Sun Valley General Improvement District
Sewer Facilities
Technical Specifications

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1.0 Applicable Publications & Reference Standards

A. The publications listed below, including the latest revisions form a part of this specification to the extent referenced.

1. 10 State Standards
2. American Society of Testing Materials, ASTM:
3. Uni-Bell Plastic Pipe Association (UNI) Publication:
4. Standard Specifications for Public Works Construction (Orange Book, Latest Revision).

2.0 General Requirements

A. This section covers gravity sewer pipe which shall be furnished and installed complete with all jointing materials, fittings and other appurtenances shown on the Drawings or otherwise required for a complete installation.

B. Also reference **SVGID** Standard Details.

C. All materials shall be sampled and tested in accordance with all applicable requirements of ASTM.

D. All laying, jointing, testing for defects and air and vacuum testing shall be performed in the presence of the **SVGID** or their designated representative and shall be subject to **SVGID** approval before acceptance. All **SVGID** expenses shall be the responsibility of the Contractor/Developer and will be invoiced in accordance with the **SVGID's** current Utility Fee Schedule.

E. Where manufacturers are specifically identified, approved or equals are acceptable.

F. Any deviations from these specifications must receive prior written approval from **SVGID**.

3.0 Gravity PVC Pipe

A. This specification designates general requirements for polyvinyl chloride (PVC) plastic gravity pipe with gasketed bell and spigot joints for the conveyance of domestic sewage.

B. Pipe and fittings shall meet the requirements of ASTM Specification D 3034 for 4" – 15" SDR 35 and F679 for 18" – 27" (T1 or T2).

C. The pipe and fittings shall be colored white or green for in-ground identification as storm and/or sewer pipe. White pipe must include manufacturer markings on the pipe indicating it as being SEWER at minimum 3-foot intervals along the entire length of the pipe.

D. Gasket materials used on the push-on joints shall comply in all respects with ASTM F 477 and shall be suitable for immersion in normal domestic wastewater. The gasketed joint shall be of integral bell design. Lubricant for jointing shall be as approved by the pipe manufacturer. Connections to precast manhole bases shall be approved by the pipe manufacturer.

E. Sizes and dimensions shall be as shown in the Drawings. Standard laying lengths shall be 20 feet and 13 feet. Specific required lengths are indicated on the Drawings.

F. Pipe shall be inspected at the point of manufacture in accordance with applicable ASTM, AWWA, or ANSI specifications.

G. Pipe and accessories that are chipped, bowed, cracked, indented, discolored from UV or contain other imperfections, or do not satisfactorily meet the manufacturer's standard test requirements, shall be rejected and removed from the Site.

H. Service laterals shall be cut into the pipe utilizing Inserta Tee, Fernoc Quik Seal or SVGID approved or equal.

I. All fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and shall have bell and/or spigot configurations compatible with that of the pipe.

4.0 Manholes

A. Manholes bases and walls shall be constructed of precast, reinforced concrete. Cast-in-place reinforced concrete bases, will be considered and approved by **SVGID** on a case-by-case basis. Manholes shall conform to the size, shape, form and details shown on the Plans.

B. All precast cylinder units, precast concrete taper sections and precast base units (when allowed) shall meet the strength requirements for "Precast Reinforced Concrete Manhole Risers and Tops", ASTM C 478. Design and manufacturer shall be based on H20 loading.

C. All concrete used in the construction of manholes, including barrel and base sections, shall conform to ASTM C 478 and contain Class F fly ash in a quantity between 15 and 25 percent of the total cementitious material by weight.

D. All precast concrete manhole sections shall be cured in accordance with the methods specified in ASTM 478. No precast manhole sections shall be delivered to the job Site until the specified minimum comprehensive strength has been obtained.

E. Manhole frames and covers shall be of gray iron, shall meet the requirements "ASTM A48-53B" and shall conform to the details shown on the Drawings.

F. Precast manhole sections shall be jointed with a preformed joint sealer meeting the requirements of ASTM C 990 or a rubber gasket meeting the requirements of ASTM C 443.

G. Drop manholes shall be constructed at the location and in conformance with the details shown on the Drawings. Materials and construction of drop manholes shall conform in all respects to the applicable provisions of these Specifications for standard precast manholes (including frames and covers), with modifications for the addition of drop inlet pipe of the diameter noted on the Plans or these Specifications. Drop connections shall be built along the line of the pipe at the points indicated on the Plans.

H. Fittings for drop sewer connections shall be set in the manner shown on the Plans. In all drop sewer connections, the drop wye, tee and other fittings shall be of polyvinyl chloride pipe encased in concrete as shown on the Plans.

I. Steps shall meet the requirements of ASTM C 478 and the testing requirements of ASTM C497. Steps shall be polyethylene coated and steel reinforced as manufactured by M.A. Industries or approved equal. Steps shall be installed when indicated in the Drawings.

5.0 Underground Warning Tape

A. Underground warning tape shall be detectable metallic and minimum 3 inches wide. The tape shall be colored Green and labelled as "Buried Underground Sewer" or similar.

6.0 Pipe Laying

A. Trench and prepare foundation in accordance with the SVGID Trench Detail SV-5.

B. Inspect all pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are being used. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

C. Use proper implements, tools, and facilities for the safe and proper protection of the work. Lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. Remove all damaged pipe from the Project Site. Do not drop or dump pipe into trenches under any circumstances.

D. Clean the gasket, the bell, and the groove area thoroughly. Do not remove gaskets from the bells when permanently installed.

E. Inspect the gasket, pipe spigot bevel, gasket groove and sealing surfaces for damage or deformation.

F. Clean the spigot end of the pipe, removing any dirt or foreign material before assembly.

G. Avoid getting dirt into the bell or spigot.

H. Pipe laying shall generally proceed upgrade with spigot ends pointing in direction of flow. All pipe shall be laid uniformly to line and grade so that the finished sewer will present a uniform bore. When field cutting or machining the pipe is necessary, use only tools and methods recommended by the pipe manufacturer.

I. The pipe bedding shall form a continuous and uniform bearing and support for the pipe barrel between joints. No gaps between the bottom of the pipe barrel and trench bottom will be allowed. Care shall be taken to ensure that the pipe does not rest directly on the bell or pipe joint. Place sufficient pipe zone material to secure the pipe from movement before the next joint is installed to assure proper pipe alignment and joint makeup.

J. Excavate bell holes at each joint to permit proper assembly and inspection of entire joint and to avoid high spots. After a section of pipe has been placed in its approximate position for jointing, clean the end of the pipe to be joined, the inside of the joint, and, if applicable, the rubber ring immediately before joining the pipe. Provide all special tools and appliances required for the jointing assembly. Insert the spigot into the bell, closely following the manufacturers printed instructions for joining pipe, to the proper depth of insertion as indicated by markings on the pipe. Care shall be exercised to ensure that the spigot is not over inserted. Any pipe that is over inserted shall be corrected. If undue resistance to insertion of the pipe is encountered or the reference mark does not position properly, disassemble the joint and check the position of the gasket. If the gasket is twisted or pushed out of its seat, inspect the gasket and repair and/ or replace the gasket as necessary. Check pipe for alignment and grade after the joint has been made.

K. Do not deviate from line or grade as shown more than 0.5 feet for line and 0.05 feet for grade, provided that such variation does not result in a sag or reverse sloping invert.

L. Measure for grade at the pipe invert, not at the top of the pipe.

M. When pipe is laid within a movable trench shield, take all necessary precautions to prevent pipe joints from pulling apart when moving the shield ahead.

N. Where pipe is connected to manholes or concrete structures, a standard pipe joint shall be located within 1.5 feet of the outside face of the structure.

O. Polyvinyl chloride gravity pipe may be deflected uniformly throughout each pipe length when approved by **SVGID** and where indicated on the Drawing. Allowable deflections shall be as specified in the pipe manufacturer. Deflection shall be accomplished by staking the pipe on both sides of the joint so that deflection at the joint is minimized.

P. Prevent excavated or other foreign material from getting into the pipe during the laying operation. Close and block the open end of the last laid section of pipe with a watertight plug to prevent entry of foreign material or creep of the gasketed joints when laying operations are not in progress, and at the close of the day's work. Take all necessary precautions to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

Q. Plug or close off pipes which are stubbed off for manhole or structure construction with temporary watertight plugs.

R. Sewer connections shall be per **SVGID** Standard Details SV-11A through SV-11D.

7.0 Manhole Installation

A. General

Install manhole per **SVGID** Sanitary Sewer Manhole Detail SV-8.

B. Transportation and Delivery

Every precaution shall be taken to prevent injury to the precast manhole sections during transportation and unloading of the sections. The precast sections shall be unloaded using skids, pipe hooks, rope slings or suitable power equipment, if necessary, and the sections shall be under perfect control at all times. Under no conditions shall the precast sections be dropped, dumped or dragged.

If any precast section is damaged in the process of transportation or handling, such section shall be rejected and immediately removed from the Site and replaced.

C. Cast-in-Place Bases

When cast in place bases are allowed by **SVGID**, the manhole bases shall be constructed to the form and dimensions shown on the detailed Plans. Said concrete bases shall be formed and poured on prepared foundation material as shown in the Plans. That portion of the base above the invert elevation of the sewer pipe shall be formed to provide a smooth channel section. The forms shall be checked and approved by the Resident Project Representative for accuracy of dimensions and relative smoothness prior to pouring the base. Channels shall vary uniformly in size and shape from inlet to outlet if required. The manhole base shall be poured as one monolithic pour.

D. Joint Sealing Compound

The joint shall be cleaned with a brush. The silicon treated protective paper shall be removed from one side of the preformed rope and preformed rope shall be laid paper side up on the cleaned joint surface. The surface shall be pressed firmly end-to-end around the entire joint making 1-inch laps where necessary. The protective paper shall be removed from the preformed rope and the next section shall be lowered into place. Each joint shall receive Joint Sealing Compound on both the interior and exterior of each joint.

Sufficient preformed joint sealing compound shall be installed so as to completely fill the joint and show a “squeeze-out”.

G. Elevation

Each manhole section shall be set perfectly plumb. Sections of various heights shall be used in order to bring the top of the manhole ring and cover to the required elevation.

The elevations at which manhole frames and covers are to be set shall conform to the requirements set forth on the Plans. Frames shall be set at the required grade and shall be

securely attached to the top precast manhole shaft unit.

H. Final Preparation and Cleaning

All lift holes and irregularities in the concrete bases, walls and cones shall be filled in and patched with a suitable filling compound. Any holes ¼ inch and larger (as measured in any direction) shall be filled and patched on both the interior and exterior surfaces. The interior of the manhole shall be free of all surface irregularities. All manholes shall be thoroughly cleaned of any accumulation of silt, debris or foreign matter of any kind, and shall be clear of such accumulations at the time of final acceptance. Each joint between manhole sections, grade rings, and frame and cover shall be patched with a non-shrink epoxy grout.

8.0 Control and Disposal of Water

A. Furnish, install, maintain and operate all the necessary machinery, appliances, and equipment to keep excavations free from water until the backfill material has been completed, inspected, and approved and all danger of flotation and other damages are removed.

B. Groundwater pumped from the trench shall be legally disposed of in such a manner as will not cause injury to the environment, public or private property, or constitute a nuisance or menace to the public.

9.0 PVC Gravity Pipe Testing

A. Prior to performing any tests, the pipe shall be thoroughly cleaned. This shall be performed by flushing a sewer cleaning device through the pipe. This may be an inflated sewer cleaning ball, or a poly-pig type of cleaner that will fit snugly into the pipe. The cleaner shall be placed in the last cleanout or manhole on the pipe to be cleaned and water shall be introduced behind it. The cleaner shall pass through the pipe with only the pressure of the water propelling it. All debris flushed out ahead of the cleaning operations shall be removed at the first manhole where its presence is noted. In the event the cleaning is stopped by cemented or wedged debris or damaged pipe, the obstruction shall be completely removed.

B. Vertical and Horizontal Alignment

The vertical and horizontal alignment will be verified in the field. The following will be considered as acceptable field tolerances:

Horizontal Alignment	± 6 inches
Vertical Alignment	± .05 feet
Low Spots	Shall be 1 percent of the inside diameter of the pipe or 3/8 inch, whichever is smaller.

C. Video Inspection

All sanitary sewer lines 6 inches and greater in nominal dimension (excluding services) shall be video surveyed. Such survey shall be accomplished no sooner than 30 days after backfill placement and compaction unless otherwise permitted by **SVGID**. The purpose of the video inspection is to access the acceptability of the installed pipe with respect to unacceptable low spots and infiltration as a result of rolled gaskets, pulled joints and/or broken pipe.

After thoroughly cleaning the pipeline, the manhole sections (length of pipe between manholes) shall be visually inspected by means of a closed-circuit color television. The inspection will be done one manhole section at a time and the flow in the section being inspected will be suitably controlled to limit the maximum depth of flow as shown in the Table 1.

Table 1 - Allowable Maximum Depth of Flow During Video Inspections

Nominal PVC Pipe Size, inches	Maximum Allowable Depth of Flow, inches
6	1.1
8	1.5
10	1.9
12	2.8
15	3.5
18	4.2
21	5.0
24	5.6
27	7.9

The television camera used for the inspection shall be one specifically designed and constructed for such inspection and shall be capable of producing color videos. Lightning for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera, television monitor, and other components of the video system shall be capable of producing a picture quality that is satisfactory to **SVGID**; and if unsatisfactory, the pipeline will not be accepted until suitable equipment is used.

The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer

line.

The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device. Marking on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to **SVGID**.

Documentation of the television inspection results shall be as follows:

(a) Television Inspection Logs: Printed location records shall be kept by the Contractor that will clearly describe the location in relation to an adjacent numbered manhole of each infiltration point, low spot, rolled gasket, broken pipe, pulled joint and/or deflected pipe observed during the television inspection. In addition, other points of significance such as the locations of service laterals and other discernible features shall be recorded.

(b) Photographs: Photographs of the television picture of any problems encountered shall be taken by the Contractor and provided to **SVGID**.

(c) DVD Recordings: The purpose of DVD recording shall be to supply a visual and audio record of the as built sewer system and define any problem areas found that will require correction. DVD recording playback shall be at the same speed that it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Contractor. Original DVD for the Project shall be forwarded to **SVGID**.

(d) Accurate and continuous footage readings shall be superimposed on the video recording for each line inspected. Also shown shall be the date of inspection and the manhole number referenced on the Drawings for each manhole on the line section inspected.

Any defects found shall be immediately repaired by the Contractor and a new video survey performed of the entire repaired section.

If the Contractor utilizes a Subcontractor to perform the video inspections, the Subcontractor must be approved by **SVGID** prior to the performance of the Work.

Two complete copies of the final project reports, following corrections of defects, shall be submitted to **SVGID** prior to acceptance along with one copy of the original DVD's and one copy of the original photos as required.

D. Deflection Testing

All installed pipe shall be tested to ensure that vertical pipe deflections do not exceed a maximum allowable deflection of 7.5 percent of the base inside diameter of the pipe. Deflection tests shall be performed no sooner than 30 days after completion of placement and densification of the backfill.

The mandrel shall have an odd number of legs (9 legs minimum) and be a rigid, nonadjustable mandrel having an effective length not less than its nominal diameter. The 7.5 percent deflection mandrel dimensions are shown in the Table 2.

Table 2 - 7.5% Deflection Mandrel Dimensions

Nominal PVC Pipe Size, inches	7.5% Deflection Mandrel Outside Diameter, inches
6	5.31
8	7.09
10	8.84
12	10.51
15	12.86
18	15.7
21	18.5
24	20.80
27	23.44

Immediately prior to performing the mandrel test, the lines being tested must be thoroughly cleaned. The mandrel shall be pulled through the pipe by hand to ensure that the maximum allowable deflections have not been exceeded.

If the mandrel fails to easily pass thru the pipe by pulling manually, the pipe will be deemed to be over deflected and unacceptable. Such pipe will be uncovered and, if not damaged, reinstalled. Damaged pipe shall be removed from the Site and new pipe installed and retested.

E. Air Exfiltration Testing

All gravity sewer pipe (including services) shall be tested via low pressure air exfiltration after backfilling to final grade.

All plugs and caps should be secured to prevent blowouts. All pressurizing equipment shall include a relief valve set no higher than 9 psig to avoid over pressurizing. All laterals, stubs, and fittings should be plugged or capped to prevent air loss that could affect air test results. Pneumatic or mechanical testing plugs should be installed at each end of the pipe section to be tested.

Low pressure air should be slowly introduced into the test section until the air pressure reaches 4.0 psig greater than the average external pressure of any groundwater above the pipe. Maintain this internal pressure for at least two minutes to allow pressure stabilization, and then shut off the air supply.

At any convenient observed pressure reading between 3.5 and 4.0 psig greater than the average external pressure of any groundwater above the pipe, begin timing the pressure loss.

If the time shown in Table 3 for the designated pipe size and length elapses before the air pressure drops 0.5 psig, the section is considered to have passed the test. The test may be discontinued once the prescribed time has elapsed, even though the 0.5 psig loss has not occurred.

Table 3 Specification Time Required for a 0.5 psig Pressure Drop[1]

1	2	3	4	Specification Time for Length (L) Shown (min: sec)							
Pipe Dia (in)	Min time (min: sec)	Length for Min Time (ft)	Time for Longer Length (sec)	100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54

1. If laterals are included in the test, their lengths shall be ignored for computing test times.

10.0 Manhole Testing

A. All manholes and appurtenances be as watertight and free from infiltration and exfiltration as possible. The adequacy of manholes and appurtenances as to water tightness shall be determined by vacuum testing all of the manholes as described below and per ASTM C1244 after the manhole installation is complete. If the manhole fails the test or there is any evidence of leakage the manhole shall be repaired to the satisfaction of **SVGID**.

B. The manhole shall be vacuum tested after backfilling is complete (when the grade rings and frame are in place). It is advised that the Contractor perform a presumptive test prior to

backfilling the manhole.

C. Preparation of Manhole

(a) All lift holes shall be plugged.

(b) All pipes entering or exiting the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

Procedure

(a) The test head shall be placed at the top of the manhole cone.

(b) A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of mercury.

(c) The manhole shall pass if the time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury meets or exceeds the time values shown in the Table 4.

Table 4 - Minimum Test Times for Manholes

Manhole Depth, measured from invert to surface, ft	Minimum Time, seconds	
	48 inch Diameter	60 inch Diameter
<4	10	13
6	15	20
8	20	26
10	25	33
12	30	39
14	35	46
16	40	52
18	45	59
20	50	65
22	55	72
24	59	78
26	64	85
28	69	91
30	74	98