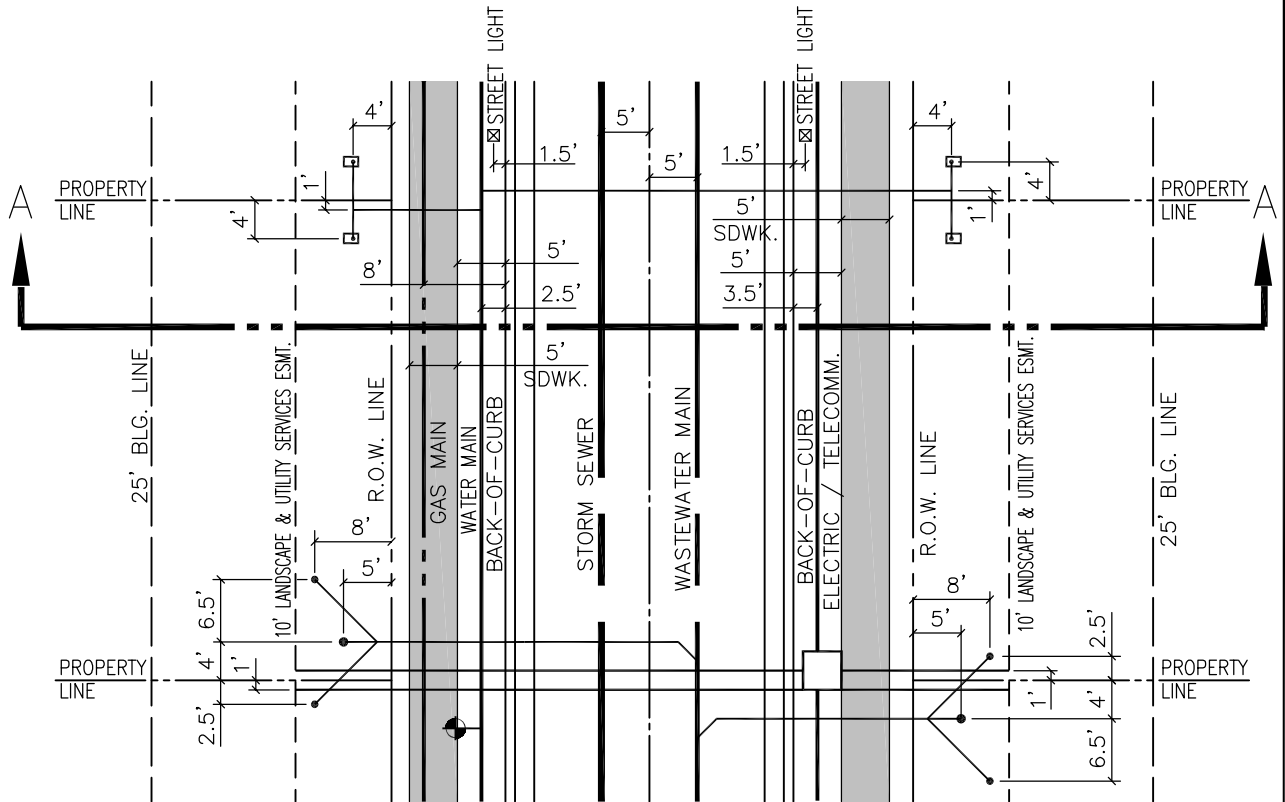
DRAWING NAME:

W01A

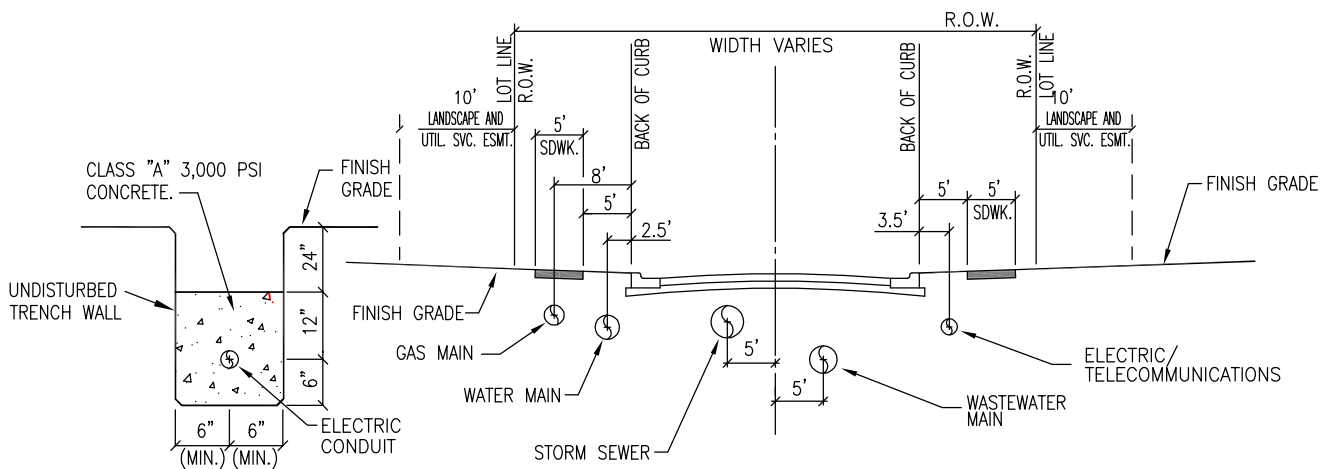
SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR LOCAL
STREETS, RESIDENTIAL COLLECTORS
AND MAJOR COLLECTORS



PLAN



SECTION A-A

NOTE: WHEN CROSSING A WATER MAIN, THE ELECTRIC CONDUIT MUST BE ENCASED WITH 3,000 PSI RED CONCRETE FOR FIVE (5) FEET BOTH SIDES FROM THE CROSSING POINT.

ELECTRIC CONDUIT
CONCRETE ENCASEMENT DETAIL

CLASSIFICATION	ROW	B-B	PVMT.
MINOR ARTERIAL	VARIES	80'	76'
MAJOR ARTERIAL	VARIES	110'	106'

The Architect/Engineer assumes responsibility for appropriate use of this standard.

MINIMUM COVER BELOW FINISH-GRADE ALL UTILITIES UNDER ROADWAY - 36"	
ELECTRIC PRIMARY	36"
ELECTRIC SECONDARY	24"
WATER	36"
WASTEWATER	48"
STORM SEWER	36"
GAS	36"
TELECOMMUNICATIONS	36"

REVISION NOTE: ADOPTED 6/21/2006

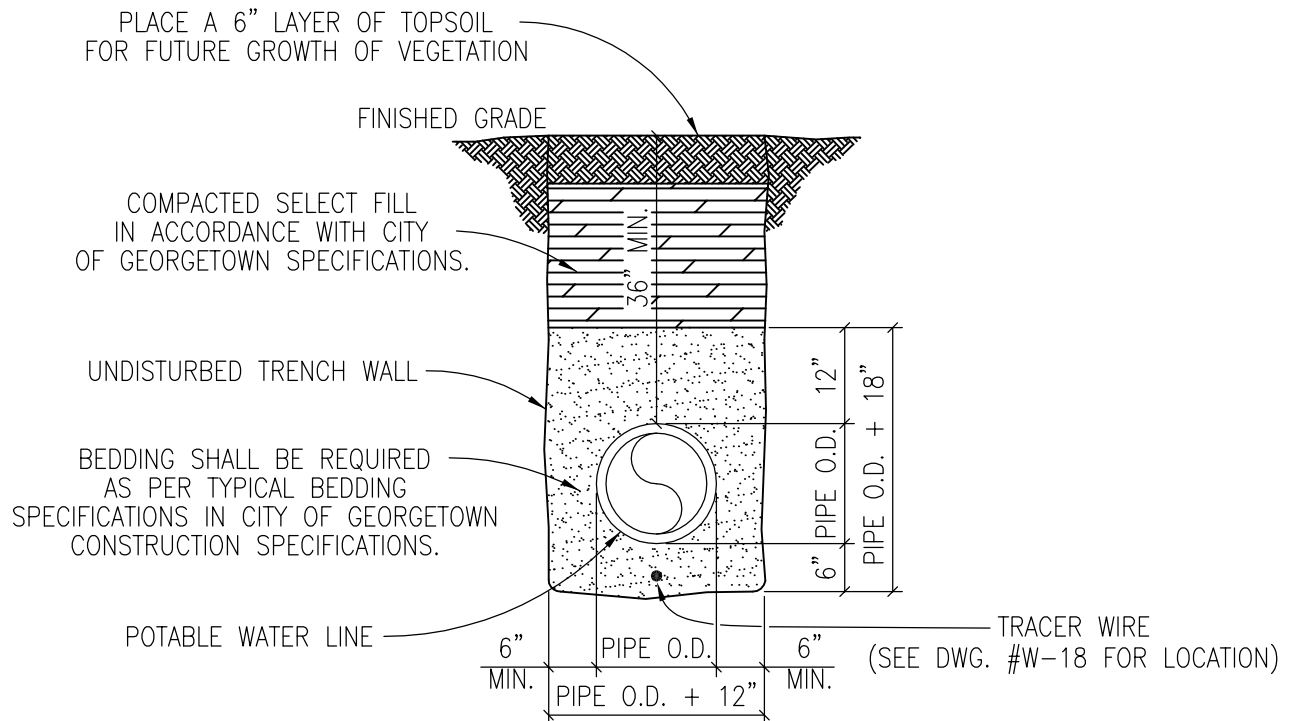
DRAWING NAME:

W01B

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR
MINOR ARTERIAL AND MAJOR
ARTERIAL ROADWAYS



TRENCH WIDTHS

- *PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.
- *20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

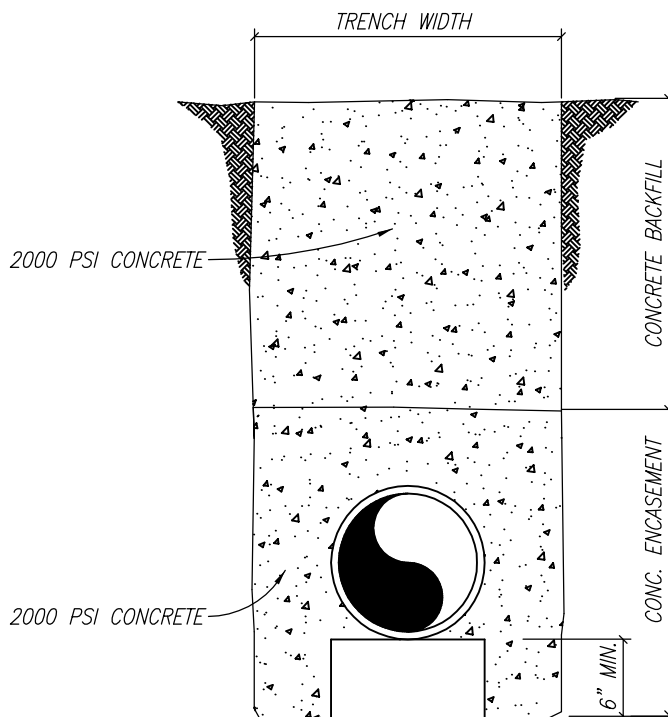
The Architect/Engineer assumes responsibility for appropriate use of this standard.



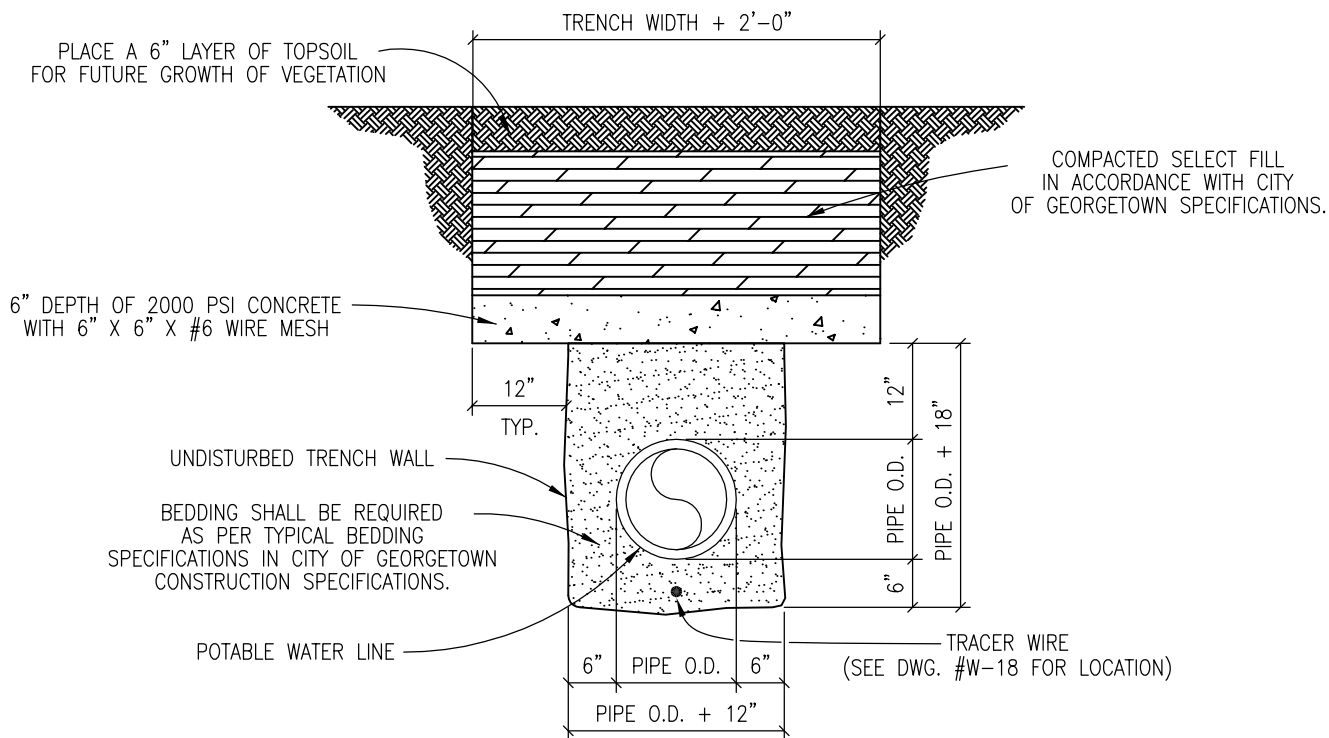
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL
UNDER NON-PAVED AREAS

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: W02	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

* WHERE 36" MINIMUM COVER CAN NOT BE OBTAINED OR DUE TO POTENTIAL SURFACE LOADING THE CITY MAY REQUIRE A CAP TO BE INSTALLED.



CONCRETE BACKFILL
AND CONCRETE ENCASEMENT



TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

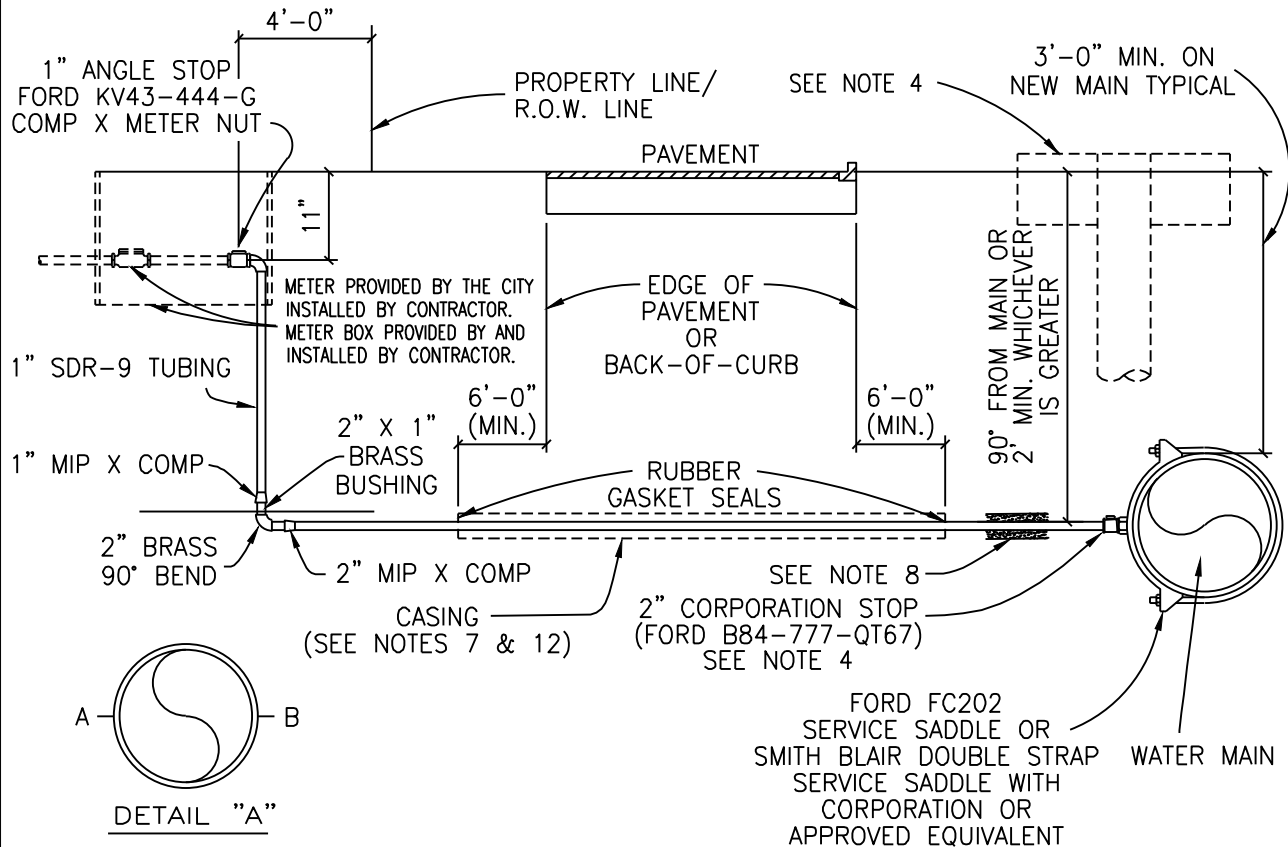


CITY OF GEORGETOWN CONSTRUCTION STANDARDS AND DETAILS CONCRETE TRENCH CAP DETAIL

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W02A

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTES:

- SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE SPACED A MINIMUM OF 18" OFFSET AND AT THE CENTERLINE AS SHOWN ON DETAIL "A".
- WHERE NO SIDEWALK EXISTS, METER BOXES SHALL BE SET TO CONFORM TO FINISHED GRADE.
- AUTHORIZED SERVICE LINE MATERIAL:
POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
- ROTATE THE CORPORATION STOP SO THAT THE OPERATING NUT IS ACTUATED FROM THE VERTICAL POSITION RATHER THAN THE HORIZONTAL. SEE STD. RISER FOR CORP. STOP DETAIL, (DWG # W08).
- SERVICE LINES SHALL BE CONTINUOUS FROM CORPORATION STOP TO CORPORATION STOP WITH NO FITTINGS IN BETWEEN.
- SERVICE CASING SHALL NOT BE INSTALLED BY WATER JETTING UNDER ROADWAY.
- CASING REQUIRED FOR ALL PAVEMENT CROSSINGS. 4" SDR-26 REQUIRED FOR OPEN-CUT. STEEL CASING PIPE REQUIRED FOR JACK AND BORE. LIMITS OF CASING SHOULD EXTEND SIX FEET BEYOND THE EDGE OF PAVEMENT OR BACK-OF-CURB.
- BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
- ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
- METER BOX TO BE CAPABLE OF HOUSING ITRON AUTOMATIC METER READING DEVICE. USE DFW-PLASTICS, INC. PART NO. 1200.SBAMR OR APPROVED EQUAL.
- ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY. SEE DETAIL W23.
- CASING SHALL EXTEND OUT TO WITHIN 4' INSIDE OF THE R.O.W. LINE, ON BOTH SIDES.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

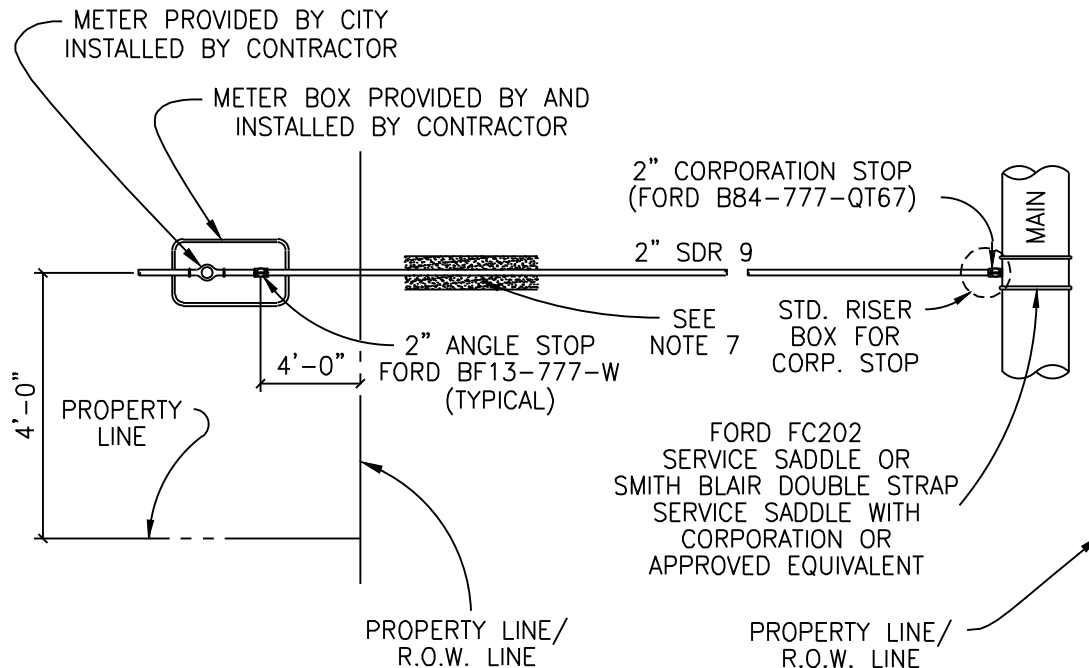
REVISION NOTE: **ADOPTED 01/23/2013**

DRAWING NAME:
W03

SCALE: NTS
DATE: 1/2013
DRAWN BY: -
APPROVED BY: MH



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL WATER SERVICE-ELEVATION



NOTES:

1. AUTHORIZED SERVICE LINE MATERIAL:
POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
2. ANGLE STOP SHALL BE 1" MINIMUM.
3. 1" ANGLE STOPS WITH 3/4" VALVES SHALL NOT BE PERMITTED.
4. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS.
5. ANGLE STOPS 1 1/2" AND 2" IN SIZE SHALL BE PROVIDED WITH BOTH A LOCKING CAP AND METER FLANGE.
6. ANGLE STOPS SHALL BE INSTALLED 8" BELOW FINISHED GRADE AND MARKED WITH A 2" X 2" X 48" TREATED WOOD STAKE, PAINTED BLUE.
7. BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. CASING REQUIREMENTS FOR SERVICE LINES CROSSING ROADWAYS SEE DETAIL W-03 NOTE #7.
9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
10. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



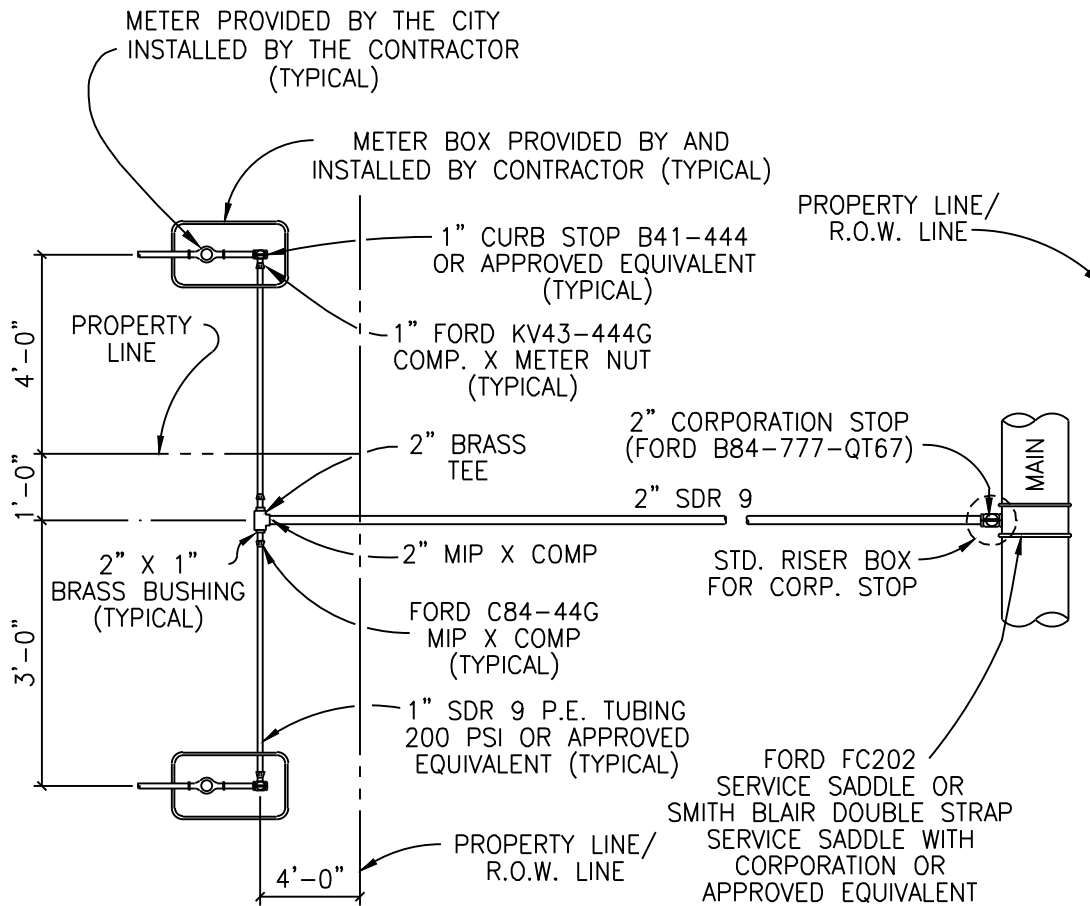
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SINGLE WATER SERVICE PLAN

REVISION NOTE: **ADOPTED 01/23/2013**

DRAWING NAME:

W04

SCALE: NTS
DATE: 1/2013
DRAWN BY: -
APPROVED BY: MH



NOTES:

1. AUTHORIZED SERVICE LINE MATERIAL:
POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
2. ANGLE STOP SHALL BE 1" MINIMUM.
3. 1" ANGLE STOPS WITH 3/4" VALVES SHALL NOT BE PERMITTED.
4. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS.
5. ANGLE STOPS 1 1/2" AND 2" IN SIZE SHALL BE PROVIDED WITH BOTH A LOCKING CAP AND METER FLANGE.
6. ANGLE STOPS SHALL BE INSTALLED 8" BELOW FINISHED GRADE AND MARKED WITH A 2" X 2" X 48" TREATED WOOD STAKE, PAINTED BLUE.
7. BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. CASING REQUIREMENTS FOR SERVICE LINES CROSSING ROADWAYS SEE DETAIL W-03 NOTE #7.
9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
10. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DOUBLE WATER SERVICE PLAN

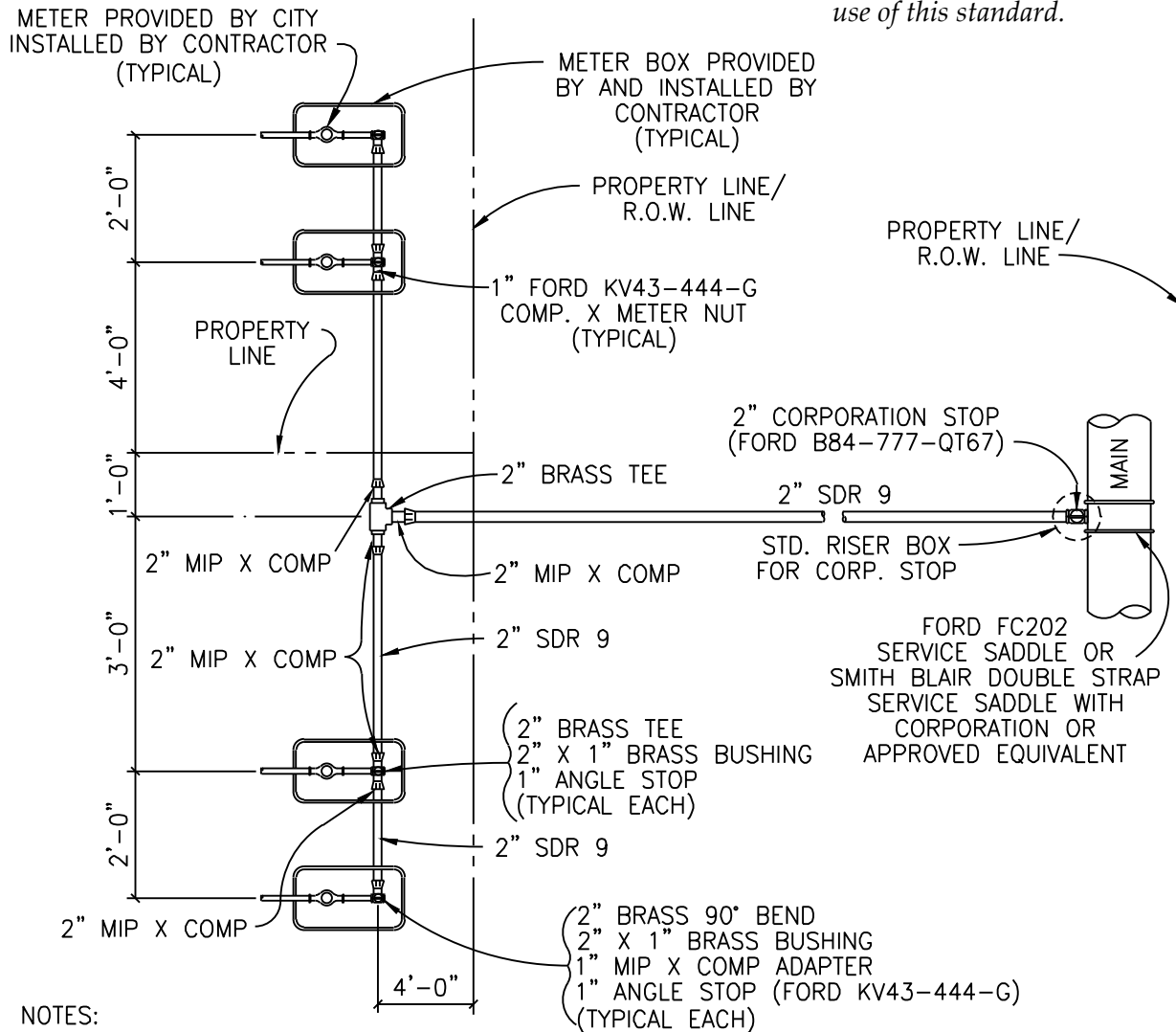
REVISION NOTE: **ADOPTED 01/23/2013**

DRAWING NAME:

W05

SCALE: NTS
DATE: 1/2013
DRAWN BY: -
APPROVED BY: MH

The Architect/Engineer assumes responsibility for appropriate use of this standard.



NOTES:

1. AUTHORIZED SERVICE LINE MATERIAL:
POLYETHYLENE TUBING SHALL BE SDR-9. CLASS 200, SDR TUBING SHALL HAVE STAINLESS STEEL STIFFENERS.
2. ANGLE STOP SHALL BE 1" MINIMUM.
3. 1" ANGLE STOPS WITH 3/4" VALVES SHALL NOT BE PERMITTED.
4. MULTIPLE SERVICE/METER INSTALLATIONS OF MORE THAN 4 METERS PER SERVICE AND SERVICE LINES LARGER THAN 2" IN DIAMETER SHALL BE HANDLED ON AN INDIVIDUAL BASIS.
5. ANGLE STOPS 1 1/2" AND 2" IN SIZE SHALL BE PROVIDED WITH BOTH A LOCKING CAP AND METER FLANGE.
6. ANGLE STOPS SHALL BE INSTALLED 8" BELOW FINISHED GRADE AND MARKED WITH A 2" X 2" X 48" TREATED WOOD STAKE, PAINTED BLUE.
7. BEDDING MATERIAL AS PER CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS.
8. CASING REQUIREMENTS FOR SERVICE LINES CROSSING ROADWAYS SEE DETAIL W-03 NOTE #7.
9. ANY VARIATIONS ON FITTINGS MUST BE APPROVED BY THE CITY ENGINEER.
10. ALL SERVICE LINES SHALL BE PLACED 90° PERPENDICULAR TO THE ROADWAY.

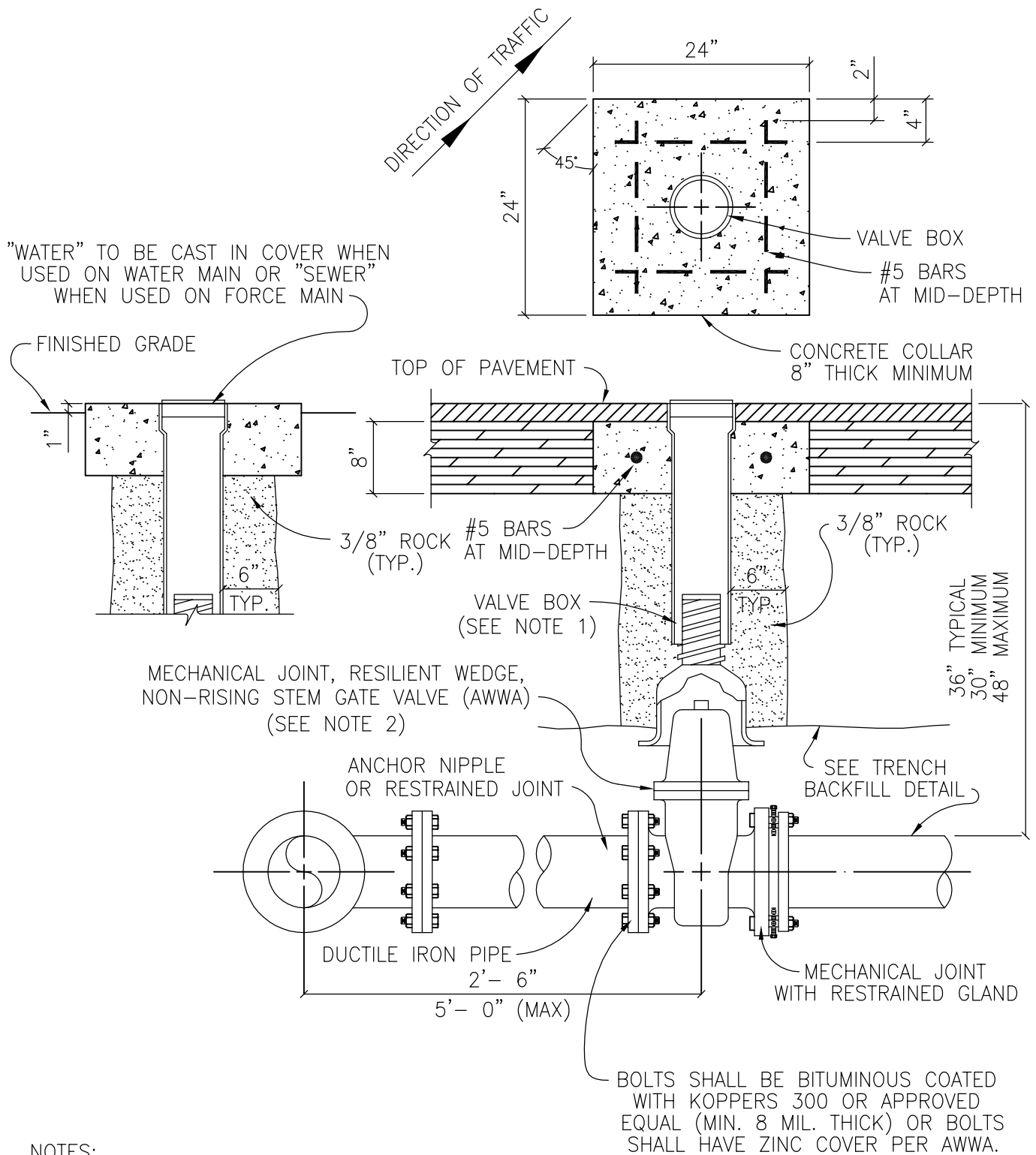
REVISION NOTE: **ADOPTED 01/23/2013**

DRAWING NAME:
W06

SCALE: NTS
DATE: 1/2013
DRAWN BY: -
APPROVED BY: MH



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUADRUPLE WATER SERVICE PLAN



NOTES:

1. VALVE BOX SHALL BE 5 1/4" CAST IRON ADJUSTABLE HAVING AN ADJUSTABLE RANGE OF + OR - 6 INCHES FROM INSTALLED FINISH GRADE.
2. ACCEPTABLE GATE VALVES ARE:
 - A. AMERICAN FLOW CONTROL - SERIES 2500
 - B. MUELLER - 2360 SERIES
 - C. CLOW

The Architect/Engineer assumes responsibility for appropriate use of this standard.

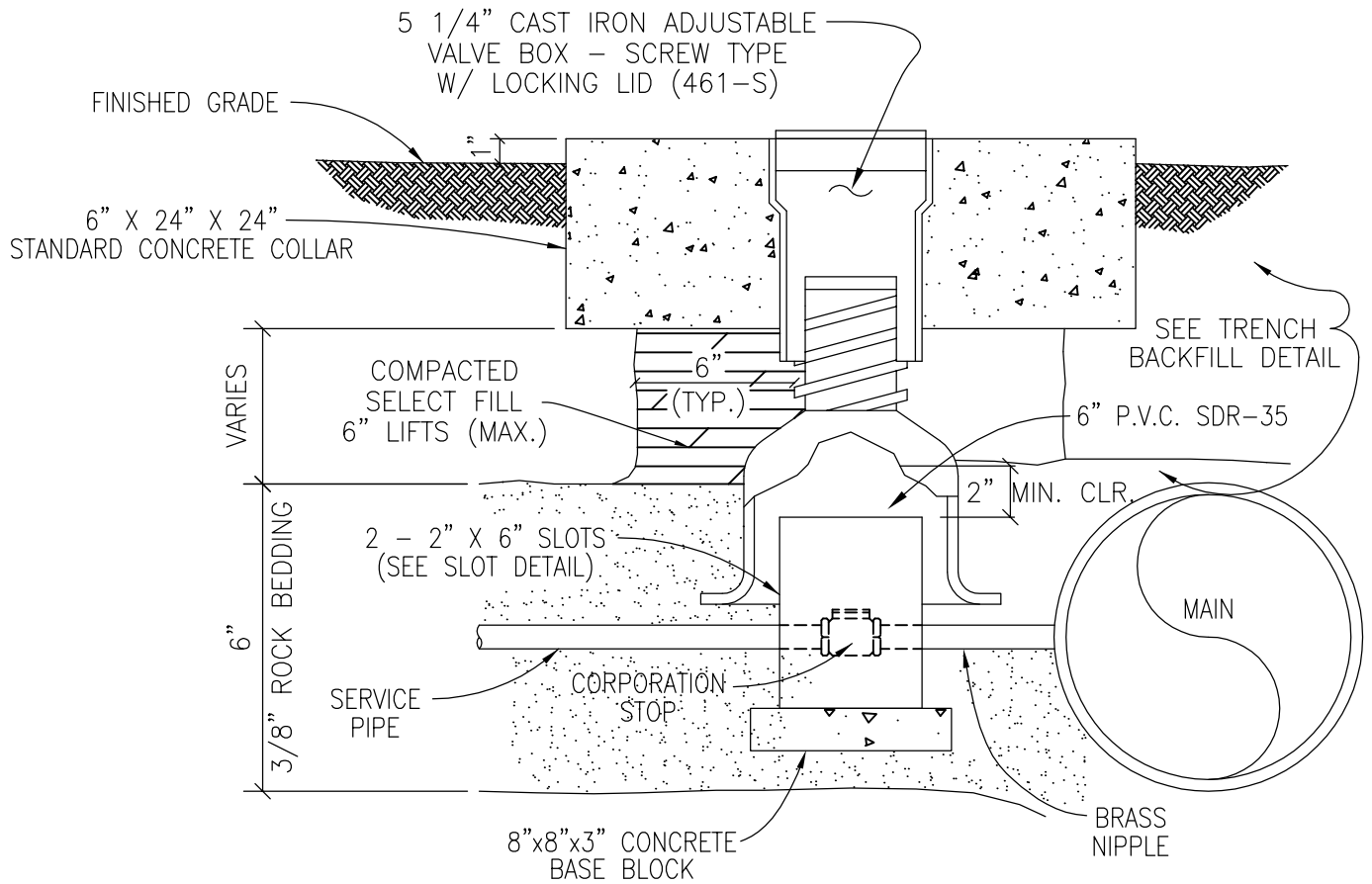


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL VALVE SETTING

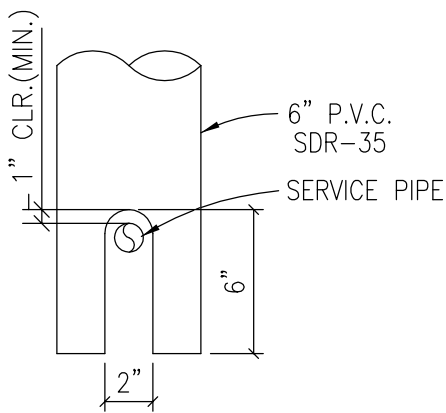
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W07

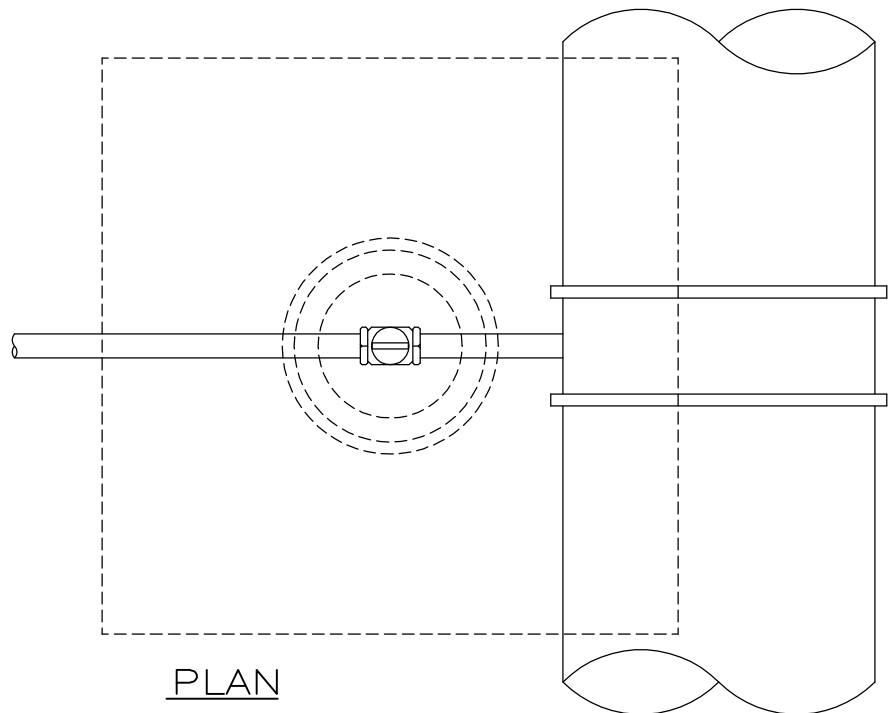
SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



ELEVATION



SLOT DETAIL



PLAN

The Architect/Engineer assumes responsibility for appropriate use of this standard.

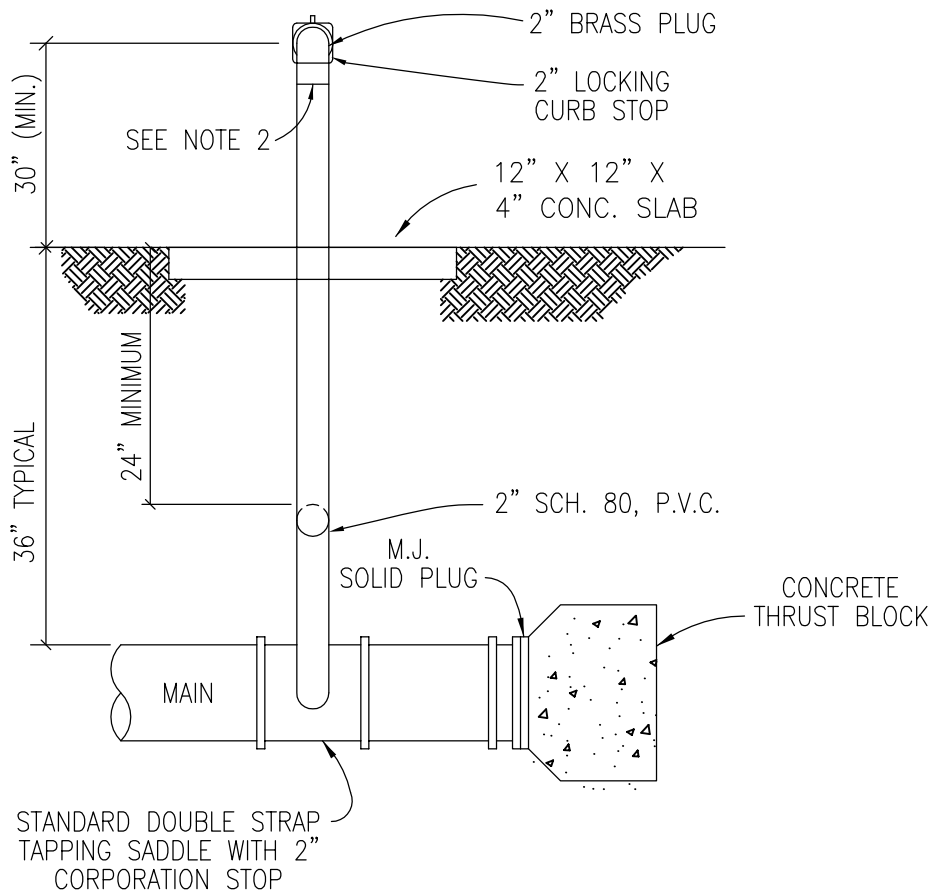


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**STANDARD RISER BOX
FOR CORPORATION STOP**

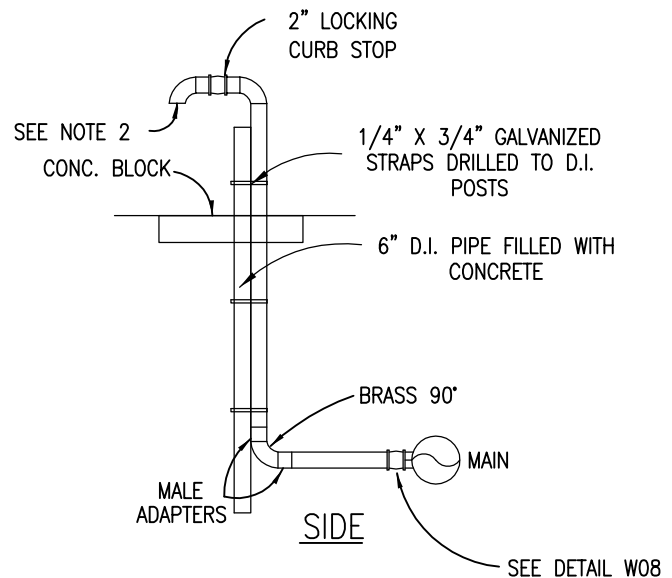
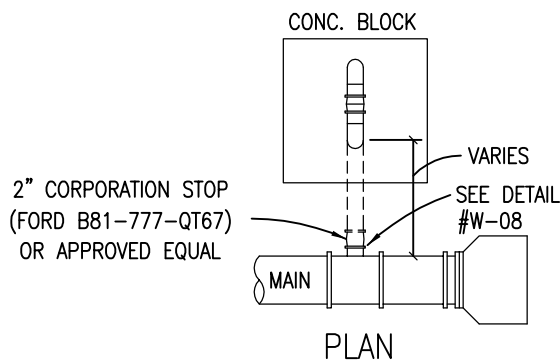
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
W08

SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



ELEVATION



NOTE:

1. ATTACH FIRE HYDRANT CONNECTION AT THE END OF THE BLOW OFF VALVE.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

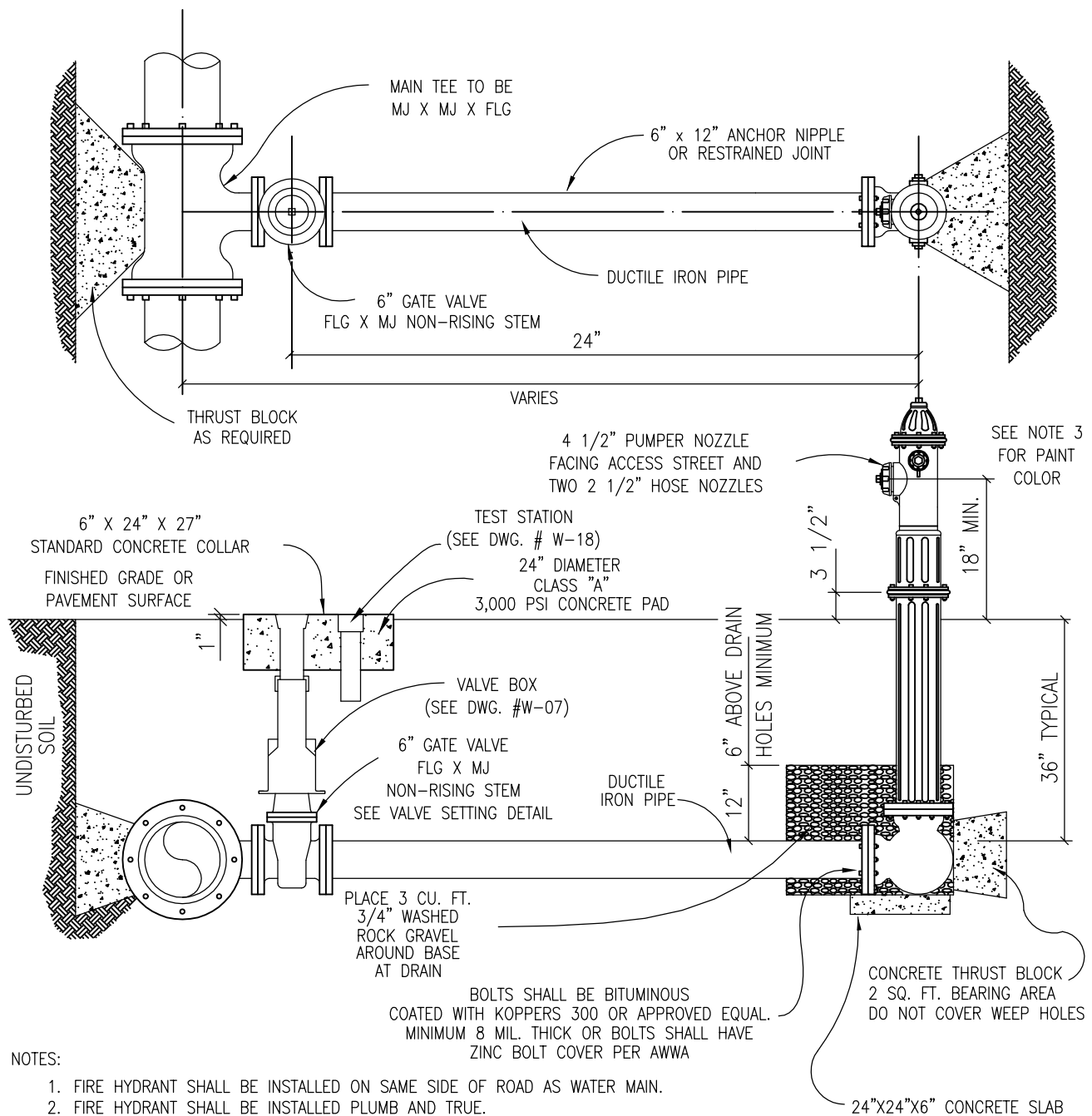


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD BLOW-OFF

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W09

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTES:

1. FIRE HYDRANT SHALL BE INSTALLED ON SAME SIDE OF ROAD AS WATER MAIN.
2. FIRE HYDRANT SHALL BE INSTALLED PLUMB AND TRUE.
3. ALL FIRE HYDRANT EXTERIORS SHALL BE FACTORY PRIMED AND PAINTED SILVER USING A HIGH GRADE ENAMEL.
4. HEEL AND THRUST BLOCKS TO REST IN UNDISTURBED SOIL.
5. THE ONLY FIRE HYDRANTS ACCEPTABLE ARE:
 - A. KENNEDY - K81
 - B. AMERICAN DARLING - B84B
 - C. CLOW MEDALLION
6. DOUBLE BLUE REFLECTOR "HYE-LITES" BRAND, MANUFACTURED BY PAVEMENT MARKERS INC. TO BE INSTALLED AT CENTERLINE OF STREET PERPENDICULAR TO HYDRANT.
7. ALL METALLIC PIPES AND FITTINGS SHALL BE WRAPPED WITH 8 MILL. POLYETHYLENE FILM.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

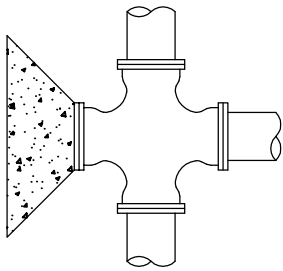


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL FIRE HYDRANT
INSTALLATION

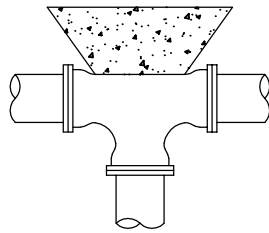
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W10

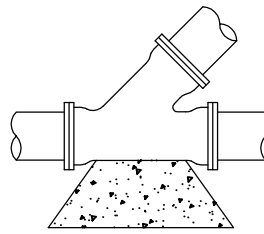
SCALE:	DATE:
NTS	1/2003
DRAWN BY:	APPROVED BY:
MRS	TRB



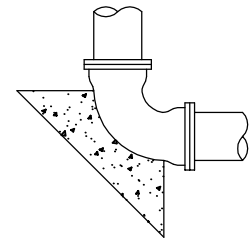
CROSS WITH PLUG



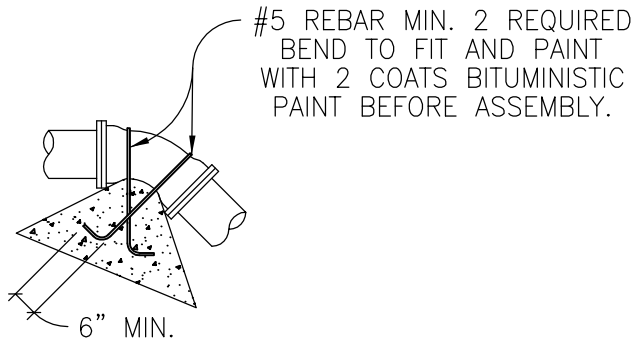
TEE



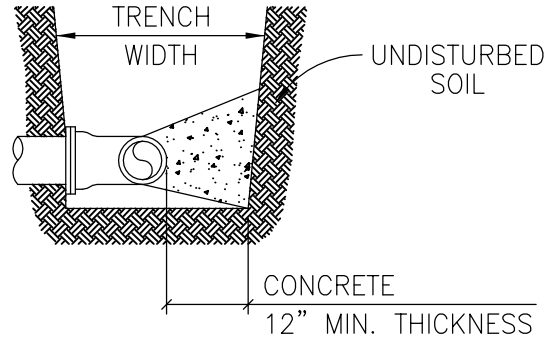
WYE



BEND



*DEADMAN



TYPICAL SECTION

ALL THRUST BLOCKS SHALL BE FORMED. LAID FORMS SHALL BE INSPECTED BY THE CITY OF GEORGETOWN PRIOR TO THE POURING OF CONCRETE AND SHALL ALSO BE INSPECTED BY THE CITY OF GEORGETOWN PRIOR TO COVERING. TYPICAL LOCATIONS WHICH REQUIRE CONCRETE REACTION (THRUST) BLOCKS, FOR PRESSURE MAINS FOUR INCHES (4") AND GREATER. CONCRETE SHALL HAVE 2,500 P.S.I. MINIMUM STRENGTH AT TWENTY EIGHT (28) DAYS AND BEAR AGAINST UNDISTURBED STABLE SOILS, AREA OF CONTACT SHALL BE GOVERNED BY PIPE SIZE, MAXIMUM PRESSURE IN PIPE, AND BEARING CAPACITY OF SOIL. PROTECT FITTINGS, BOLTS, ETC. BY COVERING WITH VISQUEEN OR OTHER ACCEPTABLE MATERIAL. CONCRETE SHALL BE A MINIMUM OF TWELVE INCHES (12") THICK.

PIPE SIZE	THRUST BLOCK AREA REQUIRED	PIPE SIZE	THRUST BLOCK AREA REQUIRED	REMARKS
4"	2.0 SQ. FT.	18"	30.0 SQ. FT.	VALUES ARE FOR 90° BENDS, BASED ON 2000 P.S.F. SAFE BEARING LOAD AND PIPE PRESSURE OF 150 P.S.I. PLUS 33% SAFETY FACTOR FOR OTHER SOILS AND PRESSURES, THE AREA REQUIRED IS IN DIRECT PROPORTION.
6"	4.0 SQ. FT.	20"	37.0 SQ. FT.	
8"	6.6 SQ. FT.	24"	53.0 SQ. FT.	
10"	10.0 SQ. FT.	27"	80.0 SQ. FT.	
12"	14.0 SQ. FT.	30"	98.0 SQ. FT.	
14"	18.0 SQ. FT.	36"	127.0 SQ. FT.	
16"	24.0 SQ. FT.			

* THE ENGINEER OF RECORD SHALL CALCULATE THE SIZE OF THE DEADMAN REQUIRED AS WELL AS ANY INSTALLATION WHICH IS NOT COVERED BY THE ABOVE.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



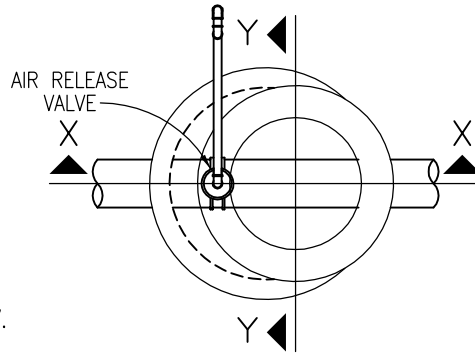
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TYPICAL THRUST BLOCKS FOR
WATER AND FORCE MAIN

REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
W11

SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB

The Architect/Engineer assumes responsibility for appropriate use of this standard.

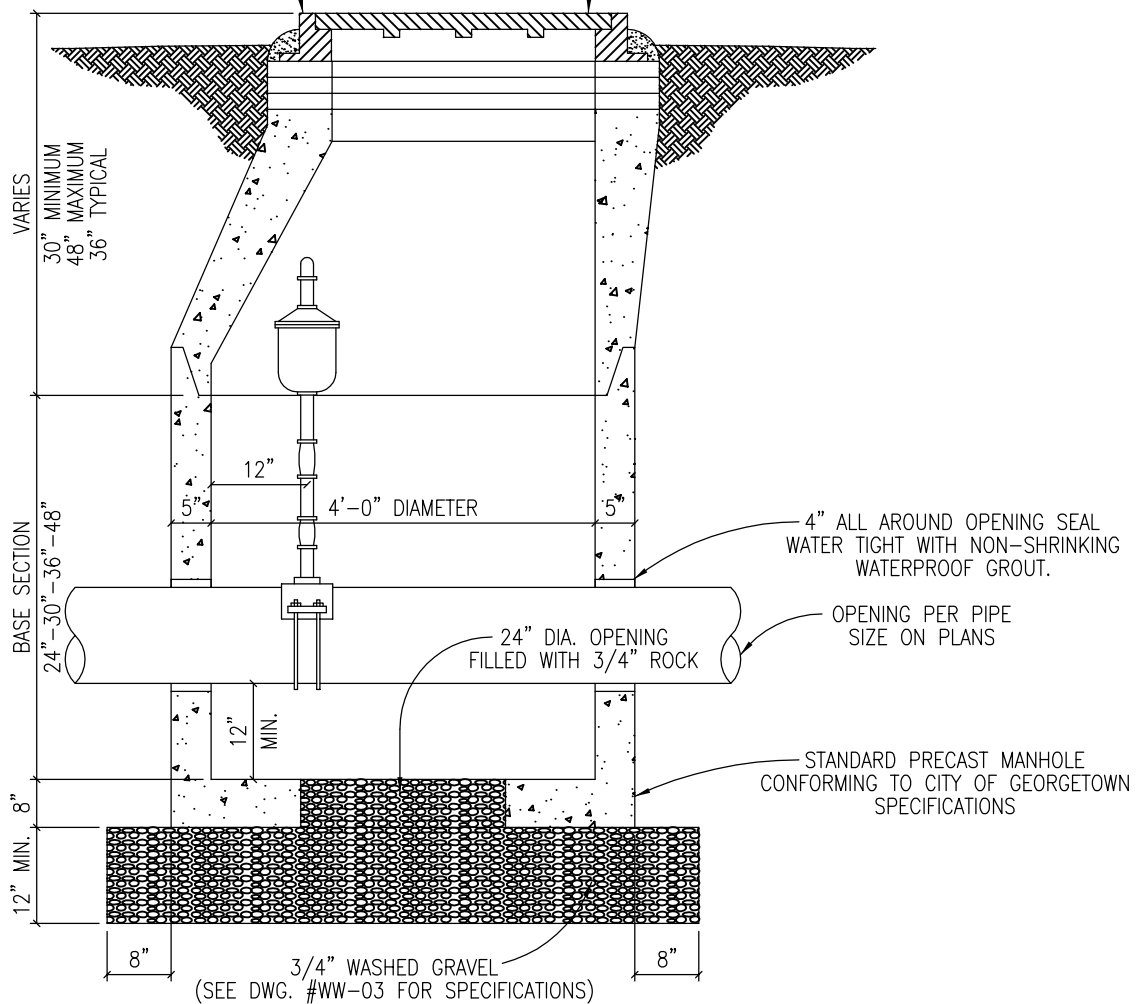


NOTE:
PLAN VIEW SHOWN ONLY
FOR CLARIFICATION OF
SECTION "X-X" AND "Y-Y".

PLAN

ADJUST WITH GRADE RINGS
AND MORTAR TO BRING TO 4"
ABOVE GRADE.
(5 COURSES MAX)

FRAME AND COVER SHALL BE
EAST JORDAN IRON WORKS
(AS PER DETAIL #WW-07) OR
APPROVED EQUIVALENT AND
SHALL BE 4" ABOVE FINISH GRADE.

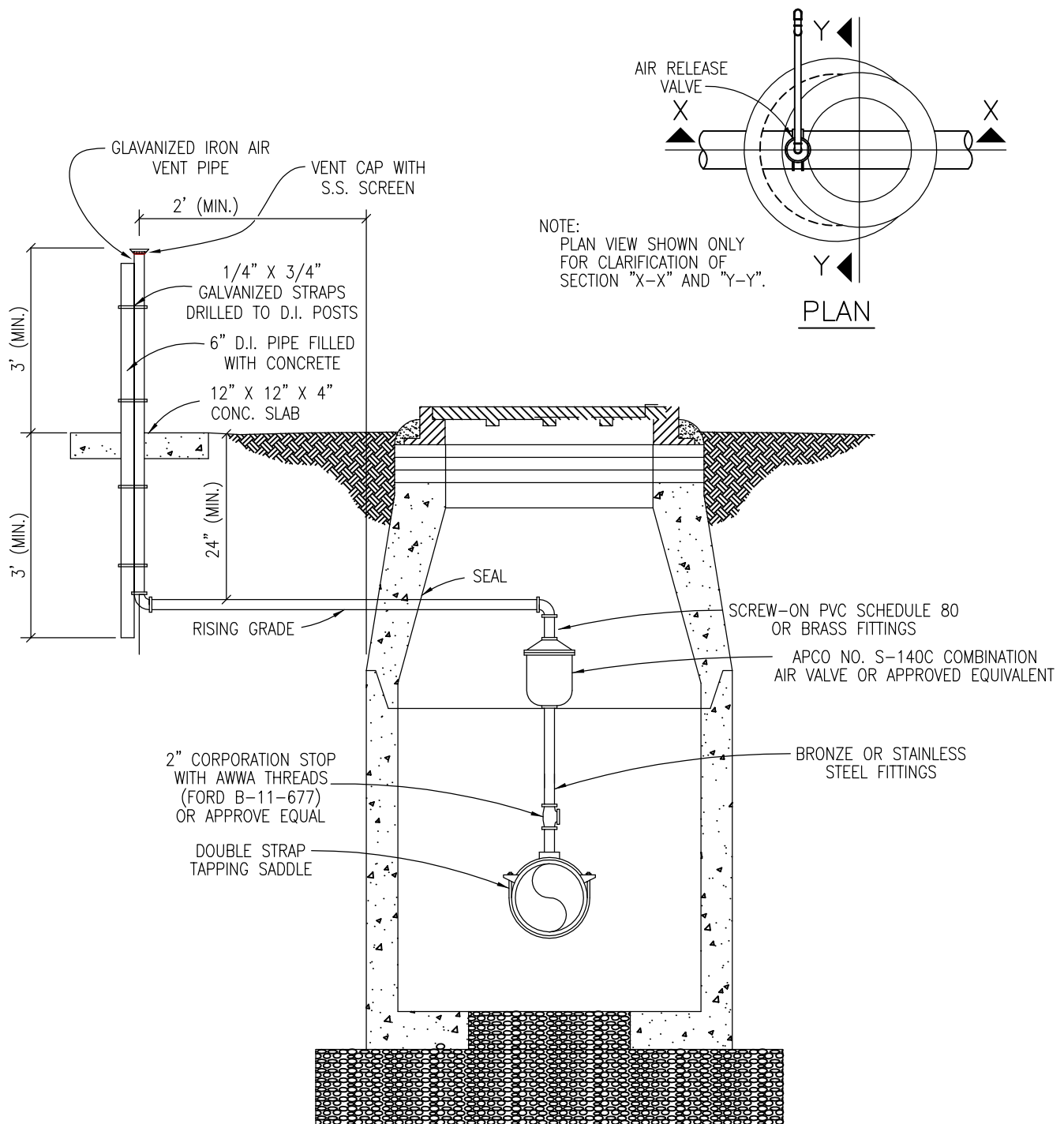


SECTION "X-X"

REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
W12

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



SECTION "Y-Y"

The Architect/Engineer assumes responsibility for appropriate use of this standard.

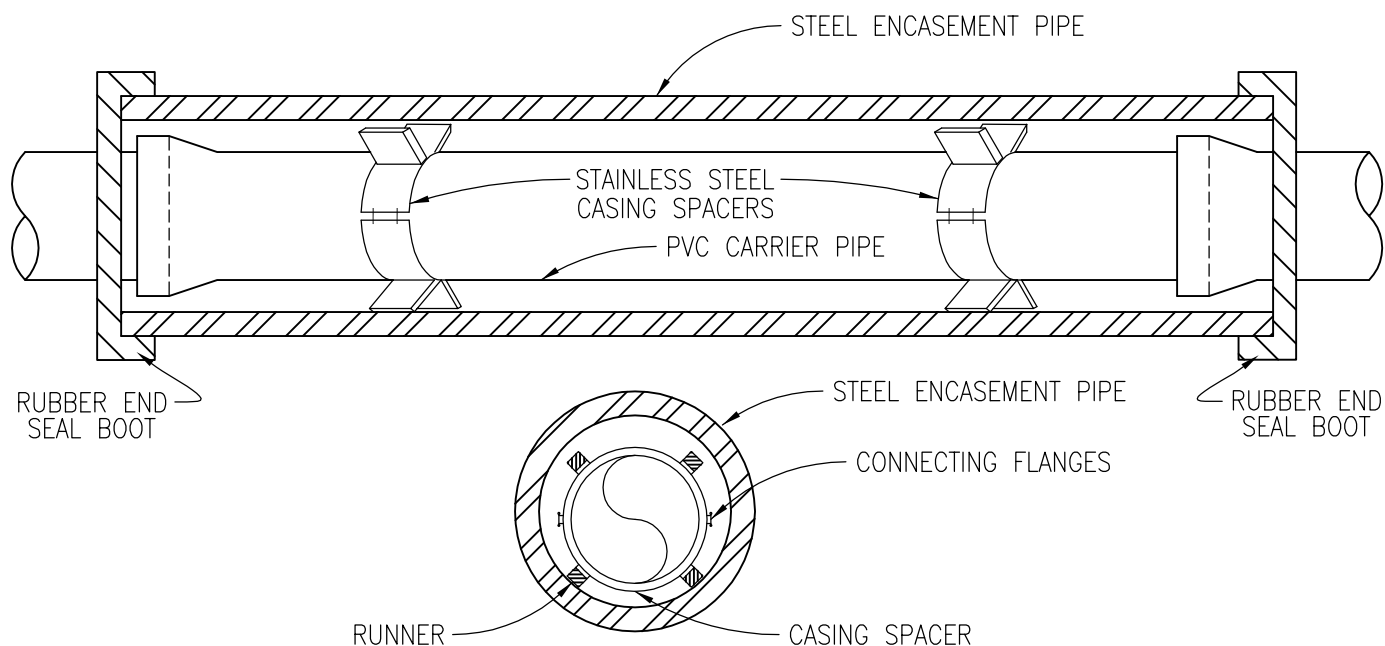


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD AIR RELEASE VALVE
FOR WATER MAIN

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W13

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTES:

1. CASING SPACERS SHALL BE BOLT ON STYLE WITH A SHELL MADE IN TWO SECTIONS OF HEAVY T-304 STAINLESS STEEL. CONNECTING FLANGES SHALL BE RIBBED FOR EXTRA STRENGTH. CASING SPACERS SHALL BE MADE BY CASCADE WATERWORKS MFG. CO. OR APPROVED EQUAL.
2. CASING SPACERS SHALL HAVE RUNNERS MADE OF ULTRA HIGH MOLECULAR WEIGHT POLYMER, WITH A MINIMUM HEIGHT OF 2 INCHES.
3. DO NOT USE WEDGES BETWEEN TOP OF PVC CARRIER PIPE AND INSIDE OF CASING TO KEEP PVC FROM MOVING.
4. PRIOR TO INSERTING PVC CARRIER PIPE, ANY WATER SHOULD BE PUMPED OUT OF THE CASING PIPE SO THAT NO MORE THAN A FEW INCHES OF WATER REMAINS.
5. SPACERS WILL BE REQUIRED WITHIN AT LEAST 3 FEET FROM BOTH OPENINGS OF THE ENCASEMENT PIPE AND SPACED NO GREATER THAN 6 FEET THROUGHOUT THE ENCASEMENT PIPE.
6. ENCASEMENT PIPE SHALL BE SMOOTH STEEL 35,000 PSI YIELD STRENGTH WITH THICKNESS ACCORDING TO THE FOLLOWING TABLE:
7. WHEN CASING IS REQUIRED UNDER PAVEMENT WITHIN THE R.O.W., THE CASING SHALL EXTEND OUT TO WITHIN 4' INSIDE OF THE R.O.W. LINE, ON BOTH SIDES.
8. ALL JOINTS SHALL BE RESTRAINED ON PVC CARRIER PIPE.

PIPE SIZE-CARRIER (DIAMETER)	PIPE SIZE-CASING (DIAMETER)(MIN.)	MINIMUM PIPE THICKNESS (INCHES)	
6"	16"		
8"	18"	1/4	0.2500
10"	20"	5/16	0.3125
12" - 14"	24"	3/8	0.3750
16" - 18"	30"	7/16	0.4375
20"	36"	1/2	0.5000
24"	42"	1/2	0.5000
30"	48"	1/2	0.5000

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

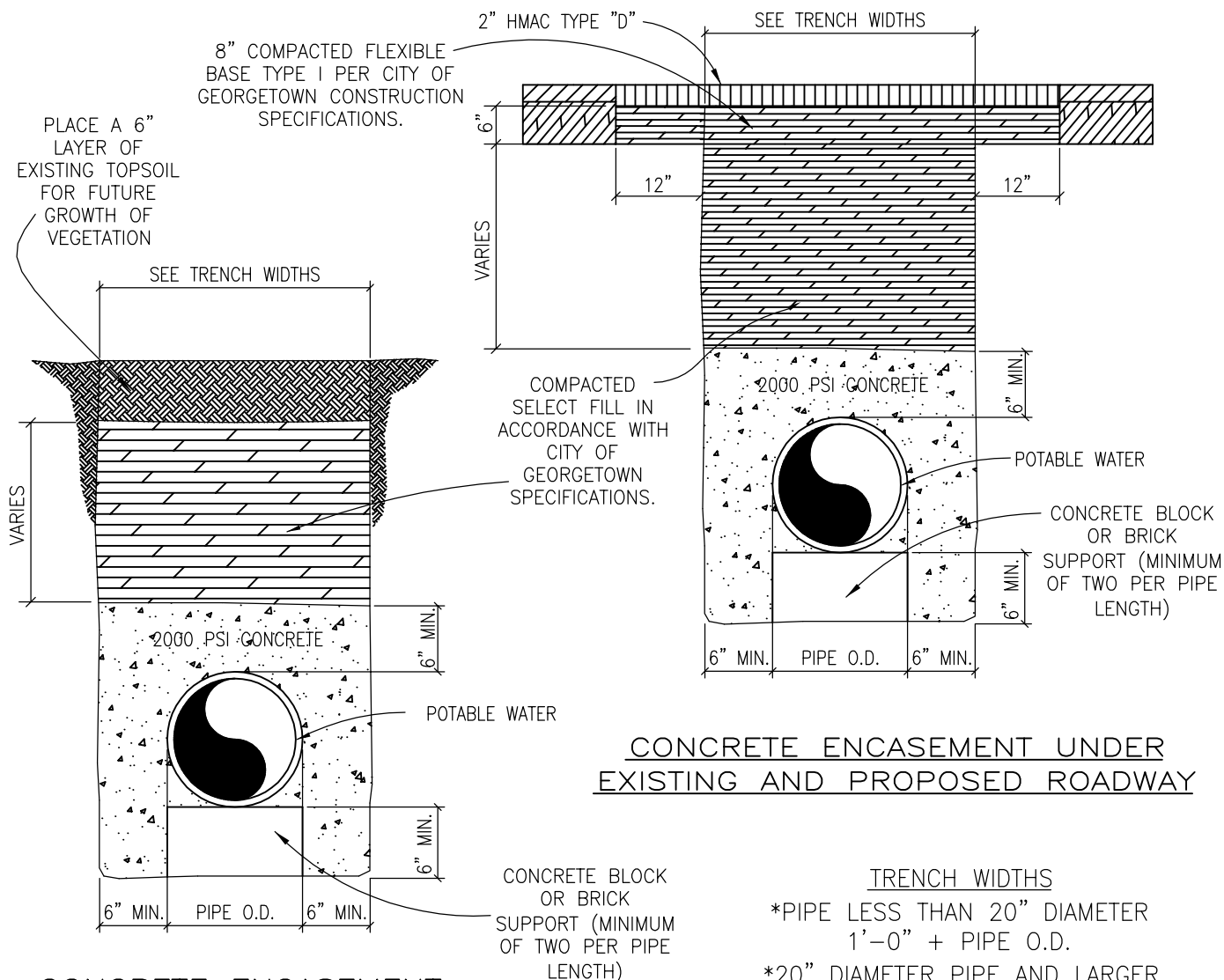


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
INSTALLATION OF P.V.C. PIPE
THROUGH CASING

REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
W14

SCALE: NTS DATE: 1/2003
DRAWN BY: MRS APPROVED BY: TRB



- NOTES: 1. ENCASEMENT TO BE CONSTRUCTED WHERE SEWER LINES PASS OVER OR UNDER A WATER MAIN WITH LESS THAN TWELVE INCHES (12") CLEAR DISTANCE.
2. AT CROSSINGS, ENCASEMENT SHALL EXTEND TEN FEET (10'-0") ON EITHER SIDE OF CROSSING.
3. BEGINNING AND ENDING OF ENCASEMENTS SHALL NOT BE MORE THAN SIX INCHES (6") FROM A PIPE JOINT.
4. WHERE WATER AND SEWER LINES PARALLEL WITH LESS THAN TEN FEET (10'-0") HORIZONTAL CLEAR DISTANCE, NO ENCASEMENT IS REQUIRED IF BOTH LINES ARE 150 PSI PRESSURE PIPE.
5. RAW WATER MAINS SHALL BE 150 PSI PRESSURE RATED WHEN PARALLELING POTABLE WATER MAINS WITH LESS THAN NINE FEET (9'-0") HORIZONTAL CLEARANCE.
6. WHERE MINIMUM COVER, THIRTY SIX INCHES (36") IS NOT AVAILABLE, ENCASEMENT WILL BE REQUIRED.
7. ALL CONCRETE ENCASEMENTS MUST BE FORMED AND INSPECTED BY THE CITY OF GEORGETOWN INSPECTOR PRIOR TO PLACING CONCRETE AND BACKFILLING.
8. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

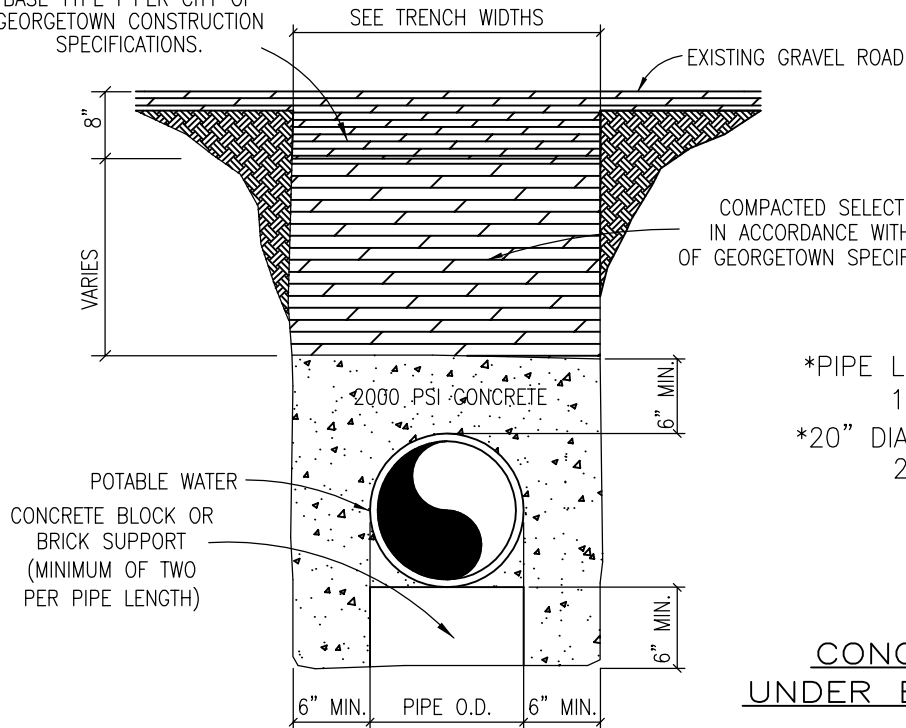
The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE ENCASEMENT DETAIL

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		W15	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

8" COMPACTED FLEXIBLE
BASE TYPE I PER CITY OF
GEORGETOWN CONSTRUCTION
SPECIFICATIONS.



COMPACTED SELECT FILL
IN ACCORDANCE WITH CITY
OF GEORGETOWN SPECIFICATIONS.

TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.

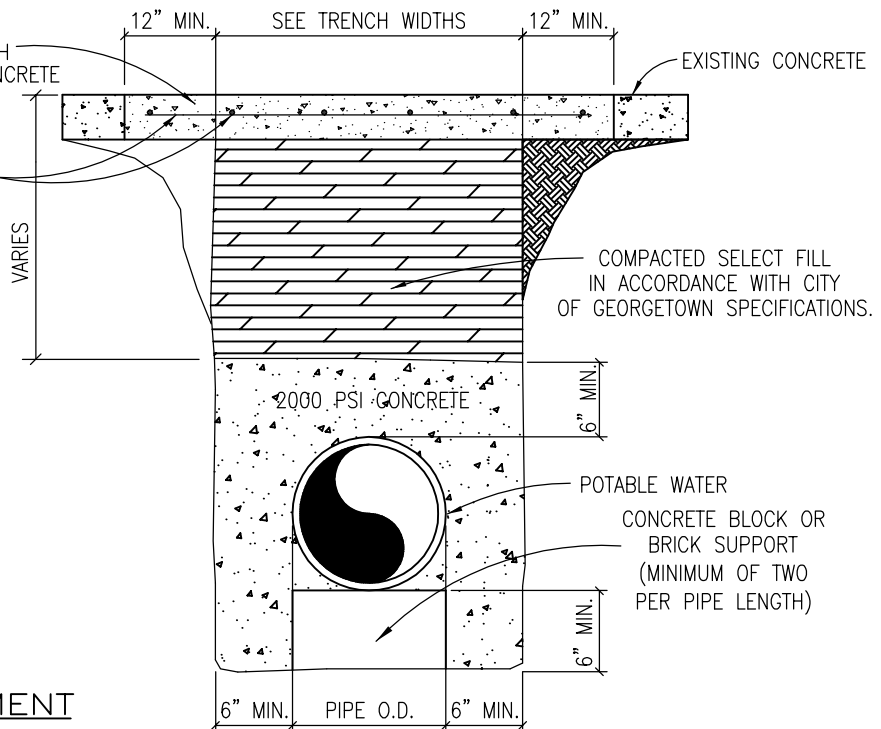
*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

CONCRETE ENCASEMENT UNDER EXISTING GRAVEL ROAD

(SEE SHEET W-15 FOR NOTES)

REMOVE AND REPLACE
EXISTING CONCRETE WITH
6" MIN. 3000 PSI CONCRETE

NO. 4 DEFORMED BARS
@ 12" O.C.



CONCRETE ENCASEMENT UNDER EXISTING CONCRETE

(SEE SHEET W-15 FOR NOTES)

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

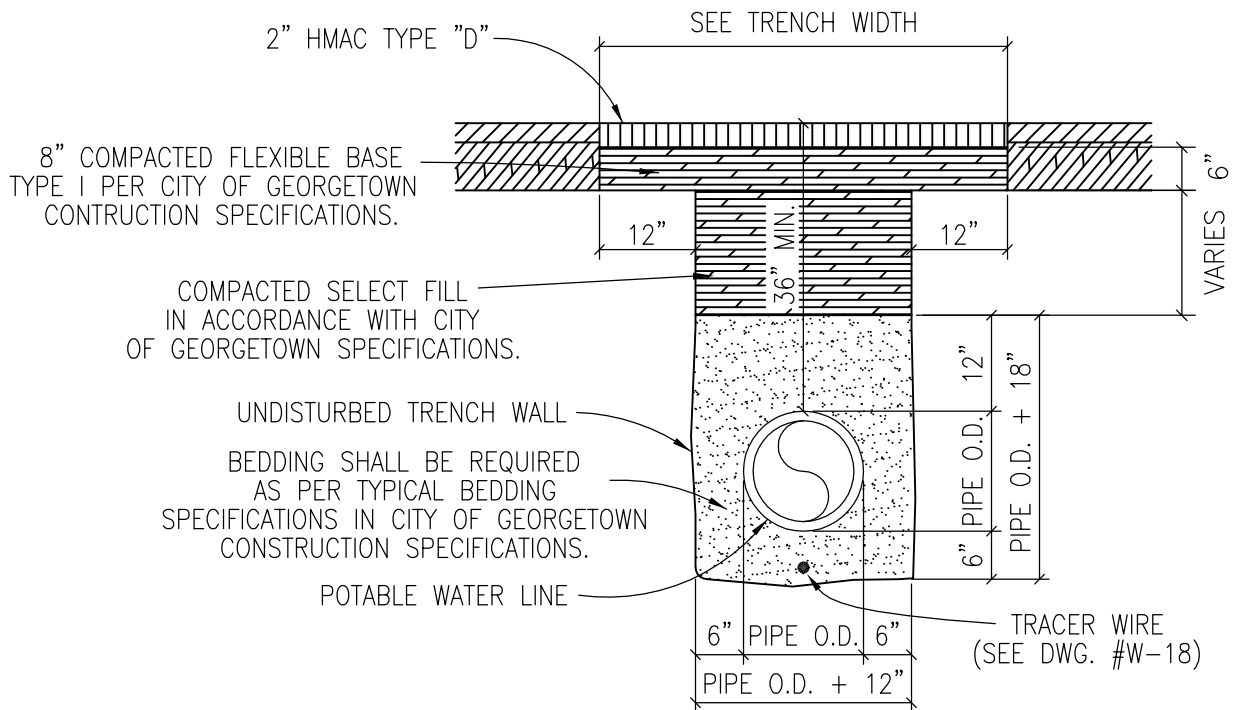


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE ENCASEMENT DETAIL

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W16

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER

1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER

2'-0" + PIPE O.D.

NOTES:

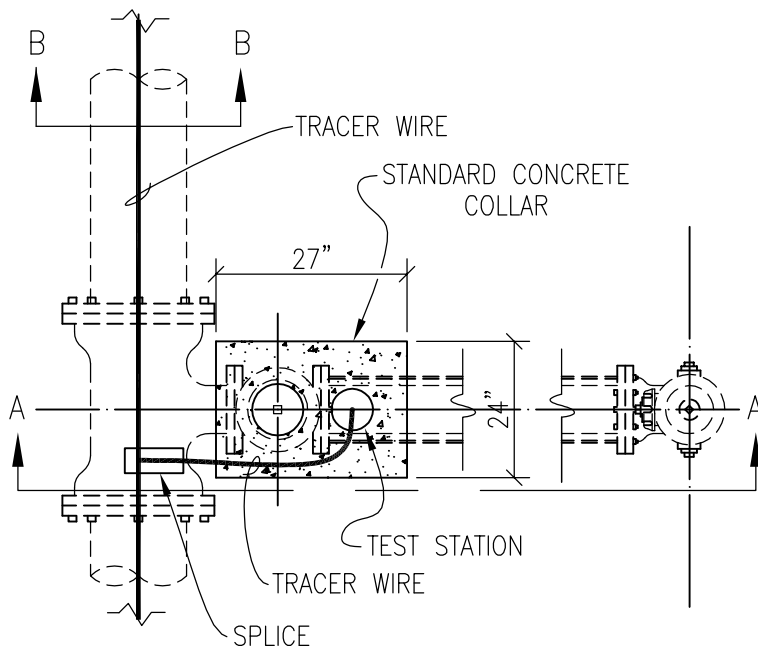
1. REPLACED BASE MATERIAL OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE.
2. BASE MATERIAL SHALL BE IN LIFTS NOT TO EXCEED 6" AND EACH LIFT THOROUGHLY ROLLED OR TAMPED TO SPECIFIED MAXIMUM DENSITY.
3. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
4. SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE.
5. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
6. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT AND
PAVEMENT REPLACEMENT DETAIL
UNDER EXISTING ROADWAY

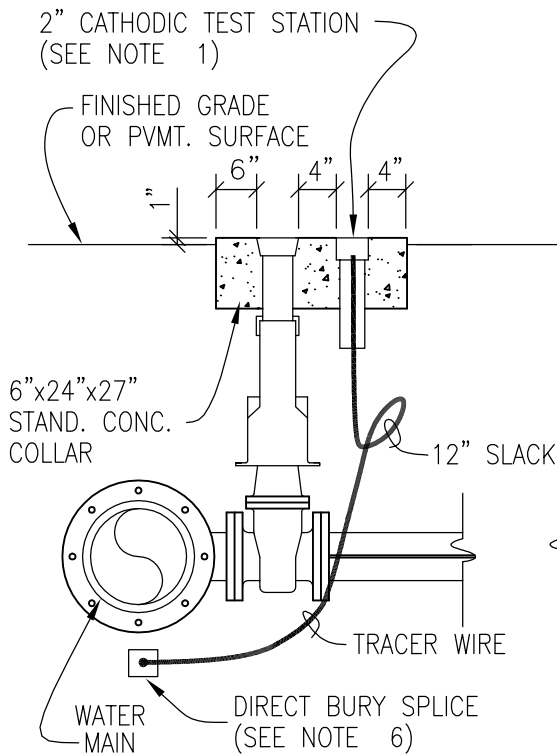
REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		W17	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



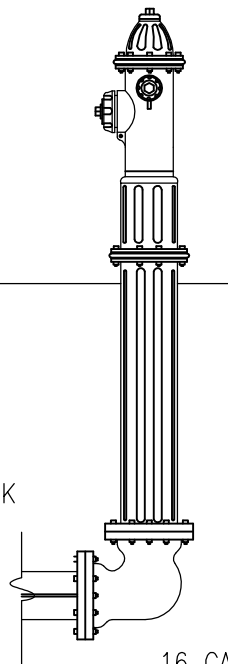
PLAN

NOTES:

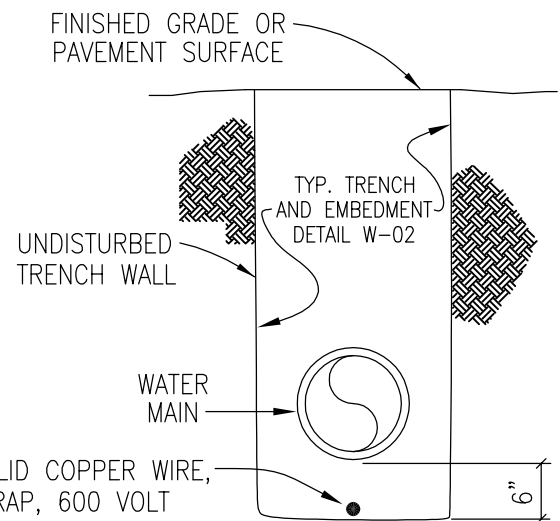
1. TEST STATION SHALL BE HANDLEY INDUSTRIES INC. - 2 INCH CATHODIC TEST STATIONS OR APPROVED EQUAL.
2. THE 15" ABS PLASTIC BOX SHALL BE A FLANGED TOP FOR INSTALLATION AT GROUND LEVEL.
3. ALL TERMINALS ARE TO BE MADE OF SOLID BRASS.
4. PLASTIC LIDS SHALL BE COLOR BLUE AND MARKED "WATER".
5. TEST TERMINALS ARE TO BE INCORPORATED WITH HANDLEY VALVE BOXES.
6. BURY SPLICE SHALL BE 3M DIRECT BURY SPLICE (DBR) OR APPROVED EQUAL.
7. TEST STATIONS SHALL BE INSTALLED AT EACH FIRE HYDRANT LOCATION.



SECTION A-A



16 GA. SOLID COPPER WIRE,
PLASTIC WRAP, 600 VOLT



SECTION B-B

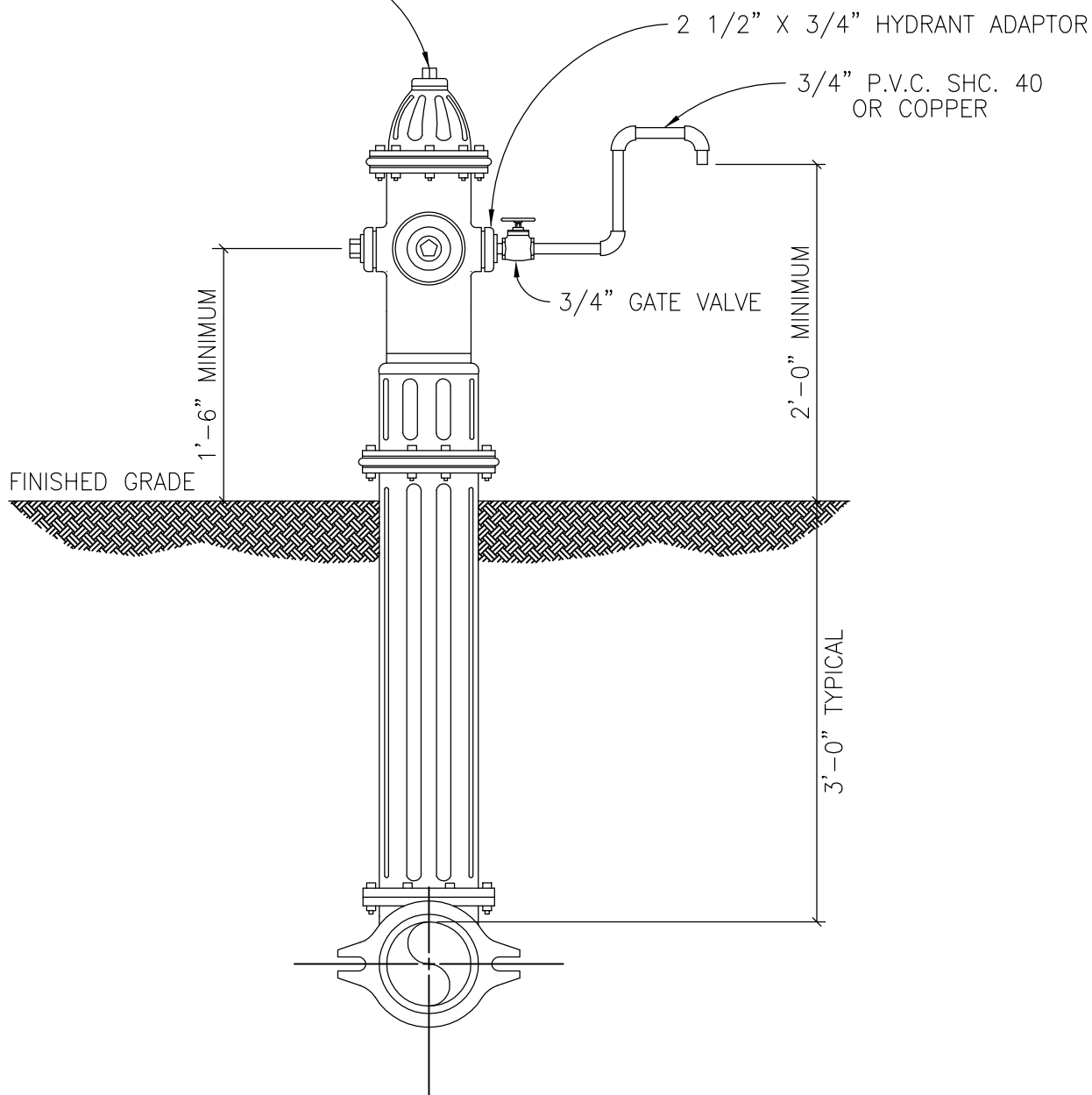
**The Architect/Engineer assumes
responsibility for appropriate
use of this standard.**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**TRACER WIRE INSTALLATION
AND TEST STATION LOCATION**

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: W18	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

FIRE HYDRANT AS SPECIFIED
(REFER TO DETAIL #W-10 FOR
ACCEPTABLE FIRE HYDRANTS)



*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

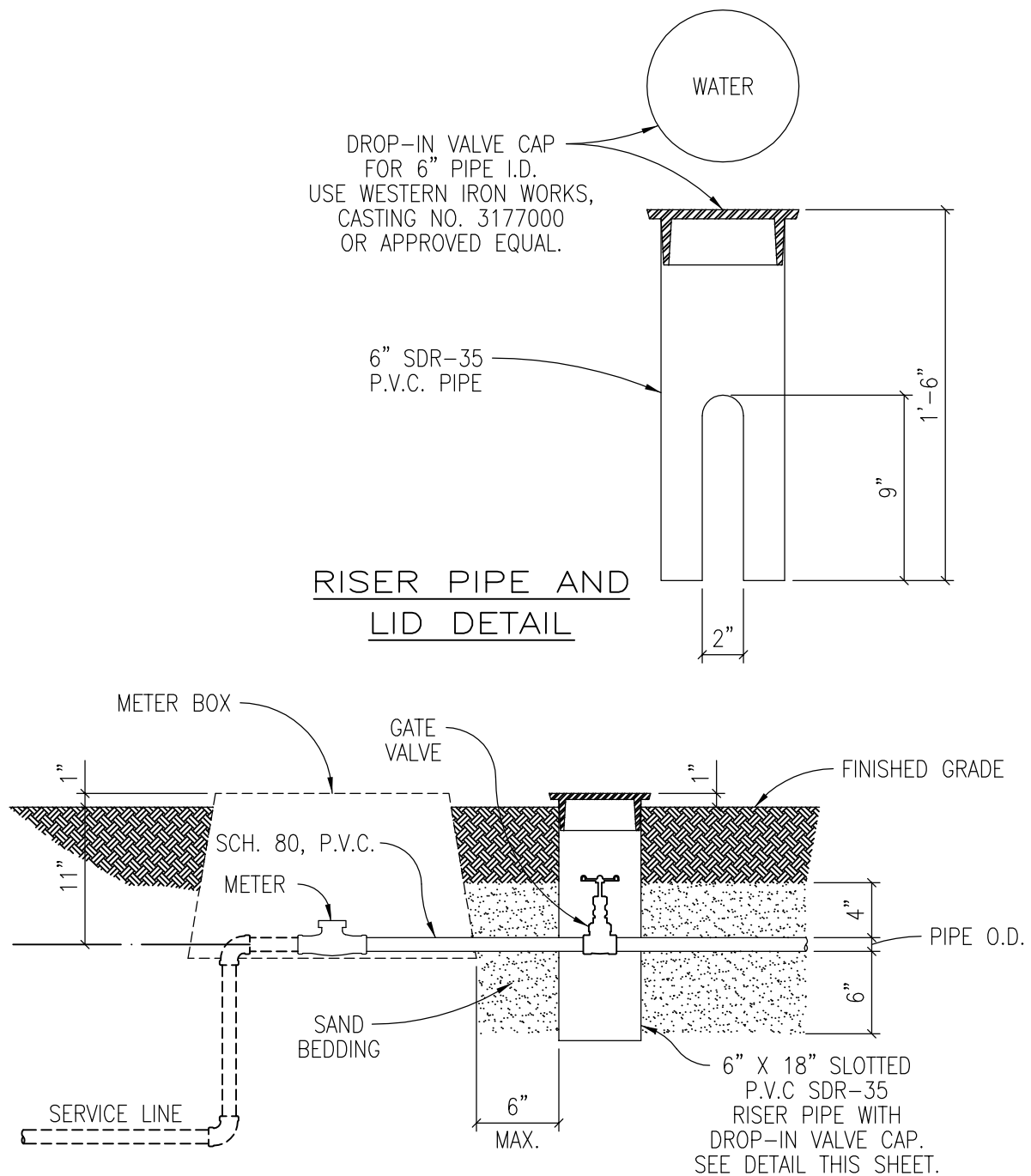


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
FIRE HYDRANT SAMPLING POINT

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W19

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTES:

1. GATE VALVE SHALL BE A HAMMOND IB645, CLASS 125, BRONZE GATE, SCREWED BONNET, NON-RISING STEM, SOLID WEDGE DISC WITH THREADED ENDS OR APPROVED EQUAL.
2. DROP-IN VALVE CAP SHALL BE CAST WITH THE WORD "WATER" ON TOP.
3. USE SCHEDULE 80, M.I.P. ADAPTER AS REQUIRED.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

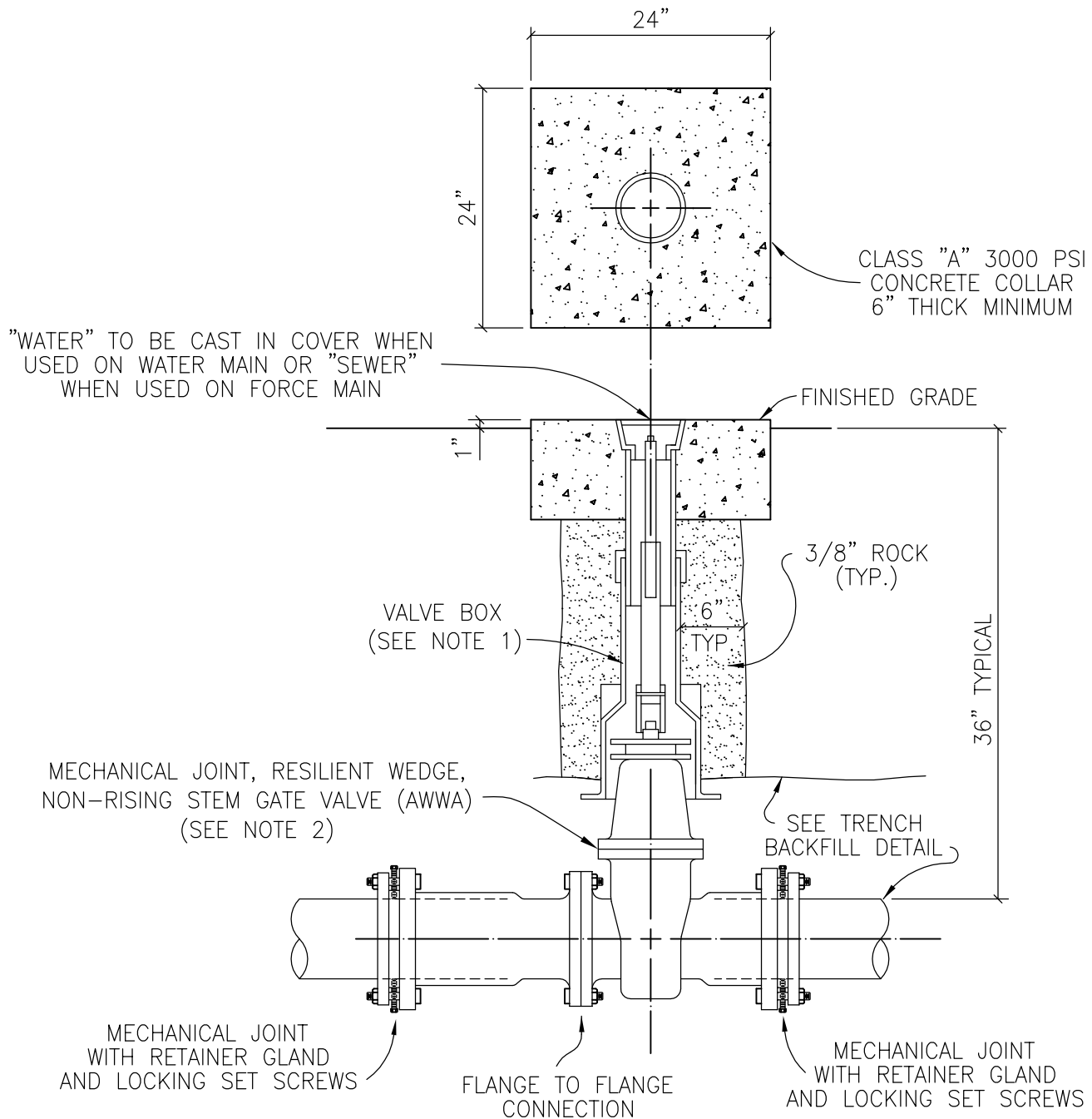


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CUSTOMER'S CUT-OFF

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: W20

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



NOTES:

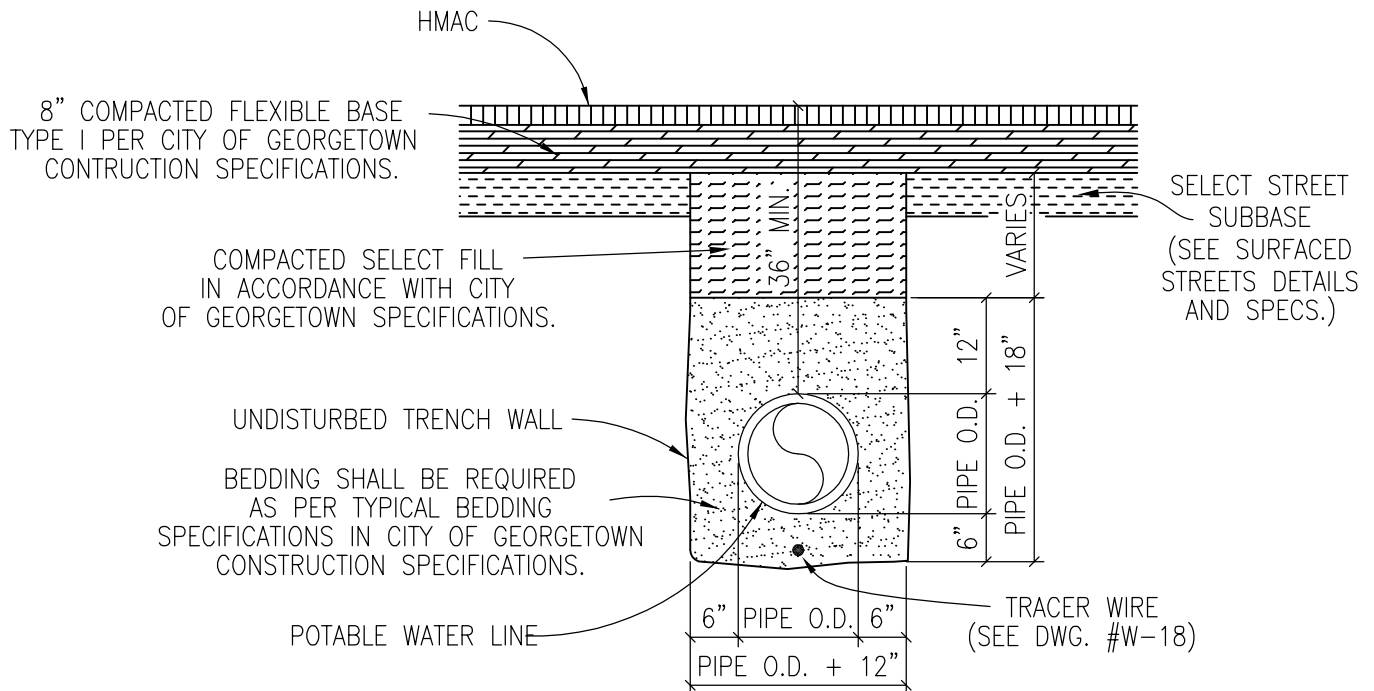
1. SEE VALVE SETTING DETAIL, DWG. #W-07.
2. ACCEPTABLE GATE VALVES ARE:
 - A. MUELLER - 2360 SERIES
 - B. CLOW

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
INLINE VALVE INSTALLATION

REVISION NOTE:		ADOPTED 6/21/2006
DRAWING NAME:		W21
SCALE:	DATE:	
NTS	1/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	



TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

NOTES:

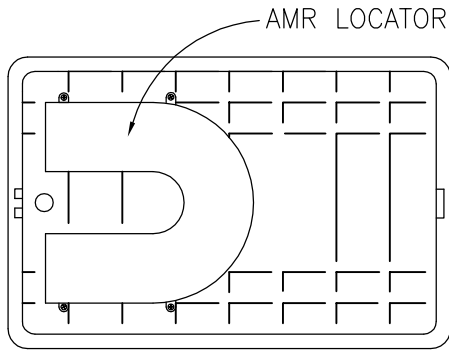
1. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

The Architect/Engineer assumes responsibility for appropriate use of this standard.

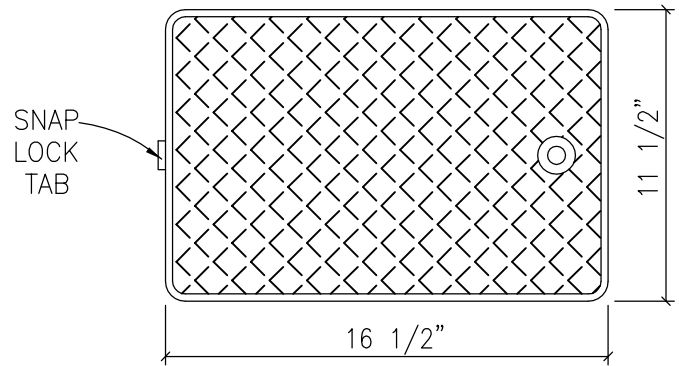


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL
UNDER PROPOSED ROADWAY

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: W22	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

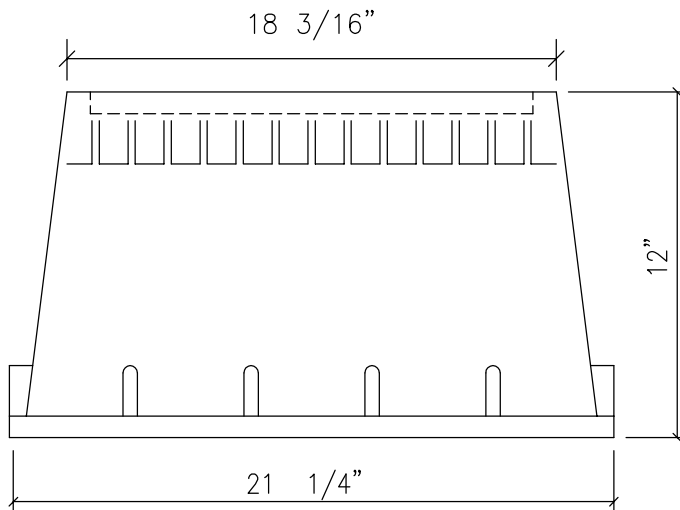


BOTTOM VIEW OF COVER

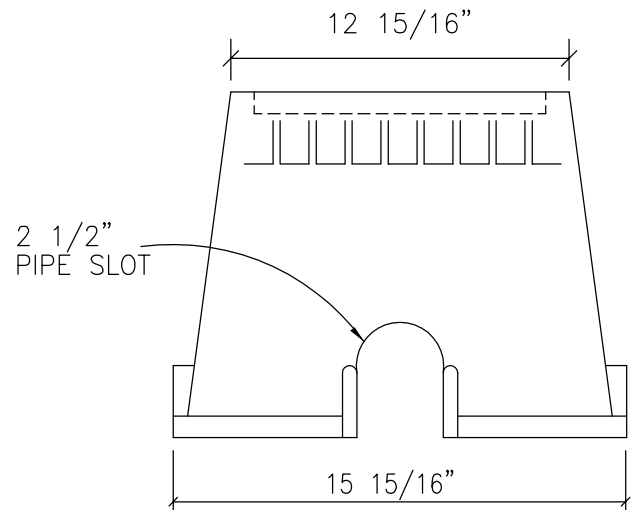


COVER

DFW PLASTINCS, INC. PART NO.
1200.SBAMR, BLACK BOX, BLACK
COVER AND 2 1/2" PIPE SLOT OR
APPROVED EQUAL.



SIDE VIEW



FRONT

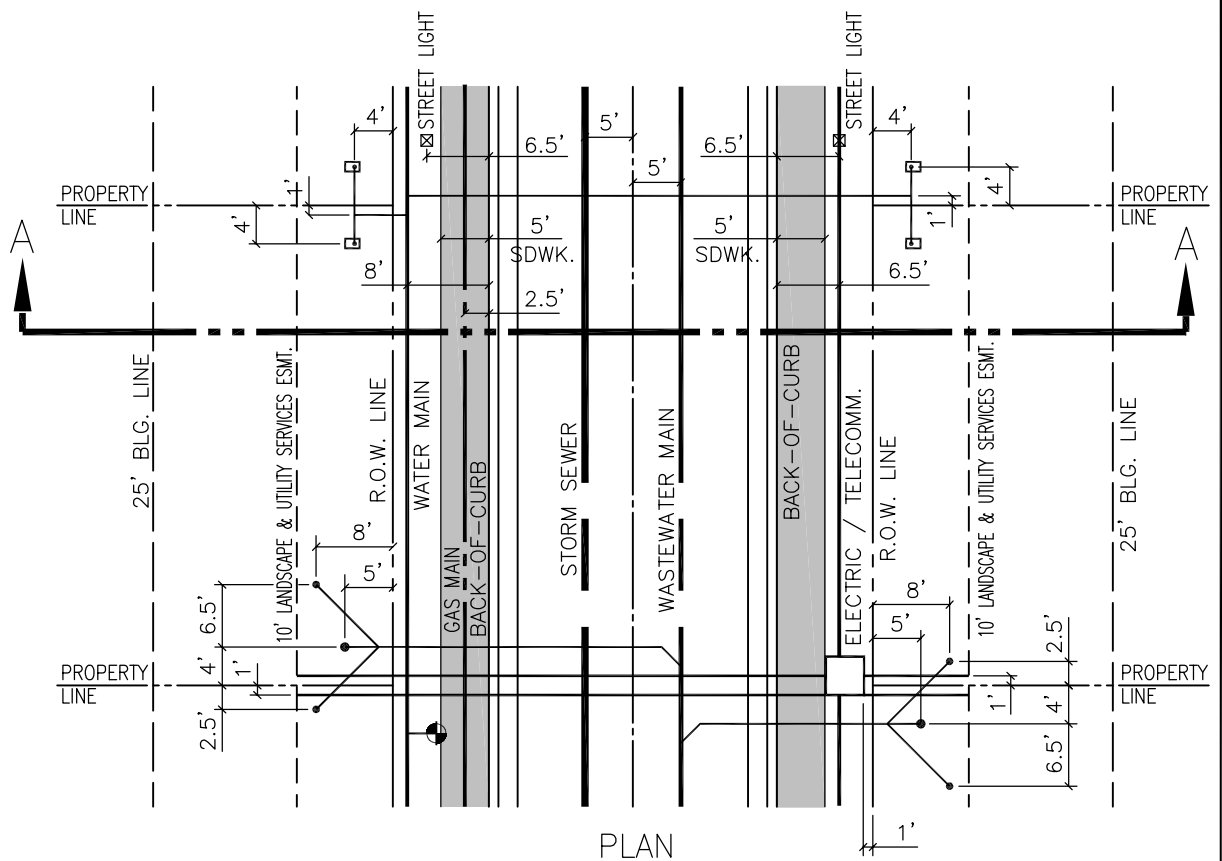
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



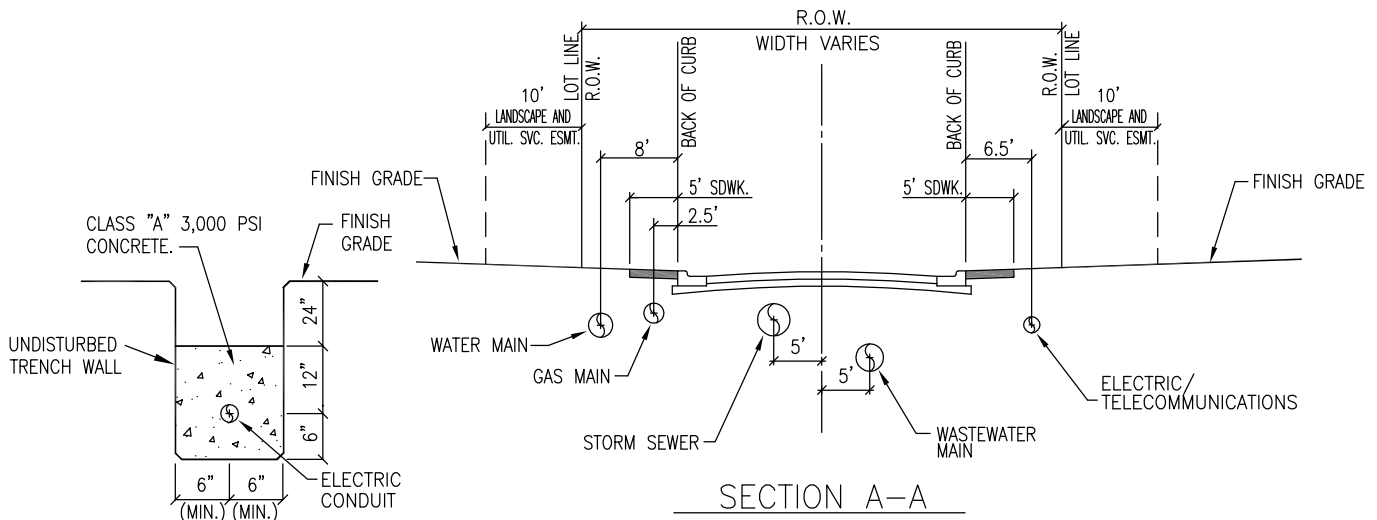
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
METER BOX (NON-TRAFFIC AREAS)

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		W23	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

WASTEWATER STANDARDS



PLAN



SECTION A-A

NOTE: WHEN CROSSING A WATER MAIN, THE ELECTRIC CONDUIT MUST BE ENCASED WITH 3,000 PSI RED CONCRETE FOR FIVE (5) FEET BOTH SIDES FROM THE CROSSING POINT.

ELECTRIC CONDUIT
CONCRETE ENCASEMENT DETAIL

MINIMUM COVER BELOW FINISH-GRADE
ALL UTILITIES UNDER ROADWAY - 36"

ELECTRIC PRIMARY	36"
ELECTRIC SECONDARY	24"
WATER	36"
WASTEWATER	48"
STORM SEWER	36"
GAS	36"
TELECOMMUNICATIONS	36"

CLASSIFICATION	ROW	B-B	PVMT.
LOCAL STREET	50'	28'	24'
RESIDENTIAL STREET	65'	37'	33'
MAJOR COLLECTOR	73'	45'	41'

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006

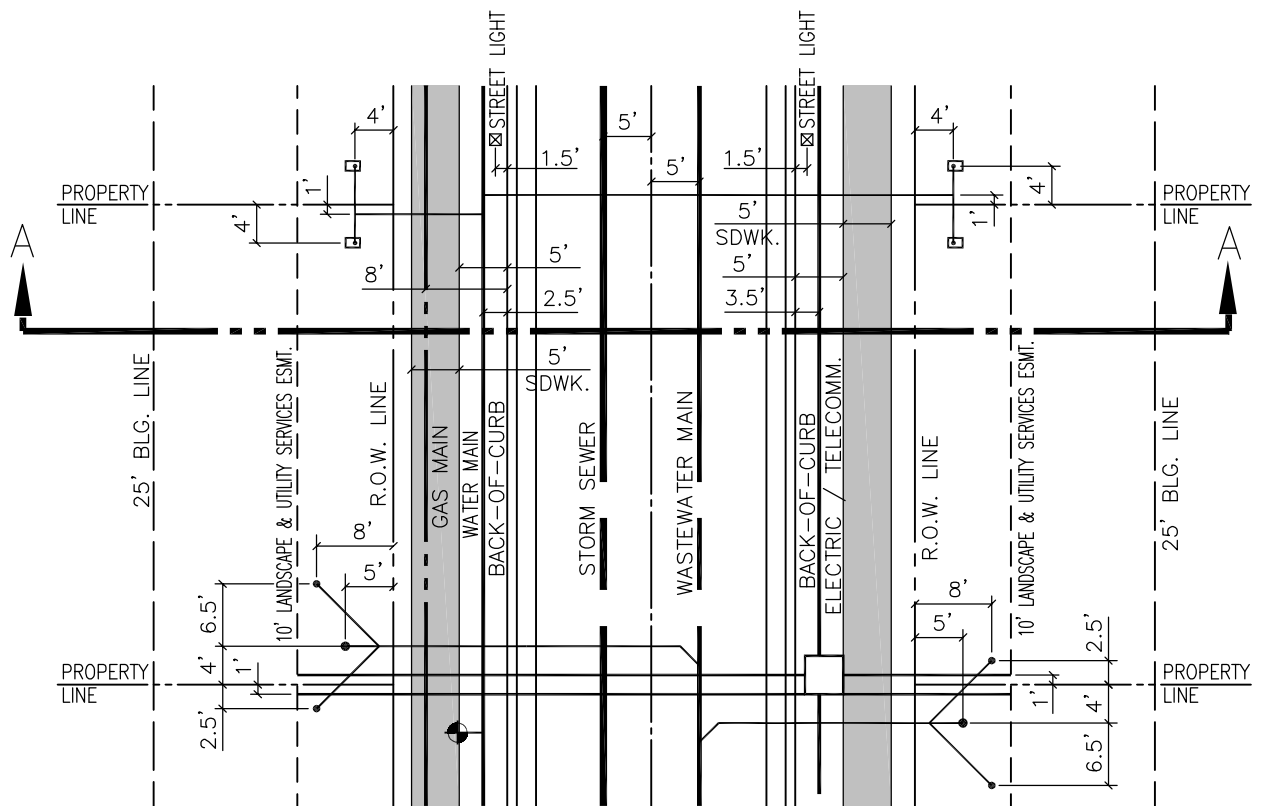
DRAWING NAME:

WW01A

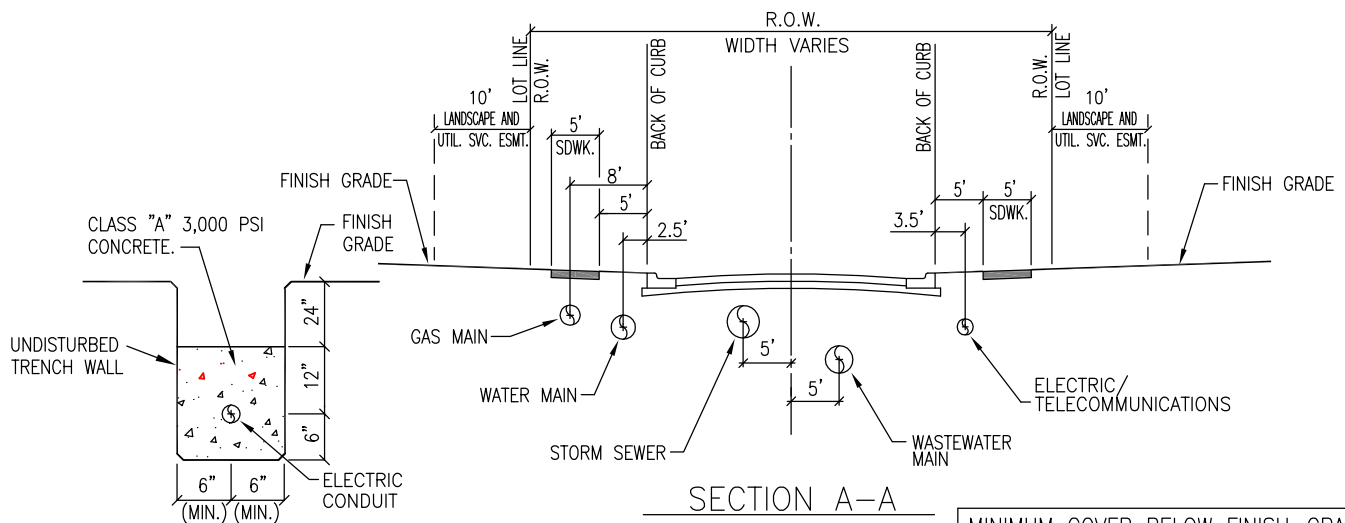
SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR LOCAL
STREETS, RESIDENTIAL COLLECTORS
AND MAJOR COLLECTORS



PLAN



SECTION A-A

NOTE: WHEN CROSSING A WATER MAIN, THE ELECTRIC CONDUIT MUST BE ENCASED WITH 3,000 PSI RED CONCRETE FOR FIVE (5) FEET BOTH SIDES FROM THE CROSSING POINT.

ELECTRIC CONDUIT
CONCRETE ENCASEMENT DETAIL

CLASSIFICATION	ROW	B-B	PVMT.
MINOR ARTERIAL	VARIES	80'	76'
MAJOR ARTERIAL	VARIES	110'	106'

MINIMUM COVER BELOW FINISH-GRADE ALL UTILITIES UNDER ROADWAY - 36"	
ELECTRIC PRIMARY	36"
ELECTRIC SECONDARY	24"
WATER	36"
WASTEWATER	48"
STORM SEWER	36"
GAS	36"
TELECOMMUNICATIONS	36"

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
UTILITY ASSIGNMENTS FOR
MINOR ARTERIAL AND
MAJOR ARTERIAL ROADWAYS

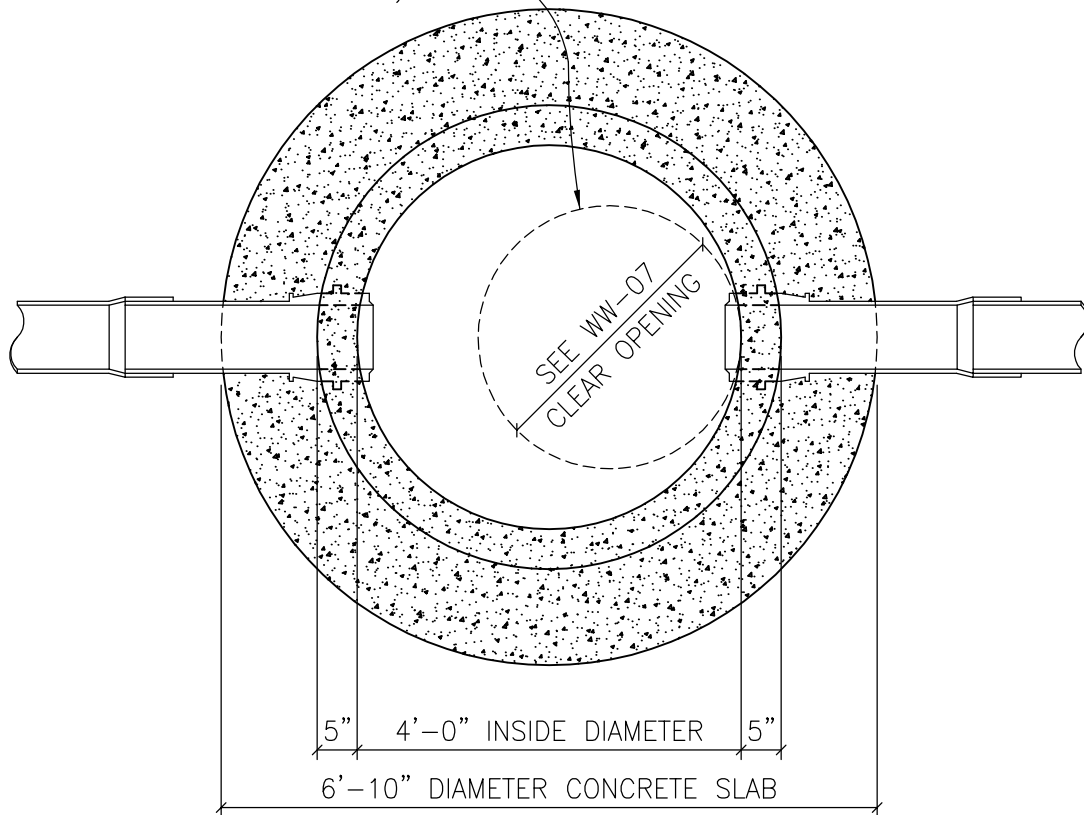
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:

WW01B

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB

STANDARD CASTING AND COVER, AS SPECIFIED.
(BOLTED WHERE SHOWN ON PLANS)



SEE DETAIL WW-03

MANHOLE PLAN

CITY OF GEORGETOWN NOTES:

MANHOLE DETAILS SHALL REFLECT THE CITY'S MINIMUM SPECIFICATIONS, AS STATED BELOW:

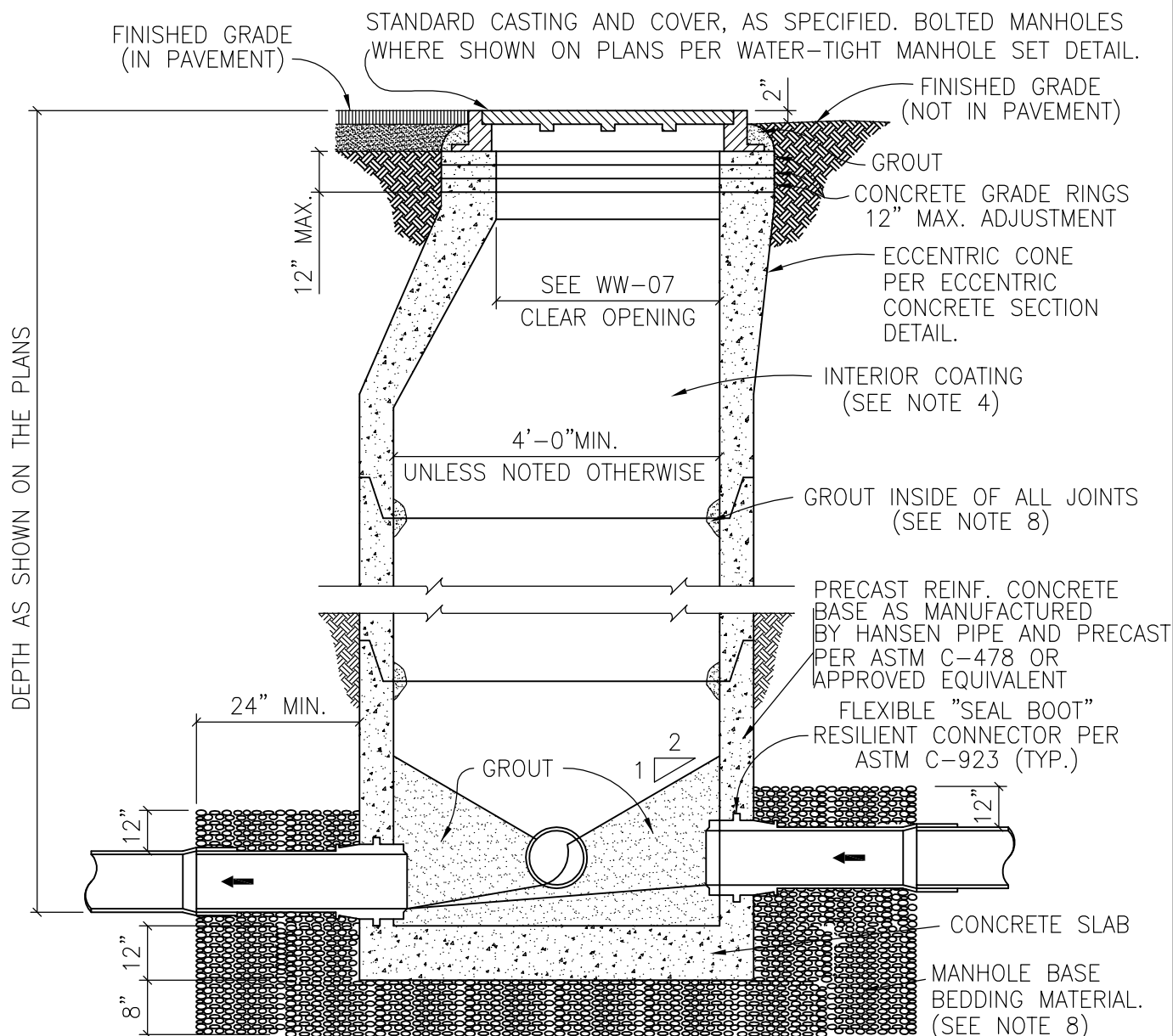
- A. ALL MANHOLES SHALL BE 48" I.D., R.C.P., CLASS III, WITH RUBBER PROFILE GASKET – SINGLE OFF-SET JOINT CONFORMING TO ASTM C478, C433 AND C76.
- B. ALL MANHOLES SHALL HAVE FRAME AND COVER, AS MANUFACTURED BY EAST JORDAN IRON WORKS (AS PER DETAIL # WW-07) OR APPROVED EQUIVALENT.
- C. ALL MANHOLES SHALL BE CONCRETE WITH CAST IRON FRAME AND COVER.
- D. ALL MANHOLES SHALL HAVE AN ECCENTRIC CONE.
- E. MANHOLES MAY HAVE A FLAT LID, IF APPROVED BY CITY OF GEORGETOWN, BEING 12" THICK WITH A MINIMUM 30" OPENING, AS MANUFACTURED BY HANSEN PIPE AND PRECAST OR APPROVED EQUAL M.F.G. CONFORMING TO ASTM C478, 5000 P.S.I. CONCRETE, TRAFFIC BEARING AND WITH PROFILE GASKET – SINGLE OFF-SET JOINT CONFORMING TO ASTM C443.
- F. INVERTS AND FLEXIBLE SEAL BOOTS, PER ASTM C-923, SHALL BE CAST INTO BASE SECTION.
- G. MINIMUM DROP BETWEEN INVERTS SHALL BE ONE-TENTH OF A FOOT (0.1').
- H. GRADE RINGS WITH AN I.D. TO MATCH FRAMES CLEAR OPENING WITH A MAXIMUM ADJUSTMENT OF 12" ARE ALLOWED.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD MANHOLE – PLAN

REVISION NOTE:		ADOPTED 6/21/2006
DRAWING NAME:		WW02
SCALE:	DATE:	
NTS	1/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	



NOTES:

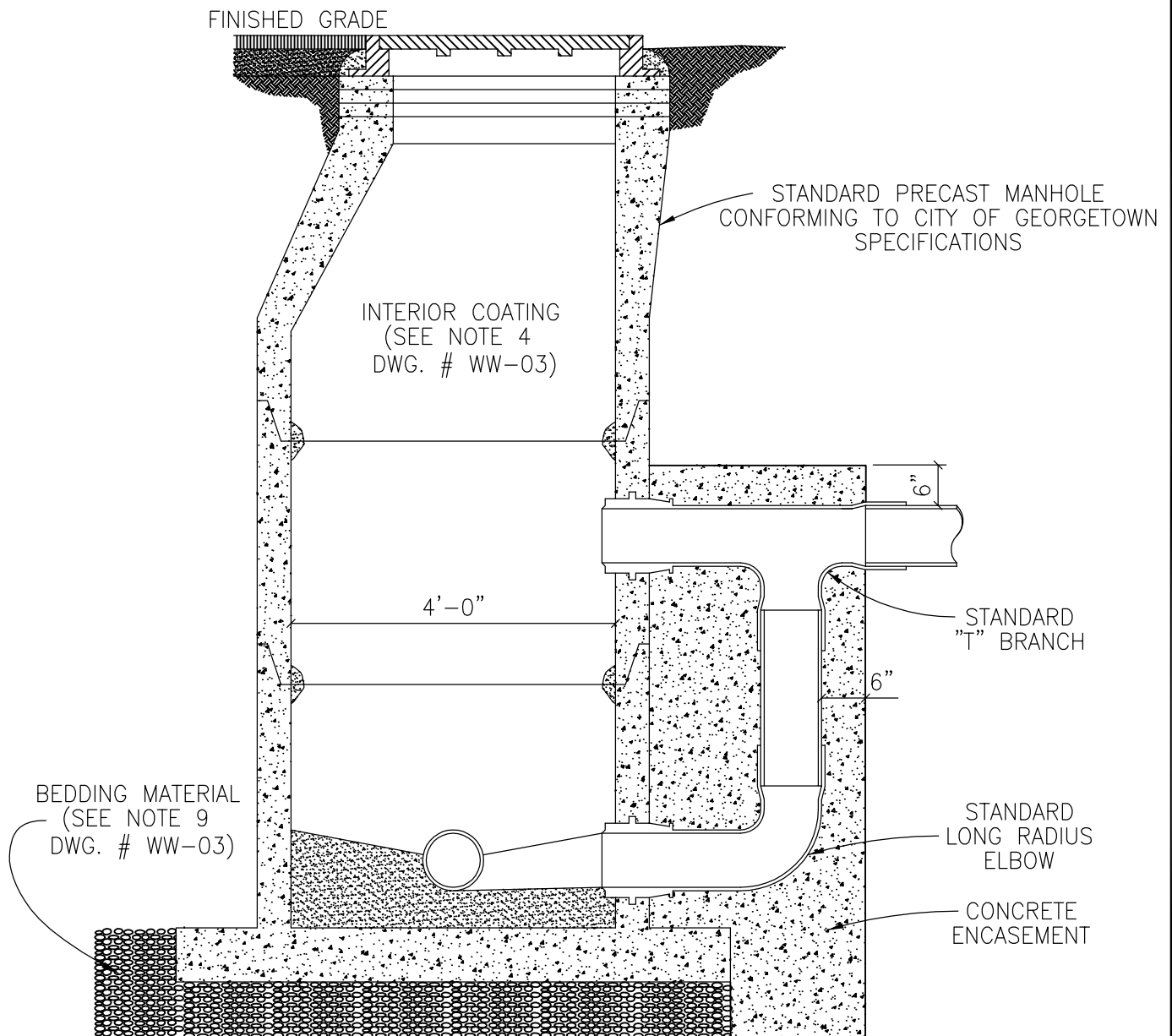
1. MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET – SINGLE OFF-SET JOINTS.
2. SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
3. SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.
4. AN 80 MIL. COAT OF RAVEN LINING SYSTEMS, RAVEN 405 ULTRA HIGH BUILD EPOXY COATING, OR SPRAY WALL EPOXY COATING, OR APPROVED EQUAL, TO BE APPLIED TO ENTIRE INTERIOR OF EACH WASTEWATER MANHOLE AND UNDERSIDE OF FLAT TOPS.
5. ALL MANHOLE COVERS SHALL BE BOLTED AND GASKETTED WHEN MANHOLES ARE LOCATED OUT FROM PAVEMENT.
6. MANHOLES TO BE VENTED ARE IDENTIFIED ON MANHOLE SCHEDULE. REFERENCE MANHOLE VENT DETAIL.
7. MANHOLES ARE TO BE DESIGNED TO RESIST LATERAL AND VERTICAL SOIL FORCES RESULTING FROM MANHOLE DEPTH. ADDITIONALLY, MANHOLES LOCATED IN PAVEMENT TO BE DESIGNED FOR HS-20 TRAFFIC LOADS.
8. GROUT SHALL MEET THE REQUIREMENTS AS STATED BY THE COATING MANUFACTURER.
9. MANHOLE BASE BEDDING MATERIAL SPECS. FOR 3/4" WASHED GRAVEL:
 - SIEVE SIZE 2", PERCENT (%) RETAINED 0
 - SIEVE SIZE 1 1/2", % RETAINED 0-10
 - SIEVE SIZE 1", % RETAINED 45-80
 - SIEVE SIZE 3/4", % RETAINED 85-100
 - SIEVE SIZE 3/8", % RETAINED 95-100

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD MANHOLE – SECTION

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: WW03	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



NOTES:

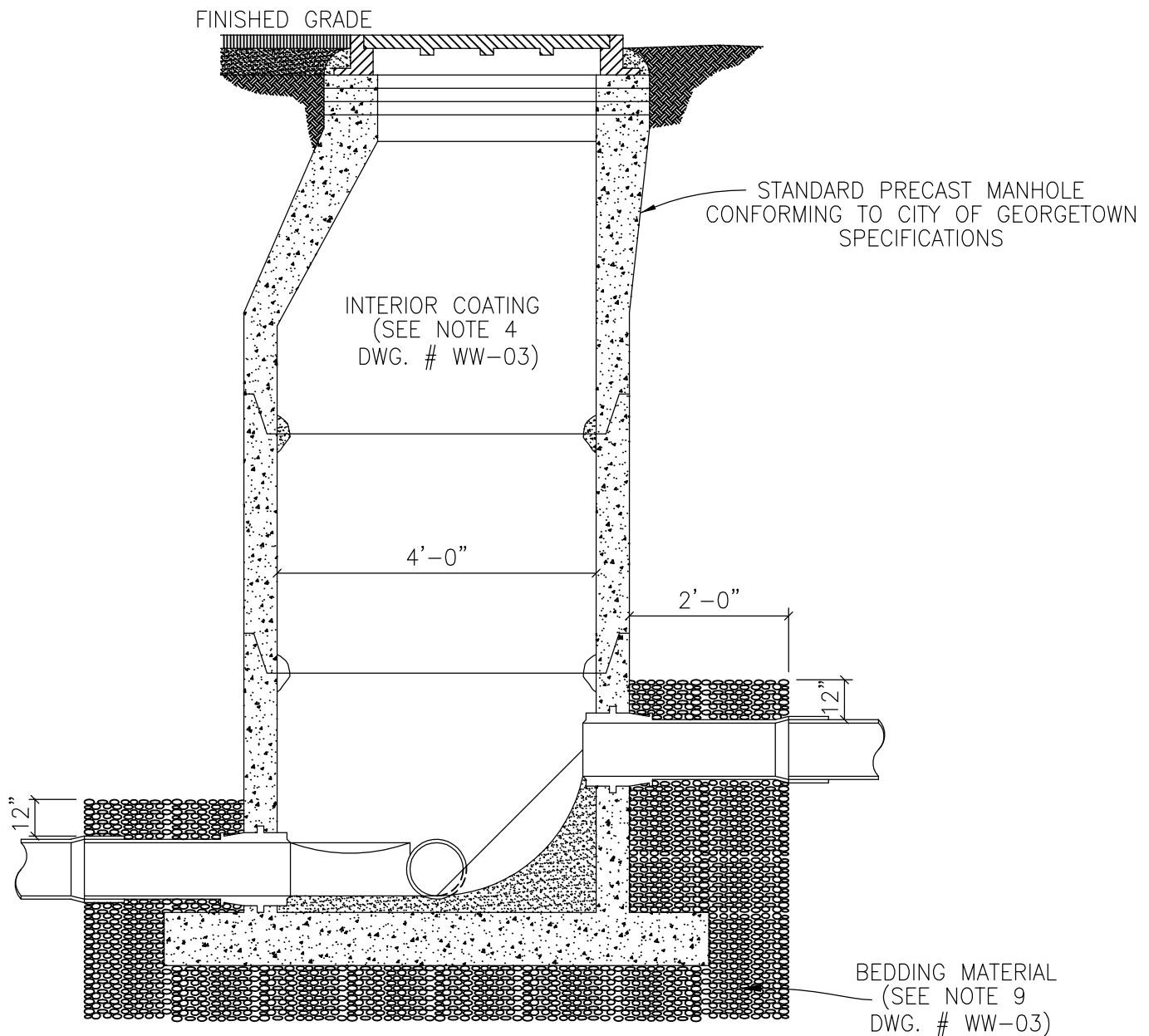
1. CONCRETE ENCASEMENT FOR DROP CONNECTION TO BE POURED INTEGRALLY WITH BOTH MANHOLE SLAB AND WALL.
2. DROP CONNECTIONS SHALL BE REQUIRED WHENEVER AN INFLUENT SEWER IS LOCATED TWO FEET (2') OR MORE ABOVE THE MAIN INVERT CHANNEL.
3. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
4. WHEN P.V.C. IS USED IN SANITARY SEWER LINES, SOLVENT TYPE JOINT P.V.C. FITTINGS MAY BE UTILIZED IN THE DROP ASSEMBLY ONLY.
5. MINIMUM PIPE SIZE FOR DROP IS EIGHT INCHES (8").
6. SEE STANDARD MANHOLE DETAIL (DWG. # WW-03) FOR ADDITIONAL REQUIREMENTS.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DROP CONNECTION—PRECAST
MANHOLE TYPE "A"

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		WW04	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



NOTES:

1. TO BE USED WHERE DROP IS SIX INCHES (6") TO TWO FEET (2'-0").
2. A FLOW CHANNEL SHALL BE CONSTRUCTED INSIDE MANHOLE TO DIRECT INFLUENT INTO FLOW STREAM.
3. CONSTRUCTION OF DROP SHALL PROVIDE AN OVERSIZED SLAB TO EXTEND UNDER THE DROP CONNECTION.
4. MINIMUM PIPE SIZE FOR DROP IS EIGHT INCHES (8").
5. SEE STANDARD MANHOLE DETAIL (DWG. # WW-03) FOR ADDITIONAL REQUIREMENTS.

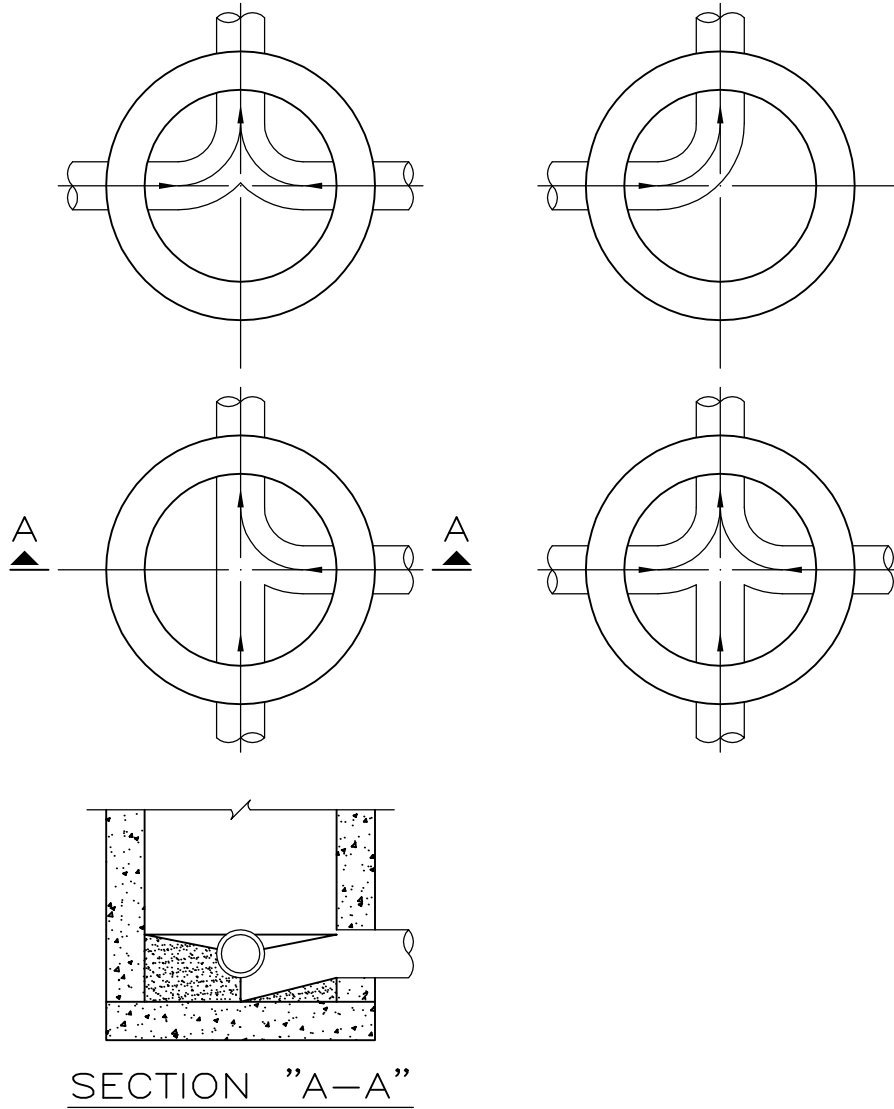
***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**DROP CONNECTION—PRECAST
MANHOLE TYPE "B"**

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		WW05	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

FLOW PATTERNS FOR INVERT CHANNELS



NOTES:

1. INVERT CHANNELS TO BE CONSTRUCTED FOR SMOOTH FLOW WITH NO OBSTRUCTIONS.
2. SPILLWAYS SHALL BE CONSTRUCTED BETWEEN PIPES WITH DIFFERENT INVERT ELEVATIONS PROVIDING FOR SMOOTH FLOW.
3. CHANNELS FOR FUTURE CONSTRUCTIONS (STUBS) SHALL BE CONSTRUCTED, FILLED WITH SAND, AND COVERED WITH 1" OF MORTAR.
4. SLOPE MANHOLE ITSELF WITH A 1:2 SLOPE FROM MANHOLE WALL TO CHANNEL.
5. INVERT SHALL BE A MINIMUM OF 1/2 THE DIAMETER OF THE LARGEST PIPE OR 4" DEEP.

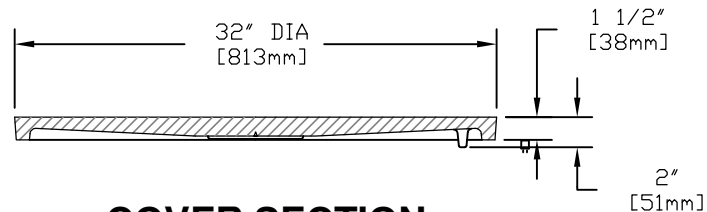
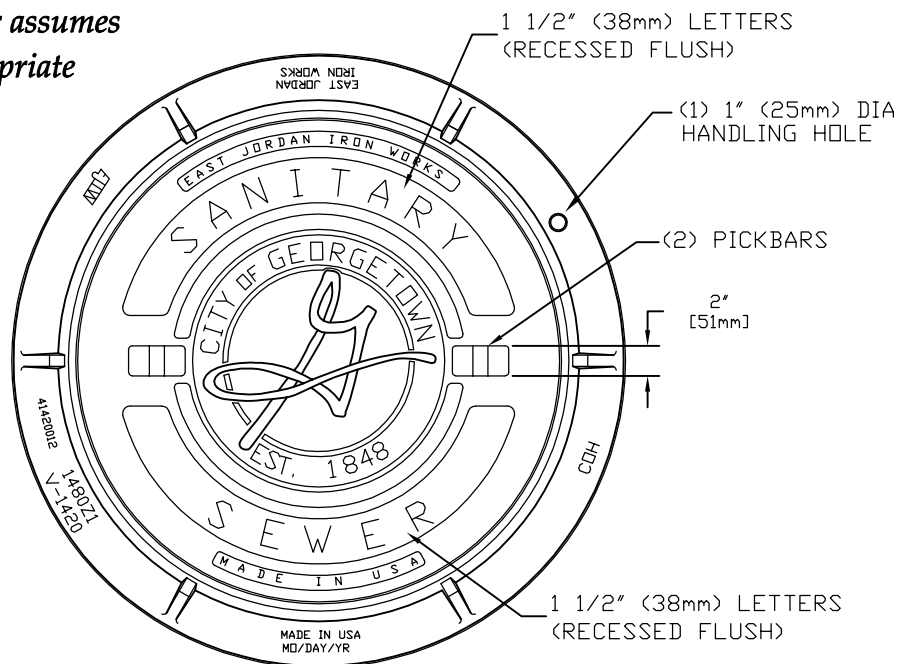
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



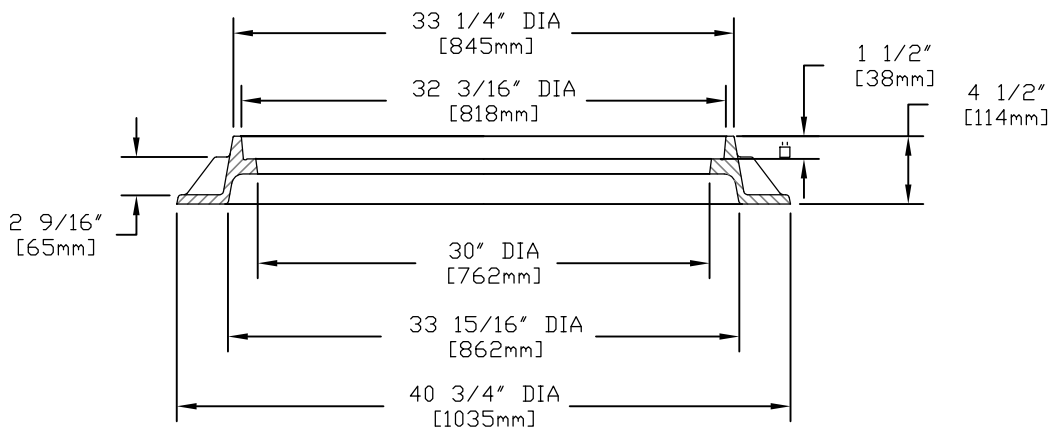
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
FLOW PATTERNS FOR
INVERT CHANNELS

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: WW06	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB

The Architect/Engineer assumes responsibility for appropriate use of this standard.



COVER SECTION



FRAME SECTION

NOTES:

1. STANDARD WASTEWATER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480A V-1420/1480Z1, COVER TO BE STAMPED WITH "SANITARY SEWER".
2. STANDARD WASTEWATER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 41420012 00148390.
4. FOR BOLTED WASTEWATER MANHOLE SET REFER TO DETAIL WW07A.

REVISION NOTE: **ADOPTED 6/21/2006**

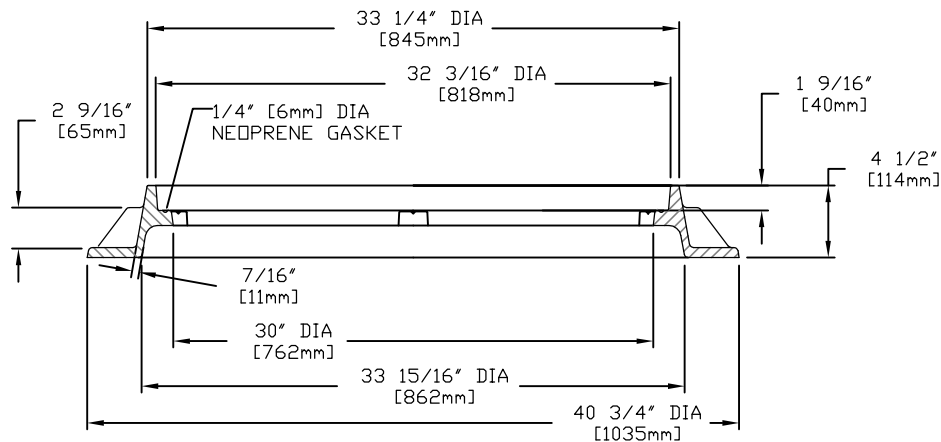
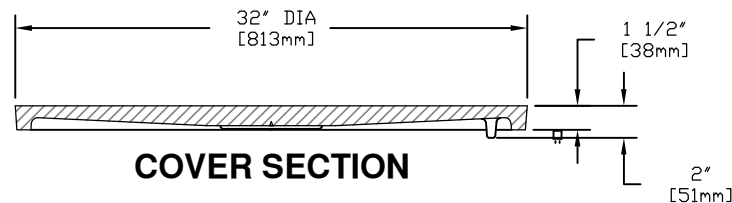
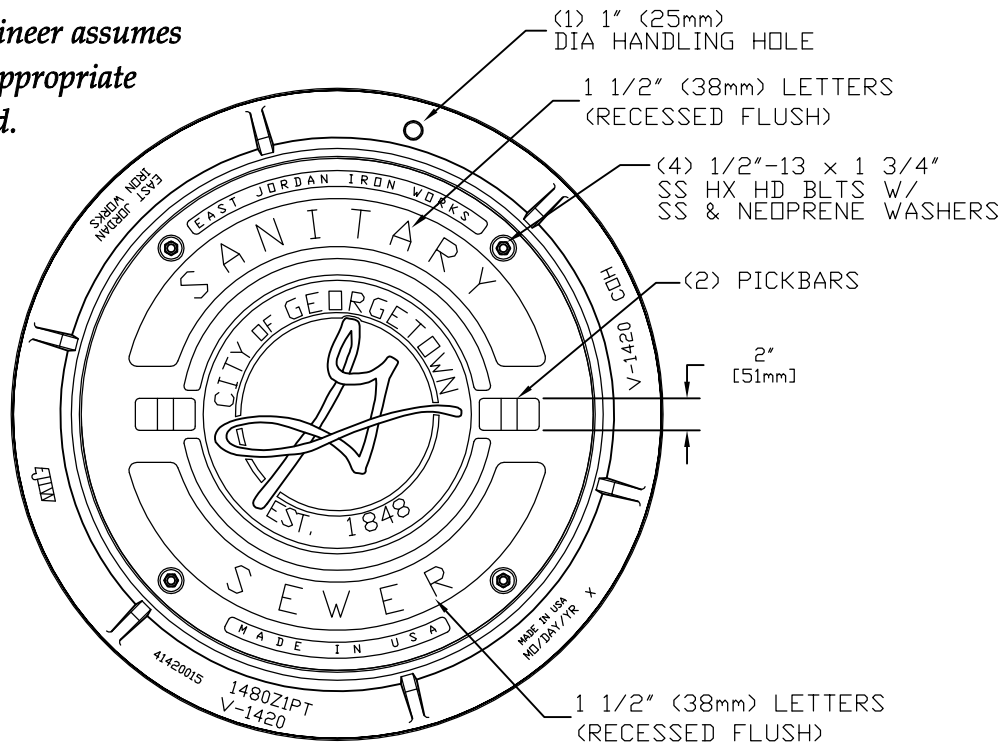
DRAWING NAME: **WW07**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**STANDARD WASTEWATER
MANHOLE SET**

SCALE: **NTS**
DATE: **1/2003**
DRAWN BY: **MRS**
APPROVED BY: **TRB**

The Architect/Engineer assumes responsibility for appropriate use of this standard.



NOTES:

1. BOLTED WASTEWATER MANHOLE SET TO BE EAST JORDAN IRON WORKS, INC. CATALOG NO. 1480APT V-1420/1480Z1PT, COVER TO BE STAMPED WITH "SANITARY SEWER".
2. BOLTED WASTEWATER MANHOLE SET TO BE HEAVY DUTY LOAD RATED.
3. FOR MORE DETAILED SPECIFICATIONS REFER TO EAST JORDAN IRON WORKS, INC. REFERENCE PRODUCT DRAWING 00148392 41420015.
4. FOR STANDARD WASTEWATER MANHOLE SET REFER TO DETAIL WW07.

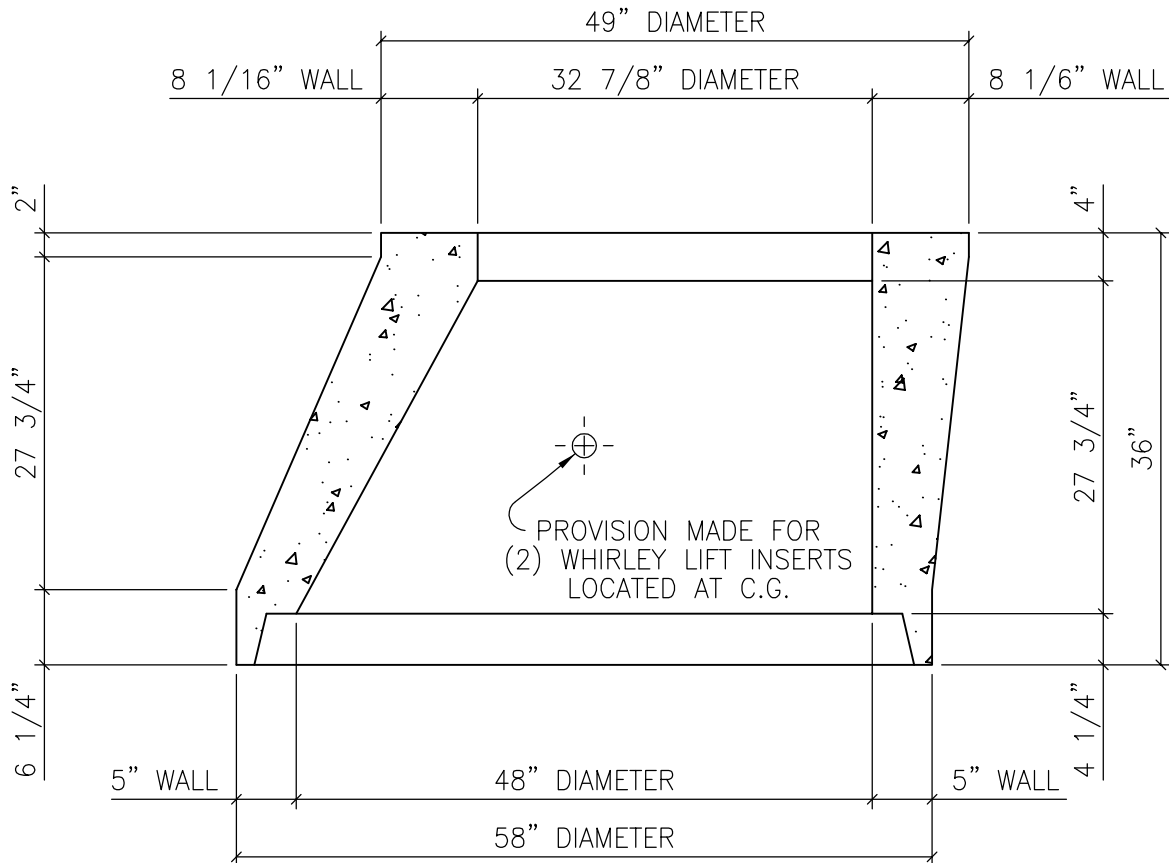
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME: **WW07A**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**BOLTED WASTEWATER
MANHOLE SET**

SCALE: **NTS**
DATE: **1/2006**
DRAWN BY: **MRS**
APPROVED BY: **TRB**



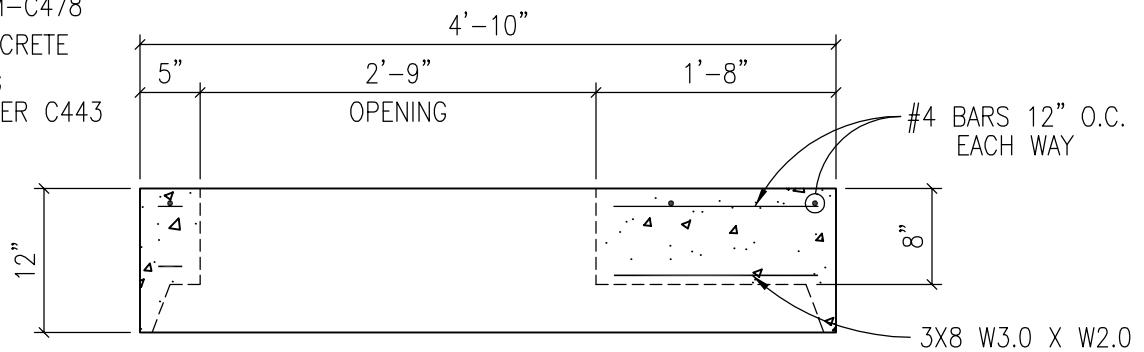
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
48"X5" TO 33"X8"X36" TALL
ECCENTRIC CONCRETE SECTION

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		WW08	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

M.F.G. PER ASTM-C478
5000 P.S.I. CONCRETE
TRAFFIC BEARING
O-RING JOINT PER C443



NOTES:

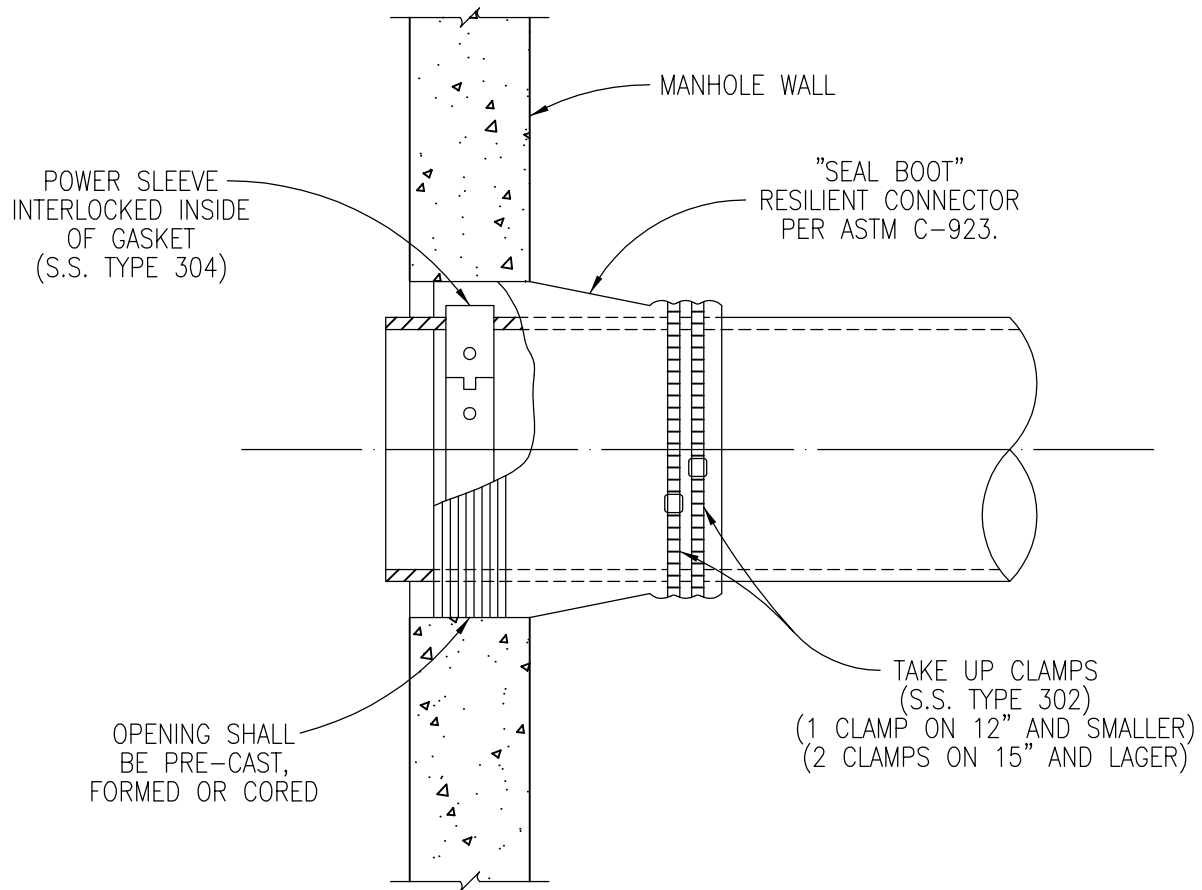
1. AVAILABLE WITH CAST IRON RING AND COVER CAST IN PLACE.
2. PERMITTED ONLY WITH WRITTEN APPROVAL FROM GEORGETOWN UTILITY SYSTEMS, CITY OF GEORGETOWN

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
48" MANHOLE FLAT LID

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: WW09		
SCALE: NTS	DATE: 1/2003	
DRAWN BY: MRS	APPROVED BY: TRB	

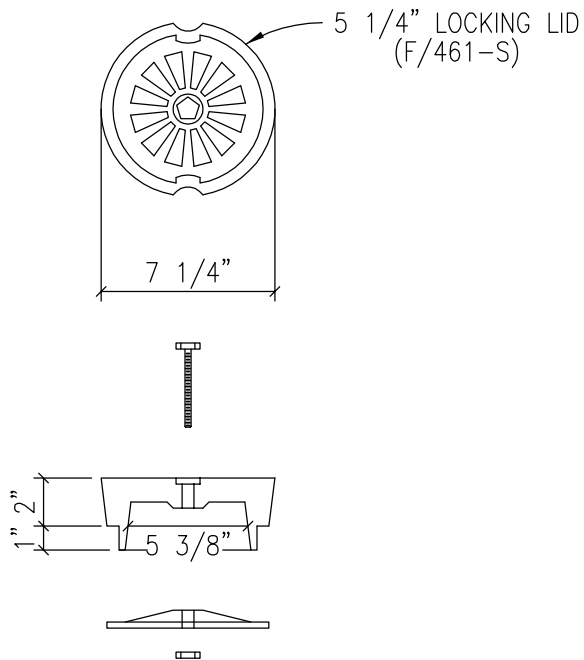


*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

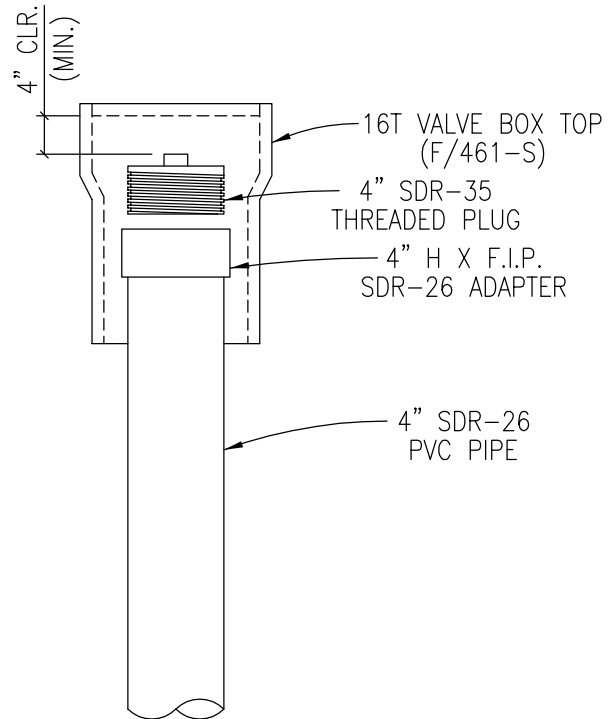


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
FLEXIBLE "SEAL BOOT" CONNECTOR

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: WW10	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



5 1/4" LOCKING LID
(F/461-S)



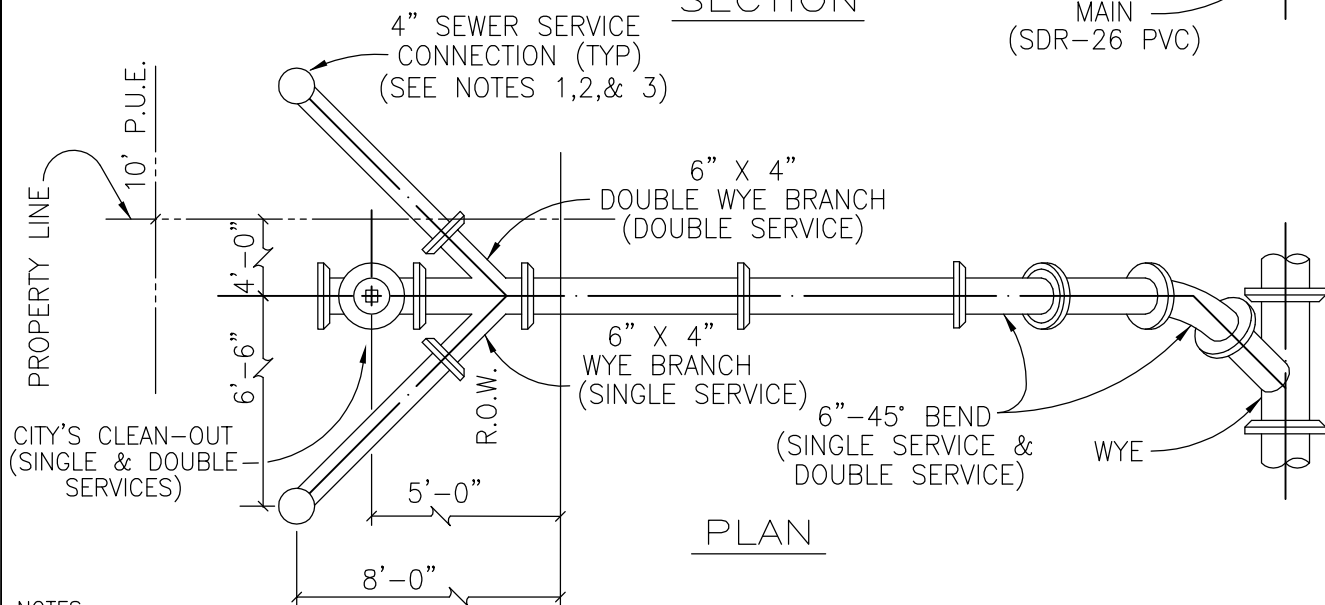
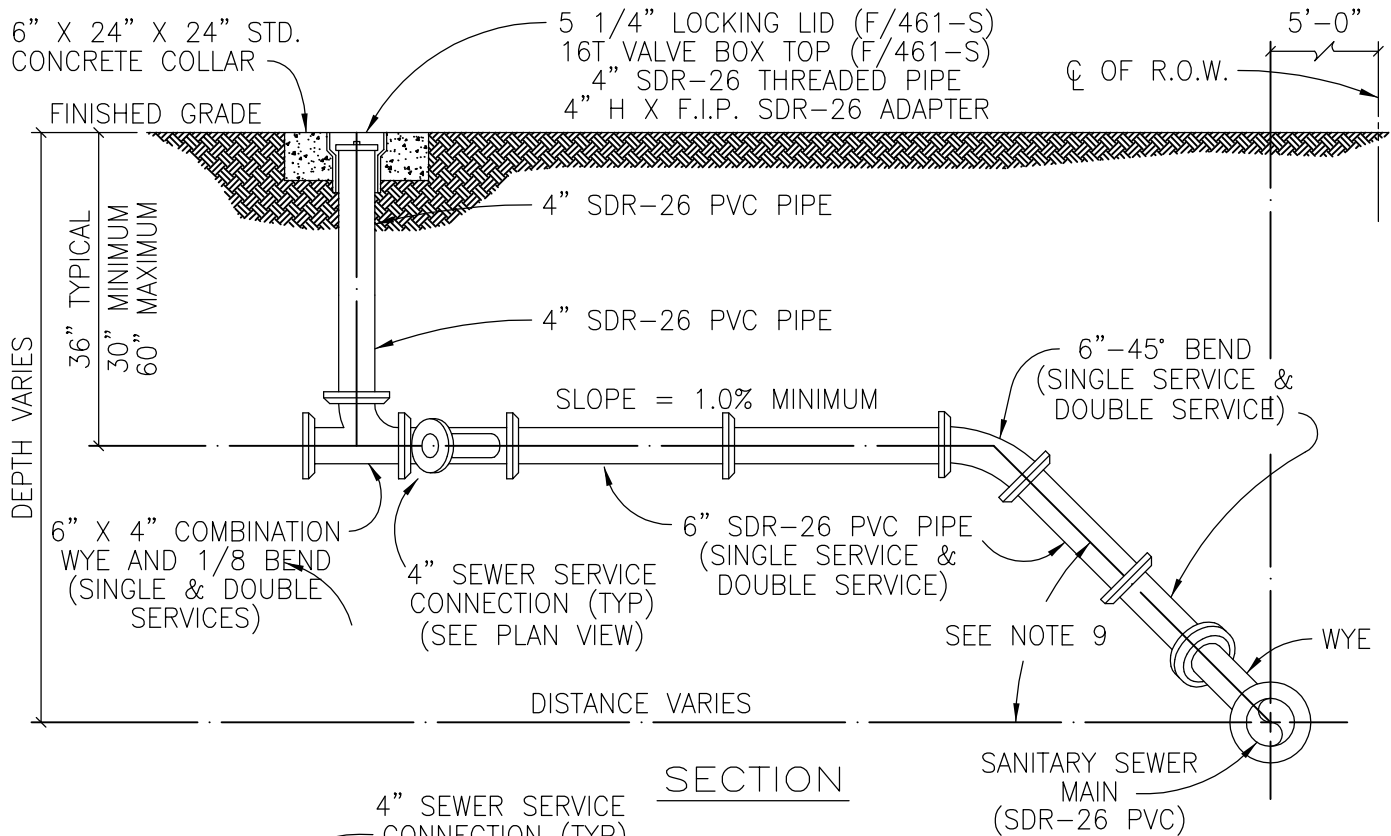
SEWER CLEAN-OUT
CITY OF GEORGETOWN
(RESIDENTIAL SERVICE)

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SEWER CLEAN-OUT DETAIL

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: WW12		
SCALE: NTS	DATE: 1/2003	
DRAWN BY: MRS	APPROVED BY: TRB	



NOTES:

- SERVICE CONNECTION RISERS SHALL TERMINATE 8' INSIDE THE PROPERTY LINE.
- THE END OF EACH SERVICE CONNECTION RISER SHALL BE EXTENDED 12" ABOVE FINISH GRADE.
- EACH SERVICE CONNECTION SHALL BE PLUGGED WATER-TIGHT WITH AN APPROVED CAP OR PLUG.
- FOR P.V.C. INSTALLATIONS, CONNECT TO EXISTING "BELL END" AND CONNECT OPPOSITE END WITH P.V.C. TO P.V.C. KNOCK ON SLEEVE.
- SOLIDLY TAMP BACKFILL AT LEAST ONE FOOT (1'-0") ABOVE TOP OF PIPE. SERVICES UNDER PAVED AREAS SHALL BE BACKFILLED TO THE SAME SPECIFICATIONS AS SHOWN ON PAVEMENT REPLACEMENT DETAIL.
- CONTRACTOR SHALL MARK ON A CLEAN SET OF PLANS THE FINAL STATIONING OR DISTANCE AND DIRECTION FROM MANHOLE TO EACH SERVICE LATERAL AND GIVE TO ENGINEER FOR RECORD DRAWING PURPOSES.
- ANY DEVIATION FROM THESE METHODS MUST BE APPROVED BY THE CITY OF GEORGETOWN ENGINEERING DEPARTMENT.
- SERVICE LINE MATERIAL SHALL BE P.V.C., SDR-26.
- SEWER SERVICE SLOPE TO BE 45° OFF CENTERLINE OF MAIN.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

WW13

SCALE:

NTS

DATE:

1/2003

DRAWN BY:

MRS

APPROVED BY:

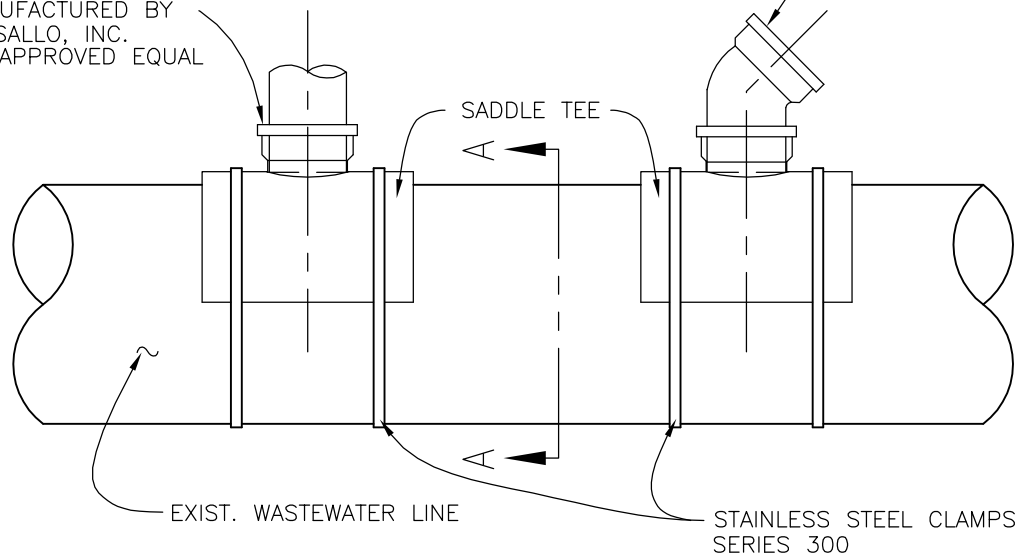
TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
SEWER SERVICE CONNECTIONS

GASKETED SEWER FITTING
NO. 52635 (6") AS
MANUFACTURED BY
VASSALLO, INC.
OR APPROVED EQUAL

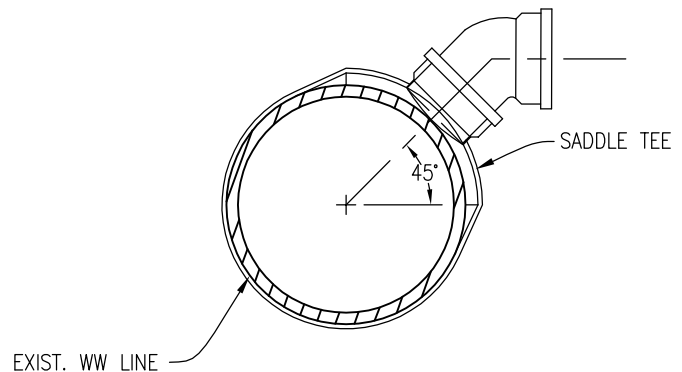
1/8 BEND-SPIGOT



PLAN VIEW

SADDLE TEE				
PART NO.	SIZE	L1	H	P
52635	8"X6"	5.625	5.659	1.448

PLASTIC TRENDS INC. - 1/8 BEND - SPIGOT					
PART NO.	SIZE	A	B	C	D
G 406	6	11.270	6.146	1.870	6.090



SECTION A-A

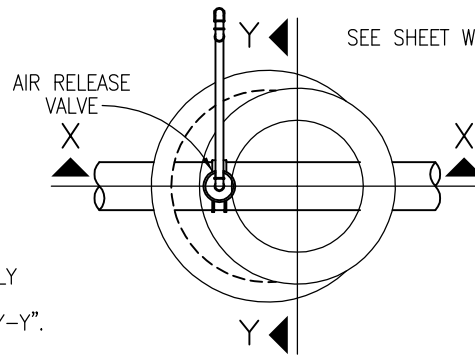
- NOTES: 1. FLEXIBLE SADDLE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.
 2. SADDLE TEE SHALL BE ORIENTATED 45° TO MAIN. (SEE SEWER SERVICE CONNECTIONS DETAIL - DWG # WW-13)
 3. EXCAVATE AROUND EXISTING 8-INCH PIPE, EXPOSING SUFFICIENT ROOM FOR S.S. CLAMPS.
 4. THOROUGHLY CLEAN AND DRY THE MATING SURFACE WITH RAG OR PAPER TOWEL. MAKE SURE THEY ARE FREE OF DUST AND MOISTURE.
 5. MARK THE SIZE OF THE HOLE TO BE CUT USING THE GASKET SKIRT OR THE SADDLE ITSELF AS THE TEMPLATE.
 6. SAW OUT THE SECTION OF THE PIPE WHERE THE SADDLE WILL BE LOCATED, WITH A SABER OR KEY HOLE SAW.
 7. TEST TO MAKE SURE SADDLE FITS HOLE PROPERLY.
 8. SERVICE PIPE SHALL NOT EXTEND MORE THAN ONE-HALF INCH INTO THE MAIN.
 9. PLACE GASKET SKIRT AND SADDLE OVER OPENING AND TIGHTEN BAND CLAMPS EVENLY UNTIL SADDLE IS FIRMLY ATTACHED TO THE PIPE. APPLY PRESSURE ON THE SADDLE AGAINST THE PIPE WHILE TIGHTENING THE CLAMPS AS INDICATED ABOVE. DO NOT OVER TIGHTEN, DO NOT STRIP THREAD.
 10. REPLACE THE BEDDING AND BACKFILL IN ACCORDANCE WITH THE TRENCH EMBEDMENT DETAIL.

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
GASKETED SEWER FITTING FOR
SEWER SERVICE CONNECTIONS
TO EXISTING MAINS

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		WW13A	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		

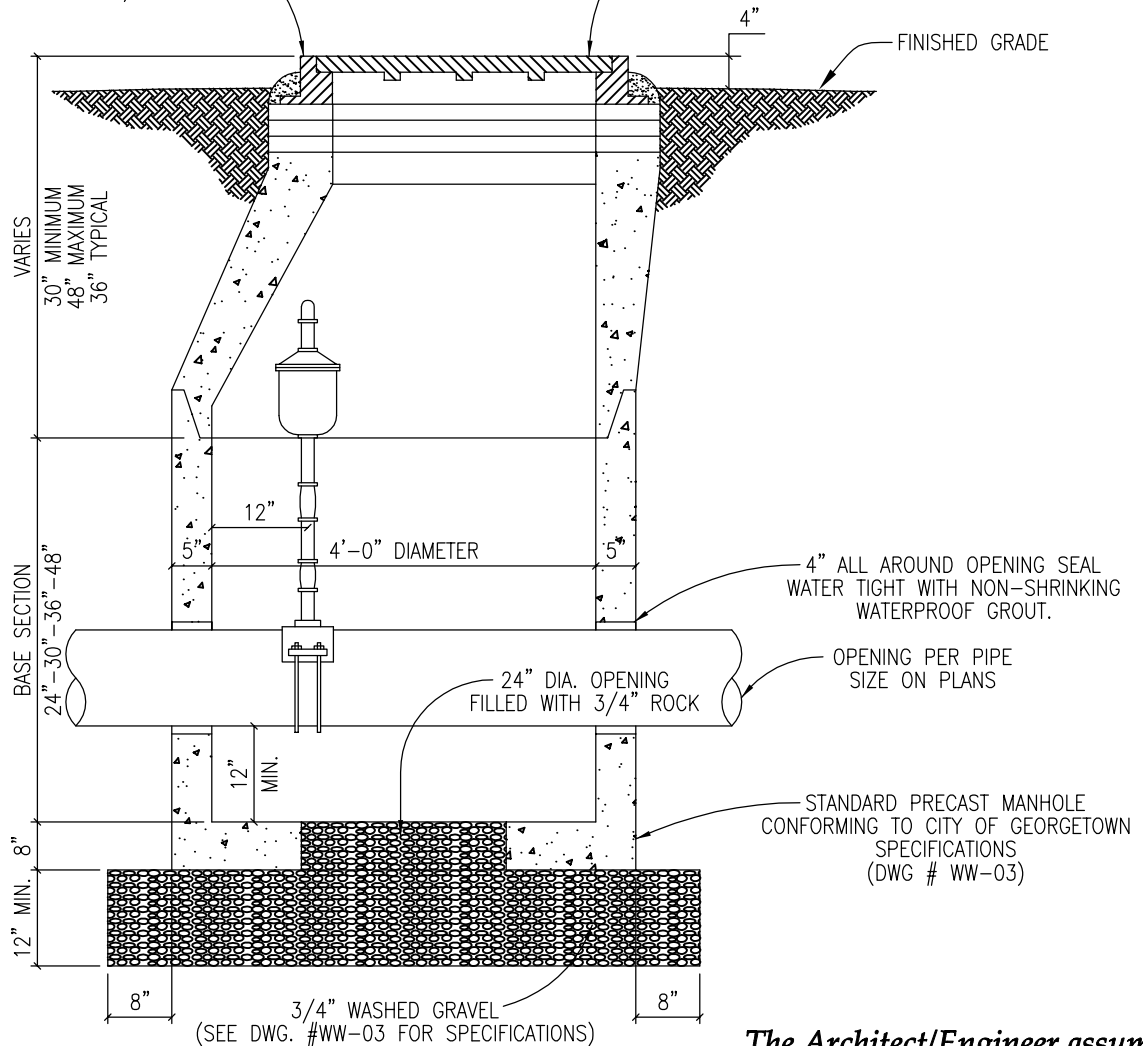


NOTE:
PLAN VIEW SHOWN ONLY
FOR CLARIFICATION OF
SECTION "X-X" AND "Y-Y".

PLAN

ADJUST WITH GRADE RINGS
AND MORTAR TO BRING TO 4"
ABOVE GRADE.
(12" MAX. ADJUSTMENT)

FRAME AND COVER
AS PER DETAIL #WW-07 OR
APPROVED EQUIVALENT AND
SHALL BE 4" ABOVE FINISH GRADE.



SECTION "X-X"

**The Architect/Engineer assumes
responsibility for appropriate
use of this standard.**



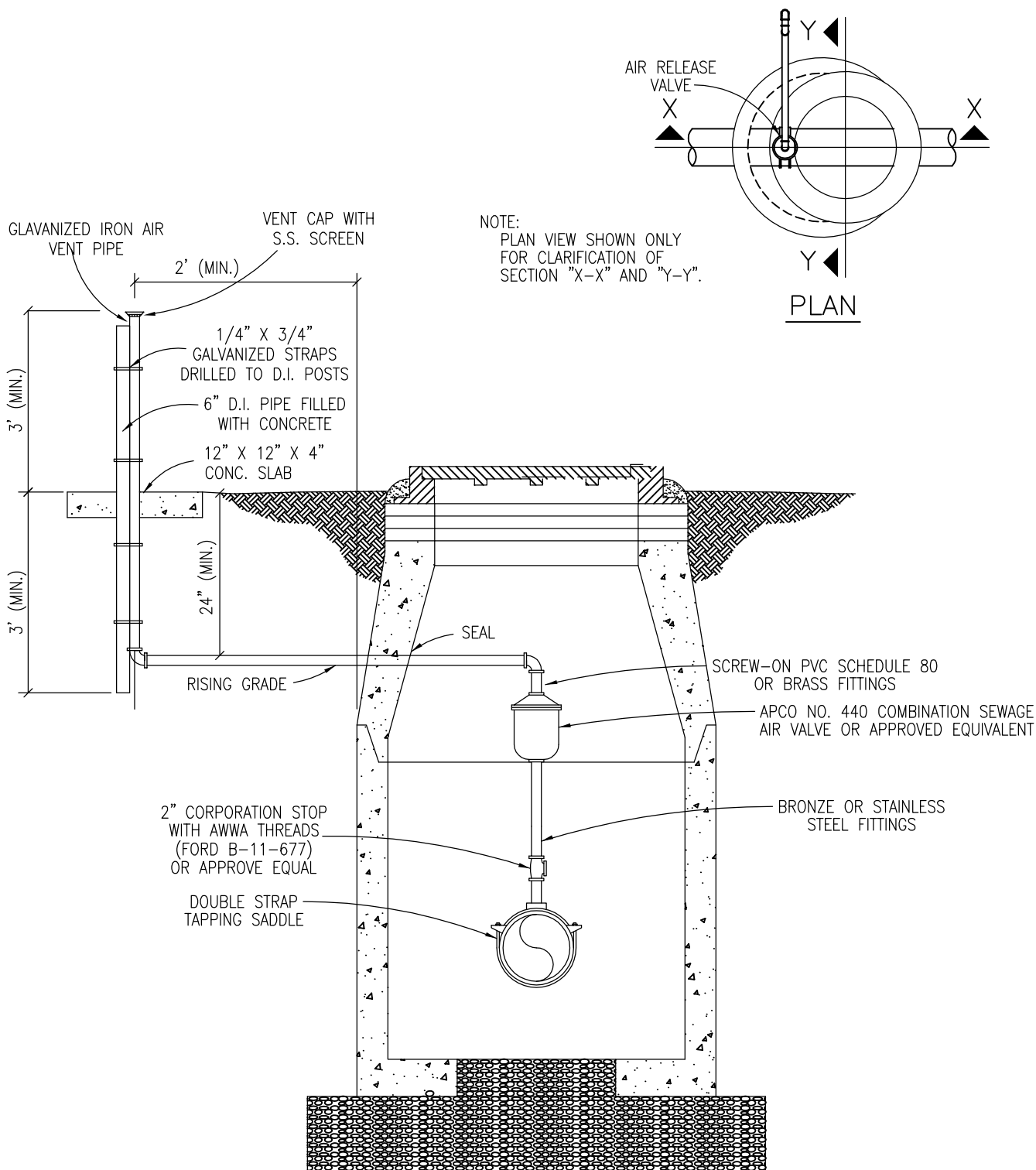
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD AIR RELEASE VALVE
FOR FORCE MAIN

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

WW14

SCALE: NTS
DATE: 1/2003
DRAWN BY: MRS
APPROVED BY: TRB



The Architect/Engineer assumes responsibility for appropriate use of this standard.

SECTION "Y-Y"



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STANDARD AIR RELEASE VALVE
FOR FORCE MAIN

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

WW15

SCALE:	DATE:
NTS	1/2003
DRAWN BY:	APPROVED BY:
MRS	TRB

PLACE A 6" LAYER OF EXISTING TOPSOIL
FOR FUTURE GROWTH OF VEGETATION

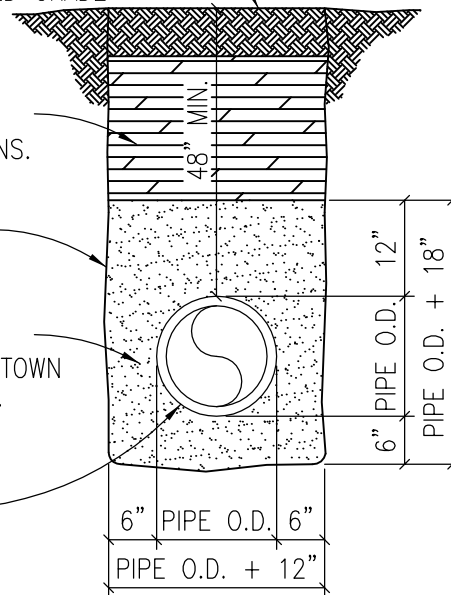
FINISHED GRADE

COMPACTED SELECT FILL
IN ACCORDANCE WITH CITY
OF GEORGETOWN SPECIFICATIONS.

UNDISTURBED TRENCH WALL

BEDDING SHALL BE REQUIRED
AS PER TYPICAL BEDDING
SPECIFICATIONS IN CITY OF GEORGETOWN
CONSTRUCTION SPECIFICATIONS.

WASTEWATER LINE
(SDR-26 PVC)



TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

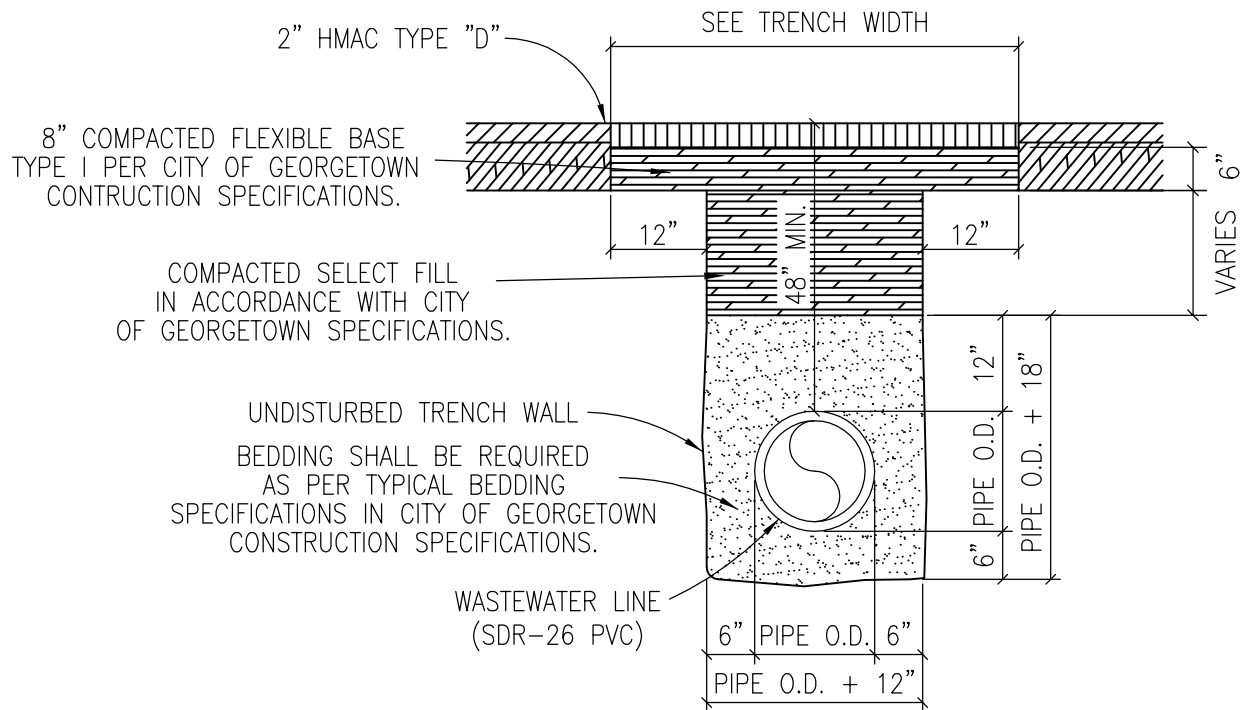


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL
UNDER NON-PAVED AREAS

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:
WW16

SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



TRENCH WIDTHS

*PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.

*20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

NOTES:

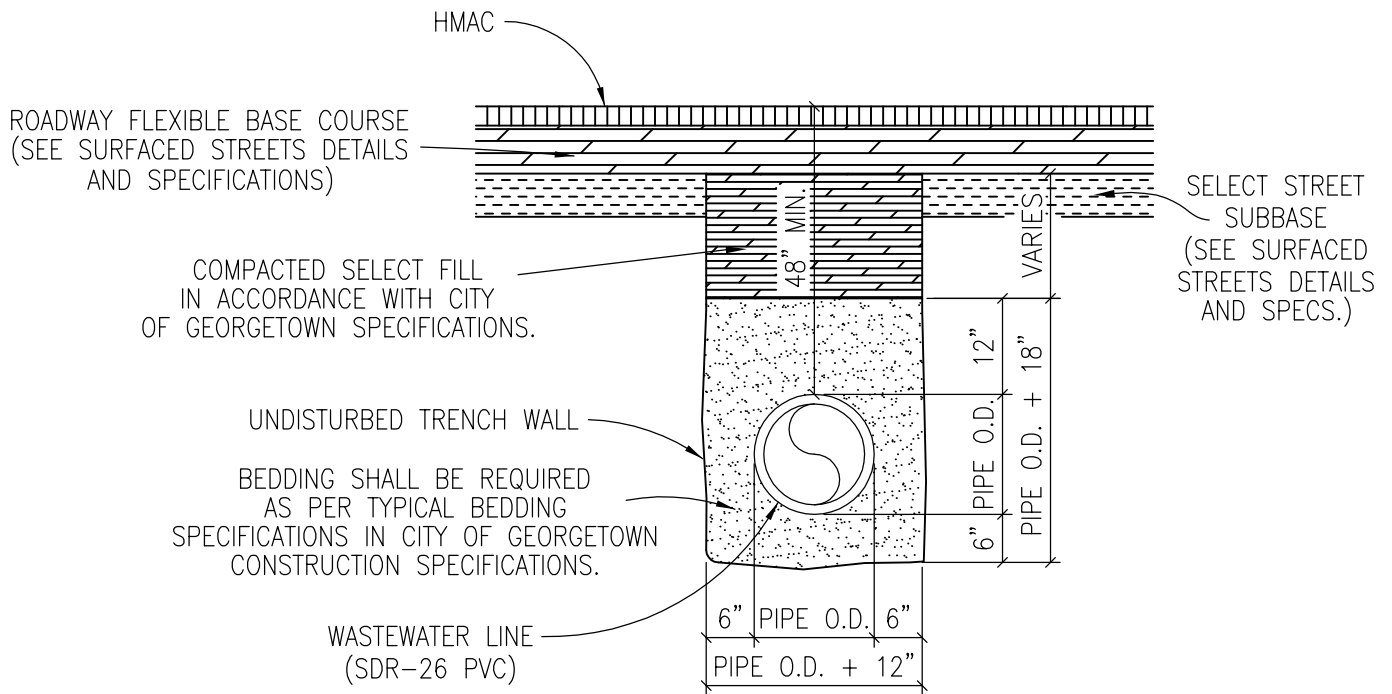
1. REPLACED BASE MATERIAL OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE.
2. BASE MATERIAL SHALL BE PLACED IN MULTIPLE LIFTS NOT TO EXCEED 6". EACH LAYER SHALL BE THOROUGHLY ROLLED OR TAMPED TO SPECIFIED MAXIMUM DENSITY.
3. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED.
4. SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE.
5. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
6. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

***The Architect/Engineer assumes
responsibility for appropriate
use of this standard.***



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
**TRENCH AND EMBEDMENT
AND PAVEMENT REPLACEMENT DETAIL
UNDER EXISTING ROADWAY**

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		WW17	
SCALE:	DATE:		
NTS	1/2003		
DRAWN BY:	APPROVED BY:		
MRS	TRB		



TRENCH WIDTHS

- *PIPE LESS THAN 20" DIAMETER
1'-0" + PIPE O.D.
- *20" DIAMETER PIPE AND LARGER
2'-0" + PIPE O.D.

NOTES:

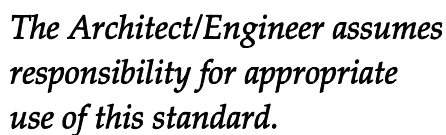
1. DENSITY TESTS SHALL BE TAKEN IN ACCORDANCE WITH THE CITY OF GEORGETOWN CONSTRUCTION SPECIFICATIONS AND STANDARDS.
2. CONTRACTOR OR ENGINEER MAY USE FLOWABLE BACKFILL AS AN ALTERNATE BACKFILL MATERIAL (SEE C9 FLOWABLE BACKFILL FOR THE SPECIFICATION).

The Architect/Engineer assumes responsibility for appropriate use of this standard.

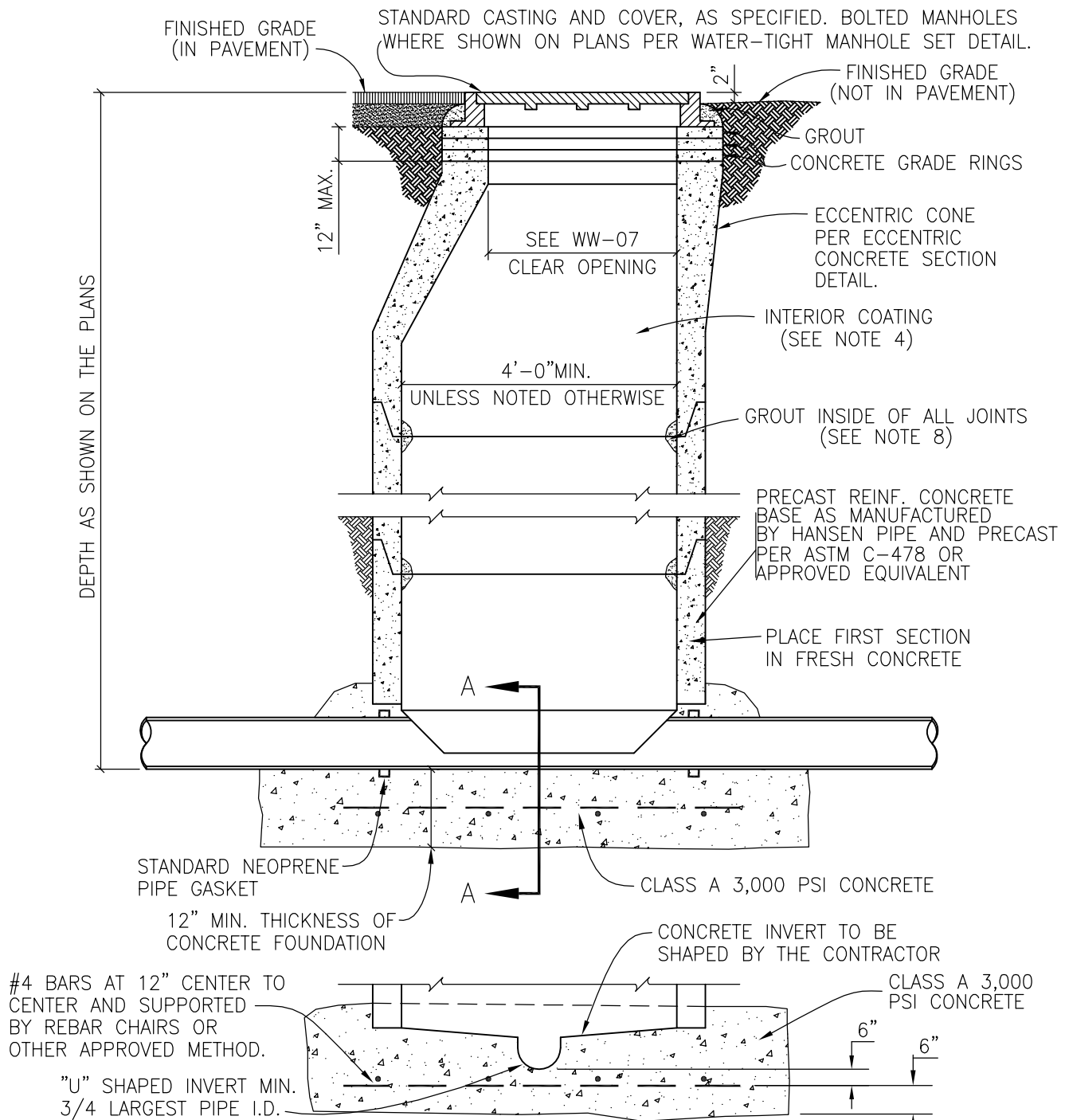


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
TRENCH AND EMBEDMENT DETAIL
UNDER PROPOSED ROADWAY

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: WW18	
SCALE: NTS	DATE: 1/2003
DRAWN BY: MRS	APPROVED BY: TRB



REVISION NOTE:		
ADOPTED 6/21/2006		
DRAWING NAME:		
WW19		
SCALE:	DATE:	
NTS	11/2003	
DRAWN BY:	APPROVED BY:	
MRS	TRB	



NOTES:

1. MANHOLES SHALL BE PRECAST ASTM C-478 BELL AND SPIGOT WITH PROFILE GASKET - SINGLE OFF-SET JOINTS.
2. SEE PLANS AND MANHOLE SCHEDULE, FOR MANHOLE SIZE, LOCATION, CONFIGURATION, TYPE OF TOP SECTION, VENTING REQUIREMENTS, PIPE SIZE AND TYPES.
3. SEE SPECIFICATIONS ON MATERIALS AND CONSTRUCTION.
4. AN 80 MIL. COAT OF RAVEN LINING SYSTEMS, RAVEN 405 ULTRA HIGH BUILD EPOXY COATING, OR SPRAY WALL EPOXY COATING, OR APPROVED EQUAL, TO BE APPLIED TO ENTIRE INTERIOR OF EACH WASTEWATER MANHOLE AND UNDERSIDE OF FLAT TOPS.
5. ALL MANHOLE COVERS SHALL BE BOLTED AND GASKETTED WHEN MANHOLES ARE LOCATED OUT FROM PAVEMENT.
6. MANHOLES TO BE VENTED ARE IDENTIFIED ON MANHOLE SCHEDULE. REFERENCE MANHOLE VENT DETAIL.
7. MANHOLES ARE TO BE DESIGNED TO RESIST LATERAL AND VERTICAL SOIL FORCES RESULTING FROM MANHOLE DEPTH. ADDITIONALLY, MANHOLES LOCATED IN PAVEMENT TO BE DESIGNED FOR HS-20 TRAFFIC LOADS.
8. GROUT SHALL MEET THE REQUIREMENTS AS STATED BY THE COATING MANUFACTURER.
9. MANHOLE BASE BEDDING MATERIAL SPECS. FOR 3/4" WASHED GRAVEL:
 SIEVE SIZE 2", PERCENT (%) RETAINED 0 SIEVE SIZE 1 1/2", % RETAINED 0-10
 SIEVE SIZE 1", % RETAINED 45-80 SIEVE SIZE 3/4", % RETAINED 85-100
 SIEVE SIZE 3/8", % RETAINED 95-100
10. ALL PVC PIPE SHALL BE REMOVED FROM INVERT.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

WW20

SCALE:

NTS

DATE:

1/2006

DRAWN BY:

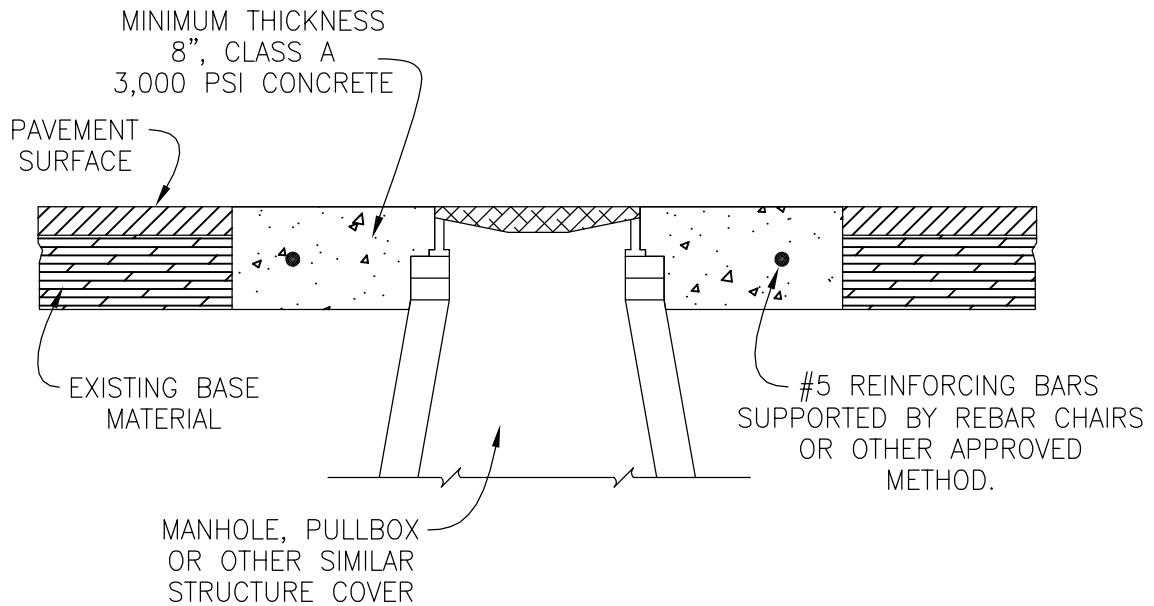
MRS

APPROVED BY:

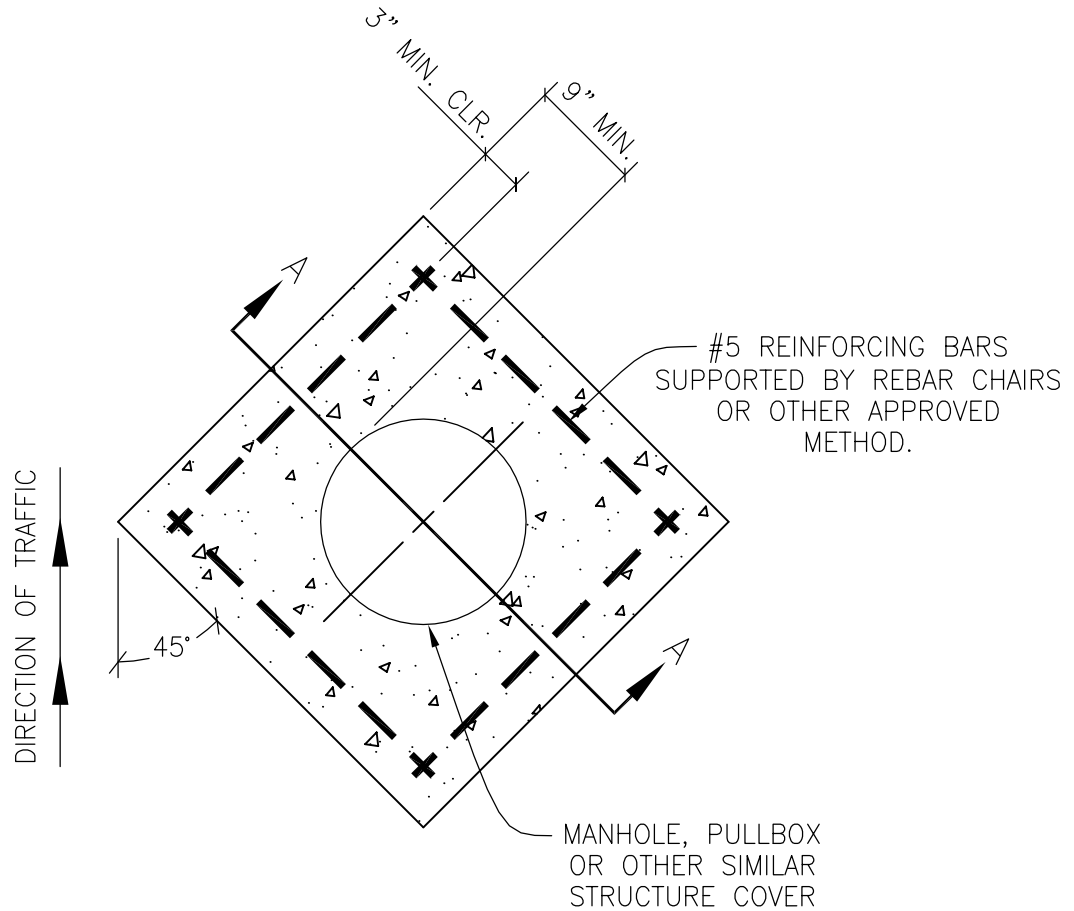
TRB



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
PRECAST MANHOLE ON
CAST-IN-PLACE FOUNDATION



SECTION A-A



PLAN OF STRUCTURE IN ROADWAY

NOTE:

INSTALLATION OF THE CONCRETE CASTING IS REQUIRED FOR AND APPLIES TO ALL TYPES OF MANHOLES TO BE LOCATED IN THE ROADWAY.

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS

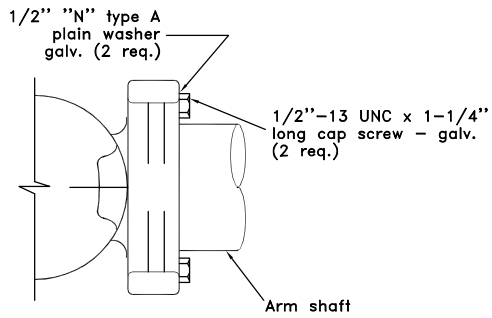
CONCRETE CASTING MANHOLE DETAIL

REVISION NOTE: APPROVED 6/21/2006

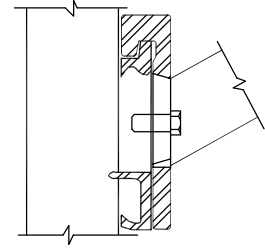
DRAWING NAME:
WW21

SCALE: NTS
DATE: 1/2006
DRAWN BY: MRS
APPROVED BY: TRB

ELECTRIC STANDARDS

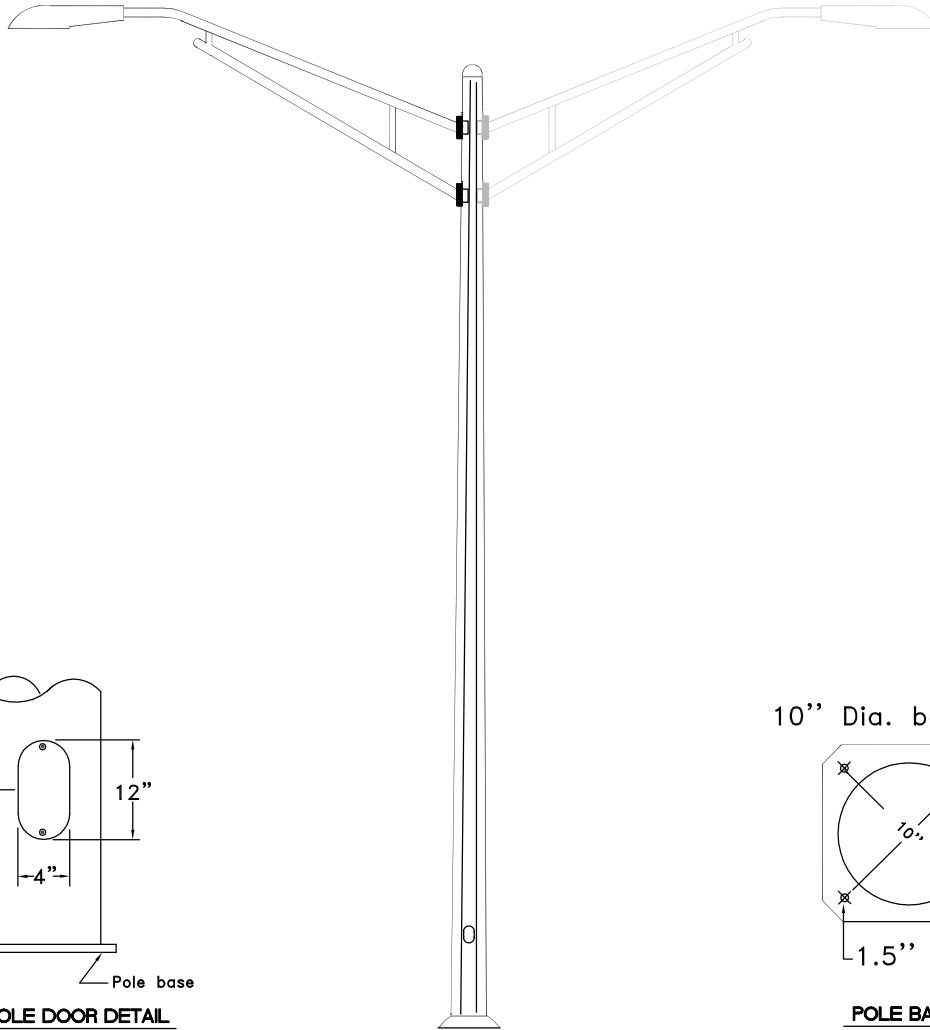


**MAST ARM MOUNTING DETAIL
TOP VIEW**

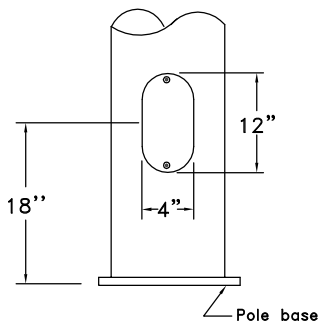


**MAST ARM MOUNTING DETAIL
SIDE VIEW**

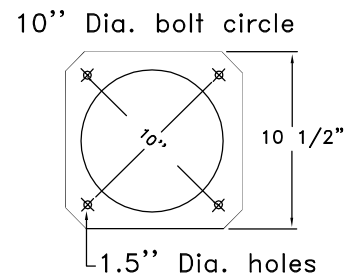
SINGLE ARM OR DOUBLE ARM



POLE ELEVATION



HAND HOLE DOOR DETAIL



POLE BASE PLAN

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
35' STREETLIGHT POLE AND MAST ARM
(DARK BRONZE POWDER COAT)

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-117	
SCALE: NTS	DATE: 6/4/03
DRAWN BY: KJH	APPROVED BY: CCS
GUSL-35-DB1 GUSL-35-DB2	

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	GUSL-35-DB1	GUSL-35-DB2
d	360643	Pole, Streetlight 35' w/6' Arm	1	
d	360644	Pole, Streetlight 35' w/2-8' Arms		1
sl	360641	Streetlight Luminaire, Cutoff 200W	1	1

NOTES:

1. Pole shaft conforming to ASTM designation: A595 with 5,000 PSI minimum yield strength linear taper – 0.14"/ft.
2. Arm shafts 2-3/8" O.D. = .154 wall steel tubing – 36,000 PSI minimum yield strength.
3. Arm struts 3/8" = 2" commercial grade hot rolled milled steel bar.
4. Arm connection – simplex attachments are ASTM designation: A27 grade 65-35, plate gussets are hot rolled commercial grade steel.
5. Cast pole top cap secured in place with 3 plated set screws.
6. Base plate – conforming to ASTM designation: A36.
7. All threaded fasteners to be galvanized to ASTM designation: A153 unless otherwise noted.
8. Pole and arm to be galvanized to ASTM designation: A123 and have polyester powder coating.
9. Accessories to be galvanized to ASTM designation: A153 and have polyester powder coating.
10. All pole bases to use a 10" bolt circle.
11. Four (4) 1-1/4" x 42" anchor bolts, including two (2) hex nuts and two (2) round washers per anchor bolt, shall be furnished with pole.
12. Pole shall be capable of withstanding a sustained wind velocity of not less than 80 mph isotach (mph) with a gust factor 1.3.
13. Cobra head fixtures to be dark bronze, cutoff type.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



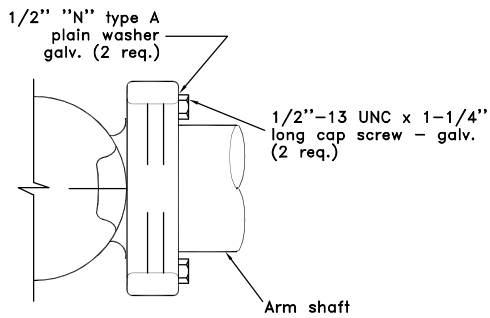
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
35' STREETLIGHT POLE AND MAST ARM
(DARK BRONZE POWDER COAT)

PAGE 2 OF 2

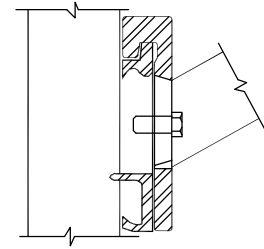
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-117A

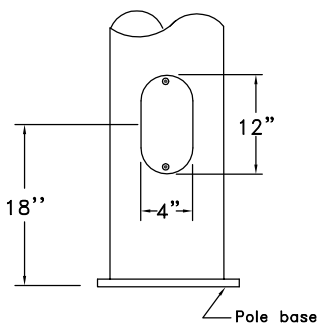
SCALE:	DATE:	GUSL-35-DB1 GUSL-35-DB2
NTS	6/4/03	
DRAWN BY:	APPROVED BY:	
GBY	CCS	



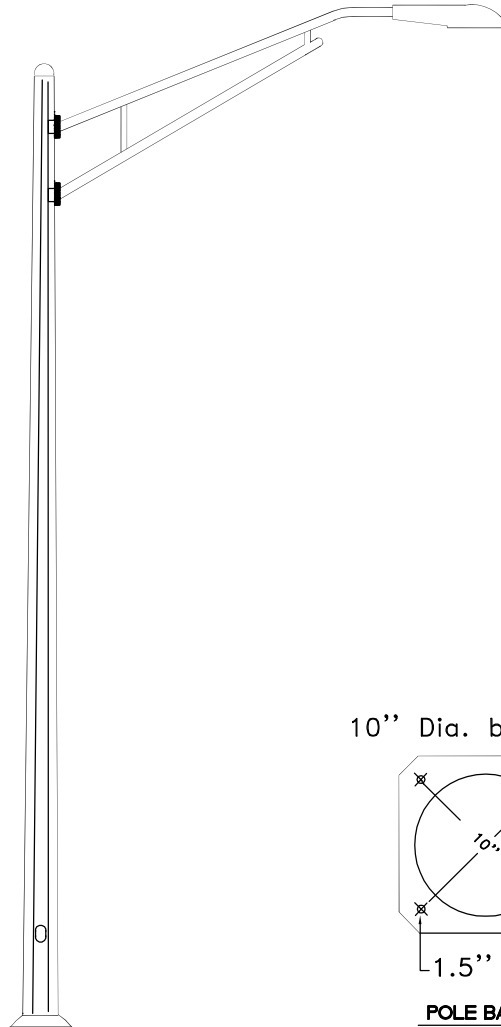
**MAST ARM MOUNTING DETAIL
TOP VIEW**



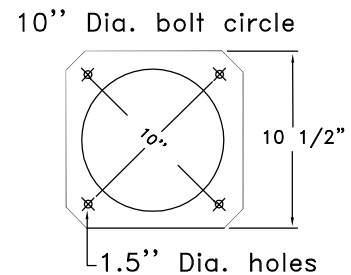
**MAST ARM MOUNTING DETAIL
SIDE VIEW**



HAND HOLE DOOR DETAIL



POLE ELEVATION



POLE BASE PLAN

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STREETLIGHT POLE AND MAST ARM
(BRUSHED ALUMINUM ROUND TAPERED)

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-118

SCALE:	DATE:	GUSL-25-BA GUSL-35-BA
NTS	6/4/03	
DRAWN BY:	APPROVED BY:	
KJH	CCS	

MATERIAL LIST

FIXTURE TYPE AND WATTAGE

ITEM NO.	STOCK NO.	DESCRIPTION	100W	200W	400W
sl	360380	Streetlight Luminaire, Cobra Head, 100W – Cutoff Fixture	1		
sl	360409	Streetlight Luminaire, Cobra Head, 200W – Cutoff Fixture		1	
sl	360410	Streetlight Luminaire, Cobra Head, 400W – Cutoff Fixture			1

POLE LENGTH

ITEM NO.	STOCK NO.	DESCRIPTION	GUSL-25-BA	GUSL-35-BA
	360624	Pole, Streetlight, Aluminum Round, 25' w/6' Arm	1	
	360404	Pole, Streetlight, Aluminum Round, 35' w/6' Arm		1

NOTES:

1. Pole shaft conforming to ASTM designation: A595 with 5,000 PSI minimum yield strength linear taper – 0.14"/ft.
2. Arm shafts 2-3/8" O.D. = .154 wall steel tubing – 36,000 PSI minimum yield strength.
3. Arm struts 3/8" = 2" commercial grade hot rolled milled steel bar.
4. Arm connection – simplex attachments are ASTM designation: A27 grade 65–35, plate gussets are hot rolled commercial grade steel.
5. Cast pole top cap secured in place with 3 plated set screws.
6. Base plate – conforming to ASTM designation: A36.
7. All threaded fasteners to be galvanized to ASTM designation: A153 unless otherwise noted.
8. Pole and arm to be galvanized to ASTM designation: A123 and have polyester powder coating.
9. Accessories to be galvanized to ASTM designation: A153 and have polyester powder coating.
10. All pole bases to use a 10" bolt circle.
11. Four (4) 1-1/4" x 42" anchor bolts, including two (2) hex nuts and two (2) round washers per anchor bolt, shall be furnished with pole.
12. Pole shall be capable of withstanding a sustained wind velocity of not less than 80 mph isotach (mph) with a gust factor 1.3.
13. Cobra head fixtures to be dark bronze, cutoff type.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

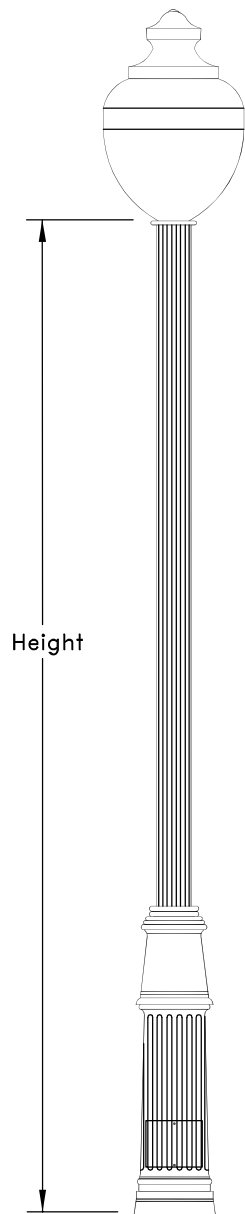
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:
GEO-118A

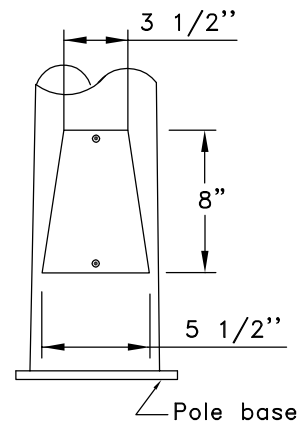
SCALE: NTS	DATE: 6/4/03	GUSL-25-BA GUSL-35-BA
DRAWN BY: GBY	APPROVED BY: CCS	



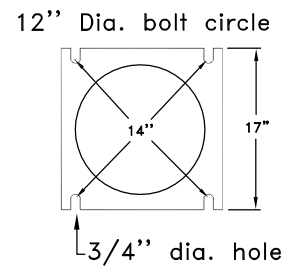
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
STREETLIGHT POLE AND MAST ARM
(BRUSHED ALUMINUM ROUND TAPERED)



POLE ELEVATION



HAND HOLE DOOR DETAIL



POLE BASE PLAN

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DECORATIVE STREETLIGHT POLE
(DARK GREEN)

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-122	
SCALE: NTS	DATE: 6/4/03
DRAWN BY: CCS	APPROVED BY: GUSL-___-D

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	8'	10'	12'	14'
zz	360374	Streetlight, Luminaire, 100W, Type III	1	1	1	1
zz	360375	Streetlight, Luminaire, 100W, Type V	1	1	1	1
zz	360376	Streetlight Post, Dark Green, 8'	1			
zz	360377	Streetlight Post, Dark Green, 10'		1		
zz	360378	Streetlight Post, Dark Green, 12'			1	
zz	360379	Streetlight Post, Dark Green, 14'				1

NOTES:

- Pole shaft conforming to ASTM designation: A595 with 5,000 PSI minimum yield strength linear taper 0.14" per feet.
- Arm shafts 2-3/8" O.D.= .154 wall steel tubing – 36,000 PSI minimum yield strength.
- Arm struts 3/8"= 2" commercial grade hot rolled milled steel bar.
- Arm connection – simplex attachments are ASTM designation: A27 grade 65–35. Plate gussets are hot rolled commercial grade steel.
- Cast pole top cap secured in place with 3 plated set screws.
- Base plate – conforming to ASTM designation: A36.
- All threaded fasteners to be galvanized to ASTM designation A153 unless otherwise noted.
- Pole and arm to be galvanized to ASTM designation – A123 and have polyester powder coating.
- Accessories to be galvanized to ASTM designation – A153 and have polyester powder coating.
- All pole bases to use a 12" bolt circle.
- Four (4) 1-1/4" x 42" anchor bolts, including two (2) hex nuts and two (2) round washers per anchor bolt, shall be furnished with pole.
- Pole shall be capable of withstanding a sustained wind velocity of not less than 80 M.P.H. isotach (MPHI) with a gust factor 1.3.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

GEO-122A

SCALE:

NTS

DATE:

6/4/03

DRAWN BY:

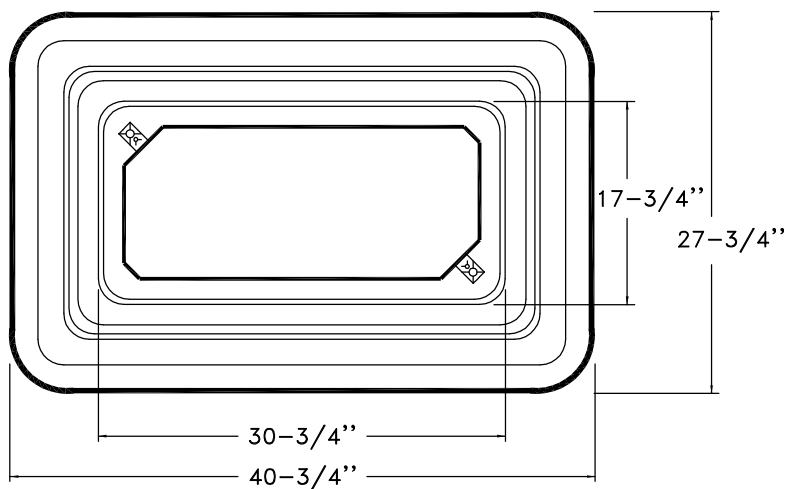
CCS

APPROVED BY:

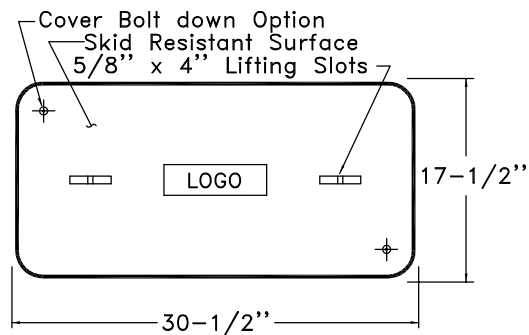
GUSL-___-D



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
DECORATIVE STREETLIGHT POLE
(DARK GREEN)

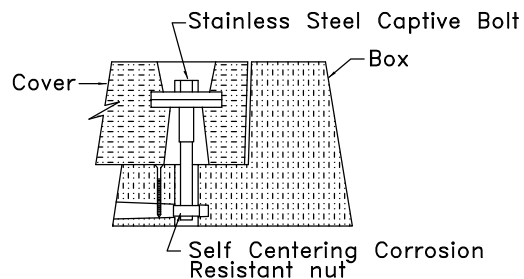


BOX - PLAN VIEW

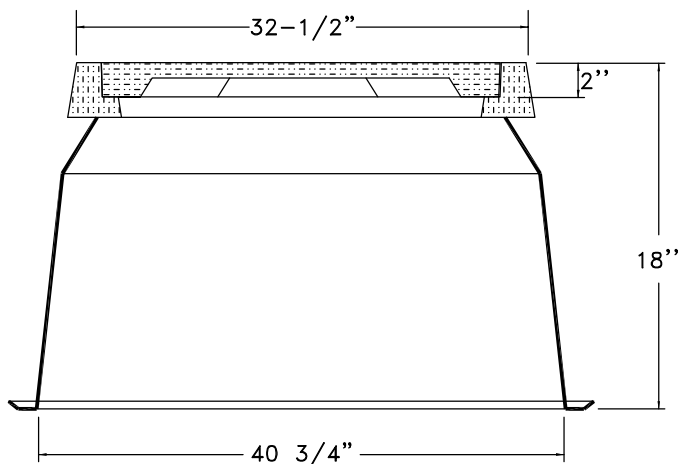


COVER

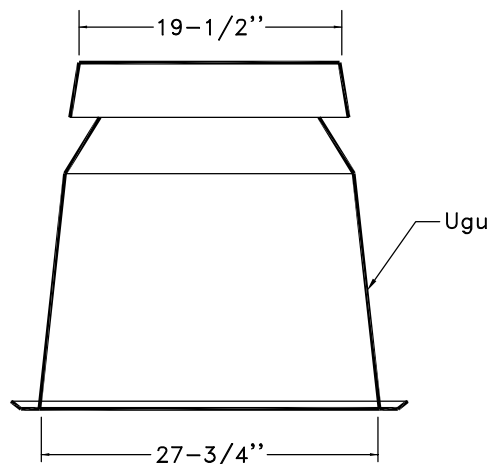
Optional Cast Iron Reader Lids Available



COVER BOLT DOWN OPTION



BOX - COVER SECTION



END VIEW

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY
600V SECONDARY - (JUNCTION BOX,
COVER, AND EXTENSION)
PAGE 1 OF 2

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-206		
SCALE: NTS	DATE: 5/30/03	GUK6, GUK6-SL, GUK6-TL
DRAWN BY: KJH	APPROVED BY: CCS	

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	GUK6	GUK6-SL	GUK6-TL
Ugu	360044	Sub-surface Box and Lid, 13" x 24" x 18"		1	1
Ugu	360045	Sub-surface Box and Lid, 17" x 30" x 18"	1		

Notes:

1. This assembly unit to be constructed out of polymer concrete and reinforced polyester.
2. This unit is to be set even with finish grade.
3. Place in logo area "CITY OF GEORGETOWN ELECTRICAL".

References:

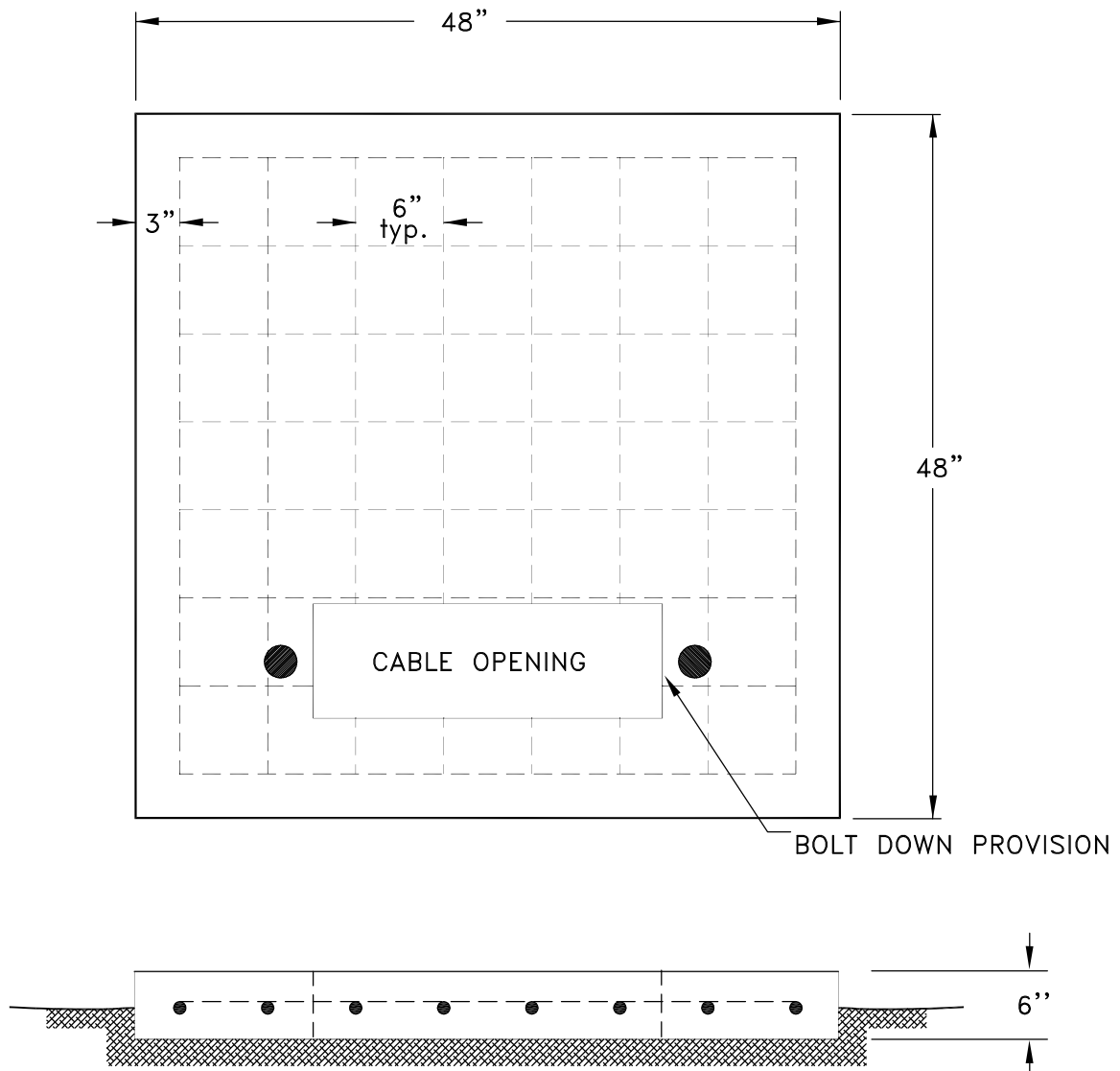
- See GUK6 – Used for Secondary Junction Box
 See GUK6-SL – Used for Streetlight Circuit
 See GUK6-TL – Used for Traffic Light Circuit

*The Architect/Engineer assumes
 responsibility for appropriate
 use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-206A	
SCALE: NTS	DATE: 5/30/03
DRAWN BY: GBY	APPROVED BY: CCS
GUK6, GUK6-SL, GUK6-TL	



CITY OF GEORGETOWN
 CONSTRUCTION STANDARDS AND DETAILS
 24.9/14.4 kV PRIMARY
 600V SECONDARY (JUNCTION BOX,
 COVER, AND EXTENSION)
 PAGE 2 OF 2



Notes:

1. Concrete testing, 4000 lbs per sq inch; 4% - 6% entrained air, 3/4" max. size aggregate.
2. #4 reinforcing steel, ATSM-A615 grade 60, place approximately 6" on-center each way and securely tied together.
3. Minimum concrete cover over reinforcing steel 3" unless noted otherwise.
4. Wood float finish, leaving no depressions.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-207

SCALE: NTS DATE: 6/12/03

DRAWN BY: KJH APPROVED BY: CCS

GUM1-5C



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY SINGLE-PHASE
CONCRETE PAD (TRANSFORMER,
VACUUM SWITCH, OR JUNCTION BOX)
PAGE 1 OF 2

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	

This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

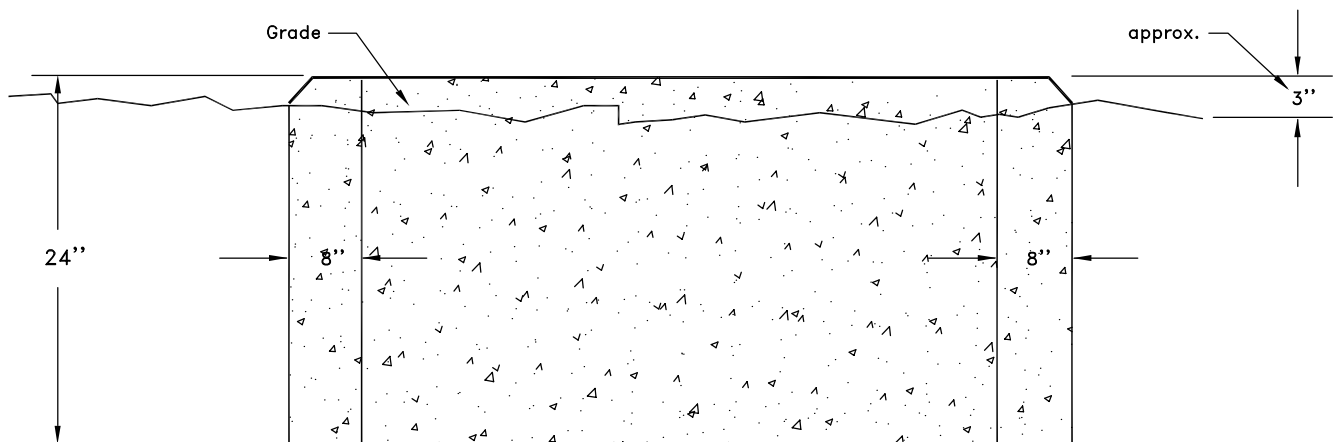
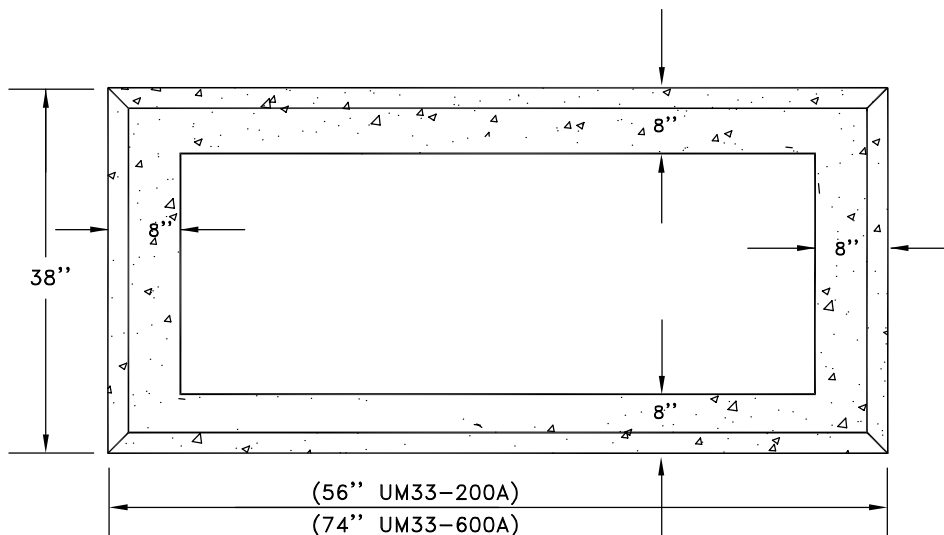
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-207A

SCALE: NTS	DATE: 6/2/03	GUM1-5C
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY SINGLE-PHASE
CONCRETE PAD (TRANSFORMER,
VACUUM SWITCH, OR JUNCTION BOX)
PAGE 2 OF 2



Notes:

1. Pad assemblies include site preparation, bedding and drainage.
2. Slabs may be precast or poured in place. Concrete shall be 1:2:4 mixture with a minimum design strength of 3,000 P.S.I. Steel reinforcing shall be 6" x 6" - No. 10 wire mesh to stop 1" from sides and cable openings.
3. Equipment shall be secured to pad in accordance with manufacturers' instructions.
4. Location and size of cable opening shall be as required for cable run.
5. When Owner furnishes transformers, sectionalizing equipment or other pad-mounted equipment, dimensioned drawings of pads will be furnished.
6. Pad will have (1) one - 3/4" x 10' copper weld ground rod for equipment grounds.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY THREE-PHASE
CONCRETE PAD
(PAD-MOUNTED JUNCTION BOX)

PAGE 1 OF 2

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-208

SCALE: NTS
DATE: 2/14/02
DRAWN BY: KJH
APPROVED BY: JKP

GUM1-6C-JB

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

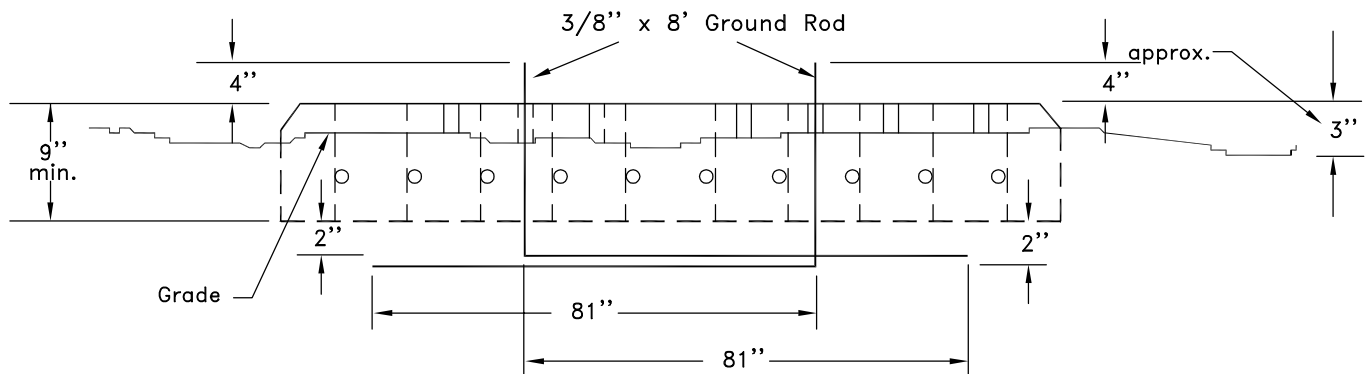
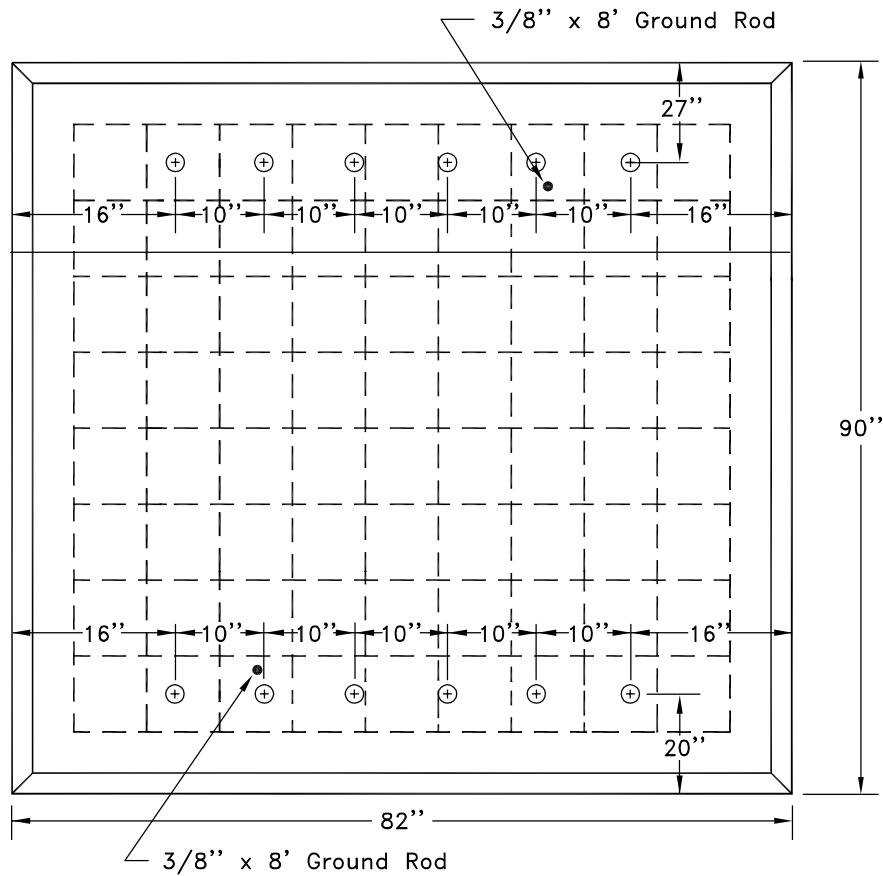
This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-208A	
SCALE: NTS	DATE: 6/2/03
DRAWN BY: GBY	APPROVED BY: CCS
GUM1-6C-JB	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY THREE-PHASE
CONCRETE PAD
(PAD-MOUNTED JUNCTION BOX)
PAGE 2 OF 2



Notes:

1. Pad assemblies include site preparation, bedding and drainage.
2. Slabs may be precast or poured in place. Concrete shall be 1:2:4 mixture with a minimum design strength of 3,000 P.S.I. #4 steel reinforcing shall be ATSM-A615 Grade 60, approximately 6" on-center each way and securely tied to stop 1" from sides and cable openings.
3. Equipment shall be secured to pad in accordance with manufacturers' instructions.
4. Location and size of cable opening shall be as required for cable run.
5. When Owner furnishes transformers, sectionalizing equipment or other pad-mounted equipment, dimensioned drawings of pads will be furnished when they become available.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY THREE-PHASE
CONCRETE PAD (PAD-MOUNTED
SWITCHGEAR 82" X 90")
PAGE 1 OF 2

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-209	
SCALE: NTS	DATE: 6/12/03
DRAWN BY: KJH	APPROVED BY: CCS
GUM1-6C-SA	

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

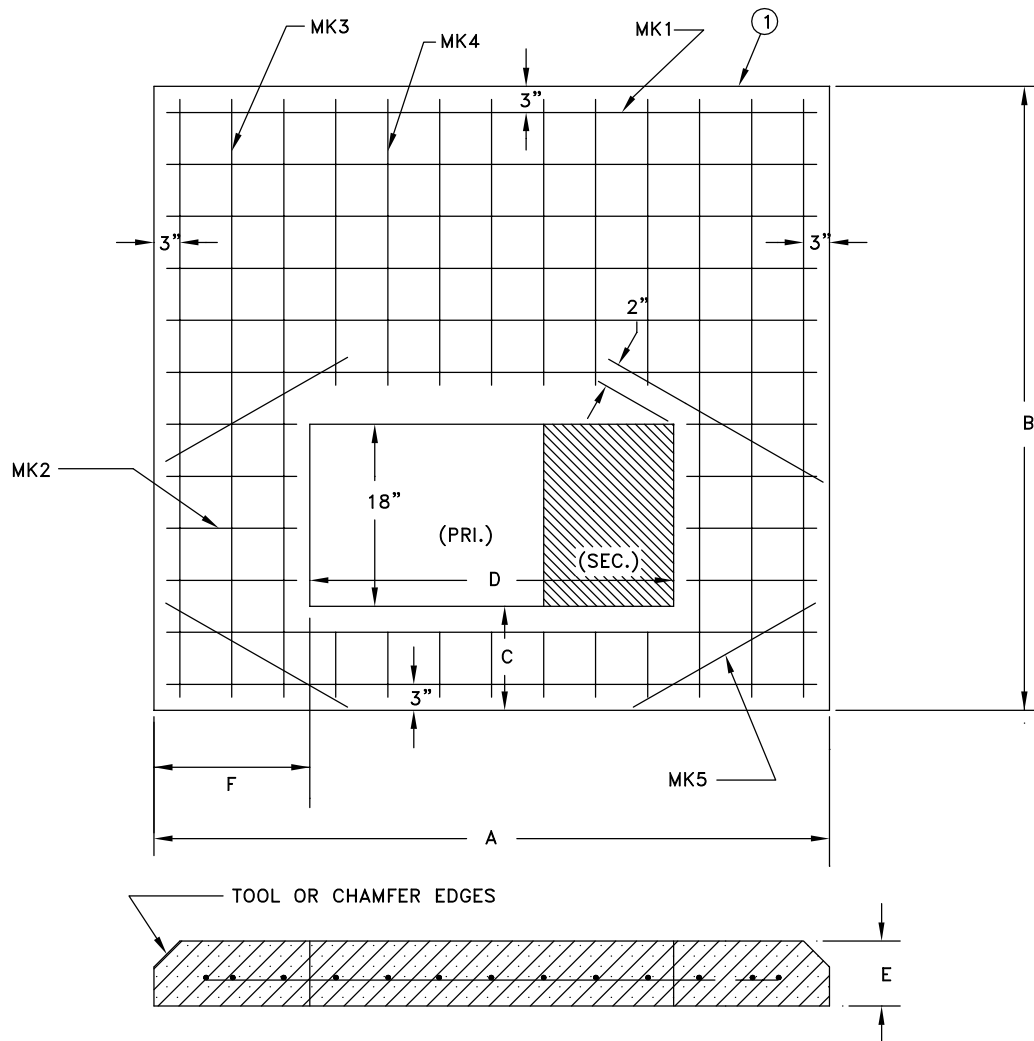
This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-209A		
SCALE: NTS	DATE: 6/2/03	GUM1-6C-SA
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY THREE-PHASE
CONCRETE PAD (PAD-MOUNTED
SWITCHGEAR 82" X 90")
PAGE 2 OF 2



PAD	3-PHASE TRANSFORMER KVA	DIMENSIONS IN INCHES						REINFORCING BARS				
		A	B	C	D	E	F	MK1	MK2	MK3	MK4	MK5
#1	75, 112.5, 150, 225, 300, 500	76	62	12	42	6	17	7 #4 70"	4 #4 10"	6 #4 57"	6 #4 28"	4 #4 26"
#2	750, 1000	120	120	12	54	8	25	12 #4 98"	6 #4 19"	6 #4 94"	7 #4 66"	4 #4 29"
#3	1500, 2000	120	120	12	66	12	30.5	12 #4 98"	6 #4 19"	6 #4 94"	7 #4 66"	4 #4 29"

Notes:

1. Concrete testing, 4000 lbs. per sq. inch; 4% - 6% entrained air, 3/4" maximum size aggregate.
2. Reinforcing steel, ATSM-A615 grade 60, place approximately 6" on-center each way and securely tied together.
3. Minimum concrete cover over reinforcing steel 2", unless noted otherwise.
4. Wood float finish, leaving no depressions.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-210

SCALE: NTS DATE: 6/12/03

DRAWN BY: KJH APPROVED BY: CCS

GUM1-6C-TA



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY THREE PHASE
CONCRETE PAD
(PAD-MOUNTED TRANSFORMER)

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-210A		
SCALE: NTS	DATE: 6/2/03	GUM1-6C-TA
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
24.9/14.4 kV PRIMARY THREE-PHASE
CONCRETE PAD
(PAD-MOUNTED TRANSFORMER)
PAGE 2 OF 2

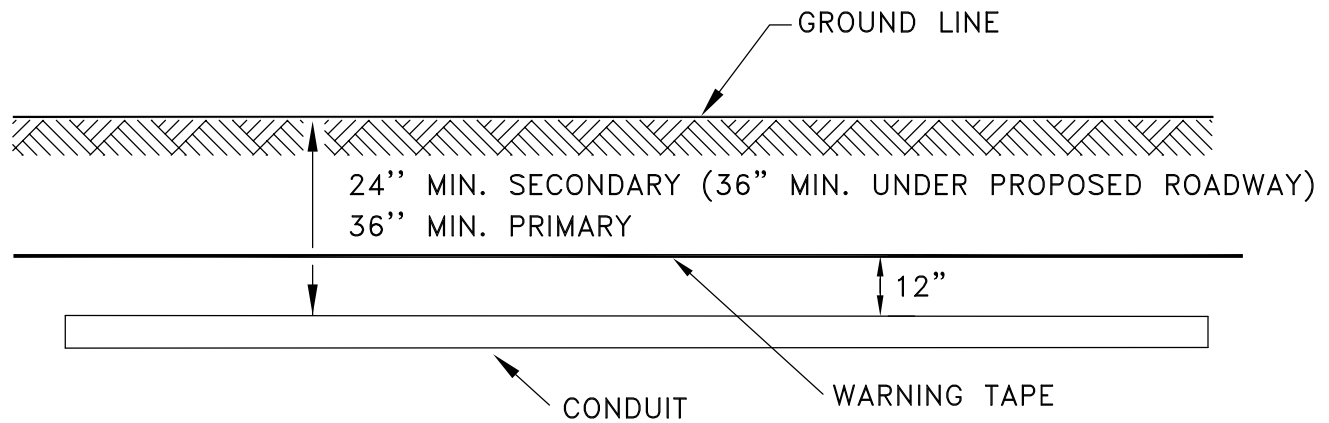
1. All electric primary conduit shall be installed below all other utilities and private underground lines whenever possible. All electric secondary conduit shall be installed under water lines whenever possible. Any exception to this specification must have written approval from the City.
2. Electric primary conduit shall be installed with a minimum of 2' vertical and 5' horizontal clearance from water mains, wastewater, storm water, and private underground lines. Any exception to this specification must have written approval from the City.
3. Electric primary conduit shall be installed with a minimum of 2' vertical and 5' horizontal clearance from natural gas lines. Any exception to this specification must have written approval from the City.
4. Electric primary conduit shall be installed with a minimum of 1' vertical and/or 1' horizontal clearance from communications lines. Any exception to this specification must have written approval from the City.
5. Electric primary conduit when installed above water mains and pressurized wastewater lines, with 2' of vertical clearance or greater, shall be capped with 6" of concrete when crossing these lines. The concrete cap shall be installed 4" above electric conduit(s); 5' each side of the outside diameter of the water main or pressurized wastewater lines.
6. Electric primary conduit when installed below water mains and pressurized wastewater lines with 2' vertical clearance or greater, does not require a concrete cap when crossing these lines.
7. Electric primary conduit installed with less than 2' of vertical and 5' of horizontal clearance from water mains, pressurized wastewater and private underground lines, shall be encased in 6" of concrete. Concrete encasement to be installed around conduit until a minimum of 2' of vertical and 5' of horizontal clearance has been met. Concrete encasements will begin 5' before and end 5' from the end where conduit are installed less than 2' vertical and 5' horizontal from the above lines. This must have City approval before installation of conduit.
8. All concrete shall have red dye or coloring added to concrete before concrete has been placed in trench.
9. Conduit shall be electrical grade, gray schedule #40 PVC conduit. Conduit shall meet the NEC and ASTM standards for installation of underground electrical conduit.
10. All conduit installations shall be owned by the City and shall be inspected by the City before backfill of trench.
11. Where conduit terminates in a pad, install bell end on each conduit.
12. Where multiple rows of conduit are required, duct spacers are to be installed every 5' with 3" of separation between conduits and trench wall. Then sand backfill is to be installed around conduit.
13. Primary conduit shall have 12" of 3/8" F washed gravel bedding prior to placing 6" wide "CAUTION" tape. Final backfilling can then be placed.
14. 1800 lbs Mule Tape with sequential footage markings, or equivalent, shall be run through all conduit and tied off on both ends of conduit.
15. All conduit for future use shall be stubbed up and capped.
16. Secondary service conduit to be stubbed out 5' outside of the utility easement into prospective lots. End of conduit to be staked with a piece of PVC conduit 30" above ground line.
17. Long sweep elbows shall be used at all bends in conduit runs. 2" and 3" conduit shall require a minimum bend radius of 36". 4" conduit shall require a minimum bend radius of 48".
18. Use long sweep PVC concrete encased elbows at all single-phase transformer pads and in conductor pulls 200' in length or less. Long sweep galvanized steel conduit elbows to be used in all other installations.
19. Water services and taps shall be placed above electric conduit with a minimum separation of 12". Water services and taps may be placed below electric conduit only with City's written approval.
20. Where electric conduit crosses roadways, the trench shall be backfilled with 3/8" F washed gravel then base and compacted or backfilled with flowable backfill in accordance with City specifications. All trenches outside of roadways shall be backfilled and compacted to 95% standard density in accordance with City specifications.
21. Where electric conduit crosses roadways, the minimum depth of cover is 36" from the top of proposed finished roadway elevation.

TYPICAL TRENCH DETAIL
CONDUIT SIZE AND NUMBER MAY VARY

TYPICAL CONDUIT CROSSING
CONDUIT SIZE AND NUMBER MAY VARY

TYPICAL DUCT SPACING

GUM-50-P_
GUM-50-S



SPECIFICATION LETTER AND NUMBER CODES:

GUM50-(P or S)-(DIAMETER)

EXAMPLE: GUM50-S-3

IS 3" STEEL CONDUIT

MATERIAL	-P-2	-P-3	-P-4	-P-6
1-1" PVC Conduit				
1-2" PVC Conduit	1			
1-3" PVC Conduit		1		
1-4" PVC Conduit			1	
1-6" PVC Conduit				1

MATERIAL	-S-2	-S-3	-S-4	-S-6
1-2" Steel Conduit	1			
1-3" Steel Conduit		1		
1-4" Steel Conduit			1	
1-6" Steel Conduit				1

Notes:

Specify trench unit separately

Reference:

GUR2 Trench specifications

The Architect/Engineer assumes responsibility for appropriate use of this standard.

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-225A	
SCALE: NTS	DATE: 6/12/03
DRAWN BY: MRC	APPROVED BY: CCS
GUM-50-P-1 GUM-50-S-1	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
MISCELLANEOUS UG CONDUIT
INSTALLATION

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

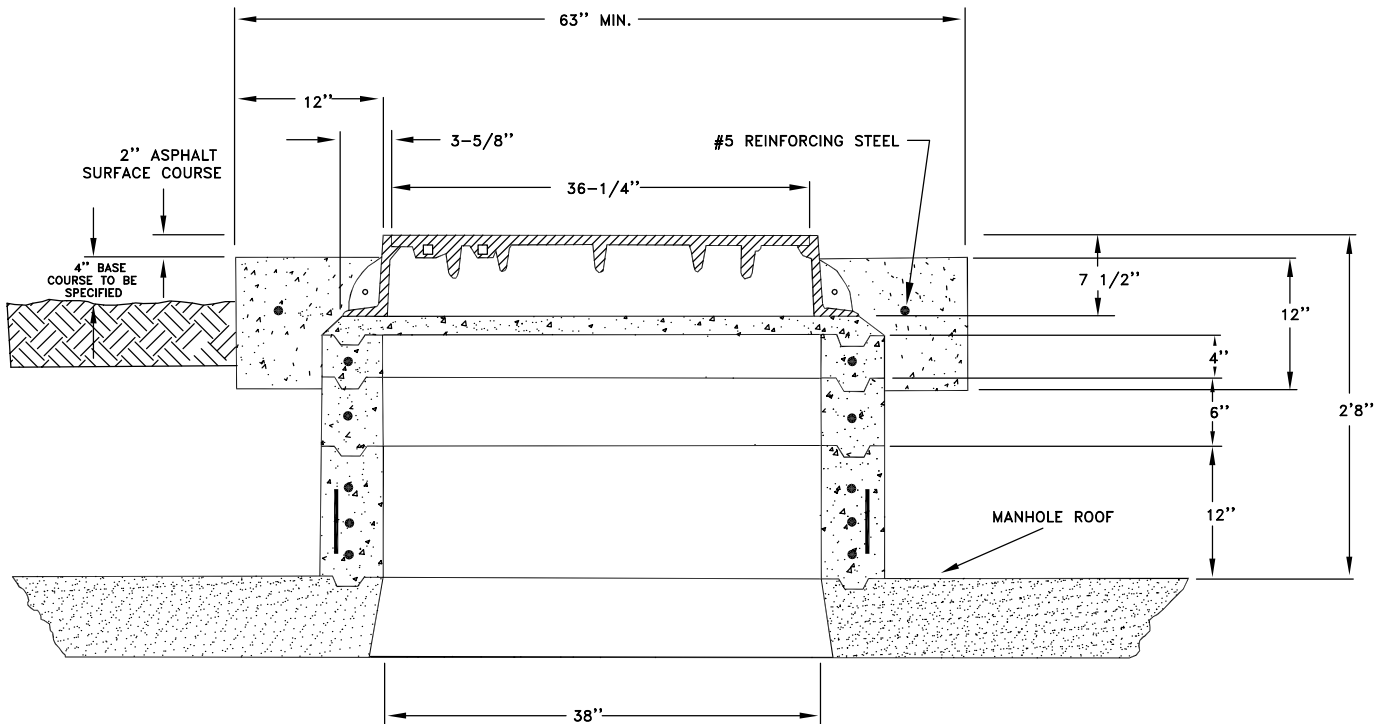
This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-225B		
SCALE: NTS	DATE: 6/2/03	GUM-50-P-1 GUM-50-S-1
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
MISCELLANEOUS UG CONDUIT
INSTALLATION



Notes:

1. Manhole cover to be made out of cast iron with the "City of Georgetown Electrical" cast in the cover. Grade rings and cover need to be traffic bearing.
2. Use sufficient preformed butyl joint sealer. Clean joint surfaces with a brush and ensure joints are dry. Firmly press joint sealer onto surface, end-to-end around the entire joint. Allow 1 inch overlaps when abutting.
3. Grout shall be 2500 PSI at 24 hours. A 2"-6" elevation adjustment may be performed as necessary.
4. Install cast iron frame to within 1/8" of final grade. A depression in roadway is preferable to a projection (bump) above final grade.
5. A 12" concrete kick block surrounding the conversion ring and steel frame with cover is required. Concrete shall have a minimum rating of 2000 PSI at 24 hours. Concrete may be 4000 PSI at 28 days (2000 PSI at 72 hours) if quick set-up is not required.
6. Identification numbers are to be welded to the manhole cover with a stainless steel welding rod. The number will be assigned at the time of installation.

GUM-CA Grade Ring Assembly Unit – Consists of one (1) lineal foot of 36" inside diameter manhole entrance extensions. The entrance extensions shall have a watertight joint at the manhole entrance and at every joint needed to bring the entrance to a level grade to the surface.

GUM-CC Manhole Entrance Cover Assembly Unit – Consists of one (1) 36" diameter cast iron entrance cover and one (1) cast iron conversion ring attached to the concrete entrance extension. Also included in this unit is a 12" concrete kick block surrounding the conversion ring and steel frame with cover. The concrete shall have a minimum rating of 2000 PSI at 24 hours. Identification numbers are to be welded to manhole cover with a stainless steel welding rod.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:
GEO-227

SCALE: NTS
DATE: 6/2/03
DRAWN BY: KJH
APPROVED BY: CCS

**GUM-CA,
GUM-CC**



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
36" FRAME, COVER, AND
GRADE RINGS FOR MANHOLE ENTRY

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-227A

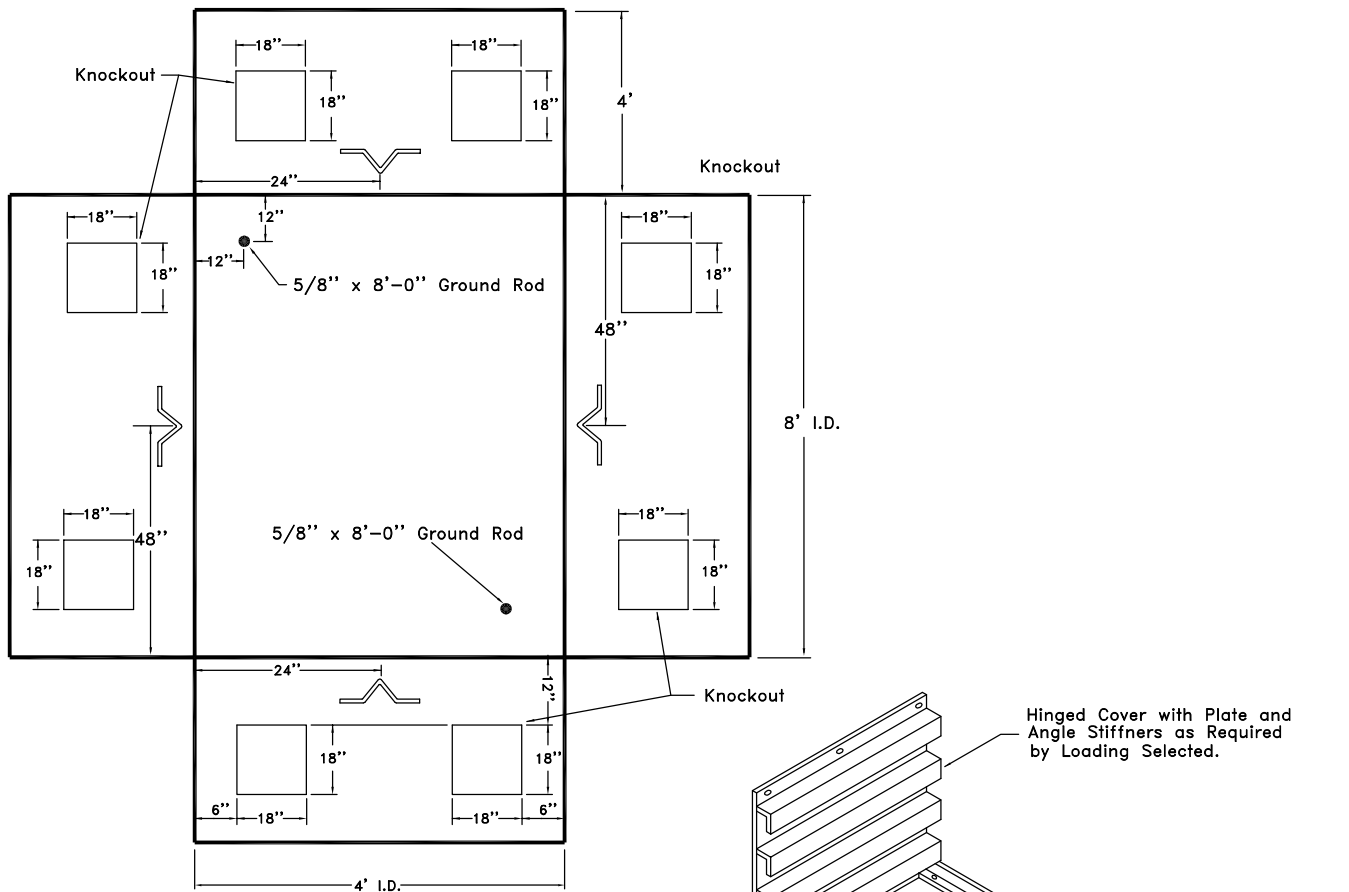
SCALE: NTS
DATE: 3/26/03

DRAWN BY: GBY
APPROVED BY:

GUM-CA,
GUM-CC

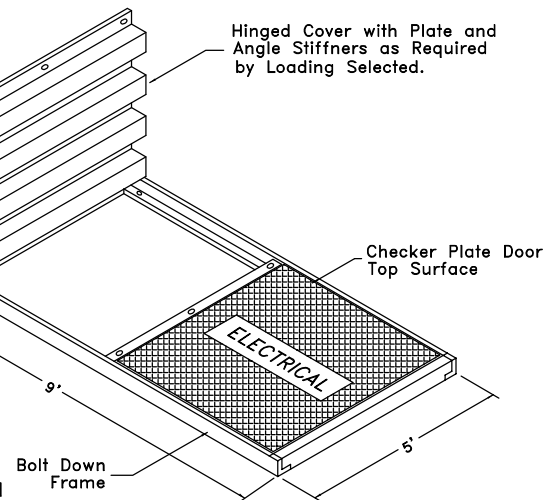


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
36" FRAME, COVER, AND
GRADE RINGS FOR MANHOLE ENTRY



NOTES:

1. The minimum working load for each pulling anchor is 16,800 lbs.
2. The minimum working load for each lifting anchor is 2,000 lbs.
3. The exact location and orientation of the pull box shall be specified on the construction drawings.
4. Engineering shall verify the strength of the pull box will not be adversely affected, prior to approving any field modifications such as cuts to form slots or holes.
5. Drive ground rod before installing the top portion of the pull box. The party responsible for the installation of the conduit system shall be responsible for the installation of the ground rod.
6. Clean joint surfaces with a brush and ensure joints are dry. Firmly press joint filler onto surface end-to-end around the entire joint. Allow 1" overlaps when abutting.
7. Preformed butyl joint sealer sufficient for setting the pull box shall be supplied by the manufacturer.
8. Minimum excavation requirements to set pull box in place are 7' x 11' x 6' with 18" of 3/4" crushed rock in the bottom excavation for pull box to rest on.
9. Pull box to have 6" thick walls and floor.
10. All concrete shall have a 28 day compression strength of 4500 psi. All reinforcing steel shall comply with ASTM A815 grade 60 with all bar bending and placement shall comply with the latest ACI Standards. Standard structural design is to be on AASHTO HS 20 wheel loading.
11. Bolt down cover and frame to be constructed of ASTM A36 FY=36,000 psi. galvanized steel with torsion hinges, drop lifting, handles, designed for sidewalk loading, and the word "ELECTRICAL" imprinted into the steel cover.



The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUICKSET PULL BOX
(4' X 8' X 4')

PAGE 1 OF 2

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:
GEO-229

SCALE:	DATE:
NTS	6/12/03
DRAWN BY:	APPROVED BY:
KJH	CCS

GUM-PB

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

This Page Intentionally Left Blank

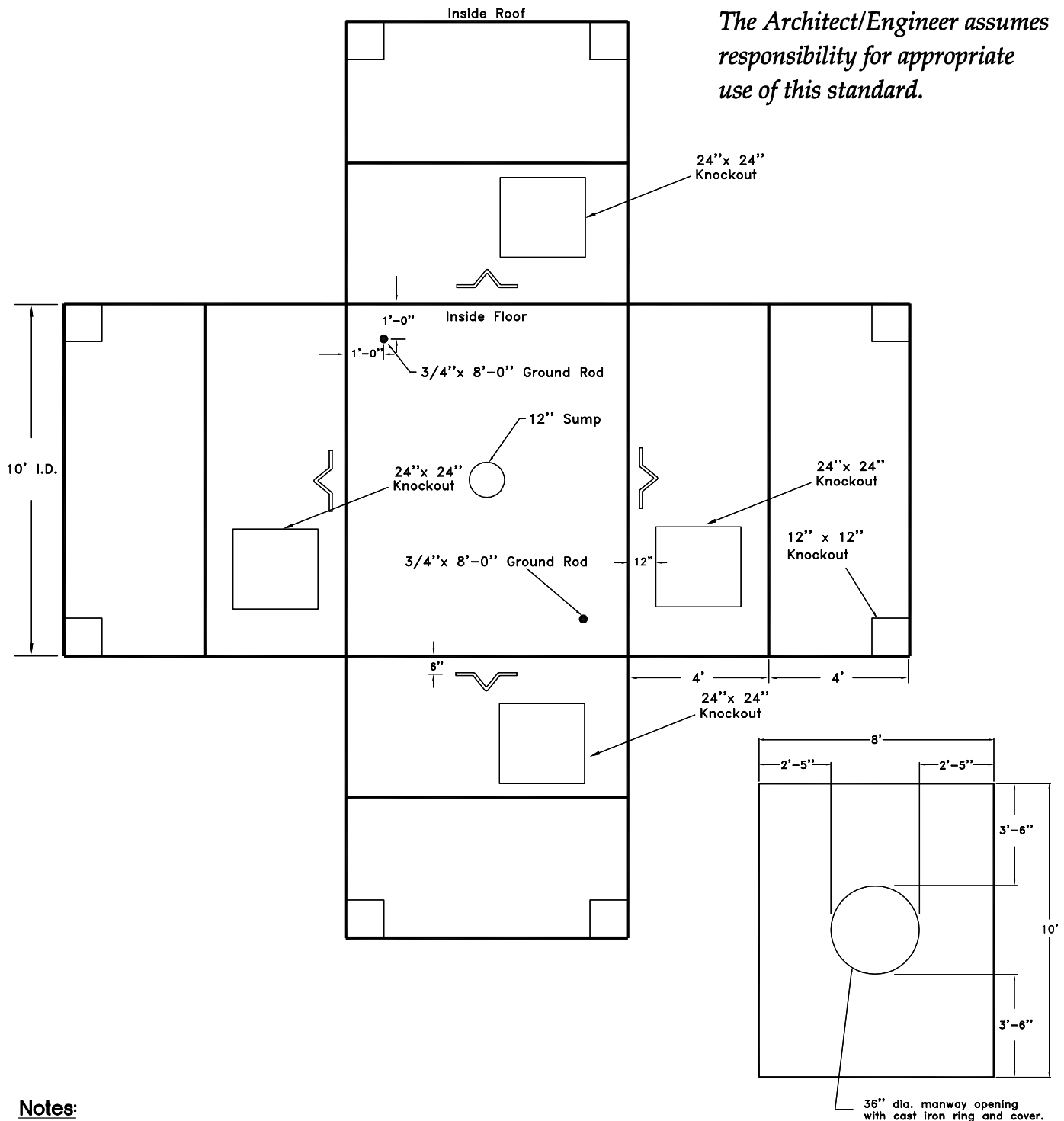
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-229A		
SCALE: NTS	DATE: 6/2/03	GUM-PB
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUICKSET PULL BOX
(4' X 8' X 4')

The Architect/Engineer assumes responsibility for appropriate use of this standard.



Plan View of Top

Notes:

1. Minimum working load for each pulling anchor is 16,800 lbs.
2. Minimum working load for each lifting anchor is 2,000 lbs.
3. Exact location and orientation of the manhole shall be specified on the construction drawings.
4. Engineering shall verify that the strength of the manhole will not be adversely affected, prior to approving any field modifications such as cuts to form slots or holes.
5. Drive ground rod before installing the top portion of the manhole. The party responsible for the installation of the conduit system shall be responsible for the installation of the ground rod.
6. Clean joint surfaces with a brush and ensure joints are dry. Firmly press joint filler onto surface end-to-end around the entire joint. Allow 1" overlaps when abutting.
7. Preformed butyl joint sealer sufficient for setting the manhole shall be supplied by the manufacturer.
8. Minimum excavation requirements to set manhole in place are 11' x 13' x 14' with 18" of 3/4" crushed rock in the bottom excavation for manhole to rest on.

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME: GEO-230



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUICKSET MANHOLE
(8' X 10' X 8')

SCALE: NTS
DATE: 6/2/03
DRAWN BY: MRC
APPROVED BY: CCS

GUM-MH1

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	

This Page Intentionally Left Blank

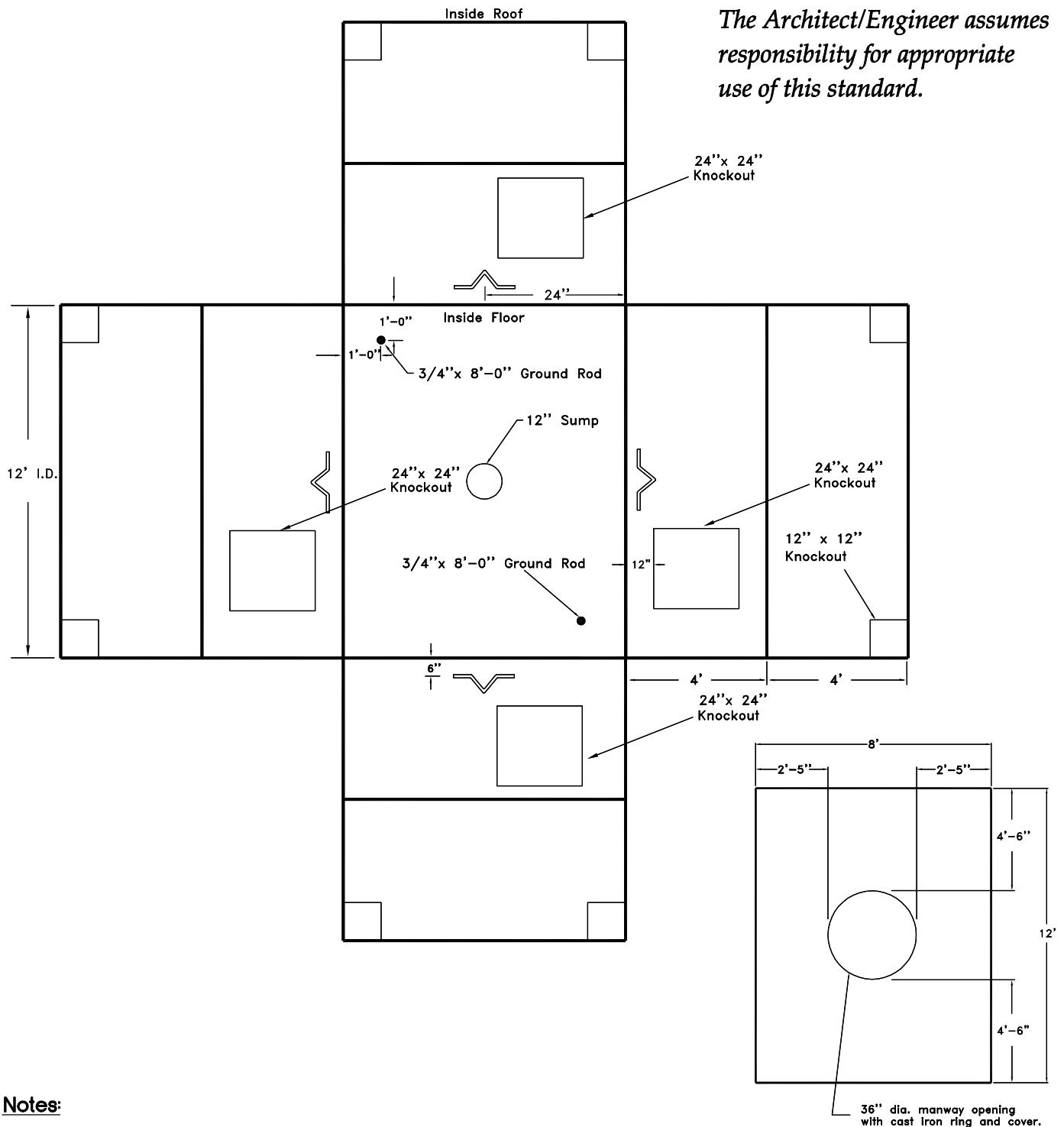
*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-230A		
SCALE: NTS	DATE: 6/2/03	GUM-MH1
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUICKSET MANHOLE
(8' X 10' X 8')

The Architect/Engineer assumes responsibility for appropriate use of this standard.



Plan View of Top

Notes:

1. Minimum working load for each pulling anchor is 16,800 lbs.
2. Minimum working load for each lifting anchor is 2,000 lbs.
3. Exact location and orientation of the manhole shall be specified on the construction drawings.
4. Engineering shall verify the strength of the manhole will not be adversely affected, prior to approving any field modifications such as cuts to form slots or holes.
5. Drive ground rod before installing the top portion of the manhole. The party responsible for the installation of the conduit system shall be responsible for the installation of the ground rod.
6. Clean joint surfaces with a brush and ensure joints are dry. Firmly press joint filler onto surface end-to-end around the entire joint. Allow 1" overlaps when abutting.
7. Preformed butyl joint sealer sufficient for setting the manhole shall be supplied by the manufacturer.
8. Minimum excavation requirements to set manhole in place are 11' x 15' x 14' with 18" of 3/4" crushed rock in the bottom excavation for manhole to rest on.

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-231	
SCALE: NTS	DATE: 3/26/03
DRAWN BY: MRC	APPROVED BY: GBY
GUM-MH2	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUICKSET MANHOLE
(8' X 12' X 8')

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

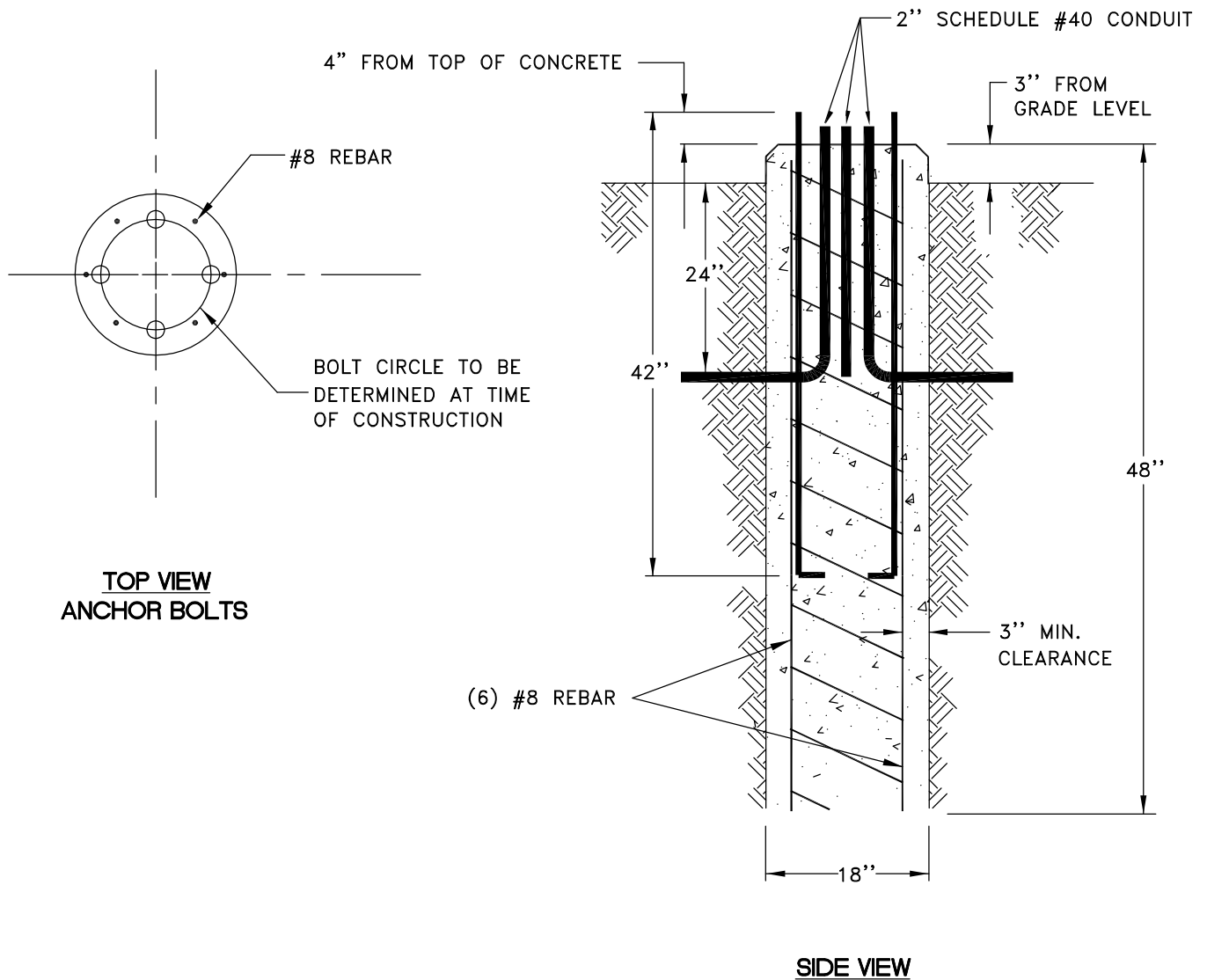
This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006		
DRAWING NAME: GEO-231A		
SCALE: NTS	DATE: 6/2/03	GUM-MH2
DRAWN BY: GBY	APPROVED BY: CCS	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
QUICKSET MANHOLE
(8' X 12' X 8')



Notes:

1. "R" designates installation in rock.
2. #3 Spiral, 4" pitch.
3. 4-1/4" anchor bolt, 43" long with 4" projection from concrete.
4. Anchor bolt: 6" thread top, 2' to be galvanized.
5. Anchor bolt to be a 326, with 2 nuts and 2 square washers.
6. (6) #8 vertical rebar.
7. All concrete to be 3,000 PSI grade.
8. Foundation to have 1" chamfer on top to prevent chipping.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE FOUNDATION
STREETLIGHT POLE
(18" DIAMETER X 48" DEPTH)
PAGE 1 OF 2

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-235	
SCALE: NTS	DATE: 6/2/03
DRAWN BY: MRC	APPROVED BY: CCS
GUSL-CF-A, GUSL-CF-AR	

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

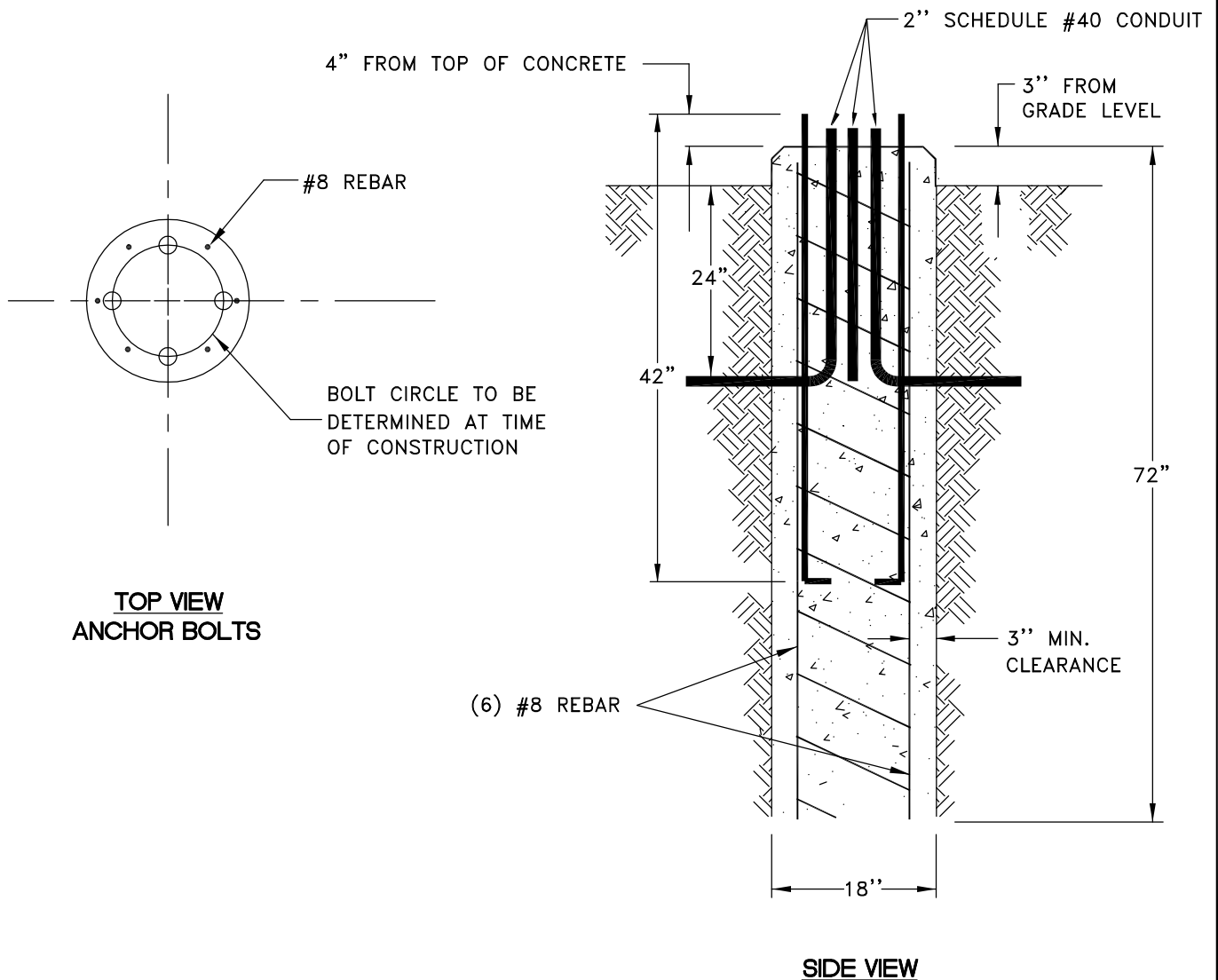
This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-235A	
SCALE: NTS	DATE: 6/2/03
DRAWN BY: GBY	APPROVED BY: CCS
GUSL-CF-A, GUSL-CF-AR	



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE FOUNDATION
STREETLIGHT POLE
(18" DIAMETER X 48" DEPTH)
PAGE 2 OF 2



Notes:

1. "R" designates installation in rock.
2. #3 Spiral, 4" pitch.
3. 4-1/4" anchor bolt, 42" long with 4" projection from concrete.
4. Anchor bolt: 6" thread top, 2' to be galvanized.
5. Anchor bolt to be a 326, with 2 nuts and 2 square washers.
6. (6) #8 vertical rebar.
7. All concrete to be 3,000 PSI grade.
8. Foundation to have 1" chamfer on top to prevent chipping.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE FOUNDATION
STREETLIGHT POLE
(18" DIAMETER X 72" DEPTH)
PAGE 1 OF 2

REVISION NOTE: ADOPTED 6/21/2006	
DRAWING NAME: GEO-236	
SCALE: NTS	DATE: 6/2/03
DRAWN BY: SCE	APPROVED BY: CCS
GUSL-CF-B, GUSL-CF-BR	

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

REVISION NOTE: ADOPTED 6/21/2006

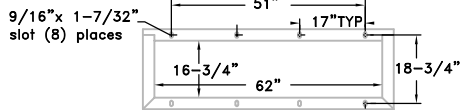
DRAWING NAME:
GEO-236A



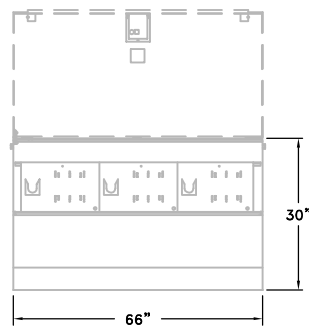
CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONCRETE FOUNDATION
STREETLIGHT POLE
(18" DIAMETER X 72" DEPTH)
PAGE 2 OF 2

SCALE: NTS	DATE: 6/2/03	GUSL-CF-B, GUSL-CF-BR
DRAWN BY: GBY	APPROVED BY: CCS	

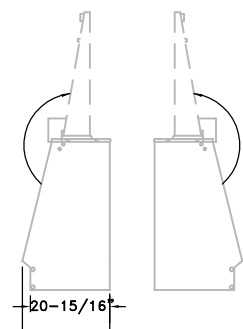
The Architect/Engineer assumes responsibility for appropriate use of this standard.



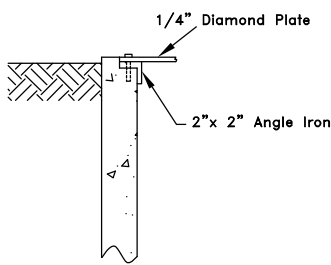
JUNCTION BOX
BASE PLATE



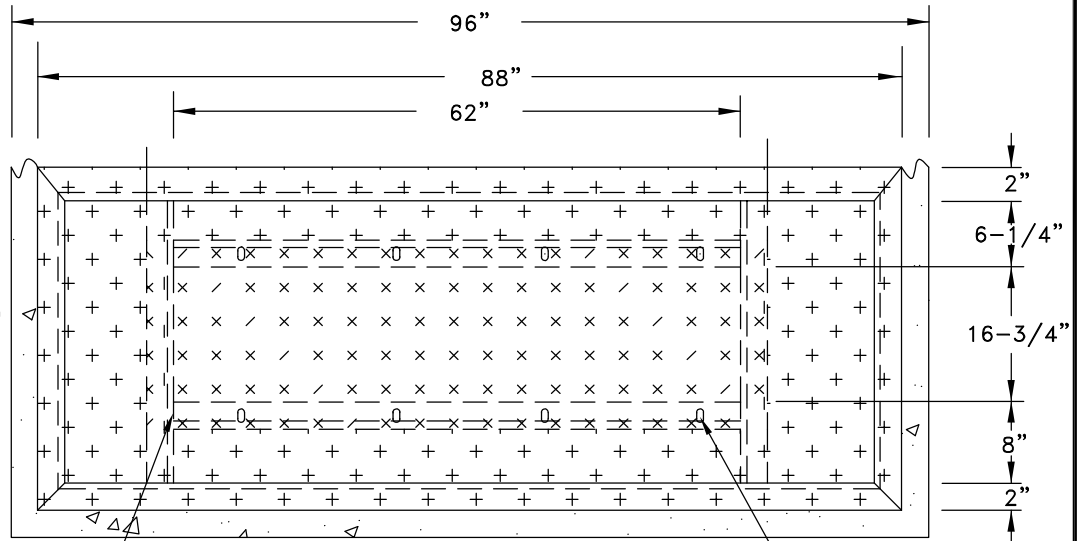
JUNCTION BOX
FRONT VIEW



JUNCTION BOX
SIDE VIEW

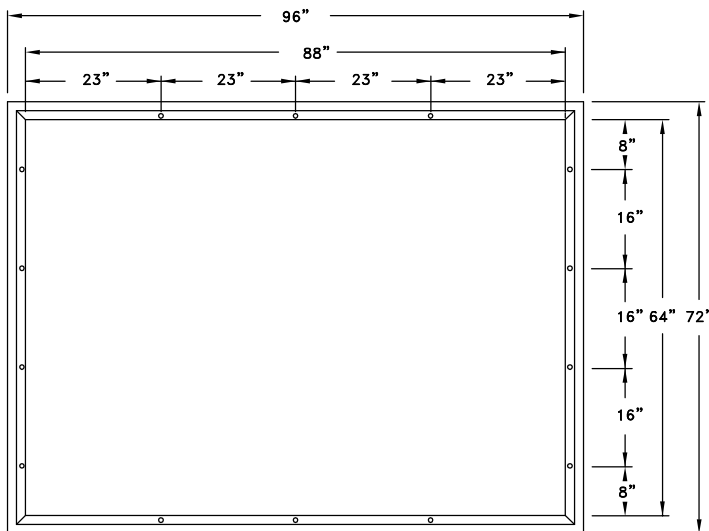


DIAMOND PLATE
MOUNTING DETAIL

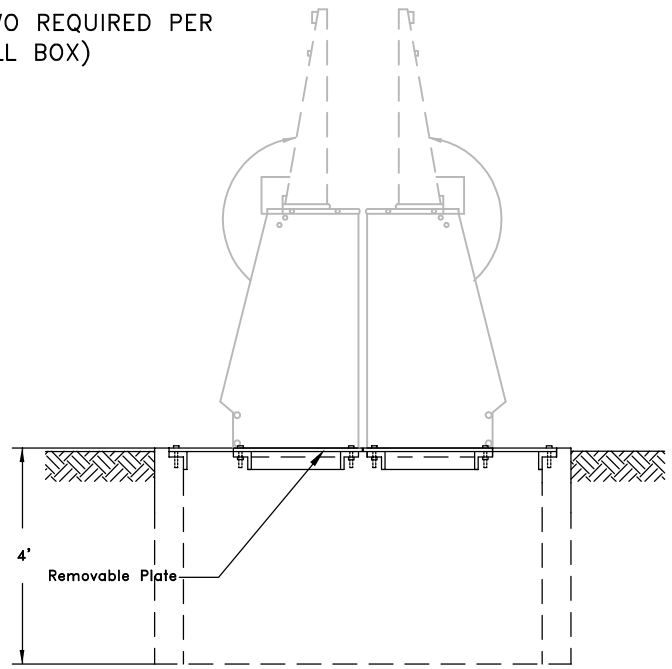


PULL BOX WITH
DIAMOND PLATE COVERS
(TWO REQUIRED PER
PULL BOX)

3/8" Bolt Hole for Junction
Box or Removable Plates



PULL BOX WITH
2" X 2" ANGLE IRON



JUNCTION/PULL BOXES
SIDE VIEW

REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:

GEO-238

SCALE: NTS
DATE: 6/2/03
DRAWN BY: KJH
APPROVED BY: CCS

GUM-PB1



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
JUNCTION BOX AND PULL BOX
COMBINATION DETAIL

MATERIAL LIST

ITEM NO.	STOCK NO.	DESCRIPTION	QTY.

This Page Intentionally Left Blank

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
JUNCTION BOX AND PULL BOX
COMBINATION DETAIL

PAGE 2 OF 2

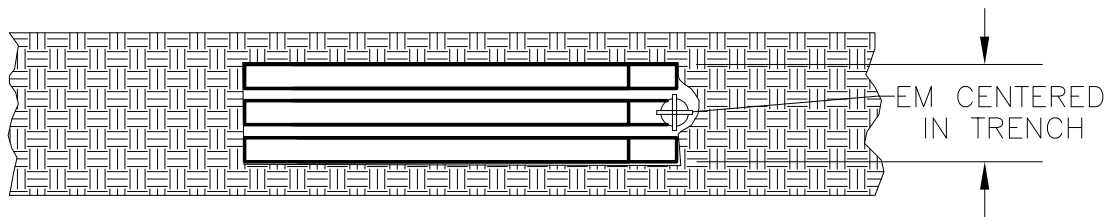
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:
GEO-238A

SCALE: NTS DATE: 6/2/03

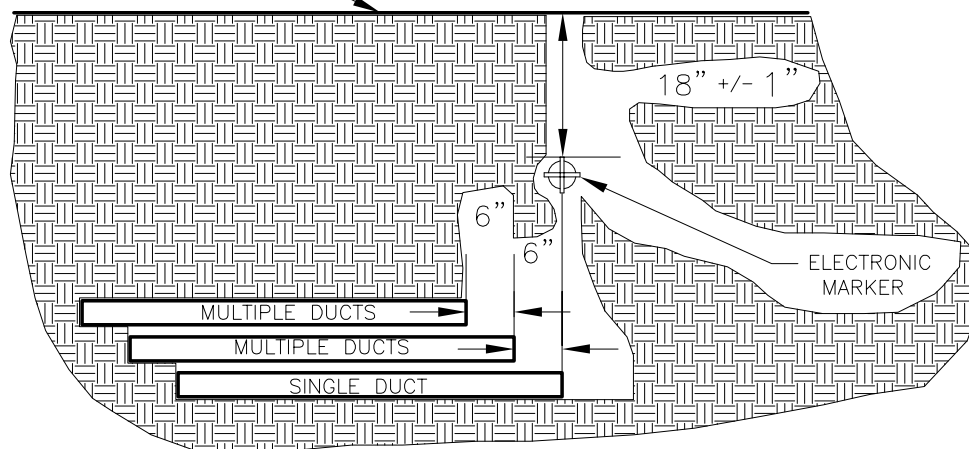
DRAWN BY: GBY APPROVED BY: CCS

GUM-PB1



PLAN VIEW

FINAL SURFACE GRADE
(PAVEMENT, LANDSCAPE,
OR UNDEVELOPED AREA
— ALL SAME)



ELEVATION VIEW

NOTES:

1. ELECTRONIC MARKERS SHALL BE TEMPO/TEXTRON, MODEL 160 OMNI MARKERS, RED IN COLOR TO INDICATE ELECTRIC POWER
2. THE MARKERS SHALL BE INSTALLED AT A DEPTH OF 18" BELOW GRADE DIRECTLY ABOVE THE END OF THE CONDUIT STUB-OUT, AND IN THE CENTER OF THE TRENCH.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

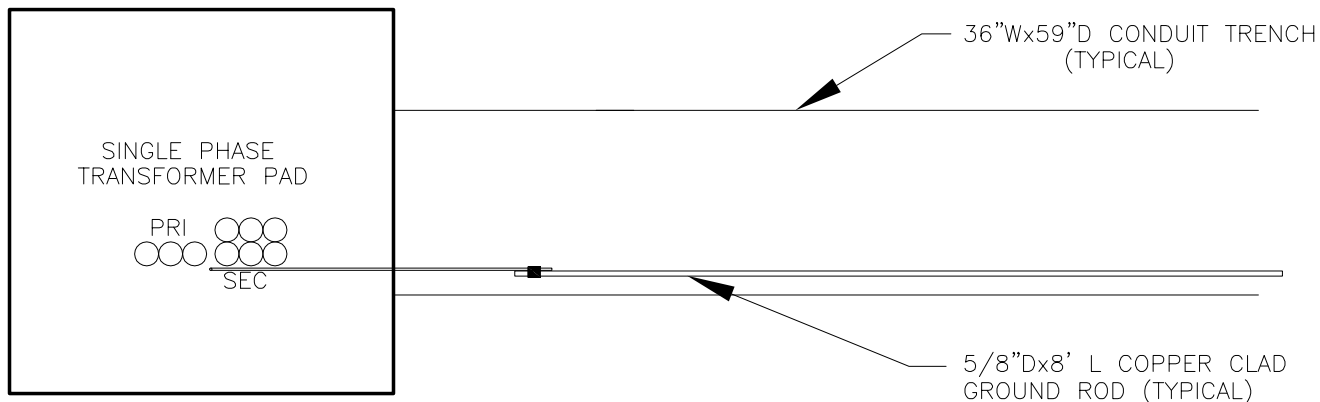


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
CONDUIT STUB-OUT
& ELECTRONIC MARKER
INSTALLATION

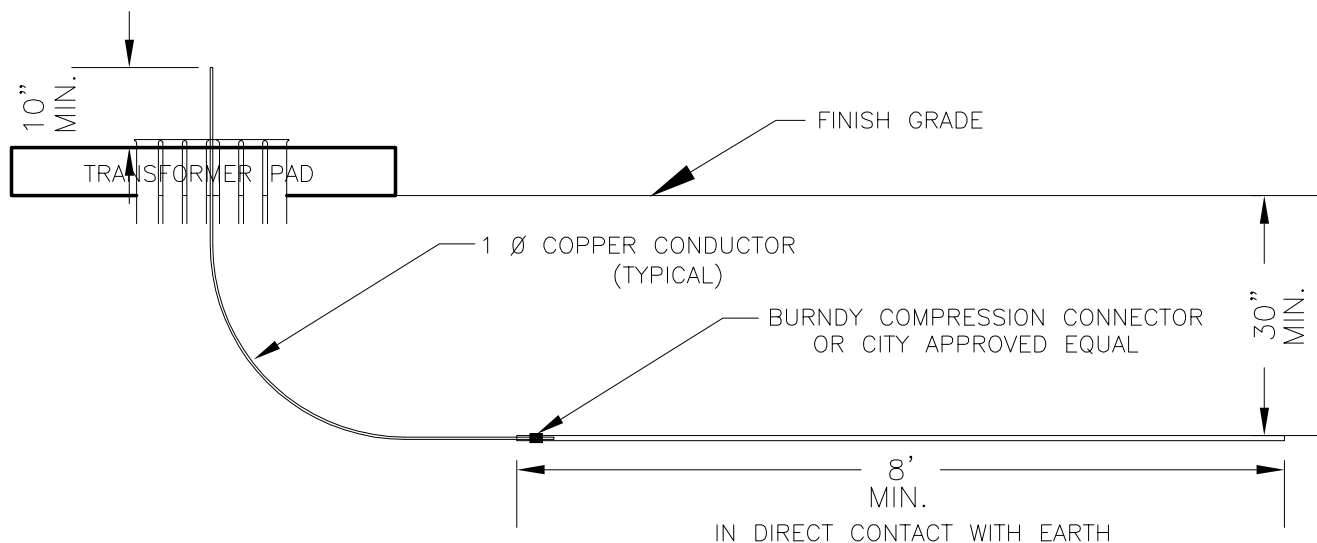
REVISION NOTE: ADOPTED 6/21/2006

DRAWING NAME:
UGDEM1.1

SCALE: NTS DATE: 11/05
DRAWN BY: JLV APPROVED BY: MWM



PLAN VIEW



ELEVATION VIEW

NOTES:

1. THE GROUND ELECTRODE SHALL BE A 5/8" DIAMETER x 8' LONG, COPPER-CLAD STEEL GROUND ROD.
2. A 1 Ø STRANDED CONDUCTOR SHALL BE CONNECTED TO THE GROUND ELECTRODE AND EXTEND 10" MINIMUM ABOVE FINAL GRADE OF THE SLAB
3. THE 1 Ø CONDUCTOR SHALL BE ATTACHED TO THE GROUND ELECTRODE USING AN APPROPRIATE SIZE BURNDY COMPRESSION-TYPE CONNECTOR OR CITY-APPROVED EQUAL.
4. THE FULL 8' LENGTH OF THE GROUND ELECTRODE SHALL BE BURIED IN DIRECT CONTACT WITH THE EARTH.
5. THE GROUND ELECTRODE SHALL BE BURIED WITH A MINIMUM OF 30" OF COVER TO FINISH GRADE.

*The Architect/Engineer assumes
responsibility for appropriate
use of this standard.*

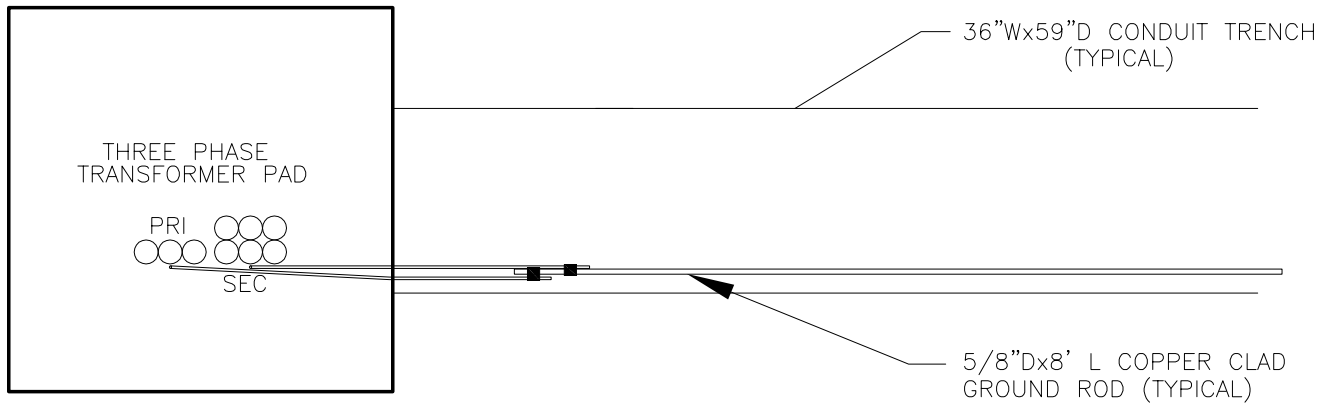


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
ALTERNATE GROUNDING SYSTEM
FOR PADMOUNT XFMRs & SWITCHGEAR
(SINGLE PHASE)

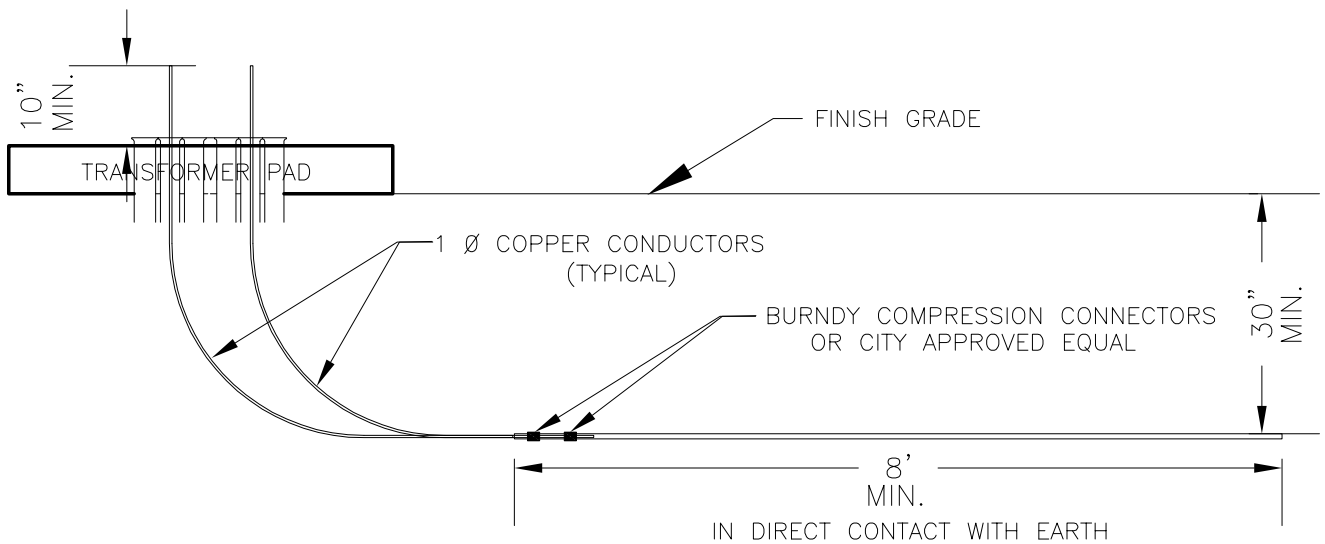
REVISION NOTE: **ADOPTED 6/21/2006**

DRAWING NAME:
UGG1.1

SCALE: NTS
DATE: 7/05
DRAWN BY: JLW
APPROVED BY: MWM



PLAN VIEW



ELEVATION VIEW

NOTES:

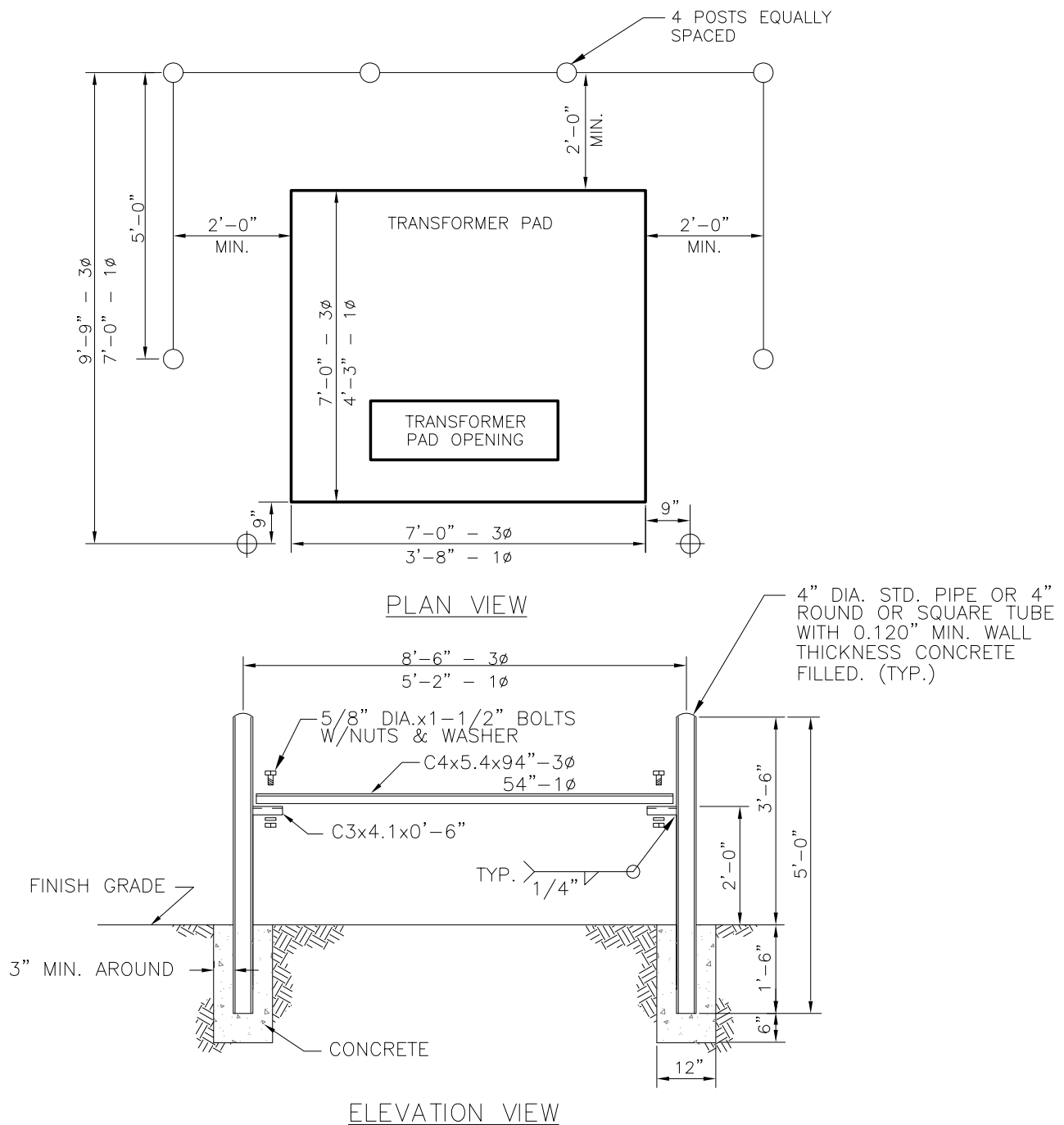
1. THE GROUND ELECTRODE SHALL BE A 5/8" DIAMETER x 8' LONG, COPPER-CLAD STEEL GROUND ROD.
2. TWO EACH 1 Ø STRANDED CONDUCTORS SHALL BE CONNECTED TO THE GROUND ELECTRODE AND EXTEND 10" MINIMUM ABOVE FINAL GRADE OF THE SLAB
3. THE 1 Ø CONDUCTORS SHALL BE ATTACHED TO THE GROUND ELECTRODE USING AN APPROPRIATE SIZE BURNDY COMPRESSION-TYPE CONNECTOR OR CITY-APPROVED EQUAL.
4. THE FULL 8' LENGTH OF THE GROUND ELECTRODE SHALL BE BURIED IN DIRECT CONTACT WITH THE EARTH.
5. THE GROUND ELECTRODE SHALL BE BURIED WITH A MINIMUM OF 30" OF COVER TO FINISH GRADE.

The Architect/Engineer assumes responsibility for appropriate use of this standard.



CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
ALTERNATE GROUNDING SYSTEM
FOR PADMOUNT XFMRs & SWITCHGEAR
(THREE PHASE)

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		UGG1.2	
SCALE:	DATE:		
NTS	7/05		
DRAWN BY:	APPROVED BY:		
MRS	MWM		



NOTES:

1. IF A BUILDING IS USED AS ANY PORTION OF THIS GUARD, THE TRANSFORMER PAD SHALL BE SO LOCATED THAT THE PAD SIDE OR SIDES ADJACENT TO THE SURFACE OF THE BUILDING SHALL HAVE A CLEARANCE OF NOT LESS THAN 5 FEET. FOR TRANSFORMERS 750 KVA AND ABOVE CONTACT GEORGETOWN UTILITY SERVICES ABOUT SPECIAL CLEARANCE REQUIREMENTS.
2. 10'-0" CLEARANCE SHALL BE PROVIDED IN FRONT OF THE EQUIPMENT TO PERMIT HOT STICK OPERATION.

The Architect/Engineer assumes responsibility for appropriate use of this standard.

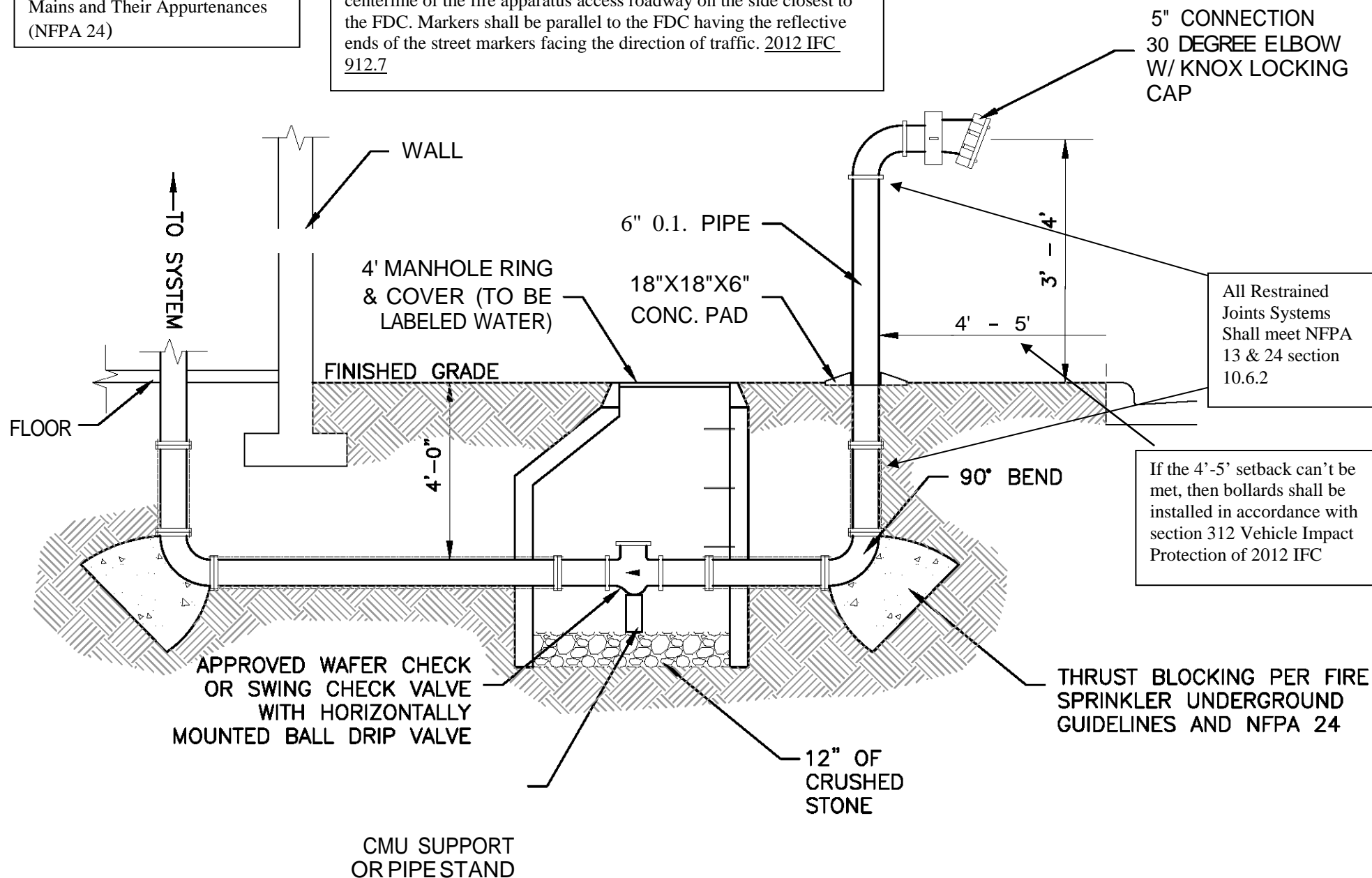


CITY OF GEORGETOWN
CONSTRUCTION STANDARDS AND DETAILS
PROTECTIVE BOLLARD INSTALLATION FOR
PADMOUNT XFMRS, JUNCTION BOXES
AND SWITCHGEAR

REVISION NOTE:		ADOPTED 6/21/2006	
DRAWING NAME:		UGPB1.1	
SCALE:	DATE:		
NTS	7/05		
DRAWN BY:	APPROVED BY:		
JWL	MWM		

Per State Fire Marshall's Office
an RME-U License is required in
order to work on Private Fire
Mains and Their Appurtenances
(NFPA 24)

All Fire Department Connections (FDCs) shall be marked as
approved by the Fire Code Official. Two red street lane reflectors
(stimsonite model 88AB or similar) shall be installed six inches from
centerline of the fire apparatus access roadway on the side closest to
the FDC. Markers shall be parallel to the FDC having the reflective
ends of the street markers facing the direction of traffic. 2012 IFC
912.7



FIRE DEPARTMENT CONNECTION

NOT TO SCALE

APPENDIX “B” WAGE
DECISION

GENERAL DECISION TX990041 03/12/99 TX41

General Decision Number TX 990041:

Superseding General Decision No. TX980041

State: TEXAS

Construction Type: SEWER/WATER TREATMENT PLANTS

County (ies):

BELL	HILL	MILLS
BOSQUE	LAMPASAS	NAVARRO
CORYELL	LEON	ROBERTSON
FALLS	LIMESTONE	WILLIAMSON
FREESTONE	MCLENNAN	
HAMILTON	MILAM	

Modification Number	Publication Date
0	03/12/1999

WATER & SEWER TREATMENT PLANTS AND LIFT STATIONS

SUTX5006A 02/09/1990

	<u>Rates</u>	<u>Fringes</u>
CARPENTERS	9.00	
CEMENT MASONS	8.00	
ELECTRICIANS	13.45	.80+8 ½%
FORM BUILDERS	6.50	
FORM SETTERS	6.00	
LABORERS	5.15	
UTILITY LABORERS	5.15	
PIPELAYERS	7.50	
POWER EQUIPMENT OPERATORS:		
Cranes, Clambshells, Backhoes,		
Derricks, Dragline, Shovels	6.97	
FRONT END LOADERS	10.00	
BULDOZERS	5.48	
SCRAPERS	5.60	
STEEL SETTERS	9.50	

STEEL WORKERS	7.00
TRUCK DRIVERS:	
Tandem Axles	5.75
Transit Mix	5.75

Welders - receive rate prescribed for craft performing operation to which welding is incidental

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5 (a) (1) (v)).

General Decision Number TX 990043

Superceded General Decision No. TX 980043

State: TEXAS

Construction Type: HEAVY HIGHWAY

County (ies):

BELL	CORYELL	TRAVIS
BEXAR	GUADALUPE	WILLAMSON
BRAZOS	HAYS	
COMAL	MCLENNAN	

Heavy (excluding tunnels and dams) and Highway Construction Projects (does not include building structures in rest area projects). NOT TO BE USED FOR WORK ON SEWAGE OR WATER TREATMENT PLANTS OR LIFT/PUMP STATIONS IN BELL, CORYELL, McLENNAN AND WILLIAMSON COUNTIES.

Modification Number	Publication Date
0	03/12/1999

SUTX2042A 03/26/1998

	<u>Rates</u>	<u>Fringes</u>
AIR TOOL OPERATOR	8.08	
ASPHALT HEATER OPERATOR	11.00	
ASPHALT RAKER	8.00	
ASPHALT SHOVELER	7.97	
BATCHING PLANT WEIGHER	11.00	
CARPENTER	10.80	
CONCRBTE FINISHER - PAVING	9.57	
CONCRETE FINISHER - STRUCTURES	8.83	
CONCRETE RUBBER	8.52	
ELECTRICIAN	16.25	
FLAGGER	6.86	
FORM BUILDER - STRUCTURES	8.77	
FORM LINER - PAVING & CURB	8.00	
FORM SETTER - PAVING & CURB	8.68	
FORM SETTER - STRUCTURES	8.73	
LABORER - COMMON	7.12	

LABORER - UTILITY	7.99
MECHANIC	12.15
OILER	11.40
SERVICER	8.44
PAINTER - STRUCTURES	10.00
PIPE LAYER	8.27
ASPHALT DISTRIBUTOR OPERATOR	9.70
ASPHALT PAVING MACHINE	9.26
BROOM OR SWEEPER OPERATOR	7.12
BULLDOZER	9.28
CONCRETE CURING MACHINE	7.79
CONCRETE FINISHING MACHINE	11.00
CONCRETE PAVING SAW	9.79
SLIPFORM MACHINE OPERATOR	11.15
CRAN, CLAMSHELL BACKHOE	
DERRICK, DRAGLINE, SHOVEL	10.12
FOUNDATION DRILL OPERATOR	
TRUCK MOUNTED	15.00
FRONT END LOADER	8.86
HOIST - DOUBLE DRUM & LESS	10.81
MIXER	7.12
MIXER - CONCRETE PAVING	11.00
MOTOR GRADER FINE GRADE	12.37
MOTOR GRADER	11.14
PAVEMENT MARKING MACHINE	8.31
PLANER OPERATOR	15.75
ROLLER, STEEL WHEEL PLANT-MIX	
PAVEMENTS	7.73
ROLLER, STEEL WHEEL OTHER	
FLATWHEEL OR TAMPING	7.33
ROLLER, PNEUMATIC, SELF PROPELLED	7.17
SCRAPERS	8.38
TRACTOR-CRAWLER TYPE	9.40
TRAVELING MIXER	7.92
TRENCHING MACHINE, HEAVY	9.92
WAGON-DRILL/BORING MACHINE	8.00
REINFORCING STEEL SETTER PAVING	14.50
REINFORCING STEEL SETTER	
STRUCTURES	10.61
STEEL WORKER-STRUCTURAL	11.73
SPREADER BOX OPERATOR	8.55
WORK ZONE BARRICADE"	8.29
SIGN INSTALLER	7.97
TRUCK DRIVER-SINGLE AXLE LIGHT	8.32
TRUCK DRIVER-SINGLE AXLE HEAVY	7.954
TRUCK DRIVER-TANDEM AXLE SEMI-	

TRAILER	8.02
TRUCK DRIVER-LOWBOY/FLOAT	10.12
WELDER	11.02

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5 (a) (1) (v)).

APPENDIX “C”
ADOPTED REVISIONS

Appendix “C” - Adopted Revisions

The commentary provided below is a brief summary of the adopted revisions and may not specifically detail every revision reflected in the document as part of that update. The commentary is provided as reference for revisions made to the construction specifications and standards. Revisions are reflected in the construction specifications and standards.

Second Edition, Version Three, effective June 21, 2006

Construction Specifications

Capital Improvement Project Requirements

CIP 12.05

Section title revised to include Force Mains.

CIP 12.05 F.2

Required testing time increased from 90 seconds to 120 seconds.

CIP 12.05 F.3

The following comment removed from item. If there has been no pressure loss during the first 23-seconds the test may be stopped and the manhole will be accepted.

CIP 12.05 K.2.e

Item included to require additional video inspections be performed prior to completion of one-year warranty period and requiring a submittal of the inspections to the City of Georgetown on DVD.

CIP 12.05 L.1

Item added for force mains. Force main shall be pressure tested one and one-half (1 1/2) times the maximum output of the pumps. The allowable hydrostatic leakage rate shall be based on CIP 12.06 Table 6A.

General Specifications

G4.03 B.1

The minimum width of trench in which the pipe may be installed shall not be less than 12-inches plus the outside diameter of the pipe. Previous specifications called for the minimum width of the trench to not be less than 18-inches.

G 6.05 G.5

Item has been included requiring that no vehicles or equipment shall be parked within the dripline of an existing tree.

Streets and Drainage Specifications

SD 2.03 C

Item revised to include the following requirements. Type A Grade 1 base material may be used with a minimum ratio of 1 to 1, in lieu of lime. If using lime treatment, refer to Item 260 in the TXDOT Standard Specifications for Construction of Highways, Streets and Bridges.

Item revised to include proposed paved areas.

Non-swelling soils shall have a density of not less than 95% of density. This is a change for the 100% of density requirement that is currently required to be obtained.

Item added for Street Signs. All signage sheeting shall be high intensity or better. All signage posts shall be 2.375" OD x 0.095" thin wall steel tubing. All signs shall have breakaway foundations. All Signage shall meet requirements of the current edition of TMUTCD.

Gate Valves - AWWA C500 standard changed to AWWA C515 to reflect latest AWWA/ANSI adopted standard.

Item added requiring that fire sprinkler lines are protected by a reduced pressure zone (RPZ). All fire lines shall be ductile iron pipe. All private fire lines shall be separated by a double detecta check.

Included into item is that all carrier pipe shall have restrained joints.

Maximum adjustment with concrete grade rings is to be 12".

Item added for force mains. Force mains all shall be C-900, DR-18 pipe or epoxy coated ductile iron encased with brown 8 mil. polyethylene film.

Item revised to include that all reinforcing steel be adequately supported and approved by the City of Georgetown to assure proper placement when poured.

Item revised to include that all reinforcing steel be adequately supported and approved by the City of Georgetown to assure proper placement when poured.

Construction Standards

*Addition to all details is a note stating that “the Architect/Engineer assumes responsibility for appropriate use of this standard”.

Example:

The Architect/Engineer assumes responsibility for appropriate use of this standard.

Erosion Control Standard Details

EC01A Erosion and Sedimentation and Tree Protection Notes

Sentence removed in the notes suggesting these notes pertain only to heavy civil projects.

Streets and Drainage Standard Details

SD01 Typical Half Cross – Sections for HMAC surfaced Streets

Dimensioning was corrected on the flexbase and subgrade depths to show accurate depths.

Dimensioning for distance under pavement for base material was changed from 12” to 18” from back of curb.

SD03 Concrete Valley Gutter Detail

Note 10 added requiring that rebar be supported by rebar chairs or other approved methods.

SD06 Curb and Gutter Details

Note 10 added requiring that rebar be supported by rebar chairs or other approved methods.

Note 11 added: Rebar supports are not required on machine placed curb provided that rebar is properly guided into the curb section.

SD07 Mountable Curb and Gutter Details

Note 10 added requiring that rebar be supported by rebar chairs or other approved methods.

Note 11 added: Rebar supports are not required on machine placed curb provided that rebar is properly guided into the curb section.

SD08 Ribbon Curb Details

Note 10 added requiring that rebar be supported by rebar chairs or other approved methods.

Note 11 added; Rebar supports are not required on machine placed curb provided that rebar is properly guided into the curb section.

SD10 Curb Drain Inlet Typical Section

Dimensioning modified to clarify inlet opening.

SD11 Standard Storm Sewer Manhole Set

New manhole ring and cover adopted use.

SD11A Bolted Storm Sewer Manhole Set

New detail for bolted manhole adopted for use.

SD13 Standard Storm Sewer Manhole – Section

Dimensioning added to depth of cover for base material over storm sewer lines at the base of the manhole. Maximum adjustment with concrete grade rings is to be 12”.

Note 1: Manholes shall be precast ASTM C-478 bell and spigot with profile gasket – single off-set joints.

SD14 Sidewalk Section and Joint Detail

Note added requiring that rebar be supported by rebar chairs or other approved methods.

SD15 Concrete Driveway Approach – Typical

Note added requiring that rebar be supported by rebar chairs or other approved methods.

Note 7 added: Driveway approach thickness to be a minimum of 6”.

SD16 Concrete Dip Driveway Approach

Note 5 added to require reinforcing wire mesh, as support for approach slab, be supported by rebar chairs or other approved methods.

SD19 Typical Concrete Rip-Rap at Pipe

Note 3 added to require reinforcing wire mesh, as support for approach slab, be supported by rebar chairs or other supported methods.

SD21 Permanent End-of-Road Barricade

Added a reference to detail SD24 for sign post requirements. Note 9 added to require rail-high density polyethylene or hollow profile plastic lumber and sheeting be retroreflective, including splice blocks.

SD25 Standard Street Sign Detail

All signage sheetings shall be high-intensity “3M” sheeting.

SD28 Pedestrian Ramps General Notes

Note 13 added to allow for variance by TDLR for sidewalk cross-slopes that exceed 1:50.

SD39 Concrete Trench Cap Detail for Storm Sewer

Include note for trench widths, as noted on W02. Pipes less than 20” dia. and 20” dia. and larger pipes.

SD40 Trench and Embedment and Pavement Replacement Detail Under Existing Roadway for Storm Sewer

Include note for trench widths, as noted on W02. Pipes less than 20” dia. and 20” dia. and larger pipes.

SD41 Trench and Embedment Detail Under Proposed Roadway for Storm Sewer

Include note for trench widths, as noted on W02. Pipes less than 20” dia. and 20” dia. and larger pipes.

SD42 Trench and Embedment Detail (Profile) for Storm Sewer

Note 3 revised to require all joints be wrapped with MARF1-140-N Geotextile fabric or approved equal and the wrap is to be 18” wide centered on the joint.

SD45 Downtown Overlay District – Type III and IV Sidewalk Details

New detail added.

Water Standard Details

W01A Utility Assignments for Local Streets, Residential Collectors and Major Collectors

Included a detail for electric conduit concrete encasement.

The minimum depth of cover below finish grade for all utilities under the roadway increased to 3 feet.

W01B Utility Assignments for Minor Arterial and Major Arterial Roadways

Included a detail for electric conduit concrete encasement.

The minimum depth of cover below finish grade for all utilities under the roadway increased to 3 feet.

W02 Trench and Embedment Detail Under Non-Paved Areas

Include note for trench widths, as noted on W02. Pipes less than 20" dia. and 20" dia. and larger pipes.

W02A Concrete Trench Cap Detail

Include note for trench widths, as noted on W02. Pipes less than 20" dia. and 20" dia. and larger pipes.

W03 Typical Water Service – Elevation

Note 7 added requiring concrete collar. Valve flanges on inline main to be mechanical joint with restrained gland and locking set screws. Ductile iron pipe required for anchor nipple or restrained joints.

W07 Typical Valve Setting

Rebar required in the concrete collar around valve stem. Assembly at main modified.

W08 Standard Riser Box for Corporation Stop

Concrete base block required for all installations

W09 Standard Blow-off

Reference to detail W08 added.

W10 Typical fire Hydrant Installation

Ductile iron pipe required for line

W13 Standard Air Release Valve for Water Main

Vent cap revised to include stainless steel screen

W14 Installation of PVC Pipe Through Casing

Note 7 added requiring casing under pavement to be extended out to within 4 feet inside of the ROW line on both sides. Note 8 added stating that all joints shall be restrained on PVC carrier pipe.

W15 Concrete Encasement Detail

Include note for trench widths, as noted on W02. Pipes less than 20" dia. and 20" dia. and larger pipes.

W16 Concrete Encasement Detail

Include note for trench widths, as noted on W02. Pipes less than 20" dia. and 20" dia. and larger pipes.

Wastewater Standard Details

WW01A Utility Assignments for Local Streets, Residential Collectors and Major Collectors

Included a detail for electric conduit concrete encasement.

The minimum depth of cover below finish grade for all utilities under the roadway increased to 3 feet.

WW01B Utility Assignments for Minor Arterial and Major Arterial Roadways

Included a detail for electric conduit concrete encasement.

The minimum depth of cover below finish grade for all utilities under the roadway increased to 3 feet.

WW02 Standard Manhole – Plan

Maximum adjustment with concrete grade rings is to be 12”.

Note “A” change: All manholes shall be 48” ID RCP Class III, with profile gasket – single off-set joints.

Note “E” change: Manholes may have a flat ID lid, if approved by City of Georgetown, being 12” thick with a min. 30” opening, as manufactured by Hansen Pipe and Precast or approved equal manufacturer conforming to ASTM C478, 5,000 PSI concrete, traffic bearing, and profile gasket – single off-set joint conforming to ASTM C443.

WW03 Standard Manhole - Section

Added note 4 to require spray wall epoxy coating as approved manhole coating option. Included dimensions for depth of base material covering pipe. Maximum adjustment with concrete grade rings is to be 12”.

Note 1: Manholes shall be precast ASTM C-478 bell and spigot with ~~“O” ring joints~~ profile gasket – single off-set joints.

WW04 Drop Connection – Precast Manhole Type “A”

Correct note cross-reference to other detail.

WW05 Drop Connection – Precast Manhole Type “B”

Included dimension for depth of base material covering pipe.

WW07 Standard Wastewater Manhole Set

Revised approved manhole set.

WW7A Bolted Wastewater Manhole Set

New Detail showing approved manhole

WW11 Pickbar Detail

Deleted Detail

WW13 Sewer Service Connections

Corrected the dimensioning for sewer service connections and cleanouts.

WW14 Standard Air Release Valve for Force Main

General note revisions to reflect changes in cover manufacturer and ring adjustments.

WW15 Standard Air Release Valve for Force Main

Vent cap revised to include stainless steel screen.

WW19 Typical Manhole with Vent

Correct note cross-reference to other detail.

WW20 Precast Manhole on Cast-in-Place Foundation

New Detail

WW21 Concrete Casting Manhole Detail

New Detail

Electric Standard Details

*All details listed below are new details.

GEO-117 35' Streetlight Pole and Mast Arm (Dark Bronze Powder Coat)

GEO-118 Streetlight Pole and Mast Arm (Brushed Aluminum Round Tapered)

GEO-122 Decorative Streetlight Pole (Dark Green)

GEO-206 24.9/14.4 kV Primary 600V Secondary – (Junction Box, Cover, and
Extension)

GEO-207 24.9/14.4 kV Primary Single-Phase Concrete Pad (Transformer, Vacuum
Switch, or Junction Box)

GEO-208 24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Junction
Box)

GEO-209 24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Switchgear
82" x 90")

GEO-210 24.9/14.4 kV Primary Three-Phase Concrete Pad (Pad-Mounted Transformer)

GEO-225 Miscellaneous UG Conduit Installation

GEO-227 36" Frame, Cover, and Grade Rings for Manhole Entry

GEO-229 Quickset Pull Box (4' x 8' x 4')

GEO-230 Quickset Manhole (8' x 10' 8')

GEO-231 Quickset Manhole (8' x 12' x 8')

GEO-235 Concrete Foundation Streetlight Pole (18" Diameter x 48" Depth)

GEO-236 Concrete Foundation Streetlight Pole (18" Diameter x 72" Depth)

GEO-238 Junction Box and Pull Box Combination Detail

UGDEM1.1 Conduit Stub-out and Electronic Marker Installation

- UGG1.1 Alternate Grounding System for Pad-Mount Transformers and Switchgear
(Single Phase)
- UGG1.2 Alternate Grounding System for Pad-Mount Transformers and Switchgear
(Three Phase)
- UGPB1.1 Protective Bollard Installation for Pad-Mount Transformers, Junction Boxes
and Switchgear

[End of Section]