

Mt. Olympus Improvement District



Standards and Specifications

Mt. Olympus Improvement District
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Mt. Olympus Improvement District reserves the right to update and make changes to these Standards & Specifications from time to time as conditions dictate.

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Section 1 – Introduction

1-1. Approach

Projects within the Mt. Olympus Improvement District (District) are subdivided into three (3) different categories: lateral construction, commercial development, and developments with main lines. Each development must have a preliminary plan review and a final plan review. Emergency repairs on existing sanitary sewer laterals and main lines do not require a plan review. Inspections for repairs can be scheduled by phone and must be done by bonded excavating and plumbing contractors.

The District is responsible for the operation and maintenance of main lines which have been accepted by the District and meet all District requirements. The District is not responsible for the ownership and maintenance of any laterals and private main lines. A complete definition of main lines and laterals can be found in the District's Code of General Regulations.

The District will review and approve submittals in the order they are received. Projects with large or more complicated designs must submit their plans to the District as far in advance as possible to allow adequate time for plan review and approval. Plan submittals must be in pdf format. Plan submittals must be complete, high quality, reproducible, and shall follow industry guidelines for design and drafting. Plan submittals which are scanned must be high quality. Plans that are incomplete, difficult to read and interpret will be rejected and returned. Use of "color" line work to differentiate utilities will not be accepted. If special conditions exist, contact a District representative for additional discussion and site visit when necessary.

Plans for commercial development and developments with main lines must be submitted to the District and shall include a Utility Plan, Site Plan, and Plat with addresses and lot numbers. Utility Plans for Main Line projects must include a Plan & Profile drawing. Plans for one single-family residence can be submitted in a simplified format and shall include the proposed footprint of the home along with the proposed sanitary sewer lateral alignment. All plan submittals must include the officially assigned addresses and lot numbers. Any changes or corrections to addresses and lot numbers must be sent to the District, failure to do so may lead to a delay in plan approval and permit issuance.

1-2. Work Schedule

Inspections shall take place during normal District business hours. Inspections must be scheduled 1 business day in advance. If inspections are needed outside of normal business hours, the inspection(s) will be charged at the approved overtime rate. The overtime rate for normal inspections shall be for an inspector and a pickup truck, with a two-hour minimum. The Contractor agrees to conform with the Code of General Regulations, these Standards and Specifications, any other District requirements. The Contractor agrees to pay for all inspection costs and overtime costs as necessary. The Contractor shall schedule all inspections with the District, if for any reason they cannot work as previously scheduled, they will notify the District to reschedule their inspection. Inspections requiring multiple visits may be charged additional fees.

1-3. Prevailing Fees

Information on inspection fees and fees associated with development activities are updated from time to time. The prevailing fees are available at the District office located at 3932 South 500 East, Millcreek, Utah 84107 or on the District's website at www.mtoid.org.



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Section 2 – Construction

2-1. General Information

The District must inspect all work being performed and nothing shall be buried until approved by a District representative. When scheduling an inspection the Contractor must have the physical address, as assigned by the County, where the inspection is to be performed. Subdivision and lot numbers are not acceptable addresses. Approval must be given by the District to open any sanitary manhole lid.

All Construction activities must be done in accordance with the contractor's Health and Safety plan, which must comply with all OSHA regulations including but not limited to those for trench safety, confined space entry, traffic safety. All work done must conform with all the requirements of the various Federal, State, City and County Agencies involved. All work must also conform with all Central Valley Water Reclamation Facility requirements. Contractors and Developers with unpaid fees, invoices, or outstanding work items will not be issued additional permits to work in the District until the previous items are completed.

2-2. Pipe Material

The contractor shall provide all new high-quality materials for sewers. Materials not meeting the District's standards will be considered defective and will be removed immediately from the site.

- (1) **Polyvinyl Chloride (PVC):** PVC pipe shall be bell and spigot with gasket joint and shall have minimum wall thickness conforming to ASTM D3034 (latest edition) and shall be SDR 35 pipe. Glued joints are not allowed.

2-3. Lateral Diameter & Slope

Sewer laterals shall be designed and installed with a minimum of 2% slope for 4" pipe and 1% for 6" pipe. Anything larger must be installed per main line specifications. All lateral test tees, clean-out tees, and caps shall be installed and set in accordance with the District's specifications.

2-4. Lateral Placement

Laterals shall not be placed under concrete or asphalt driveways. Laterals shall be placed to limit the number of bends. Laterals shall not cross adjacent properties. If crossing an adjacent property is the only option, an easement must be obtained and recorded with the County from the adjacent property owner.

2-5. Cleanout Placement & Type

A test tee must be installed at the property line when installing a new lateral. The maximum spacing between cleanouts is 100' for 4" and 6" laterals. Cleanouts must be placed between the property line and the structure. A cleanout near the structure is recommended. Cleanouts must remain visible and accessible during and after construction. Cleanouts that must be placed in concrete must have cast iron box placed over the cleanout and must be installed flush with the concrete. It is recommended that an irrigation style box be placed over any cleanout in landscaped areas. Cleanouts shall be constructed using a combination wye, PVC standpipe, and a watertight cast iron cap with a brass screw type lid.

2-6. Fittings

Each joint or fitting must be watertight and free from defects. Only bell to spigot gasket joints are permitted; no glue joints are allowed. Glued joints shall only be allowed in poured in place sampling



manholes and inside drop manholes. If a repair is being made, all transition couplings must have stainless steel shear bands or shielded bands (Fernco type or approved equal).

2-7. Lubrication for Gasket Joints

The lubricant used in joining pipes will be recommended by the pipe manufacturer.

2-8. Pipe Testing

- (1) **Laterals:** A water test is required on all new laterals. A water test is required to ensure joint tightness and that the lateral drains freely without any obstructions. A test tee must be installed at the property line on all new installations. After the pipe is laid to grade and bedded in gravel, an inflatable test ball plug is inserted at the test tee, then the entire lateral is filled with water including a standpipe or cleanout with at least 10' of head. The lateral shall be allowed a maximum water loss of 1" in 5 minutes for a 4" or 6" lateral per 100' feet in length. When the test ball is removed, the lateral must drain freely without any obstructions or interruption to the flow. Any other testing methods shall be approved by the District prior to beginning project.
- (2) **Main Line (pipe 8" and larger):** Requires a licensed pipe tester to pressure test with District representative present. The trench must be backfilled evenly on both sides of the pipe and compacted to retain proper alignment of the main line. All pipe must be cleaned by Contractor. The District shall perform a closed-circuit television (CCTV) inspection of the inside of the pipe. All pipe must be cleaned of dirt and foreign material by the Contractor before the system is accepted.

2-9. Bedding & Backfill Requirements

Pipe bedding shall consist of 3/4" minus angular material. Pipe bedding shall surround the pipe and shall extend to a depth of 1' below and above the pipe. Anything that deviates from these requirements must be approved by the District. All backfill placed in the trench shall meet specified gradation and compaction requirements as provided in the specifications.

2-10. New Connections

All nose-ons (taps for new connections) made on existing sewer main lines, whether District owned or private must meet the District standards. The Contractor is responsible to provide a safe excavation for the nose-on (tap). The Contractor must notify the District, 1 business day in advance before work is to be performed. Work must be completed per District requirements. The District will record all inspections.

2-11. Lateral Repairs & Rehabilitation

The service life of many types of sewer laterals is estimated to be 50 years. The District does not recommend re-using laterals which are older than this. Under no circumstance shall the District assume any liability for loss or damage which takes place as the result of rehabilitating or reusing laterals. The Contractor shall explain all limitations of the rehabilitation work, along with any deficiencies to the legal property owner. The District makes no representation or warranty of any kind, express or implied, regarding the quality, workmanship, or remaining service life of any work done using rehabilitation methods. Existing laterals may be re-used upon inspection from the District. It will be the Contractor or Owners responsibility to CCTV inspect the lateral with a District representative present to observe the condition of the pipe. The CCTV inspection equipment must produce a high-quality color image and



include camera head skids. The CCTV inspection must take place at least 1 business day before any permit is obtained. The District can require the lateral to be lined or a new connection be installed if necessary.

All damaged pipes must be removed. Transition couplings with stainless steel shear bands or shielded bands (Fernco type or approved equal) are to be used when joining different pipe materials. All pipe shall be clean and free of debris during the installation. The District will inspect all work being performed and nothing shall be buried until approved by a District representative. The Contractor must have the appropriate staff present for the inspection (i.e., the employee who physically performed the work or was in direct supervision and onsite). When the appropriate staff for the Contractor are not present, the inspection will be recorded as a failed inspection, another inspection fee will be required, and the inspection will need to be rescheduled.

2-12. New Connections & Utility Billing

It is the District's policy that single family residential properties shall be placed into the billing cycle four (4) months after the connection to the District system is made. Commercial, industrial, institutional, multi-family, and all other property types shall be placed into the billing cycle six (6) months after the connection to the District system is made. Extensions may be granted on a case-by-case basis. Extensions must be requested in advance of any utility billings and will only be granted one time. The legal property owner is responsible for all utility billings whether the building has been granted occupancy or not.

2-13. Lateral Cap-Offs

Laterals must be abandoned and capped-off as close to the property line as possible. An expandable plug must be used to plug the lateral as well as one (1) sack of concrete mixed and placed over the plug. A District representative must visibly see both the expandable plug and the concrete as it is placed to be approved and have the property taken out of billing.

2-14. Maintenance

The District will maintain main lines that have been accepted by District representatives and which are:

- (1) 8" in diameter or larger;
- (2) Serve more than one owner or association of owners;
- (3) Has a formal Line Extension Agreement;
- (4) Located in a public street or within an easement area given to District and acceptable to District representatives, and which are accessible using District cleaning equipment.

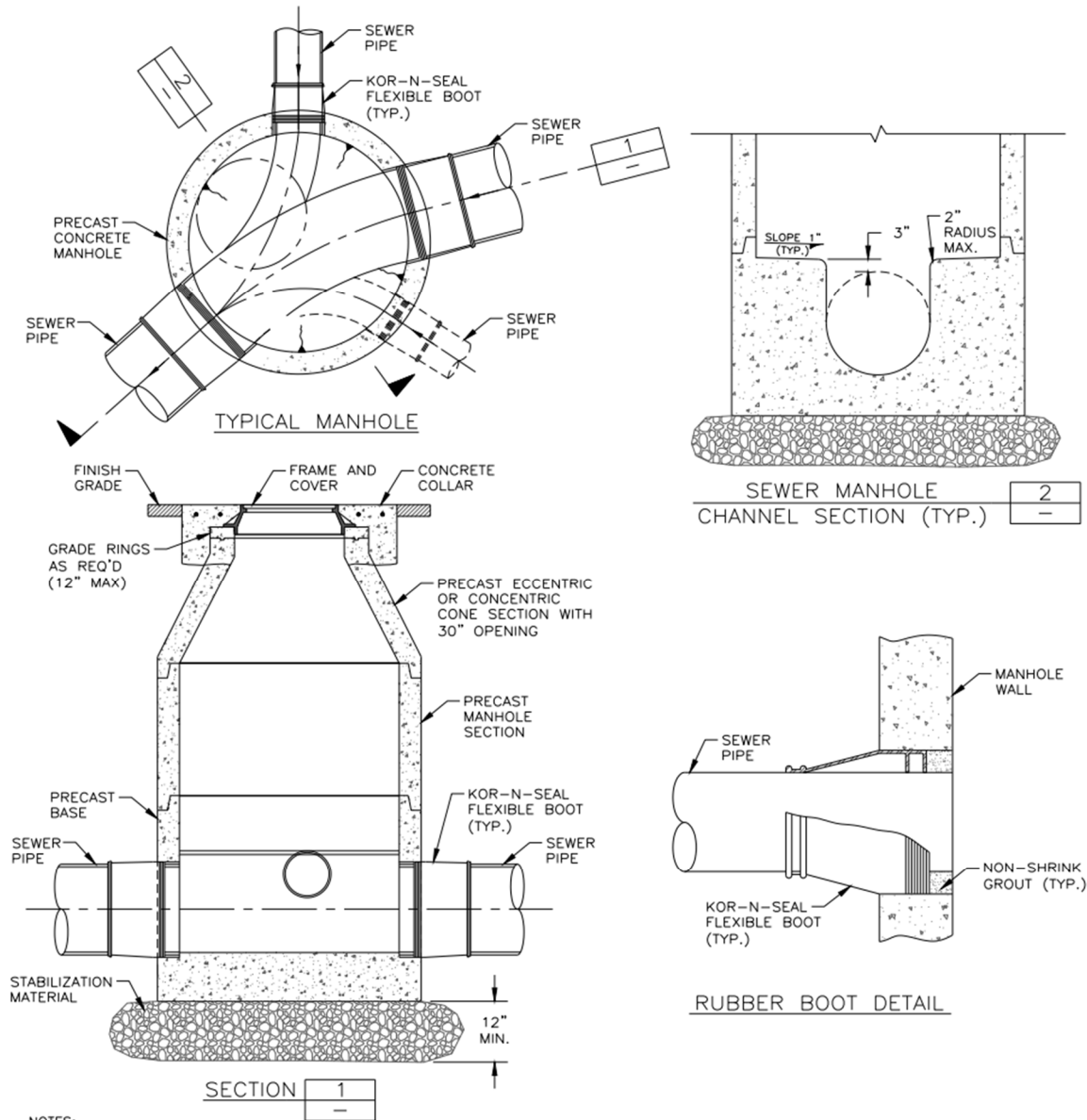
The District will not maintain or take over ownership of any lift stations or force mains. The District maintains a database of the District main lines. Individual owners or association of owners are responsible for the ownership and maintenance of private main lines and laterals.

2-15. Material Specifications

	<p>Pipe</p> <p>Pipe size and material shall be approved by the District.</p>		<p>Cleanout Caps</p> <p>Must be brass twist-on cap.</p>
	<p>Shear Band Connectors</p> <p>All connections must be stainless steel shear band (Fernco or approved equal)</p>		<p>Manhole Ring and Lids</p> <p>Lid shall be cast with MTOID logo.</p>
	<p>Inserta Tee</p> <p>Use for service connection to existing main line.</p>		<p>Mechanical Test Plug</p> <p>Use for abandoning existing manhole.</p>
	<p>Cast Iron Hub</p> <p>Cast iron hub required on all cleanouts.</p>		<p>Pipe Lubricant</p> <p>Must be lubricant recommended by the manufacturer.</p>
	<p>PVC Wye</p> <p>Must be appropriate size for the pipe.</p>		<p>PVC 22°</p> <p>Must be appropriate size for the pipe.</p>
	<p>PVC 45°</p> <p>Must be appropriate size for the pipe.</p>		<p>Kor N Seal Flexible Boot</p> <p>Boot for connection to manhole.</p>
	<p>RV Cleanout Caps</p> <p>Must be metal and have a lockable cap.</p>		<p>Kent Seal</p> <p>Rope gasketing material for use on piping and manholes.</p>

Section 3 – Standard Drawings

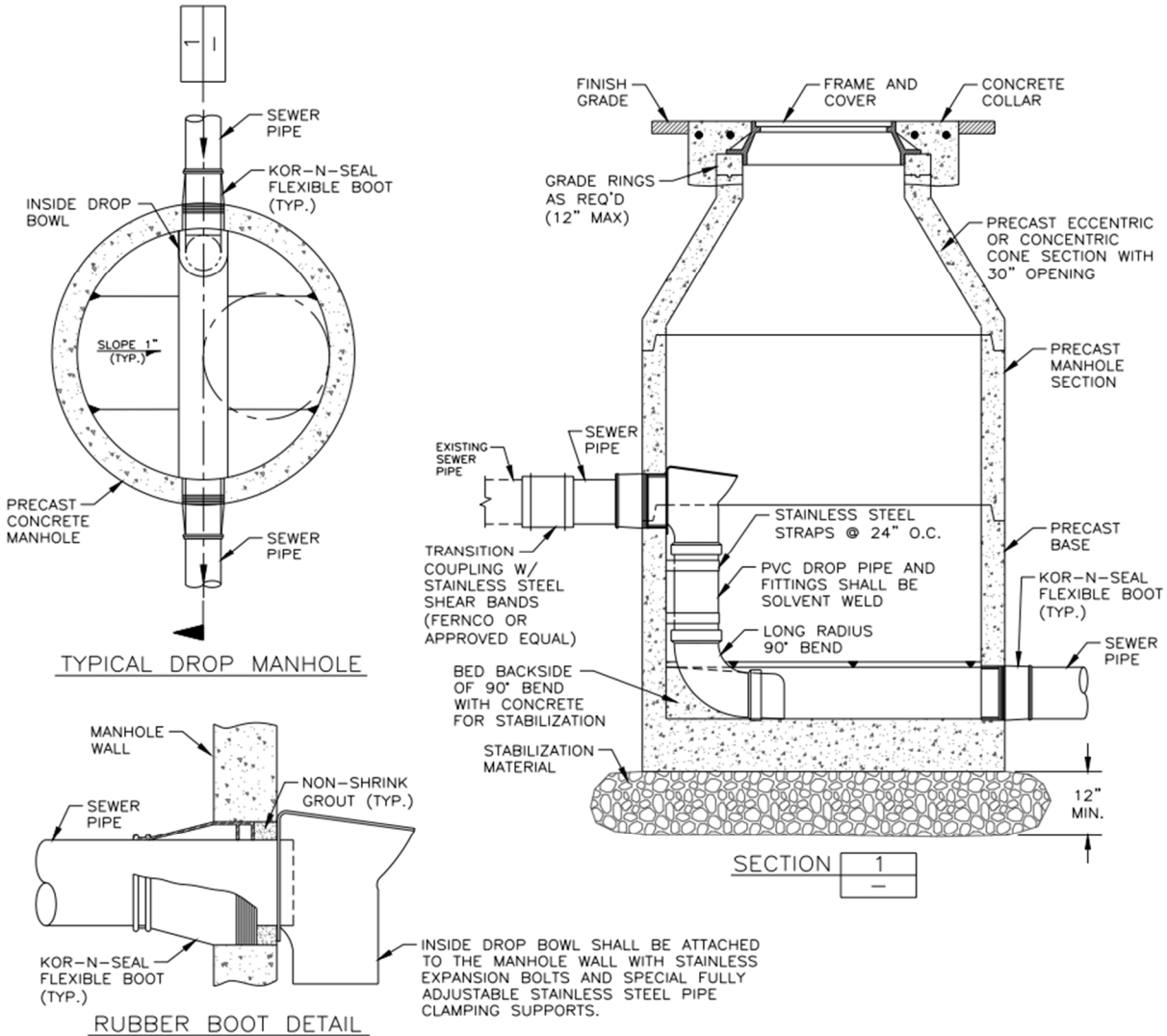
3-1. Typical Sanitary Sewer Manhole



NOTES:

1. MANHOLE SIZE:
 - A. DIAMETER IS 4 FEET: FOR SEWERS UNDER 12" DIAMETER.
 - B. DIAMETER IS 5 FEET: FOR SEWERS 12" THROUGH 24", OR WHEN 3 OR MORE PIPES INTERSECT THE MANHOLE.
 - C. CONSULT WITH MTOID FOR SEWERS LARGER THAN 24".
2. PRECAST REINFORCED CONCRETE MANHOLE SECTIONS SHALL CONFORM TO ASTM C 478. JOINTS SHALL BE RUBBER GASKET, OR SEALED WITH APPROVED SEALANT.
3. CONCRETE: CLASS 4000, APWA SECTION 03 30 04.
4. GROUT: 2 PARTS SAND TO 1 PART CEMENT MORTAR, ASTM C 1329. GROUT SHALL BE NON-SHRINK.
5. MANHOLES SHALL NOT HAVE STEPS.
6. ADDITIONAL WATERPROOFING OF MANHOLES MAY BE REQUIRED WITHIN 400 FEET OF WATERBODIES AT THE DISCRETION OF THE DISTRICT ENGINEER.

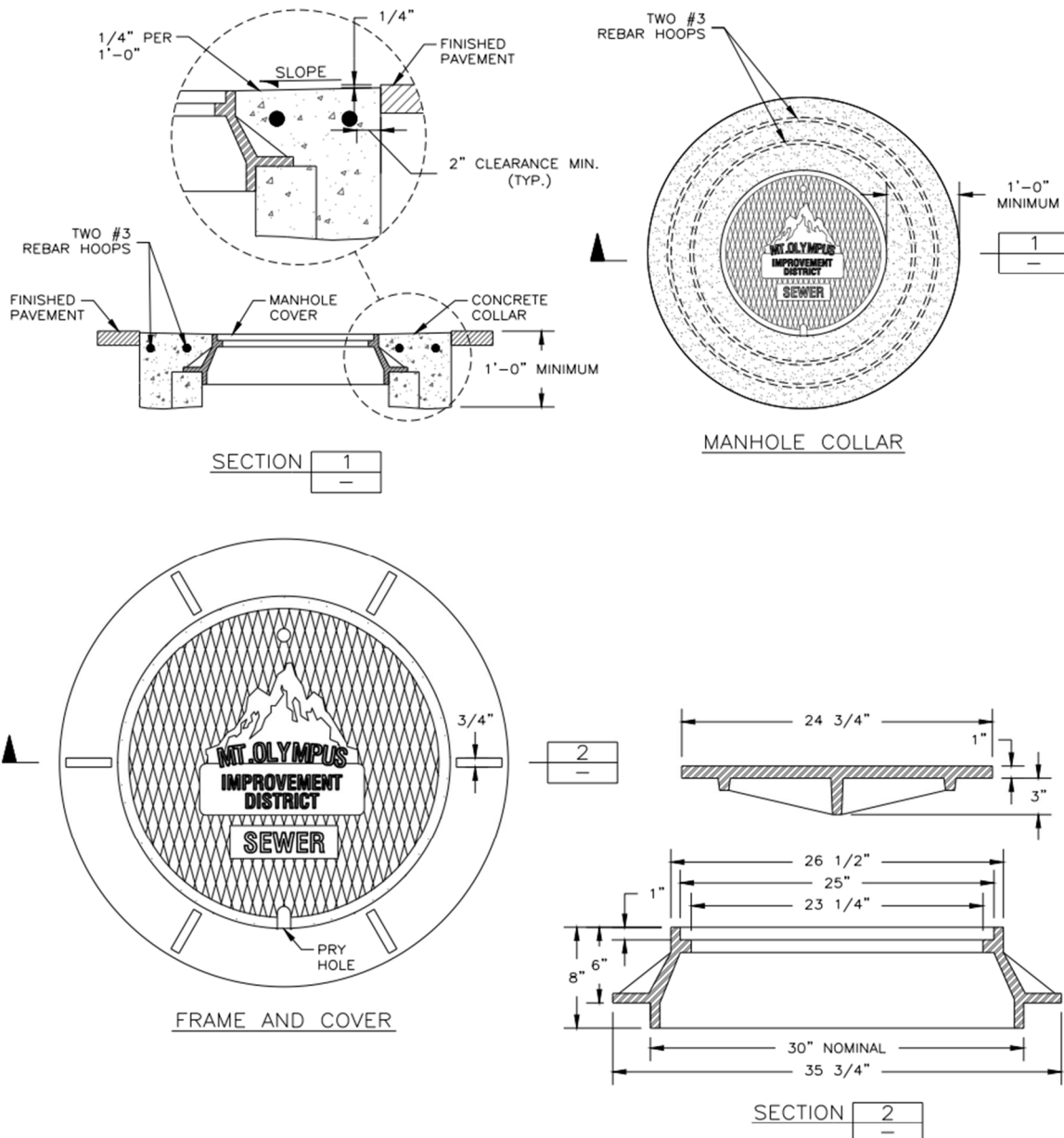
3-2. Typical Drop Manhole



NOTES (CONTINUED):

7. THE INVERT CHANNELS SHALL BE SMOOTH AND SEMICIRCULAR IN SHAPE CONFORMING TO THE INSIDE DIAMETER OF THE ADJACENT SEWER SECTION. CHANGES IN DIRECTION OF FLOW SHALL BE MADE WITH A SMOOTH CURVE AS LARGE A RADIUS AS THE SIZE OF THE MANHOLE WILL PERMIT. CHANGES IN SIZE AND GRADE OF THE CHANNELS SHALL BE MADE GRADUALLY AND EVENLY.
8. THE FLOOR OF THE MANHOLE OUTSIDE THE CHANNELS SHALL BE SMOOTH AND SHALL SLOPE TOWARD THE CHANNELS NOT LESS THAN 1 INCH PER FOOT NOR MORE THAN 2 INCHES PER FOOT. WHERE DROP BOWL AND PIPING CANNOT BE USED, PROVIDE SMOOTH TRANSITION INTO TROUGH AS DIRECTED / APPROVED BY MT. OLYMPUS IMPROVEMENT DISTRICT.
9. PIPE CONNECTIONS TO EXISTING MANHOLES SHALL BE MADE IN SUCH A MANNER THAT THE FINISH WORK WILL CONFORM AS NEARLY AS PRACTICABLE TO THE ESSENTIAL APPLICABLE REQUIREMENTS SPECIFIED FOR NEW MANHOLES, INCLUDING ALL NECESSARY CONCRETE WORK, CUTTING, AND SHAPING.
10. INVERT COVERS SHALL BE PLACED BY CONTRACTOR PRIOR TO CONSTRUCTION.

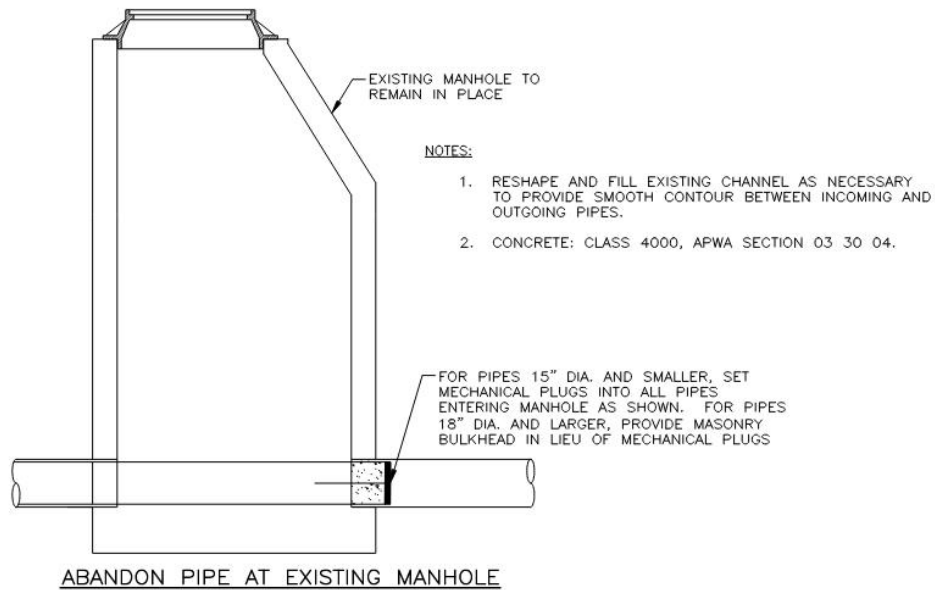
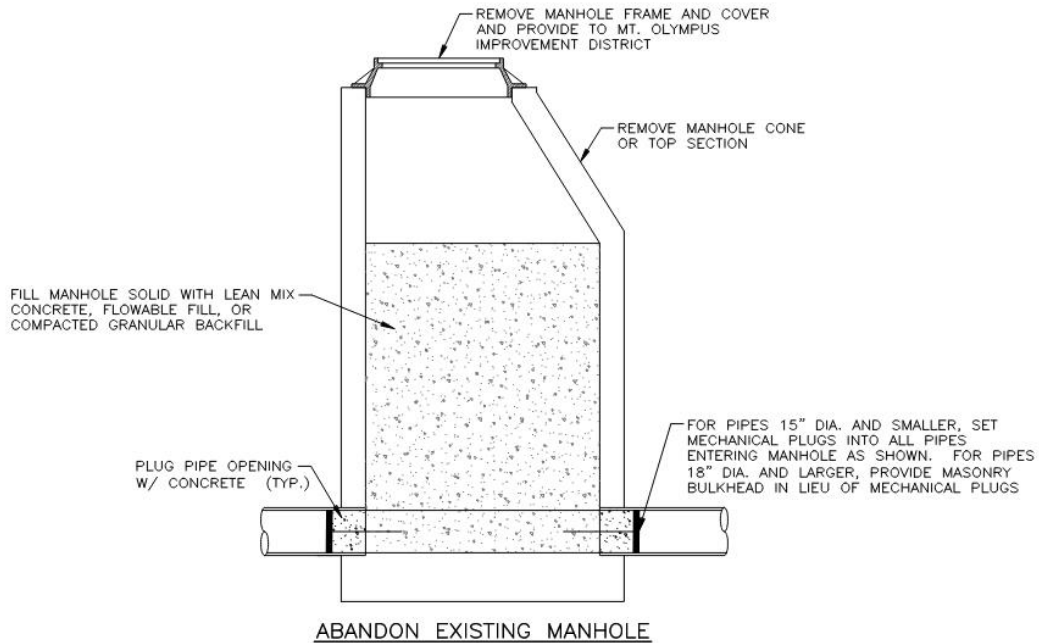
3-3. Manhole Collar



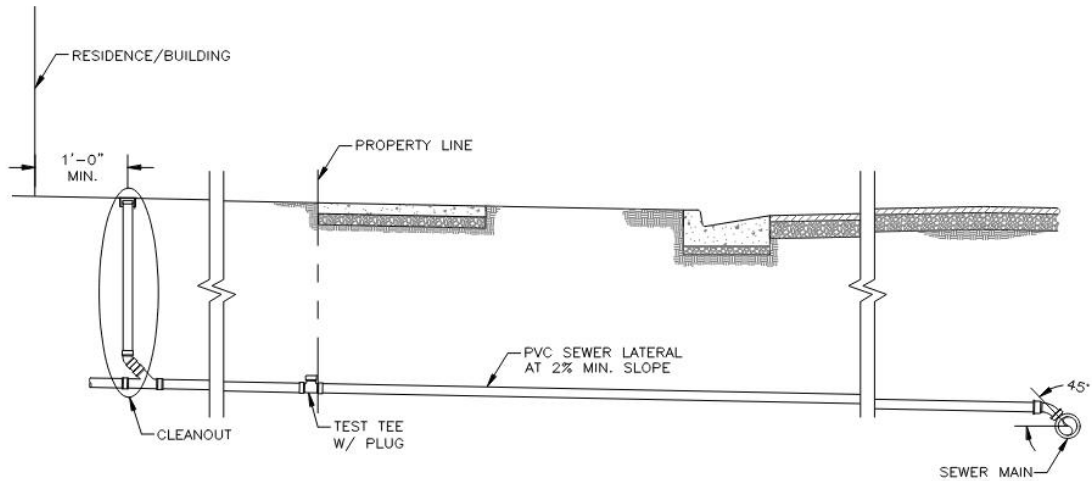
NOTES:

1. CONCRETE SHALL BE CLASS 4000 AS PER APWA SECTION 03 30 04. U-CART OR HAND MIXED CONCRETE WILL NOT BE ACCEPTED.
2. BACKFILL WITH GRADE 1 UNTREATED BASE COURSE AS PER APWA 32 11 23 2.1.
3. GRADE RINGS SHALL BE APWA STANDARD PLAN NO. 361. MTOID RECOMMENDS THE USE OF WHIRLYGIG, OR CRETEX PRO RING, OR APPROVED EQUIVALENT FOR SETTING GRADE RINGS.
4. CONCRETE COLLAR SHALL BE APWA STANDARD PLAN NO. 362.
5. LID SHALL BE CAST WITH "MTOID" LOGO. D&L MODEL NO A-1180 MT OLYMPUS.
6. LOW PROFILE FRAMES WILL NOT BE ALLOWED. A 6" TALL FRAME MAY BE USED WITH SPECIAL PERMISSION FROM DISTRICT ONLY ON LOW VOLUME ROADWAYS.

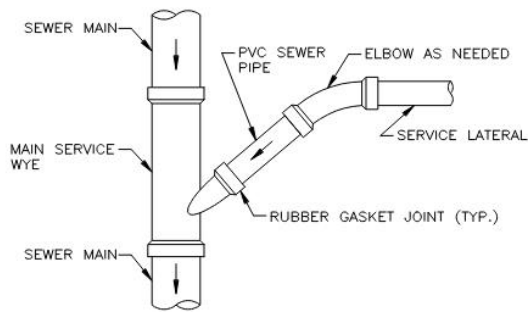
3-4. Abandon Existing Manhole



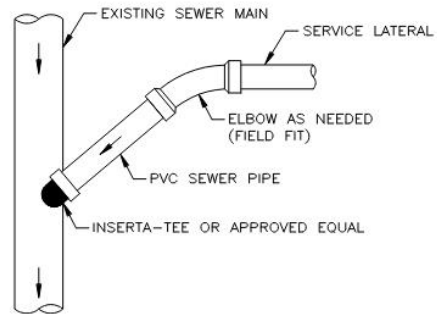
3-5. Typical Sewer Lateral & Cleanout



TYPICAL SEWER LATERAL



SERVICE CONNECTION TO NEW MAIN

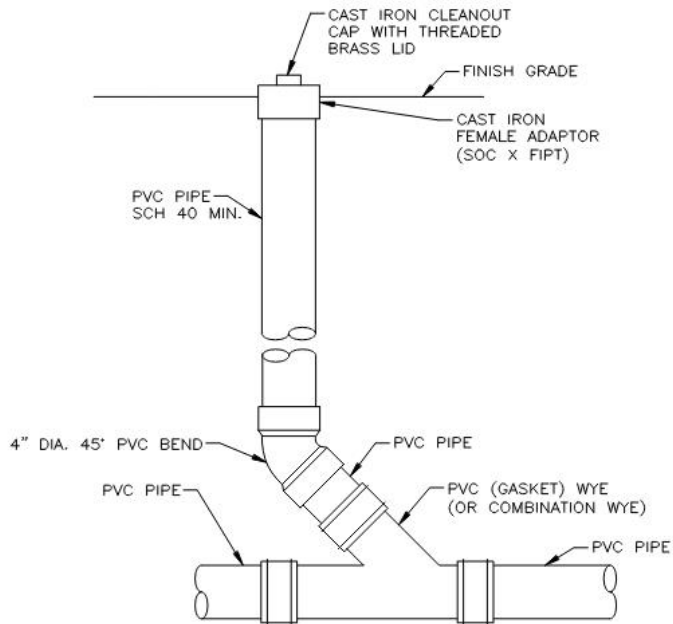


SERVICE CONNECTION TO EXISTING MAIN

NOTES:

1. SERVICE LATERAL SHALL BE 4" OR 6" AS SHOWN ON PLANS OR AS DIRECTED BY MT. OLYMPUS IMPROVEMENT DISTRICT.
2. SEWER LATERALS SHALL CONNECT TO SEWER MAIN AT EITHER A 22.5° OR 45° ANGLE.
3. LATERAL CONNECTIONS SHALL BE A MINIMUM OF 24 INCHES OFF OF BELL SPIGOT OF SEWER MAIN.
4. ONLY ONE (1) NEW LATERAL CONNECTION SHALL BE ALLOWED PER 4 FOOT SEGMENT OF SEWER MAIN PIPE.

3-6. Typical Sewer Lateral & Cleanout (Cont.)

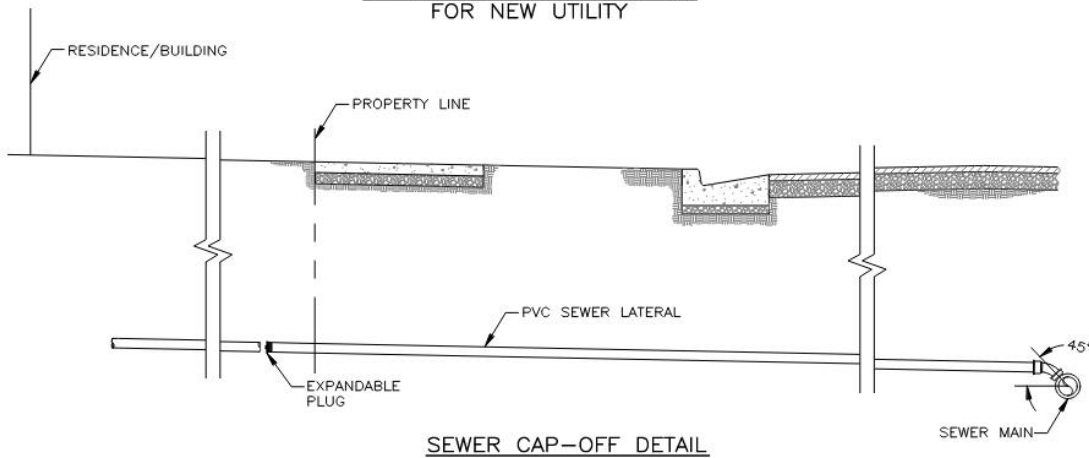
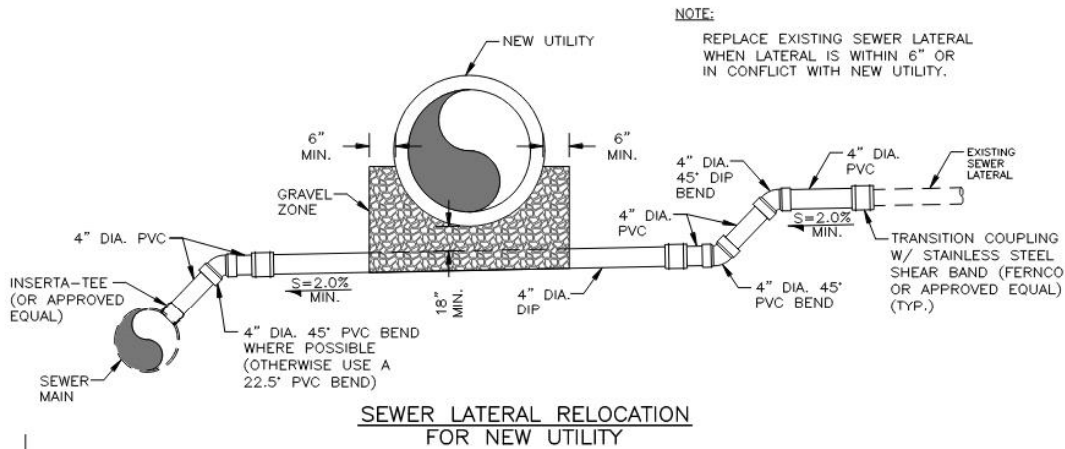
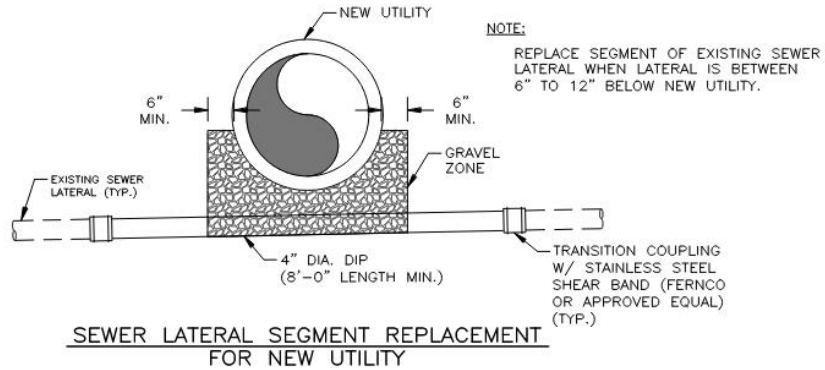


CLEANOUT

NOTES:

1. SIZE OF PIPING AS SHOWN ON DRAWINGS OR AS DETERMINED BY MT. OLYMPUS IMPROVEMENT DISTRICT.
2. PVC JOINTS SHALL BE GASKETED JOINTS. NO GLUE JOINTS ARE ALLOWED.
3. WHEN CONNECTING TO INTERIOR PIPING, SHEAR BAND FERNCO OR APPROVED EQUAL SHALL BE USED.

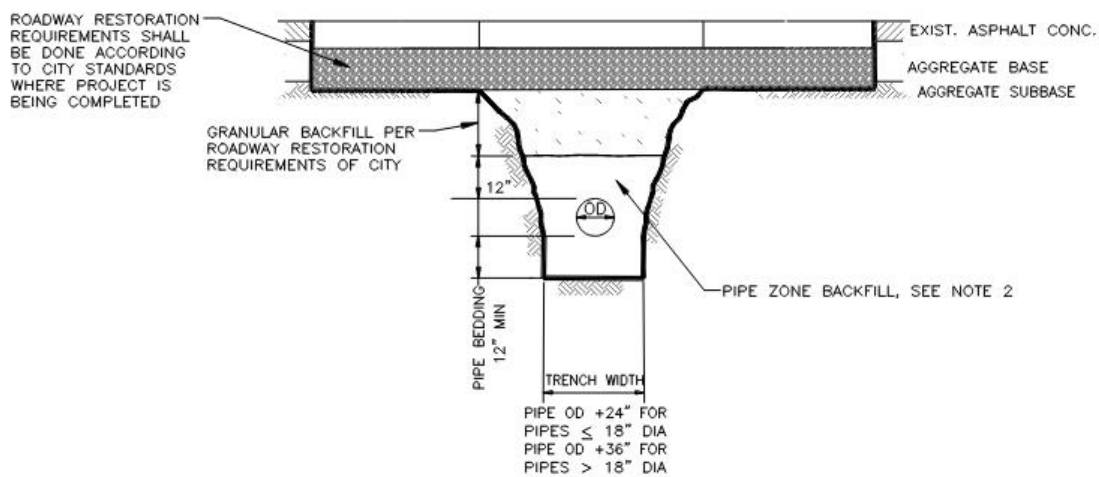
3-7. Lateral Replacement for New Utility



NOTES:

1. A BAG OF QUIK-CRETE OR APPROVED EQUAL SHALL BE USED TO MIX AND FILL AROUND EXPANDABLE PLUG.
2. CAP-OFF SHALL BE BEHIND PROPERTY LINE. OLD PROPERTY LINE CLEANOUTS SHALL BE ABANDONED AS PART OF CAP-OFF PROCESS.

3-8. Typical Trench Detail

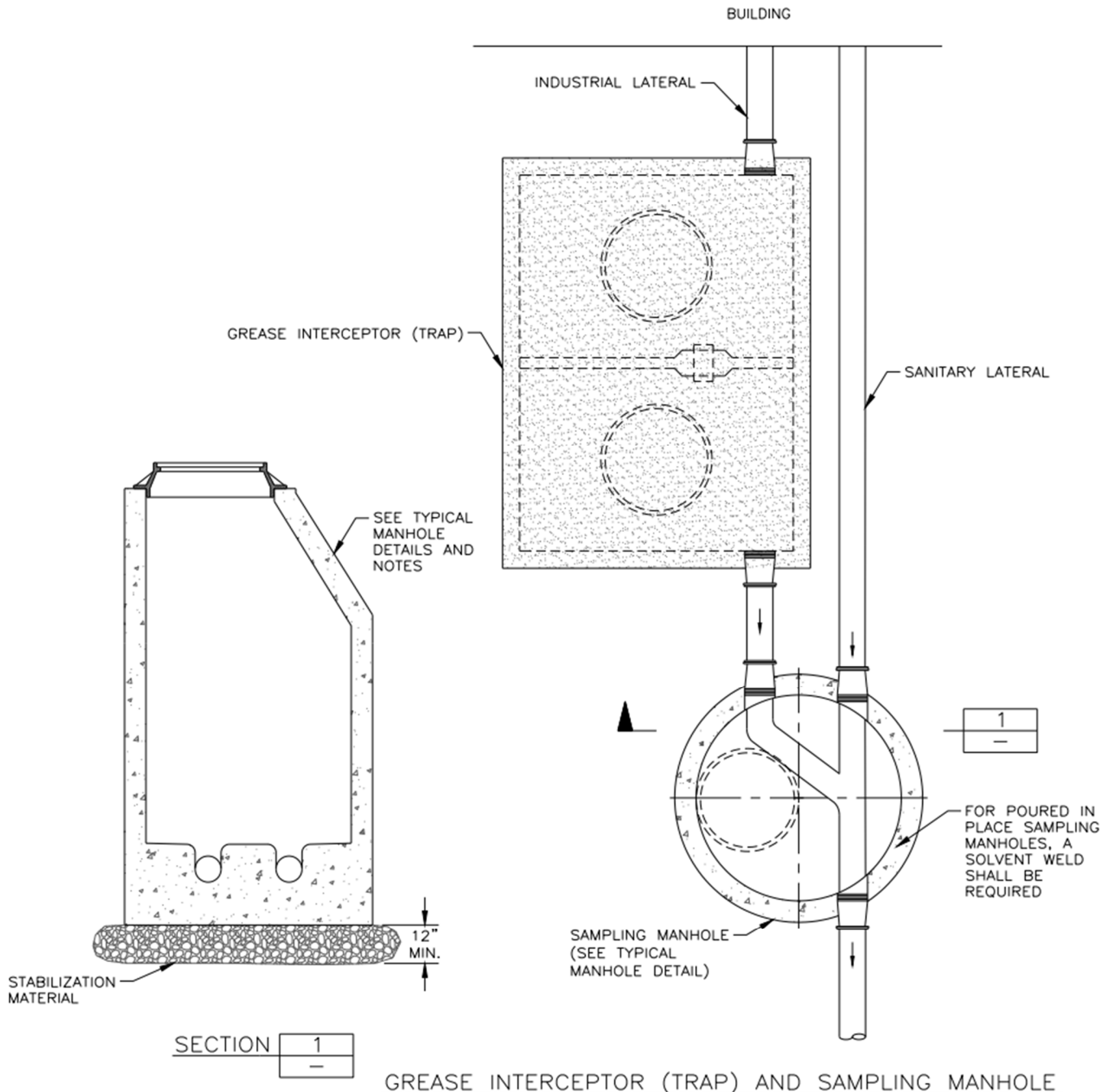


TYPICAL TRENCH SECTION

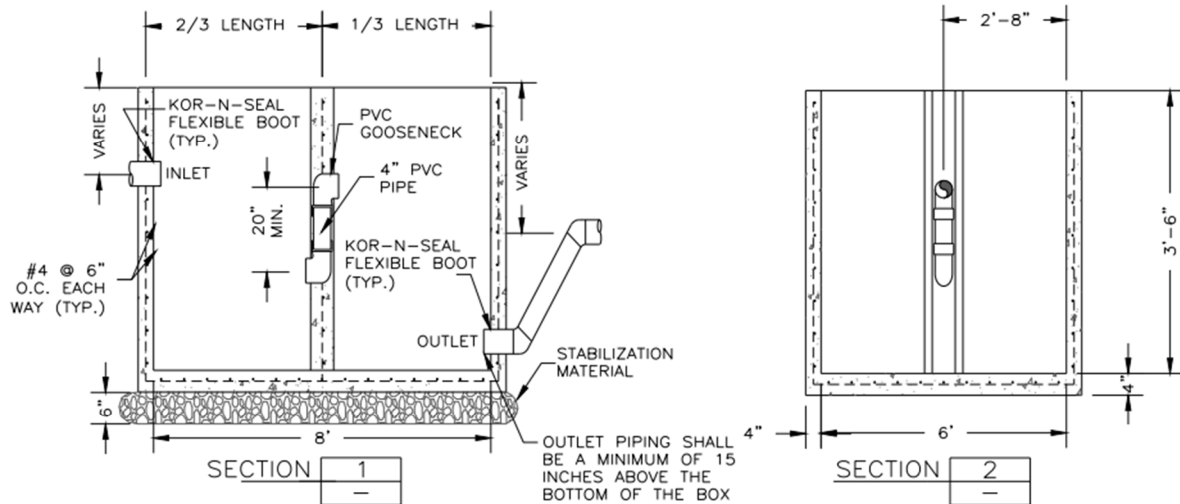
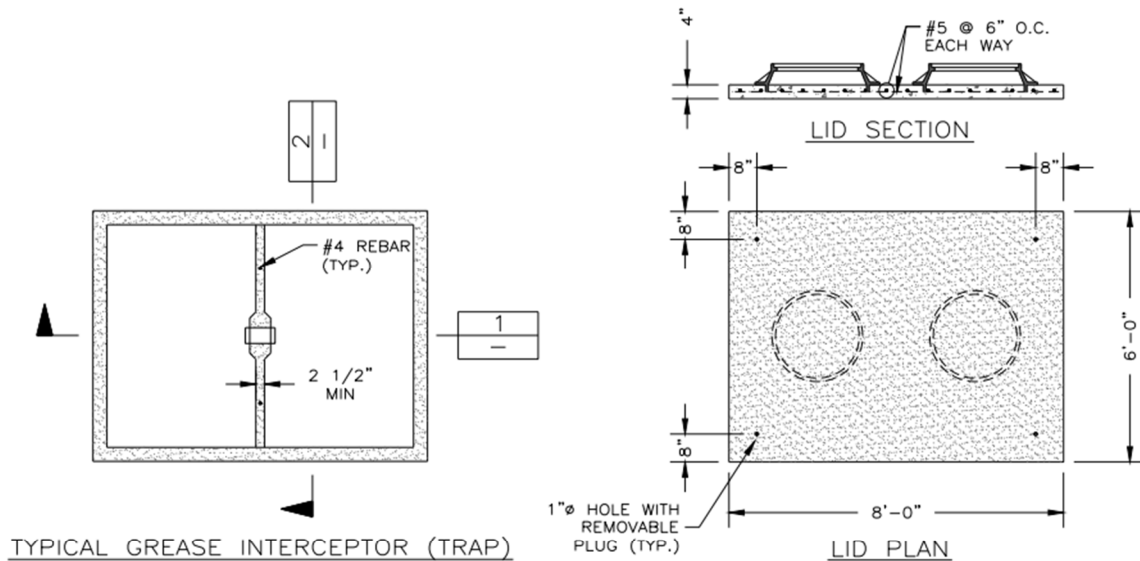
NOTES:

1. TRENCH EXCAVATION IN ACCORDANCE WITH APWA 31 23 16, OSHA, AND UOSH SAFETY STANDARDS.
2. PIPE ZONE MATERIAL TO BE A-1-a OR A-1-b ASTM D 3282 3/4" MAXIMUM PARTICLE SIZE. PEA GRAVEL AND "SQUEEGY" IS NOT ALLOWED IN ANY PART OF THE PIPE ZONE. MATERIAL SHALL BE PLACED IN LIFT NOT EXCEEDING 8" AND COMPACTED TO A MODIFIED PROCTOR DENSITY OF 95% OR GREATER (PER ASTM 1557) WITHOUT DAMAGING OR DEFLECTING PIPE.
3. RECYCLED ASPHALT SHALL NOT BE USED FOR BACKFILL IN ANY PART OF THE TRENCH.
4. FOR NEW CONNECTIONS TRENCH WIDTH SHALL BE 4 FOOT MINIMUM.

3-9. Grease Interceptor (Trap) & Sampling Manhole



3-10. Grease Interceptor (Trap) and Sampling Manhole (Cont.)



NOTES:

1. MINIMUM VOLUME CAPACITY: 800 GALLONS. VARIANCES MUST BE APPROVED BY DISTRICT ENGINEER.
2. CONCRETE: CLASS 4000, APWA SECTION 03 30 04, PLACEMENT PER APWA SECTION 03 30 10, PROVIDE 1/2-INCH RADIUS EDGES. APPLY A BROOM FINISH. APPLY CURING AGENT.
3. REINFORCEMENT: DEFORMED, 60 KSI YIELD GRADE STEEL, ASTM A 615, PLACEMENT PER APWA SECTION 03 20 00.
4. PVC PIPE: APWA SECTION 33 05 07.
5. SEAL ALL WALL PENETRATIONS.
6. PROVIDE TWO 30" DIAMETER ACCESS OPENINGS WITH FRAME AND COVER (ONE FOR EACH SECTION OF GREASE TRAP).
7. BAFFLE WALL SHALL BE WITHIN 3" OF LID.
8. ALL FOOD AND BEVERAGE BUSINESSES OR ANY OTHER BUSINESSES WITH FLOOR DRAINS THAT CONNECT TO THE SEWER SYSTEM ARE REQUIRED TO HAVE A GREASE INTERCEPTOR (TRAP) AND SAMPLING MANHOLE.



Section 4 – Technical Specifications

4-1. General Requirements

(1) CITY, COUNTY, AND UDOT REQUIREMENTS:

Contractors shall contact the appropriate permitting agency with the State, City, County, UDOT, etc. to determine any necessary plan reviews, permits, bonds, and inspections required prior to starting work.

(2) PUBLIC CONVENIENCE:

The Contractor shall at all times conduct his work as to insure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the proper authorities. Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to ensure the use of sidewalks and proper functioning of all gutter, storm drain inlets, drainage ditches and irrigation ditches, which shall not be obstructed.

(3) SAFETY AND PROTECTION:

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work including but not limited to trench safety, confined space entry, traffic safety, and following all OSHA regulations. The Contractor shall take all necessary protection to prevent damage, injury or loss to:

- (a) All employees on the work and other persons who may be affected hereby.
- (b) All the work and all material or equipment to be incorporated herein, whether in storage on or off the site, and
- (c) Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavement, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable laws, ordinances, rules, regulations, and others of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and utilities when prosecution of work may affect them. All damage, injury, or loss to any property directly or indirectly, in whole or in part, by Contractor, any subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for the safety and protection of the work shall continue until such time as all the work is completed.

The Contractor shall designate a responsible member of his organization at the site whose responsibility shall be on-site safety.



4-2. Excavation, Trenching & Backfill for Piping

(1) WORK INCLUDED:

The work under this Section includes the furnishing of all labor, materials, equipment, transportation, hauling, and services required to construct the excavation, trenching and backfill for piping in place, complete, including but not limited to the following general classifications of work:

- Existing Utilities and Improvements
- General Excavation Requirements
- Trench Excavation
- Trench Backfilling
- Schedule of Trench Backfill Materials
- Cleaning Up

(2) EXISTING UTILITIES AND IMPROVEMENTS:

It shall be the Contractor's sole responsibility to locate all existing water, sanitary sewer, storm drain, and gas lines, electrical and telephone conduit, and other underground structures in order that no damage or loss of service will result from interference with existing lines. The Contractor shall review all available maps, notes, and information on the location of these underground lines and structures in determining the location of the existing facilities. The Contractor shall have locating equipment and shall mark all lines on the road ahead of the excavating machine.

- (a) Protection of Existing Construction: All gas, sanitary sewer, storm drain, culinary water and other pipelines, flumes and ditches of metal, wood or concrete, underground electrical conduits and telephone cable, and all walks, curbs, and other improvements encountered in excavating trenches carefully shall be supported, maintained and protected from injury or interruption of service until backfill is complete and settlement has taken place.
 - (i) Alignment: Care shall be exercised so that when backfilling is complete and settlement has taken place, the existing pipes, flumes, ditches, conduits, cables, walks, curbs, and other improvements will be on the same alignment and grade as they were before work commenced.
 - (ii) Blue Stakes Location Center shall be contacted before any excavation is commenced. Telephone 811 for assistance.
- (b) Pipelines, Ditches, and Other Utilities: Pipelines, ditches, and other utilities which are interrupted shall be repaired immediately at the Contractor's expense to the complete satisfaction of the Owner of the pipelines, ditches, and other utilities. The Contractor shall indemnify the Owner from any and all damages resulting from damaged facilities.
- (c) Fences shall be returned to their original condition except those damaged portions will be replaced with new fencing at the Contractor's expense.
- (d) Existing Concrete Improvements: It shall be the responsibility of the Contractor to mark with paint any existing cracks on concrete along which his work may take place, to determine after the construction is completed whether such damage was caused by the operations of the Contractor or had occurred previously. Any concrete showing



unmarked cracks upon completion of construction will be evidence of damage by the Contractor's forces and shall be replaced or repaired to the satisfaction of the Owners of the concrete.

- (e) Existing Pavement Materials: All existing pavement materials, whether bituminous or portland cement concrete must be cut to provide a straight, neat line along the edge of the patch that will be made at the completion of the project.

(3) GENERAL EXCAVATION REQUIREMENTS:

Excavation for pipelines, concrete valve boxes, manholes, cleanouts and appurtenant structures shall include the work of removing all earth, sand, gravel, quicksand, stone, loose rock, solid rock, clay, shale, cement, hardpan, boulders, and all other materials necessary to be moved in excavating the trench for the pipe; maintaining the excavation by shoring, bracing, and sheeting or well pointing to prevent the sides of the trench from caving in while pipe laying is in progress; and removing sheeting from the trench after pipe has been laid.

- (a) Ground Water: The Contractor shall do all pumping, shall build all drains, and do all the work necessary to keep the trench and pipes free from water during the progress of the work. In wet trenches, a channel shall be kept open along the side of the pipe for conducting the water to a sump hole, from which it shall be pumped out of the trench. No water shall be allowed to enter the pipe.

(4) TRENCH EXCAVATION:

Trenches shall be of the necessary width for proper laying of pipe. Care shall be taken not to over-excavate. The bottom of the trenches shall be accurately graded to provide uniform bedding and support for each section of the pipe on a 3/4" minus gravel foundation along the entire length of the pipe.

- (a) Depth of Excavation: Trenches shall be excavated to the depths shown on Standard Drawing 3-8, "Typical Trench Detail", including any required allowances for the 3/4" minus gravel foundation.
 - (i) Minimum Cover: Over the top of the pipe, including any paving, shall be as follows unless noted otherwise on plans:
 1. Sanitary Sewer Lateral: 3' minimum. The District engineer may allow for less cover on a case-by-case basis. If allowed by the District engineer, additional requirements be required including placing insulation around or on top if the lateral.
 2. Sanitary Sewer Main Line: 4' minimum
 - (ii) Width of Trench: The width of a trench for a nose-on connection shall be at least 4' wide measured at the top of the pipe and long enough to allow adequate room to comfortably work with a drill. No tunneling shall be allowed for a nose-on. The width of a trench for pipe 18" and smaller shall be the outside diameter (OD) of the pipe plus 24". The width of a trench for pipes larger than 18" shall be the OD of the pipe plus 36".



- (iii) Trench Support System: Shall be suitable for the soil structure, depth of cut, water content of soil, weather conditions, superimposed loads, and vibration. The Contractor is responsible for the safety of the trench support system. The Contractor may select one of the following methods of ensuring the safety of workers in the trench, as approved by OSHA and its safety inspectors.
 - 1. Sloping Side of Trench: To the angle of repose required by OSHA, at which the soil will remain safely at rest.
 - 2. Shoring Sides of Trench: By placing sheeting, timber shores, trench jacks, bracing, piles, or other materials to resist pressures surrounding the excavation. All trench support systems must have "shoring side" (walls) in place at all times.
 - 3. Using a Movable Trench Box: Built of steel plates and a heavy steel frame of sufficient strength to resist the pressure surrounding the excavation.
- (b) Inadequate Support: All damage resulting from lack of adequate sheeting, bracing and shoring shall be the responsibility of the Contractor; and the Contractor shall correct all necessary repairs for reconstruction resulting from such damage.
- (c) Excavation for Appurtenances: Excavation for manholes, cleanouts, and similar structures shall be sufficient to leave at least 12" clear between the outer surface and the embankment or timber that may be used to hold and protect the banks.
- (d) Excess Materials: Shall be hauled away from the construction site or otherwise disposed of by the Contractor as approved by the design engineer or District representative.

(5) TRENCHING BACKFILLING:

The trenches shall not be backfilled until the utilities systems as installed conform to the requirements of the drawings and specifications. Where, in the opinion of the District representative, damage is likely to result from withdrawing sheeting, the sheeting shall be left in place. Trenches shall be backfilled to the ground surface with material that is suitable for the specified compaction. Trenches improperly backfilled shall be reopened to the depth required for proper compaction, then refilled and compacted as specified, or the condition shall be otherwise corrected as approved. No material of a perishable, spongy, deleterious or otherwise improper nature shall be used in backfilling.

- (a) Pipe Bedding: Consists of preparing an acceptable pipe foundation, excavating the pipe groove in the prepared foundation and backfilling from the foundation to 12" above the top of the pipe and 12" below the bottom of the pipe. All piping shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.
- (i) Pipe Groove: A groove shall be excavated in the pipe foundation to receive the bottom quadrant of the pipe so that the installed pipe will be true to line and grade.
 - 1. Bell Holes: Shall be dug after the trench bottom has been graded. Bell holes shall be excavated so that only the barrel of the pipe will be in contact with the soil.



- (ii) Pipe Bedding from Pipe Foundation to 12" Above Top of Pipe and 12" Below the Bottom of the Pipe: Materials shall be deposited and compacted in layers not to exceed 8" in uncompacted depth. Deposition and compaction of bedding materials shall be done simultaneously and uniformly on other sides of the pipe. All bedding materials shall be placed in the trench with hand tools or other approved methods in such a manner that they will be scattered alongside the pipe and not dropped into the trench in compact masses.
 - 1. Materials: Shall be 3/4" minus angular gravel. Bedding material from the trench excavation shall be free from roots, sod or other vegetable matter.
 - 2. Trenching Backfilling Above Pipe Bedding: Shall normally be accomplished with native excavated materials and shall be free from rocks larger than 4" in diameter. Consult the City, County, or UDOT for exact specifications and requirements.
 - 3. Compaction: Shall be according to City, County, or UDOT requirements. Where not specified and under pavements, or other surface improvements, the in-place density shall be a minimum of 95% of laboratory standard maximum dry density as determined as AASHTO T-99. In shoulders and other areas, the in-place density shall be a minimum of 90% of the maximum dry density as determined as AASHTO T-99. Road base shall be 96% as determined by AASHTO-180.
 - a. Tests: The Contractor shall perform all tests required by the District representative to determine any adjustments in compacting equipment, thickness of layers, moisture content and compactive or other effort necessary to attain the specified minimum relative density.
 - 4. Methods of Compaction: Are listed in the Schedule of Trench Backfill Materials and include Mechanical Compaction (MC). Selection of method of compaction in each case will be made according to the requirements of the materials being placed. Authorization by the District representative to use any method does not relieve the Contractor of this responsibility to meet the specified density requirements. Compaction shall be performed in strict accordance with the manufacturer's recommendations for each type of pipe.
 - a. Mechanical Compaction: Shall be accomplished using sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers of a size and type approved by the District representative.
 - i. Placing of Material: Shall be in lifts which, prior to compaction, shall not exceed 8". Each lift shall be evenly spread and moistened and worked by disk harrowing so that the required density will be produced.

(6) PIPE BEDDING MATERIALS:

All sanitary sewer pipe shall be bedded in 3/4" minus coarse angular gravel.



(7) CLEANING UP:

The surface of the ground shall be restored to the condition in which it was found prior to construction to include any landscape, pavement, gravel surface restoration. All excess materials shall be hauled from the site and properly disposed of.

4-3. Sanitary Sewer Installation

(1) GENERAL:

This Section outlines the requirements for construction of the sanitary sewer, including the following general classifications of work:

- Pipe Materials
- Main Lines
- Pipe Installation
- Sewers Laterals
- Manholes
- Leakage Tests

(2) GENERAL DESIGN STANDARDS:

(a) Definitions:

- (i) **Main Lines:** will be 8" or larger and serve more than one building, owner, or association of owners.
- (ii) **Laterals:** Service line from the outside of a building to the Main Line. Sewer Laterals shall be designed and installed with a minimum of 2% slope for 4" pipe and 1% for 6" pipe. Anything larger must be installed per Main Line specifications. There must be a separate Lateral with a separate connection to the Main Line for each building. Duplexes, twin homes, townhomes and external ADU's must have two separate Lateral connections to the Main Line.

A complete definition of Main Lines and Laterals can be found in the *Code of General Regulations of Mt. Olympus Improvement District*.



(b) Minimum Grades and Access for Pipes:

Size	Minimum Grade	Type of Access *	Maximum Spacing of Access	Comments **
4"	2%	4" Cleanout	100'	Cleanouts can be spaced closer if conditions dictate.
6"	1%	6" Cleanout	100'	Cleanouts can be spaced closer if conditions dictate
8"	0.40%	4' Manhole	400'	0.50% or more desirable
10"	0.28%	4' Manhole	400'	0.38% or more desirable
12"	0.22%	5' Manhole	400'	Increased grade desirable
15"	0.15%	5' Manhole	400'	Increased grade desirable
18"	0.12%	5' Manhole	400'	Increased grade desirable
21"	0.10%	5' Manhole	400'	Increased grade desirable
24"	0.08%	5' Manhole	400'	Increased grade desirable
<p>* A manhole or cleanout, as noted above, will also be required at all changes in grade and alignment except that one (1) 45-degree bend will be allowed in Laterals.</p> <p>** This table shows the minimum slopes that must be provided; however, slopes greater than those listed are desirable.</p>				



(3) PIPE, FITTINGS, & JOINTS:

For the various services:

TYPE OF SERVICE	PIPE			FITTINGS			JOINTS	
	MATERIAL	SPEC.	CLASS	MATERIAL	SPEC.	CLASS	TYPE	SPEC
Main Lines	PVC*	ASTM D-3034	SDR 35	PVC	ASTM D-3034	SDR 35	Push-on Gasket	ASTM D2000, AA820, AA625
	PVC*	ASTM F-679	SDR 35	PVC	ASTM F-679	SDR 35	Push-on Gasket	ASTM D2000, AA820, AA625
	GFRP***	ASTM D-3262 AWWA M45	Type 1, Line 1/2 Grade 1/3	GFRP	ASTM D-3262	---	Elastomeric Seals Push-on Gasket	
	Concrete	ASTM C-76	Class 3 Minimum	Concrete	ASTM C-14	Extra Strength	Push-on Gasket	ASTM C-443
	DI	AWWA C-151	150	DI	AWWA C-110	250 psi	Push-on Gasket	AWWA C-900 C-110
	VC**	ASTM C-700	Extra Strength	VC**	ASTM C-700	Extra Strength	Push-on	ASTM C-425
Laterals	PVC	ASTM D-3034	SDR 35	PVC	ASTM D-3034	---	Push-on Gasket	ASTM D2000, AA820, AA625
	VC**	ASTM C-700	Extra Strength	VC**	ASTM C-700	Extra Strength	Push-on	ASTM C-425
Manholes	Concrete	ASTM C-478	---	---	---	---	---	---
<p>* Used for new construction.</p> <p>** Used only for repair purposes. Must be approved prior to use by a District representative.</p> <p>*** Used for District Trunk Lines and boring applications.</p>								

- (a) Vitrified Clay Pipe: Shall be unglazed, bell and spigot pipe.
 - (i) Joints: Shall be factory-made, flexible compression.
 - (ii) Quality Standard: Gladding, McBean and Company.
- (b) Cast Iron Pipe: Provide redwood supports for cast iron clean-out branches to prevent breaking pipe when trench is backfilled. Use only when required by Salt Lake County Health Department Regulations for separation of culinary water and sanitary sewer.
- (c) PVC: Shall be push on gasket type joints.
- (d) Glass Fiber Reinforced Polymer (GFRP) Pipe: see Appendix A – Glass Fiber Reinforced Polymer Pipe (GFRP)



(4) PIPE INSTALLATION:

- (a) Pipe Laser: Is to be used to control the line and grade of Main Line pipes.
- (b) Bedding: All pipes shall be laid on a firm bed, true to the line and grade shown on the drawings, and the end and shoulder of each pipe shall abut against the other in such a manner that there shall be no unevenness of any kind along the bottom half of the pipeline.
 - (i) Pipe Groove: Material under the pipe bell shall not be compacted.
 - (ii) Materials: Pipe bedding shall conform to the District's recommendation for the pipe being installed. Large stones shall not be used for pipe bedding.
 - (iii) Placing of pipe bedding shall be done carefully to prevent damage to the pipe.
- (c) Floating: Care in all phases of pipe installation shall be taken to prevent floating of pipe. Consideration shall be given in design and construction to ensure that pipe materials are used that will not float.
- (d) Use of Compaction Equipment: Care shall be taken to avoid contact between the pipe and compaction equipment. Compaction of bedding and backfill material shall generally be done in such a way so that compaction equipment is not used directly above the pipe until sufficient backfill has been placed to assure that such compaction equipment will not have a damaging effect on the pipe.
- (e) Laying: Pipe shall be laid in the uphill direction with the bell-end pointing upgrade.
- (f) Manufacturer's Recommendations: All work shall be performed in strict accordance with the manufacturer's recommendations for the type of pipe being installed.

(5) MANHOLES:

The Contractor shall construct the manhole at the specific stations shown on the drawings. Manholes shall be set per Standard Drawings 3-1, "Typical Sanitary Sewer Manhole" 3-3, and Standard Drawing 3-3, "Manhole Collar".

- (a) Pre-Cast Concrete Manholes: Used for new manholes and replacement of existing manholes. This shall include standard barrel sections, cone section, and floor or base.
- (b) Watertightness: All manholes shall be watertight, both in the floor and the full height of the walls. All manhole grade rings shall be set on a full bed of concrete grout to insure watertightness between the rings. A maximum of 12" of grade rings can be used. Waterproofing of manholes (e.g., gaskets, mastic, external wrap, tar coating, spray coating, spray foam, grouting, concrete admixtures, or other approved measures) shall be required of any manholes located within 400' of a stream, river, lake, or any other water features than could lead to infiltration. Waterproofed manholes may also be required in well protection zones.
- (c) Joints: Shall be made tight by the use of Kent-seal or approved gasket.



- (d) Reinforcement: Circumferential reinforcement shall conform to ASTM C-478. The area of vertical reinforcement shall be at least 0.2% of the area of the horizontal concrete cross section.
- (e) Manhole Frames and Covers: All castings shall conform to the requirements of the American Society for Testing Materials specifications for gray iron castings. The bearing between the cover and the frame shall be machined so that it will be uniform all around, and any cover which tips, rocks or creates road noise will be rejected. No low-profile frames will be allowed. Low-profile frames are defined as any frame that is less than 8" in height
 - (i) Cover Lettering: Shall read "Mt. Olympus Improvement District" D&L Model No A-1180 MT OLPMUS.
- (f) Invert Covers/Invert Boards: Shall be 5/8" thick exterior plywood and shall be placed over the top of pipe/trough in all manholes to prevent debris from entering the sewer during the construction activities. Invert covers shall remain in place for the duration of construction activities and shall be removed after the manhole covers have been finally set at final grade.
- (g) Final Grade Adjustment: In non-paved areas manhole rings and covers shall be adjusted to make them flush with the surface. In paved areas a concrete collar shall be used, the concrete collar shall slope at 1/4" per foot away from the pavement toward the manhole ring and cover. The manhole ring and cover shall be held 1/4" to 1/2" below the adjacent pavement surface.
- (h) Drop Manholes: Drop manholes shall only be used when approved by the District. All drops into manholes shall be inside drops as shown on Standard Drawing 3-2, "Typical Drop Manhole". All drops require a Reliner Bowl or District approved equivalent, with the bowl and piping restrained to the manhole walls as shown on Standard Drawing 3-2, "Typical Drop Manhole". Glued fittings shall be used in drop manholes.
- (i) Grade rings: shall only be used for adjustment of frame and cover to final grade when specifically approved by a District Representative. Standard adjustment shall be accomplished with a Thermo-plastic Riser Form (Whirlygig System) or approved equal. If approved, grade rings shall meet the following requirements:
 - (i) Precast reinforced concrete conforming to ASTM C 478 or expanded polypropylene grade rings, "Pro-Ring™" as manufactured by Cretex Specialty Products or approved equal, installed per manufacturers specifications.
 - (ii) Designed to meet H-20 live loading.
 - (iii) Sizes: 2", 3", 4", 5" or 6" height.
 - (iv) Grade rings with cracks or visible damage shall not be accepted.
 - (v) Grade Rings shall be limited to a total height of 12".



- (j) Prohibited Manhole Adjustment Materials:
 - 1. Block, rocks, wood, metal shims and all other similar material shall not be used for adjustment of frame and cover to final grade.
 - 2. Sections of cinder or cement-based masonry units shall not be used.

- (k) Manhole Adjustment
 - 1. Standard adjustment shall be accomplished with a Thermo-plastic Riser Form trimmed to allow the frame to sit firmly on the form without any further adjustment.
 - 2. Brick for Manhole Adjustment
 - a. Brick shall only be used for adjustment of frame and cover to final grade when specifically approved by the District Representative. Standard adjustment shall be accomplished a Thermo-plastic Riser Form. If approved for use, brick shall meet the following requirements:

- (l) Manhole Access. Manholes shall remain accessible at all times. Manholes must not be paved over or covered with debris or any other permanent or temporary obstruction.

- (m) A Single Cast Iron Riser Ring may be used as needed to fit in ring securely. Three (3) 3/8" set screw are to be used to lock riser ring into manhole ring.

(6) SEWER LATERALS:

The Contractor shall furnish and install wyes for new Laterals from the Main Line to all proposed structures and vacant lots. Use Inserta Tees for Lateral connections to existing PVC, Concrete, and Clay pipe. The minimum Main Line size to use a 4" Inserta Tee is 8", and the minimum Main Line size to use a 6" Inserta Tee is 10".

- (a) Size: Must be 4" diameter or larger. Sized by the design engineer of the building. Acceptable pipe: SDR 35 PVC. Laterals must be sized to adequately handle the proposed wastewater loads. No oversizing of Laterals to allow flatter slopes will be allowed.
- (b) Location: Laterals shall not be located under driveways or under extensive porch areas. Laterals shall not be connected to manholes.
- (c) Minimum Grade: Laterals shall be 2% for 4" diameter Laterals and 1% for 6" diameter Laterals or as approved by the District.
- (d) Cleanouts: Shall be installed outside of the structure and at 100' intervals along the Lateral and at all changes in direction of the Lateral. Clean-out branches shall be the same size as the Lateral and shall be connected to wyes or combinations in the Lateral. Use a PVC combination wye with a standpipe with a watertight cast iron cap with a brass screw type lid. Cleanouts that must be placed in concrete must have a cast iron triangular box placed over the cleanout and must be poured flush with the concrete. It is recommended that an irrigation style box be placed over any cleanout in a



landscaped area. Cleanouts shall remain accessible at ground surface at all times. Connecting a new sewer lateral to an existing cleanout standpipe is prohibited.

(7) MAIN LINES:

- (a) Size: Main Lines shall be 8" in diameter or larger. Acceptable pipe: SDR 35 PVC for 8" to 15". For Main Lines above 15" consult with District Representative. For Trunk Lines above 24" and for any boring or tunneling, Glass Reinforced Fiber Polymer (GFRP) Pipe shall be used.
- (b) Depth: Main Lines must be installed below frost line, and where possible, below water lines in the same street. Main Lines installed deeper than the maximum depth on the following table shall follow the manufactures allowable maximum burial depth charts and/or calculations. Documentation on the allowable maximum burial depth shall be submitted to the District when burial depths greater than the following table are necessary.
 - (i) Cover: Over the top of the pipe, as measured from the outside diameter, including any paving shall be as follows unless noted otherwise on the drawings. Main Lines that do not meet the minimum cover requirements will not be accepted as District Main Lines. Main Lines that exceed the maximum cover requirements must submit design calculations to support the proposed pipe bury depth.

Pipe Material	Minimum Cover Depth	Maximum Cover Depth
PVC	4'-0"	16'-0"
Concrete	4'-0"	16'-0"
VC	4'-0"	16'-0"

(8) MULTIPLE CONNECTIONS & SIZING:

- (a) Number of Connections: The District will not allow multiple Laterals to be connected to a District Main Line for a single building or structure. A maximum of two Laterals for a single building may be allowed to connect to a District Main Line in circumstances where no other options are possible. Design calculations must be submitted to a District representative and must include the depth of flow, velocity, water surface profiles, gradients, and an explanation of the design basis and why a single Lateral connecting to the District Main Line is not possible. The second point of connection may be approved or rejected at the District's sole discretion and done on a case-by-case basis.
- (b) Sizing Laterals and Main Lines: The District uses the procedures set forth in Utah Administrative Code 317-3-2 for the sizing of Laterals and Main Lines, with the exception that District uses a design flow for one Residential Equivalent unit (RE) of 200 gallons per day. This design flow is supported by flow metering and studies completed by the District. A drainage fixture unit approach will not be accepted for sizing outdoor sanitary sewers within the District. The District will not allow oversizing of infrastructure where conditions are not warranted. Infrastructure which is oversized may lead to septic conditions, odor complaints, and a lack of a self-cleaning velocities. Where future conditions may warrant larger infrastructure, a full set of plans including a Site Plan, Utility Plan, and supporting design calculations including the depth of flow, velocity, water surface profiles, gradients, an explanation of the



design basis and why larger infrastructure is necessary. This information must be submitted to the District for approval. Improvements that are not warranted and/or oversized will be rejected by the District. Where larger infrastructure is warranted and supported by the necessary plans and design calculations, the project and/or development, shall be responsible for any and all costs associated with upsizing the necessary improvements. All improvements must be upsized up to the location where the existing infrastructure is of a sufficient size and capacity to provide adequate sanitary sewer service for the particular project and/or development.

(9) LEAKAGE TESTS:

The following procedures are for air testing of Main Lines. All inspection tests, including all devices for testing purposes, shall be performed and furnished by the Contractor. Any material or workmanship proven defective shall be replaced with sound material and the test repeated if deemed necessary by the District. All tests shall be performed after backfill and compaction are completed. In addition, the District will perform a CCTV inspection as part of the testing procedures.

- (a) Notice: The Contractor shall give the District at least 1 business day of notice of any test to be performed on the system.
- (b) Observations: Tests shall be observed by the District representative. Any test performed and not so observed shall be repeated when observed by the District representative.
- (c) Correction and Re-Testing: All corrections indicated by any unsuccessful tests shall be made and the tests repeated until the successful performance of all tests is achieved. Cost of making corrections and retesting shall be borne by the Contractor.
- (d) Length Tested: Shall be from manhole to manhole.
- (e) Method of Test: All Main Lines shall be air tested. The method of air testing shall be as follows: Reference ASTM F1417-11a
 - (i) Clean test section.
 - (ii) The ends of all branches, laterals, tees, wyes, and stubs included in the test section shall be plugged or capped to prevent air leakage. All plugs and caps shall be securely braced to prevent blow-out. One of the plugs or caps shall have an inlet tap, or other provision for connecting an air hose to a portable air control source.
 - (iii) Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 4.0 psig.
 - (iv) After the pressure of 4.0 psig is obtained, regulate the air supply so that the pressure is maintained between 3.5 to 4.0 psig for at least 2 min. Depending on air/ground temperature conditions, the internal air temperature will stabilize in equilibrium with the temperature of the pipe walls. The pressure will normally drop slightly until equilibrium is obtained; however, a minimum of 3.5 psig is required.
 - (v) After the two minute period, disconnect the air supply.
 - (vi) Decrease the pressure to 3.5 psig before starting the test. Determine pressure drop time per Section 9.e.vii – Table 1.



1. 1.0 psig pressure drop: Determine the time required for the pressure to drop from 3.5 psig to 2.5 psig, and compare this interval to the minimum time for the pipe diameter and the length per Table 1. If the rate of air loss is greater than or equal to the minimum time for the pipe diameter and length per Table 1, the installation is acceptable.
2. If the stopwatch time is less than the time specified in Table 1 the Contractor shall fill the line with water and hold for 60 minutes. The water is to be released from the test section and immediately retested.
3. If after all sources of air leakage have been corrected and there is still difficulty in meeting the minimum specification time requirements, a water exfiltration test may be conducted, at the sole discretion of the District, to determine the acceptability of the test section.

(vii) Safety Provisions:

1. This low-pressure air testing practice may be dangerous to personnel if, through lack of understanding or carelessness, a line is over-pressurized or plugs/caps are installed or restrained improperly. It is extremely important that the various plugs be properly installed, restrained and braced to prevent the sudden expulsion of a poorly installed or partially inflated plug. Observe the following minimum safety precautions:
2. During testing, no one shall be allowed in manholes or in the possible path of a suddenly expelled cap or plug.
3. Install and restrain all caps and plugs securely.
4. When lines are tested, it is mandatory that all the caps and plugs shall be braced as an added safety factor.
5. Do not over-pressurize the lines. Do not exceed 9.0 psig.
6. A regulator or relief valve set no higher than 9 psi shall be included on all pressurizing equipment.



(viii) Table 1 Minimum Time for a 1.0-psig Pressure Drop:

Table 1											
Pipe Diameter, in	Minimum Time,	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, min:s							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:5	26:1	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:1	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:34	57	41.883 L	39:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236 L	115:24	1173:05	203:47	288:29	346:11	403:53	461:34	519:16
60	54:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04

Note: Consult with pipe and appurtenance manufacturer for maximum test pressure for pipe size greater the 30 in. in diameter.

(ix) Exfiltration Tests: The length of pipe tested shall be limited so that the pressure on the invert of the lower end of the section tested shall not exceed 16' of water column, and in no case shall the length of the section tested be greater than 400' or the distance between manholes, where greater than 400'.

1. Allowable Leakage: The measured rate of leakage during the test shall not exceed 500 gallons per inch of pipe diameter per mile of pipe per 24 hours, with a 6' head at the crown at the end of the test section.

(10) CLEANING AND FLUSHING:

All pipe lengths or units laid shall be thoroughly cleaned of all debris immediately after laying.

(a) At the end of the day's work, or at any time the work is terminated for any reason, the Contractor shall plug all open ends of the pipe with material satisfactory to the District representative to prevent the entrance of small animals and foreign material of any kind into the pipe. Plugs shall be furnished and placed by the Contractor at his expense.

(b) Before connection to existing sewer is made, all new sewer Main Lines shall be thoroughly cleaned by flushing, and all debris removed, as approved by the District.

4-4. Restoration of Surface Improvements

(1) Work Included:

The work under this Section includes the furnishing of all labor, materials, equipment, transportation, hauling and services included in the following general classifications:



- General Requirements
- Gravel Surfaced Areas, Bituminous Paved Surfaces
- Concrete Curbs, Gutters, Sidewalks, and Driveways
- Planted Areas, Miscellaneous Improvements

(2) GENERAL REQUIREMENTS:

All surface improvements existing at the time of the start of the work, or placed during the construction period, which require interruption or removal to permit the construction specified herein shall be restored following completion of the work. The requirements in this Section are only general in nature and the appropriate City, County, UDOT, or other Owners shall be contacted for specific requirements.

- (a) Quality of Restoration Work: Shall equal or exceed that of the original surface improvements in every case.

(3) GRAVEL SURFACED AREAS:

Where trenches are excavated through gravel surfaced areas, such as roads and driveways and other areas, the gravel surface shall be restored by placing a gravel road base.

- (a) Subgrade Preparation: Immediately after the trench has been backfilled to the required road base subgrade, the subgrade shall be compacted to not less than an average dry density of 96% determined in accordance with AASHTO Designation T-180 Method D. No test shall be less than 92%.
- (b) Gravel Road Base
- (i) Construction Methods: Mixing, placing, compaction and finishing shall conform to the State of Utah Standard Specifications for Road and Bridge Construction.
- (ii) Material: Gradation of gravel and road base material shall be as follows:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
1"	100
1/2"	70 – 100
No. 4	41 – 68
No. 16	21 – 41
No. 50	10 – 27
No. 200	4 – 13

Materials shall conform to the State of Utah Standard Specifications for Road and Bridge Construction.

- (iii) Thickness: Of gravel road base course shall be 6".
- (iv) Compaction: Average dry density shall be not less than 96% of the dry density determined in accordance with AASHTO Designation T-180 Method D. No test shall be less than 92%.



(4) BITUMINOUS PAVED SURFACES:

Where trenches are excavated through bituminous surfaced roads, driveways or parking areas, the surface shall be restored as follows:

- (a) Subgrade Preparation: Shall be performed as specified above.
- (b) Gravel Road Base: Shall be constructed as specified above.
- (c) Bituminous Prime Coat: Shall be applied to the untreated base course. Materials and construction methods shall be in accordance with State of Utah Standard Specifications for Road and Bridge Construction.
- (d) Bituminous Surface Course: Shall be composed of a mineral aggregate and bituminous binder mixed at a central mixing plant and spread and compacted on the primed base course.
 - (i) Thickness: Shall match existing thickness or shall be 3" whichever is greater.
 - (ii) Materials and Construction Methods: Shall be in accordance with the State of Utah Standard Specifications for Road and Bridge Construction. Dry mineral aggregate shall meet the requirements for 3/4" gradation.
 - (iii) Compaction: Average density shall be at least 96% of the maximum laboratory density.

(5) CONCRETE CURBS, GUTTERS, SIDEWALKS AND DRIVEWAYS:

Shall be removed and replaced to the next joint or scoring lining beyond the actually damaged or broken sections; or in the event that joints or scoring lines do not exist or are three or more feet from the removed or damaged section, the damaged portions shall be removed and reconstructed to neat, place faces. All new concrete shall match, as nearly as possible, the appearance of adjacent concrete improvements. Where necessary, lampblack or other pigments shall be added to the new concrete to obtain the desired results.

- (a) Concrete Work: Shall conform to the requirements of the appropriate City, County, or UDOT.

(6) PLANTED AREAS:

- (a) Sodded and planted areas shall be replanted with sod or landscaping materials that are equal or exceed that of the original.



(7) MISCELLANEOUS IMPROVEMENTS:

All other improvements interrupted or removed to permit the construction specified herein shall be restored. Miscellaneous improvements to be restored shall include, but shall not be limited to the following:

- Culverts
- Canals and Canal Structures
- Bridges and Bridge Abutments
- Fences
- Driveways
- Sidewalks
- Curbs
- Gutters
- Waterways



Section 5 – Repairs & Development Procedures

5-1. Work on Laterals

- (1) LATERAL SPECIFICATIONS
 - (a) Use SDR 35 PVC pipe. Bell to spigot gasket joints only. All fittings and cleanouts to be SDR 35 PVC. No glued fittings except in sampling manhole.
 - (b) Cleanouts: Cleanouts are SDR 35 PVC pipe with the same diameter as the Lateral. The top of cleanout must have a cast iron hub with a threaded brass cap for locating purposes. One cleanout outside of the structure one cleanout every 100' thereafter. If more than a 45° bend, there must be a clean-out. A clean-out is also required at every 90° bend and between (2) 45° bends. Fernco shielded couplings (shear band couplings) or an approved equal required.
 - (c) 3/4" minus gravel 12" around pipe & clean-out. 2% minimum grade on 4", 1% on 6", uniform grade from start to finish.
 - (d) New connections require a test tee at the property line. Water test to be run on all Laterals with 10' of head.
 - (e) The District will install the nose-on, customer pays for the nose-on. The 4" nose-on is a SDR 35 PVC bell. Trench box required for nose-on or trench must be sloped to meet OSHA standards. Trench needs to be dewatered. One nose-on per segment of Main Line. The nose-on shall be installed at least 18" from the existing bell end of the Main Line.
 - (f) Cap-offs: Expose Lateral as close to the property line as possible without disturbing sidewalk or road asphalt. Cap-off shall take place past any property line cleanout so that the old cleanout will be removed or abandoned. An expandable plug the size of the line to be capped off is needed along with a bag of fence post concrete mix. Pipe to be capped off needs to be cut off square. Install the expandable plug. Call for an inspection by the District representative. Mix concrete and place around cap/plug while District representative is present. The account will only be closed when the District representative witnesses the cap-off and any remaining amounts are paid on the account.
 - (g) Sampling manhole is required for all commercial buildings. An appropriately sized outside grease interceptor shall be required at all commercial establishments where food and drink are prepared or at any establishment with indoor floor drains. Minimum grease interceptor size is 800 gallons.
 - (h) No building sewer Lateral shall have less than 3' of earth cover over the pipe at finished grade. The District engineer may allow for less on a case-by-case bases.
 - (i) Inspection fees must be paid and a Lateral Bond in place prior to any work beginning. Property owner may do the repair without a bond if they are doing all the work and no other party will be paid to perform any portion of the sewer Lateral work. Nothing shall be buried until approved by a District representative. Surface restoration of



yards, sidewalks, and other improvements disturbed in the course of the work is required.

(2) LATERAL SPECIFICATIONS – REHABILITATION WORK

Under no circumstance shall the District assume any liability for loss or damage which takes place as a result of rehabilitating or reusing existing Laterals. The service life of many types of sewer Laterals is estimated to be 50 years. The contractor shall explain all limitations of the rehabilitation work along with any deficiencies to, and obtain the consent from, the legal property owner. The District makes no representation or warranty of any kind, express or implied, regarding the quality, workmanship, or remaining service life of any work done using rehabilitation methods.

(a) Lateral Liners

- (i) Lateral liners shall not protrude into the Main Line. Protruding liners shall immediately be removed using a robotic cutter. The protruding liner shall be cut neatly to not cause any rough edges. The District may recoup any costs necessary to eliminate protruding liners which are not addressed in a timely matter. A separate bond may be required for Lateral liners.
- (ii) Lateral liners shall not be installed from within a permanent structure (e.g. homes, businesses, etc.)
- (iii) Lateral liners shall have an accessible outdoor cleanout.
- (iv) Lateral liners shall be continuous and cover all joints. The liner shall be free from visual defects such as foreign inclusions, pinholes, fins, large wrinkles, burns, and delamination. The host pipe shall have no holes or collapsed sections that would affect the structural stability. Fins and wrinkles outside of the flow line shall not exceed 5% of the pipe diameter. Fins and wrinkles in the lower third or flow line of the finished liner shall not exceed 3% of the pipe diameter or 0.5", whichever is smaller. A contractor provided camera with skids is required for the inspection.
- (v) All fabric tube and resin materials shall be compatible. Follow all manufacturer recommendations for materials and curing procedures. A pinch roller, or other approved method, shall be used for the wet-out process. Linoleum rollers are not an approved method for the wet-out process.
- (vi) Liners shall meet all manufacturer, ASTM & NASSCO standards.

(b) Point Repairs (Spot Repairs)

- (i) Fernco shielded couplings (i.e., shear band couplings) or an approved equal shall be used to join new pipe to existing pipe.
- (ii) The repair shall be bedded and haunched in 3/4" minus gravel with adequate and uniform slope.
- (iii) The repaired pipe must form a tight and strong connection. Cut ends must be clean, uniform, dry, and watertight.



(c) Reconnections

24 hours prior to reconnecting to any existing Lateral, the contractor shall contact the District for a CCTV inspection. A high-quality color camera with skids is required. The contractor shall provide the sewer inspection camera. An adequate supply of water shall be available for the inspection. The camera shall be pushed the entire length of the Lateral with the District representative present. Any deficiencies shall be noted and corrected prior to reusing the Lateral.

(3) CAP-OFF REQUIREMENTS

- (a) When a building/structure is demolished the Sewer Lateral must be exposed and capped-off at the property line.
- (b) A house sheet can be obtained from the District before the demolition work. The house sheet will show the approximate location of the Sewer Lateral. District personnel will provide any information they have available to help locate the Lateral.
- (c) The Lateral must be exposed as close to the property line as possible without digging into improvements such as the sidewalk and curb and gutter and cut off the existing Lateral square. In some cases, it may be necessary for the contractor to dig across the front of the property line, perpendicular to the Lateral to locate it. Any old property line cleanouts must be removed or abandoned as part of the cap-off process.
- (d) A cap-off inspection must be scheduled with the District by phone or in person. All cap-offs must be witnessed by a District representative. The contractor will supply an expandable plug with a bag of concrete mix. Then with a District Inspector present the expandable plug is inserted in the pipe and the concrete mix is placed around the plug and pipe.
- (e) Once the cap-off takes place and any amount owing on the account is paid, the account will be taken out of billing. Cap-offs not witnessed by a District representative will not be taken out of billing. A permit for future construction activities will not be issued until the Sewer Lateral has been capped-off. Impact fee (capacity fee) credits for future development activities will not be given for accounts where a cap-off inspection was necessary but did not take place.
- (f) When a cap-off inspection takes place a capacity fee credit is given. The policy of the District is that any capacity fee credits due shall be applied to the permit fees for the first connections made within the redevelopment area. Once all the credits due are used, any new connections will be responsible for paying the capacity fees and other permit fees owed prior to being issued a permit.

(4) RECONNECT PROCEDURES

Disclaimer: The District does not recommend the use of sanitary sewer laterals which are older than 50 years. Where an existing old lateral is reused only the street section (section in the roadway) should be reused. All other portions of the sewer lateral should be abandoned, and new SDR 35 PVC sewer pipe should be installed. See the District Standards and Specifications for additional information.



If choosing to reconnect to an existing lateral 50 years old or more, two separate inspections must take place and the following procedures must be followed:

- (a) Has a CCTV Inspection with a District Representative taken place? If not, call (801) 262-2904 to schedule the CCTV Inspection (the first inspection). The Contractor is responsible for providing a high-quality CCTV camera for the inspection. The contractor must also provide a source of water and camera skids for the inspection.
- (b) If the existing old lateral does not pass inspection the District Representative will discuss possible options with the Owner and/or Contractor.
- (c) Once the existing old lateral has passed inspection. The permit for a reconnection can be obtained by bonded Contractors. Call (801) 262-2904 to schedule the Reconnection Inspection (the second inspection). Work on the reconnection (i.e., laying new SDR 35 PVC pipe, furnishing and installing 3/4" minus gravel, shielded Ferncos, etc.) should not take place until the CCTV Inspection is passed off and a Reconnection Permit is obtained.



(5) SINGLE FAMILY / LATERAL SITE CHECKLIST

- Sewer Availability Letter (i.e., Board of Health Letter, Will Serve Letter) if required by the City. A preliminary utility layout along with the assigned addresses and lot numbers will be required prior to issuing the letter.
- If a Sewer Availability Letter is not required, send a preliminary utility plan to the District Engineer.
- Any old and abandoned Laterals must be capped at the property line. Call 801-262-2904 to schedule a Cap-Off Inspection. New permits and credits for capacity fees will not be issued until old Laterals have been capped-off and any owing amounts paid to the District.
- Excavating/Plumbing Contractor to have current lateral bond with the District. Lateral bonds are good for 3 years.
- Contact the District and submit final plans 1-2 weeks prior to the start of the project. At this time the final addresses and lot numbers will be verified, and the project fees will be determined. Any last plan review comments will be addressed.
- The District will send an Application for Sewer Service to be filled out by the Owner or the Owner's authorized representative. Once the Application is completed the District can prepare the permit and send an invoice for the project fees.
- Excavating/Plumbing Contractor to review the District's Lateral Specifications.
- Once all fees have been paid to the District and the Excavating/Plumbing Contractor is bonded, a permit and a work order will be issued, and the Contractor can then schedule their inspection(s)
- All sewer Lateral improvements shall be inspected by a District representative. Call 801-262-2904 to schedule inspections. Have the exact address and lot number ready when calling. Also, please reference the type of inspection requested (e.g., Nose On, New Connection, Re-Connection, Lateral Liner, Lateral Repair)



5-2. Commercial Projects

- (1) GREASE INTERCEPTORS & SAMPLING MANHOLES
 - (a) Outside grease interceptors are required on all food and beverage establishments and any other commercial or industrial buildings that may discharge fats, oils, grease, or similar type of materials. All commercial or industrial buildings are required to have a sampling manhole.
 - (b) All floor drains in a commercial building will discharge through an outside grease interceptor. The only exception is when a floor drain is required for a water heater.
 - (c) All new construction must meet the requirements for grease interceptors. All commercial or industrial buildings that are remodeled that meet the above-mentioned criteria are required to install a grease interceptor as part of the remodel.
 - (d) The District will allow the installation of hydromechanical grease interceptors. Use Schier GB-1000 or GB-1500 or approved equal. The approval and design of hydromechanical grease interceptors must take place under the direction of the District's Engineer.
 - (e) *Indoor, under sink style, grease traps are only allowed for existing buildings that are only undergoing a remodel, where outdoor utility work is not anticipated to take place. The food or beverage establishment must also meet the District's criteria for being a low to medium producer of grease.* If only in this specific circumstance can the Owner contact the District and request a "Grease Trap Variance". If the variance is approved the District will prepare a "Grease Trap Variance" for the Owner to sign and agree to. The only approved indoor grease traps are the "Big Dipper Grease Trap" or the "Grease Guardian, Point Source Style with X or D Series Models". If the indoor grease trap proves to be inadequate an outdoor grease interceptor will be required and installed at the Owner's expense.
 - (f) Only food and beverage establishments which produce low to medium amounts of grease are eligible for an indoor grease trap. The following is a list of establishments which are eligible, allowed on a case-by-case basis, or not eligible:
 - (i) **Low Grease Production** (allowed in most instances) – establishments which prepare food offsite and food that requires minimal preparation and/or warming; sandwich shop, convenience store (no kitchen), hotel breakfast bar, frozen yogurt, coffee shop, take & bake pizza, bar (limited food service), cafeteria (no prep), sushi (no grill).
 - (ii) **Medium Grease Production** (allowed on a case-by-case basis) – establishments which serve food from a limited menu and/or with a limited amount of onsite preparation; pizza, ice cream parlor, fast food hamburger (pre-cooked), caterer, Greek, Japanese, Vietnamese (Pho), grocery store (no fryer), cafeteria (limited prep).



- (iii) **High Grease Production** (not allowed) – serves a full menu of food prepared onsite; American traditional, hamburger (with grill), BBQ, Mexican, Italian, steak/seafood house, hibachi, buffet, fast food fried chicken, bakery/donut shop (w/ fryer), Chinese, Indian, grocery store (with fryer), cafeteria (full prep), restaurants (with fryer).
- (g) Sanitary wastewater discharge is not to be discharged through a grease interceptor.



(6) COMMERCIAL OR INDUSTRIAL SITE CHECKLIST

- Sewer Availability Letter (i.e., Board of Health Letter, Will Serve Letter) if required by the City. A preliminary utility layout along with the assigned addresses and lot numbers will be required prior to issuing the letter.
- If a Sewer Availability Letter is not required, send a preliminary utility plan to the District for review and approval.
- Any old and abandoned Laterals must be capped at the property line. Call 801-262-2904 to schedule a Cap-Off Inspection. New permits and credits for capacity fees will not be issued until old Laterals have been capped-off and any owing amounts paid to the District.
- A sampling manhole is required on all commercial or industrial sewer Laterals.
- A grease interceptor is required for all food & beverage establishments & buildings with floor drains.
- Excavating/Plumbing Contractor has current Lateral Bond with the District. Lateral Bonds are good for 3 years.
- Excavating/Plumbing Contractor has a copy of the District Lateral Specifications.
- Industrial users complete and return the Industrial Discharge Questionnaire (IDQ) if required.
- Contact the District and submit final plans 2-3 weeks prior to the start of the project. At this time the final addresses and lot number will be verified, and the project fees will be determined. Any last plan review comments will be addressed.
- The District will send an Application for Sewer Service to be filled out by the Owner or the Owner's authorized representative. Once the Application is completed the District can prepare the permit and send an invoice for the project fees.
- Once all fees have been paid to the District and the Excavating/Plumbing Contractor is bonded, a permit & work order will be issued and the Contractor can schedule their inspection(s).
- All sewer improvements shall be inspected by a District representative. Call 801-262-2904 to schedule an inspection. Have the exact address ready when calling. Also, please reference the type of inspection requested (e.g., Nose-on, New Connection, Re-Connection, Lateral Liner).



5-3. Main Line Projects

(1) MAIN LINE CHECKLIST

- Sewer Availability Letter (i.e., Board of Health Letter, Will Serve Letter) if required by the City. A preliminary utility plan along with the assigned addresses and lot numbers if available.
- If a Sewer Availability Letter is not required, send a preliminary utility plan to the District Engineer.
- Any old, abandoned Laterals must be capped at the property line. Call 801-262-2904 to schedule a Cap-Off Inspection. New permits and credits for capacity fees will not be issued until old Laterals have been capped-off and any owing amounts paid to the District.
- 2 - 3 Weeks before the start of construction contact the District to notify them of the start of the project. At this point, submit a copy of the contractor's bid. Bid to show the total cost of the necessary sewer improvements.
- The District will send an Application for Sewer Service to be filled out by the Owner or the Owner's authorized representative. Once the Application is returned the District can prepare the permit and send an invoice for the project fees.
- Owner/Developer to sign the District's Line Extension Agreement.
- Excavating Contractor to complete a District Main Line Bond. The Main Line Bond will be provided by the District after the excavating contractor's bid is received. The Main Line Bond amount is for 100% of the contractor's bid price for the sewer improvements, excluding the cost of the Laterals.
- On the plat show specific language dedicating a sewer easement to Mt. Olympus Improvement District such as "10 foot wide utility easement in favor of Mt. Olympus Improvement District".
- Submit electronic copies of the plans in AutoCAD format. Submit the following: Utility Plan with Plan and Profiles, Site Plan, building foot prints, and Final Plat. Show all rim and invert elevations. Show SDR 35 PVC pipe with slopes and no more than 400' manhole spacing.
- Final addresses and lot numbers provided to the District. Plans will not be approved that do not have officially assigned addresses and lot numbers.
- Pay all fees. Contact District 2-3 weeks before the start of project to determine the project fees and obtain a final plan review. Engineering fees, manhole deposit, capacity fees, and inspection fees as shown on the Rates & Fees Schedule.
- Onsite pre-construction meeting prior to starting the sewer improvements.
- All sewer improvements shall be inspected by the District. Call 801-262-2904 to schedule inspections. Be sure to have assigned exact addresses and lot numbers ready when calling.



- (2) DETAILED PROCEDURES FOR MAIN LINE EXTENSIONS
- (a) Developer provides the District with a site plan, utility plan, and plat with easements, assigned addresses and lot numbers. There will be two plan reviews. A preliminary plan review that should take place as part of issuing the "Sewer Availability Letter/Will Serve Letter" and a final plan review. The utility plan shall include a plan and profile drawing. After the final review and corrections, Developer to provide AutoCAD files of the Site Plan, Utility Plan and Plat.
 - (b) Easements shall be provided by Developer on all Main Lines that will be owned and maintained by the District. A 10 foot wide public utility easement, 5 feet on each side of the Main Line shown on the plat is required. On the plat state "10 foot wide utility easement in favor of Mt. Olympus Improvement District". Larger Main Lines may require wider easements.
 - (c) An easement using metes and bounds is acceptable in the absence of a plat. The Developer's engineer/surveyor will provide legal description and tax number of property where easement is located and send it to the District. The District will prepare the easement document. Developer will have the legal Owner of the property sign easement and return the completed document to the District. The District will record the easement document once the project is completed.
 - (d) Excavating Contractor to provide the District a copy of the bid for the sewer improvements. A Main Line Bond on the District's bond form is specific to the job for the amount of installing the sewer Main Line improvements. The amount includes all materials, manholes, pipe, labor to complete the job. Based on the sewer Main Line cost, an engineering fee is charged based on the Rates & Fees schedule (Mainline Project Fee, Engineering). A manhole deposit for each new and any existing manholes affected is charged. Manhole deposits will be returned to the Developer once a final inspection of the Main Line has taken place. To receive the refund of the deposit, the manholes need to be cleaned-out, invert boards removed, and the manhole to final grade in existing asphalt, concrete, or landscaped areas. All necessary fees and deposits will be paid before work can begin.
 - (e) A line extension agreement will be signed by the Developer/Owner.
 - (f) A pre-construction meeting with the Excavating Contractor and District will take place before work begins.
 - (g) All pipe to be laid with the use of an in-pipe laser.
 - (h) 5/8" invert boards will be installed in all new manholes when they are stacked. Eccentric manhole cones will have the flat side of the core on the outlet side (i.e., downstream) of the manhole invert. No steps in manholes.
 - (i) The inlet and outlet pipes of the manhole will be grouted.
 - (j) All new Laterals will need to be inspected before they are backfilled.
 - (k) Work on Laterals is covered by a separate "Lateral Bond" with the District to be obtained by the Excavating Contractor connecting the Laterals.



- (l) An air test of all new Main Lines will be performed by a qualified pipe tester and witnessed by the District.
 - (m) After the Main Line has passed the air test, the District will dump water at the top of all new Main Lines and perform a CCTV inspection of the Main Lines.
 - (n) A final inspection on the manholes will be done by the District after the asphalt is finished; manholes are set to grade and cleaned-out. New manholes will have District lids.
 - (o) Copy of "Line Extension Agreement" signed and returned to Owner along with letter reducing bond to 25% for the warranty period. Remaining manhole deposits returned.
- (3) MAIN LINE PRE-CONSTRUCTION CONFERENCE
- (a) District lid with standard frame only. No low-profile frames allowed.
 - (b) Manholes shall not have steps.
 - (c) If using an eccentric or offset manhole cone the flat side shall be placed downstream.
 - (d) Core into manholes to install new lines only. Trough needs to be grouted in. Grout around pipe inside manhole.
 - (e) Invert boards (5/8" plywood) to be installed when manhole is stacked to protect sewer mains from falling debris. Invert board to be removed after paving .
 - (f) 3/4"-minus gravel to be used 12" over and under the pipe. See Standard Drawing 3-8, "Typical Trench Detail".
 - (g) Contractor can use up to 12" of grade rings. Use mortar between grade ring joints. Use of Whirlygig manhole riser or approved equal using a thermoplastic form may be used.
 - (h) Cast iron riser rings may be used. Ring must sit down solid in base ring and must have three (3) - 3/8" set screws to help secure the riser ring to the base ring.
 - (i) A pipe laser is required for laying pipe.
 - (j) Water stop required on all poured in place manholes.
 - (k) Final grade of the manhole frame & cover conforms to Standard Drawing 3-3 "Manhole Collar". Asphalt cannot be built up around manhole to set grade.
 - (l) Laterals shall be stubbed past any utilities in the park strip and generally terminated at the property line. Plug Lateral stub with expandable plug prior burying and air testing.
 - (m) After the Main Line has been installed and backfilled, an air test shall be performed. Gage for air test must be a low-pressure type with at least 1/2 pound increments and show a current calibration test date.
 - (n) The District will perform a CCTV inspection of the Main Lines after a successful air test and access is provided for the CCTV truck. The District will perform a CCTV inspection



of the Main Line prior to the warranty period expiring to document any deficiencies that need to be repaired.

- (o) A compacted base is to be used for pre-cast and poured in place manholes.
- (p) Provide 18" of cover prior to compaction over pipe zone.
- (q) When tying into existing Main Lines to ensure that the new Main Line is at least 0.2' higher than the existing high-water mark.
- (r) Give the District one (1) business day notice when starting the work on the sewer. If the job is shut down for more than two days, notify the District when starting the job again.
- (s) An inside drop to be used if difference between top of pipe and flow line is more than 18". Install the inside drop per District Typical Drop Manhole Detail.
- (t) Any work done during a weekend or holiday is to be left open for inspection on the next regular business day.
- (u) Any changes to the Main Line slopes shall be annotated on as-built drawings and given to the District Representative.
- (v) Poured in place manhole bases shall be poured and allowed to cure for at least 24-hours prior to stacking additional sections. Anywhere concrete is poured over the top of a pipe there shall be an equal amount of concrete placed below the pipe.



Section 6 – Miscellaneous

6-1. Bonds

- (1) Laterals:
 - (a) All work on Laterals in the District must be performed by a licensed excavating or plumbing contractor with a current Lateral Bond with the District. No work will be allowed under another contractor's bond or permit.
 - (b) The Lateral Bond is a three-year bond for the amount shown on the Rates & Fees Schedule that allows the contractor to install Laterals at different locations throughout the District. The Lateral Bond is a continuous bond and is good for three years. It should not be cancelled after work at an individual location is completed. If the contractor desires to cancel their Lateral Bond, it must take place one-year after any work has taken place in the District. The District will not be held liable for any delays in permitting and construction on projects where the Lateral Bond has not been kept current.
 - (c) No work can be scheduled, performed, or inspected without a current bond.
- (2) Main Lines:
 - (a) All work on Main Lines in the District must be performed by a licensed excavating contractor with a current Main Line Bond with the District. No work will be allowed under another Contractor's bond or permit.
 - (b) Each Main Line Project will require a Main Line Bond specific for that project. The Main Line Bond shall be for the full amount of the sewer improvements including all costs for the installation of the Main Line, manholes, backfill, and any other necessary sewer improvements.
 - (c) When the surface improvements have been completed, the District will perform a final inspection on the Main Lines. Once all deficiencies have been corrected, the bond can be reduced to 25% of the original value for a one-year warranty period. Once the one-year warranty period has passed the Main Line Bond can be cancelled.
 - (d) Private developments with private Main Lines will be required to post a Main Line Bond to cover the cost of the improvements taking place on and near the existing District Main Line.
 - (e) No work can be scheduled, performed, or inspected without a current bond.

(3) Instructions:

Because the bond is a binding document, the District will not accept faxed, scanned, or emailed versions of the bond form. The original bond must be delivered to the District office prior to the start of any work. The District's bond forms must be used. Bonds submitted on other bond forms will be rejected. The bond form must be completely filled out and returned. Bonds missing notarizations, seals, or signatures will be rejected.



(4) Other Bonds:

Other bonds may be required by the District.

6-2. Sub-Standard Installation

- (1) When a sewer installation cannot meet the standards required by the District, the Owner must sign a "Substandard Agreement". The agreement states what the specific fault is. These agreements are then recorded with the property at the Salt Lake County Recorder's Office.
- (2) Substandard agreements must be signed for the following conditions that do not meet District requirements:
 - Lateral not receiving proper inspection
 - Lateral not using acceptable materials
 - Lateral having less than minimum required grade
 - Lateral not having sufficient bury or cover over the pipe
 - Multiple buildings or structures connected to the same Lateral.
- (3) Additional substandard conditions may apply. All substandard agreements must be approved by the District and then signed and returned to the District office before any work is to be performed. Any substandard agreements not returned to the District will be recorded on the District's records as a failed inspection and the work will be shown as not complete.
- (4) The District will not accept any Main Lines that are substandard. Main Lines which are built substandard and cannot be corrected, will belong to the Individual Owner(s) or Association of Owners for which the Main Line was constructed and where the Main Line is located. The Individual Owners or Association of Owners will be responsible for the ownership and maintenance of the Main Line.

6-3. Directional Drilling, Boring or Other Trenchless Work Near District Assets

Before performing directional drilling, boring, or using other similar trenchless methods in the Public Ways, private property, and/or adjacent areas the designer, excavator, and or contractor must do the following when the proposed excavation is more than 24" deep:

- (1) The designer, excavator, and/or contractor are responsible for clearly showing and locating all District infrastructure on the plans. When contacted the District will provide any available utility information to assist in this process.
- (2) Locate each District Sewer Line and appurtenance by potholing.
- (3) Physically mark the location of each District Sewer Line and appurtenance.
- (4) All directional borings must be done so that the borings have separations both horizontal and vertical, of at least 36" from each District main line and at least 48" from each District trunk line.
- (5) At least 1 business day prior to beginning work the excavator or contractor must contact the District and schedule to have a District Representative onsite for inspections during the work when it crosses or is near District infrastructure.



Appendix A – Glass-Fiber Reinforced Polymer Pipe (GFRP)

PART 1 GENERAL

1.1 DESCRIPTION

CONTRACTOR shall furnish and install Glass-Fiber Reinforced Polymer (GFRP) Pipe for direct burial installation including all fittings, gaskets, and appurtenances as shown on the Contract Drawings and specified herein, for a complete and operable piping system.

1.2 REFERENCES

- A. Work covered by this Specification shall meet or exceed the provisions of the latest editions of the following Codes and Standards in effect at the time of award of the Contract. The publication is referred to in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM D 638 Test Method for Tensile Properties of Plastics
 - 2. ASTM D 2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
 - 3. ASTM D 3262 Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe
 - 4. ASTM D 3681 Standard Test Method for Chemical Resistance of "Fiber glass" Pipe in a Deflected Condition
 - 5. ASTM D 4161 Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals
 - 6. ASTM F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- C. AMERICAN WATER WORKS ASSOCIATION (AWWA)
 - 1. AWWA M45 Fiberglass Design Manual

1.3 SUBMITTALS

- A. Submit the following.
 - 1. Pipe materials
 - 2. Pipe fittings
 - 3. Pipe couplings
 - 4. Accessories
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Instructions: Provide manufacturer's installation instructions for pipe.
- D. Field Test Reports: Provide results for all testing performed as indicated in Subparagraph – Field Testing.
- E. Project Record Documents: Provide marked-up set of drawings showing actual locations of piping, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.



1.4 DELIVERY, STORAGE, AND HANDLING

- A. All piping shall be bundled or packaged for transportation by commercial carrier to the site.
- B. Before off-loading, pipe shall be inspected for damage. Any pipe damaged in shipment shall be assessed and either accepted or rejected as directed by ENGINEER, and the pipe supplier shall be notified of rejected pipe within 7 days of delivery at the site. Rejected pipe shall be quarantined for disposition. Each pipe shipment shall be checked for quantity and proper pipe size, color, and type.
- C. Pipe shall be off-loaded and handled in accordance with the pipe manufacturer's instructions.
- D. Handling and Storage: All pipe handling and storage shall be strictly in accordance with the pipe manufacturer's recommendations.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in gravity sewer application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
- B. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass or ECR-glass filaments with binder and sizing compatible with impregnating resins.
- C. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the product.
- D. Elastomeric Gaskets: Gaskets shall meet ASTM F 477 and be supplied by qualified gasket manufacturers and be suitable for the service intended.

2.2 MANUFACTURE AND CONSTRUCTION

- A. Manufacturer, or approved equal:
 - 1. HOBAS
 - 2. Thompson Pipe Group
- B. Pipes:
 - 1. Manufacture pipe by a casting or continuous filament winding process to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes exposed to sewer flow shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall provide UV protection to the exterior. Pipes shall be Type 1, Liner 1 or 2, Grade 1 or 3 per ASTM D 3262.
 - 2. Nominal Stiffness (SN): 72 minimum (per Contract Drawings).
 - 3. Lengths: Pipe shall be supplied in nominal lengths of 19 to 40 feet. Actual laying length shall be nominal \pm 2 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.



4. The pipe and fittings shall be free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe and fittings shall also be as uniform as commercially practical in color opacity, density and other physical properties.
5. Pipe shall be designed in accordance with AWWA M45 to withstand the installation method and ground conditions. Detailed calculations shall be submitted to ENGINEER for review prior to its procurement/manufacture.

C. Joints

1. Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.
2. Stiffness: Joints to match the adjacent pipe stiffness.

2.3 TESTING

- A. Pipes: Pipes shall be manufactured and tested in accordance with ASTM D3262.
- B. Joints: Joints shall meet the requirements of ASTM D4161.
- C. Stiffness: Each pipe shall have sufficient strength to exhibit the minimum pipe stiffness at 5% deflection as required by the Engineer. Stiffness shall be tested in accordance with the test method of ASTM D2412. One pipe shall be tested every 100 lengths of each type, grade, and size pipe produced.
- D. Corrosion Resistance: Pipe shall meet or exceed the requirements of ASTM D3262 when tested in accordance with ASTM D3681.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation: CONTRACTOR shall install the pipe and fittings in accordance with the Contract Drawings and Specifications and the manufacturer's requirements.
- B. Excavation and backfill of trenches and for appurtenances shall be in accordance with District Standards.
- C. Pipe Handling: Use textile slings, other suitable materials or a forklift. Use of chains or cables is not permitted.
- D. Jointing:
 1. Clean ends of pipe and joint components.
 2. Apply joint lubricant to the bell interior surface and the elastomeric seals. Use only lubricants approved by the pipe manufacturer.
 3. Use suitable equipment and end protection to push the pipes together.
 4. Do not exceed forces recommended by the manufacturer for joining or pushing pipe.



- E. Provide dewatering system to draw down groundwater level below bottom of the pipe trench.
- F. Any pipe damage during handling and storage or by transport shall be repaired according to the manufacturer's recommendation or removed from the site and replaced at ENGINEER's option, at no additional cost to OWNER. ENGINEER's decision regarding rejection shall be final. Rejected pipe shall be clearly and indelibly marked to prevent confusion with pipe in subsequent shipments.
- G. If a defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional cost to OWNER. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the Work. In certain cases, the repair of pipes is allowed onsite under the supervision of a factory trained technician.
- H. Precautions shall be taken to prevent floatation of the pipe in the trench. Remove and relay any pipe which has floated. CONTRACTOR is responsible to prevent the floatation of the pipe during construction. CONTRACTOR to submit installation plan to ENGINEER for review prior to commencement of construction.
- I. All areas disturbed by installation of the pipeline shall be restored in accordance with the Specifications and Contract Drawings.
- J. Pipe system shall be field-trim capable without the use of special pipe make up joints. No specially made make-up joints are allowed.
- K. The pipe and manhole openings shall be plugged at the end of each work day, or period of work suspension.
- L. Safety tape shall be installed above pipe as required by the Drawings.

3.2 PRELIMINARY CLEANING AND FLUSHING

- A. CONTRACTOR shall flush the pipeline as the Work progresses by a means in accordance with good practice to ensure that sand, rocks, or other foreign material are not left in any of the pipeline. If possible, the flushing shall be made with an open pipe end.
- B. CONTRACTOR shall provide to ENGINEER a proposed schedule and method of flushing for review before the flushing starts.

3.3 INSPECTION AND TESTING OF PIPELINE

- A. GFRP sewer pipes shall be tested by CONTRACTOR for exfiltration or infiltration and deflection in accordance with District Standards.
- B. ENGINEER and OWNER shall be notified at least 48 hours before the pipeline is to be tested so that they may be present during the test.
- C. Pipes shall be backfilled prior to testing.
- D. Leakage tests shall be completed and approved prior to placing of permanent resurfacing of pavement.



- E. When leakage or infiltration exceeds the allowed amount, CONTRACTOR shall locate the leaks and make the necessary repairs or replacements to reduce the leakage or infiltration to the allowable limits. Individually detectable leaks shall be repaired, regardless of whether the test results are acceptable or not. Repairs and/or corrective measures shall be completed at not additional cost to OWNER. CONTRACTOR shall retest the pipeline after completing any repairs.
- F. Deflection: Maximum allowable long-term deflection is typically 5% of the internal diameter.

- END OF SECTION -



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Appendix B – Polymer, Coated, and Lined Manholes

1.1 POLYMER CONCRETE MANHOLES

- A. Provide polymer manhole sections, base sections and related components conforming to ASTM C 478. ASTM C 478 material and manufacturing is allowed compositional and dimensional differences required by a polymer product. Manhole risers, transition slabs, conical tops, grade rings and manhole base sections shall be designed, by manufacturer, to requirements of ASTM C-478 and ASTM C 857 as modified to accept polymer construction in lieu of cementitious concrete.
- B. Provide base riser section with integral floors, unless shown otherwise.
- C. Provide riser sections joined with bell and spigot/ship-lap design seamed with butyl mastic so that on assembly, manhole base, riser and top section make a continuous and uniform manhole.
- D. Construct riser sections for polymer manholes from standard polymer manhole sections of the diameter indicated in the Contract Drawings.
- E. Use various lengths of manhole sections in combination to provide correct height with the fewest joints.
- F. Design wall sections for depth and loading conditions with wall thickness as required by polymer manufacturer.
- G. Provide tops to support HL-93 vehicle loading and receiving cast iron frame covers, as indicated on drawings.
- H. Where polymer transition slabs are required provide precast base sections with flat polymer slab top sections used to transition to 48-inch diameter manhole access riser sections. Transition can be concentric or eccentric as shown in the Contract Drawings. Locate transition to provide minimum of 7-foot head clearance from base to underside of transition unless otherwise approved by ENGINEER.
- I. DESIGN CRITERIA:
 1. Manhole risers, transition slabs, conical tops, grade rings and manhole base sections shall be designed, by manufacture, to requirements of ASTM C 478 and ASTM C 857 as modified to accept polymer construction in lieu of concrete as follows:
 - a. Polymer Mixture - the mixture shall consist solely of thermosetting resin sand and aggregate. No cementitious materials shall be allowed.
 - b. Required wall thickness for all members will be that stated by polymer manhole manufacturer based upon loading conditions and material properties. The wall thickness of risers and conical tops shall be not less than that prescribed by the manufacturer's design by more than 5%. A wall greater than the prescribed design shall not be cause for rejection.
 - c. Thermosetting Resin - The resin shall have a minimum deflection temperature of 158° F when tested at 264 psi (1.820 mPa). The resin content shall not be less than 7% of the weight of the sample as determined by test method D 2584. Resin selection shall be



- suitable for applications in the corrosive conditions to which the structures will be exposed.
- d. Each manhole component shall be free of all defects, including indentations, cracks, foreign inclusions, and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. The internal diameter of manhole components shall not vary more than 1%. Variations in height of two opposite sides of risers and conical tops shall not be more than 5/8 inch. The under run in height of a riser or conical top shall not be more than 1/4 inch/foot of height with a maximum of 1/2 inch in any one section.
 - e. Marketing and Identification - Each manhole shall be marked on the inside and outside with the following information: Manufacturer's name or trademark, Manufacturer's location, and Production Date.
 - f. Manhole joints shall be assembled with a bell/spigot or shiplap butyl mastic joint so that on assembly, manhole base, riser and top section make a continuous and uniform manhole. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.
 - g. Minimum clear distance between two wall penetrations shall be a minimum of 6-inch on 48-inch to 72-inch diameter manholes and a minimum of 8-inch on larger diameter manholes. A clearance of 3-inch is required between wall penetration and joint.
 - h. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Invert slope through manhole is as indicated on drawings. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts. Polymer bench and channel are to be constructed with all resin aggregate material – no alternative fill material is allowed. Extended base footer requirements for buoyancy concerns can be addressed with cementitious concrete material.
 - i. Provide resilient connectors conforming to requirements of ASTM C 923 or as required by OWNER. All connectors are to be water tight. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.
 - j. Exceptions to ASTM C 478- components shall be designed for the intended combinations of manufacturing materials. Component designs may be as non-reinforced members or reinforced members as recommended by the manufacturer. Steel reinforcement is not required for circumferential reinforcement, joint reinforcement, base slab reinforcement or hoop reinforcement, but may be placed for the purpose of product handling.
- J. Grouting – all material needed for grouting and patching shall be a polyester mortar compound provided by the manhole manufacturer.
 - K. Manhole steps will not be required in Polymer Concrete Manholes.
 - L. The design of Polymer Concrete Manholes to be located in areas where the groundwater level is higher in elevation than the bottom of the manhole shall consider the effects of buoyancy. An extended base footer may be necessary.
 - M. Polymer Concrete Manholes shall be 'Armorock' polymer manhole or approved equal.



1.2 MANHOLE INTERIOR COATING

- A. Manhole Interior Coating shall meet the requirements of one of the following coating systems.
 - 1. Solvent Free 100% solids, ultra-high build epoxy-based coating system. Raven 405 as manufactured by Raven Lining Systems, Broken Arrow, OK; Sewer Shield® 150, as manufactured by Environmental Coatings, LLC, Mesa, AZ; or approved equal.
 - 2. 100% solids – VOC free polyurethane coating system. Spraywall® as manufactured by Sprayroz Protective Lining Systems, Pleham, AL, or approved equal.
 - 3. Multi-layer polymer resin-based lining system. SpectraShield Lining System as manufactured by CCI Spectrum, or approved equal.
 - 4. Aggregate-filled epoxy-based lining system. Sauereisen Sewergard® 210 as manufactured by Sauereisen, Pittsburg, PA, or approved equal.
- B. Surfaces shall be prepared and filled, and coating material shall be prepared and applied according to manufacturer's directions.
- C. Manholes with interior coating applied at manufacturing plant where the coating is chipped or damaged during installation shall have the damaged area repaired with the same coating material.

2.2 MANHOLE LINER SYSTEMS

- A. Lined Manholes shall be manufactured from a self-consolidating concrete (SCC) with a minimum compressive strength of 4,500 PSI conforming to material and performance standards of ASTM C-478, design requirements of ASTM C-857, and the applicable requirements of Sections 2.1 through 2.4.
- B. Lined Manholes shall consist of a monolithic precast base, risers, transition slabs, conical tops and grade rings.
- C. All precast base sections shall be provided with a fiberglass reinforced polymer (FRP) or polypropylene (PP) liner cast into concrete. The base liner shall be utilized for all pipe connections, unless otherwise shown on the Approved Drawings or approved by the District Engineer, and shall be complete with:
 - 1. Full-flow channels with side walls extending to the crown of the pipe, formed to provide smooth flow transition with no disruptions at pipe-manhole connections;
 - 2. Gasketed, flexible, watertight bell-type connections to suit the pipe type(s), size(s), and grade alignment(s) shown on the Approved Drawings. Installation of the liner to the precast base section shall be in accordance with the liner manufacturer's requirements and these Specifications.
- D. Riser sections shall be lined with yellow High Density Polyethylene (HDPE) Perfect Liner sheets with a minimum thickness of 0.079-inches (2.00mm).
- E. Manhole flat lids and conical tops shall be lined with FRP or HDPE Perfect Liner.
- F. FRP liners shall be factory sprayed to a coating thickness of 5.0 mm and shall have spray-bonded embeds/anchors on the back side cast into concrete.



- G. Manhole joints shall be assembled with a bell and spigot design, with SDV seal gaskets per ASTM C443. The joints and complete assembly shall pass a vacuum test per ASTM C1244. Gasket material shall be produced from EPDM or SBR rubber and manufactured by D+S SDV Seal.
- H. All segments: bases, risers, flat lids, and conical tops are to be provided with external lifting devices.
- I. Marking and Identification: each manhole component shall be marked on the inside and outside with the Manufacturer's name or trademark,
- J. Allowable repairs: Use manufacturer approved repair materials and methods as needed for repair of the FRP liner, HDPE liner or concrete.
- K. Steps: Manhole steps will not be required in Lined Manholes.
- L. The design of Lined Manholes to be located in areas where the groundwater level is higher in elevation than the bottom of the manhole shall consider the effects of buoyancy. An extended base footer may be necessary.
- M. Lined Manholes shall be "Perfect Lined Manholes" as manufactured by Geneva Pipe and Precast, or approved equals.

- END OF SECTION -



Appendix C – Perfect Lined Manhole System

PART 1 GENERAL

1.1 SUMMARY

This section covers Perfect Lined Manhole system, a high density polyethylene (HDPE) lined reinforced concrete manholes with a fiber reinforced polymer (FRP) lined base section intended for use in sanitary sewers, storm sewers and water transmission lines where corrosion resistance or high abrasion resistance is required.

1.2 REFERENCES

- A. The latest edition of the following publications form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM)
 1. ASTM A 48 Standard Specification for Gray Iron Castings
 2. ASTM A 536 Standard Specification for Ductile Iron Castings
 3. ASTM A 615 Standard Specification for Deformed and Plain Carbon- Steel Bars for Concrete Reinforcement
 4. ASTM A 1018 Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 5. ASTM A 1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 6. ASTM B 86 Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings
 7. ASTM C 33 Standard Specification for Concrete Aggregates
 8. ASTM C 150 Standard Specification for Portland Cement
 9. ASTM C 443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gasket
 10. ASTM C 478 Standard Specification for Precast Reinforced Concrete Manhole Sections
 11. ASTM C 497 Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile
 12. ASTM C 857 Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
 13. ASTM C 858 Standard Specification for Underground Precast Concrete Utility Structures
 14. ASTM C 913 Standard Specification for Precast Concrete Water and Wastewater Structures
 15. ASTM C 923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
 16. ASTM C 990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
 17. ASTM C 1619 Standard Specification for Elastomeric Seals for Joining Concrete Structures



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| 18. ASTM C 1802 | Standard Specification For Design, Testing, Manufacture, Selection, And Installation Of Horizontal Fabricated Metal Access Hatches For Utility, Water, And Wastewater Structures |
| 19. ASTM D 570 | Standard Test Methods for Water Absorption of Plastics |
| 20. ASTM D 638 | Standard Test Methods for Tensile Properties of Plastics |
| 21. ASTM D 968 | Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive |
| 22. ASTM D 6365 | Standard Test Methods for Hydraulic Pullout Resistance of a Geomembrane with Locking Extensions Embedded in Concrete |
| 23. ASTM D 7853 | Standard Test Methods for Nondestructive Testing of Geomembrane Seams using the Spark test |

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

- | | |
|-----------------|---|
| 1. AASHTO M 306 | Standard Specification for Drainage, Sewer, Utility, and Related Castings |
|-----------------|---|

1.3 SUBMITTALS

- A. CONTRACTOR shall provide Submittals.
- B. Shop Drawings: Indicate manhole and concrete structure locations, elevations, and piping sizes, material, and elevations of penetrations.
- C. Product Data: Submit cover and frame construction, features, configuration, and dimensions. Submit pipe connector materials and dimensions. Submit manhole step materials and dimensions. Submit manhole and structure joint sealant materials.

1.4 QUALITY ASSURANCE

- A. CONTRACTOR shall demonstrate that manholes and structures have been properly installed, level, with tight joints, at correct elevations and orientations, and have been backfilled and compacted in accordance with the specifications.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Product Requirements: Product storage and handling requirements in accordance with District Standards and manufacturers requirements.
- B. Comply with precast concrete manufacturer's instructions for unloading, storing, and moving precast manholes and structures.
- C. Store precast concrete manholes and structures to prevent damage to OWNER's property or other public or private property. Repair property damaged from materials storage.
- D. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Contract Drawings to indicate its intended use.

1.6 INSPECTION

- A. All manholes furnished under this specification are subject to inspection in the manufacturer's plant by the Owner's Representative.



1.7 QUALITY ASSURANCE

- A. The producer shall be an NPCA Plant certified.

PART 2 PRODUCTS

2.1 PERFECT LINED MANHOLE

- A. Provide Perfect Lined Manhole System components which include monolithic base, risers, conical tops or flat lids and grade rings designed and manufactured in accordance with ASTM C 478.
- B. Monolithic concrete base section shall be lined with prefabricated one-piece homogeneous fiber reinforced polymer (FRP) compound with a minimum thickness of 0.197-in (5mm).
- C. The sanitary sewer baseliner shall include:
 - 1. Full flow channels with side walls to the crown of the pipe(s).
 - 2. A non-skid pattern on inner bench surfaces.
 - 3. Pipe connections with specified invert elevations and slopes for incoming pipes.
 - 4. The standard vertical side wall (skirt) height above the bench shall be 2-in minimum. Other skirt heights, as agreed upon between the purchaser and the manufacturer.
- D. Riser sections to be lined with HDPE Perfect Liner sheets with a minimum thickness of 0.065-in (1.65mm).
- E. Manhole flat lids and cones to be lined with FRP.
- F. Manhole joints shall be assembled with a bell and spigot with SDV seal gaskets per ASTM C 443. Joint sealing surfaces shall be free of dents, gouges, and other surface irregularities. The joints and complete assembly shall pass vacuum test per ASTM C1244.
- G. The minimum clear distance between two wall penetrations shall be 6 inches. Minimum clear distance between penetrations and joint seams shall be 3 inches.

2.2 BASIS OF DESIGN

- A. Concrete sewer manholes shall be manufactured from self-consolidating concrete (SCC) with a minimum compressive strength of 4,000 PSI conforming to material and performance standards of ASTM C-478.
- B. Cement for the manholes shall conform to ASTM C-150, Type II-V. All sand and aggregate shall be nonreactive in an acid environment.
- C. Perfect Manhole system to support AASHTO HL-93 or HS-20 loads.

2.3 JOINTS

- A. Elastomeric gasket material shall be produced from EPDM 5055 rubber and manufactured by D+S SDV Seal.
- B. Installed joints shall be capable of holding constant internal pressure of 30 PSI.



2.4 PRODUCT MARKING

- A. Plainly mark each manhole section with the manufacturer's name, project and customer name, date of manufacture, nominal diameter, section height and structure ID and concrete type.

2.5 HDPE LINING

- A. The Interior of the manhole risers shall be lined with a High-Density Polyethylene (HDPE) concrete protective liner (CPL) with a minimum thickness of 1.65 mm. The CPL shall have a minimum of (94 qty) anchors per square foot extruded as one homogeneous piece.
- B. All edges of the HDPE CPL shall be covered with a EPDM liner clip manufactured by D+S Sealants.
- C. HDPE CPL shall be capable of resisting groundwater pressure up to 30 PSI.

2.5 FRP LINING

- A. The interior of the manhole base section and flow channels shall be coated prior to casting with a FRP factory spray coating a minimum of 0.197-in (5 mm) thickness.
- B. FRP coating shall have spray bonded embeds on the back side of the base liner section.
- C. When monolithically cast into the base shell the structure of the FRP liner shall be capable of resisting groundwater pressure up to 30 PSI.
- D. At the discretion of the manufacturer the FRP coating may be used in all or part of the liner fabrication for the cone.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify built-in items are in proper location, and ready for roughing into Work.
- C. Verify correct size of manhole and structure excavation.
- D. Manhole can be rejected for any of the following reasons:
 - 1. Exposure of any wires and positioning spacers or chairs used to hold the reinforcement cage in position or steel reinforcement in any surface of the manhole.
 - 2. Tears in the liner greater than 2-in in width on any segment.
 - 3. Bubble voids on the exterior surface of the manhole exceeding 3/8" in diameter.
 - 4. Missing or bent external lifting devices.

3.2 PREPARATION

- A. Do not install structures where site conditions induce loads exceeding structural capacity of structures.



- B. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

3.3 INSTALLATION

- A. Segments to be manufactured with self-aligning segment joints.
- B. All segments to have external lifting devices.
- C. When segment is placed gasket to be secured around the spigot. Once in place the gasket must be equalized by pulling it away from the spigot 1-2" on all sides and releasing.
- D. Field-welding of joints shall not be required for the Perfect Liner Manhole System.
- E. Pipe-to-Manhole Connections shall be accomplished in accordance with the following options:
 - 1. With direct drive boot connector for all pipe types
 - 2. Perfect connector when connecting Perfect Pipe to Perfect Lined Manhole
 - 3. Cast-in gasket when using 4-in through 52-in internal diameter pipes
 - 4. Other connection methods approved by a manufacturer
- F. Approved Connector Manufacturers:
 - 1. Press-Seal Corporation, PSX Direct Drive compression connector.
 - 2. Hamilton Kent, Tylox compression connector.
 - 3. Vertex, Inc., V-0216 4" to 12", V-0226 14" to 52".

- END OF SECTION -



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Appendix D – Document Revision Log

The following is a summary of the revisions made to the District’s Standards and Specification document and adopted by the Board of Trustees on July 9, 2024.

Section 1

Added text for clarification and added restrictions on the use of color on drawings.

Section 2

Added text for clarification and added restrictions on the use of color on drawings.

Section 3

Updated Standard Drawings to include rebar in the manhole concrete collar.

Section 4

Clarified that trench support systems must and added text for clarification; added text for clarification; changed sanitary sewer lateral minimum cover depth; added GFRP material to Pipe, Fitting & Joints table; moved material for Pre-Cast Concrete Manholes to top of list; Deleted 30” Grade Rings and Single Cast Iron Riser Ring from the manhole section and moved to grade ring section; defined low-profile frames; added Whirlygig system to grade rings; updated grade ring information; updated Prohibited Manhole Adjustment Materials; updated Manhole Adjustment; updated Manhole Access; clarified lateral sizing and added language prohibiting connection of laterals directly to manholes; prohibits paving over District manholes; addition of Whirligig and Cretex polypropylene for manhole grade rings; added GFRP to Main Line pipe material; updated requirements for the number of connections from a single building or structure; updated air testing requirements; deleted Time Holding Chart and replaced with Table 1.

Section 5

Added Lateral Specification as a Section of the document; added Lateral Specifications – Rehabilitation Work as a Section of the document; added Cap-Off Requirements as a Section of the document; added Reconnect Procedures as a Section of the document; Added Single Family / Lateral Site Checklist as a Section of the document; added Grease Interceptors & Sampling Manholes as a Section of the document; Clarifies situations where indoor grease traps will and will not be allowed; allows for installation of hydromechanical grease interceptors; added Commercial or Industrial Site Checklist as a Section of the document; added Main Line Checklist as a Section of the document; added Detailed Procedures for Main Line Extensions as a Section of the document; added Main Line Pre-Construction Conference as a Section of the document; added Miscellaneous as a Section of the document; prohibits digital bond submissions and requires submittal of original bond form; added Sub-Standard Installation as a Section of the document; added Directional Drilling, Boring, or Other Trenchless Work Near District Assets as a Section of the document; deleted attachments from the document as the information has been included in specific sections; references Rates and Fees Schedule for all charges and fees.



Appendix

Added Technical Specifications for Glass Fiber Reinforced Polymer Pipe (GFRP), Polymer, Coated, and Lined Manholes and Perfect Lined Manhole System.



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