



City of Rohnert Park

# Sewer Design Standards



**SEWER DESIGN STANDARDS  
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**Volume 1**

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## **SEWER DESIGN STANDARDS**

### **I. PURPOSE**

To provide guidelines for design of sewer utilities projects and thereby reduce the time required for processing the plans. These guidelines do not include, but may reference, additional conditions which may be promulgated by all other pertinent ordinances, codes and official policy set forth by the City, or other government agencies. These guidelines establish minimum acceptable design criteria. More stringent requirements may be imposed by the City based on specific project conditions.

It is the responsibility of the design engineer to initiate written requests for approval of any design concepts that differ from these criteria, to verify additional requirements imposed, to perform any necessary calculations or studies, and to resolve specific design problems with the appropriate agency, department, or division.

### **II. REQUIREMENTS FOR IMPROVEMENT PLANS AND SUBDIVISION MAPS**

- A. Provide a detailed utility plan showing onsite and offsite sewer systems, and their connections to existing City maintained sewer facilities. Show all existing septic systems in addition to those that will be abandoned.
- B. For subdivisions, annotate the local agency information sheet of the Subdivision Map with information that is needed to notify property owners of requirements for connection to City Sewer System. These include, but are not limited to:
  - 1. Lots requiring installation of sewer backflow protection;
  - 2. Private sewage grinder pumps; and
  - 3. Public sewer access requirements, such as gates or access roads.

The appropriate information may be obtained from City Engineering.

- C. It is common for a project on one property to be dependant on the construction of sewer by another project or phase of the same project. Sewer system designs will incorporate any off-site sewer that is required for the connection to an existing public main.
- D. The maintenance agreement requirements for any private sewer shall be recorded prior to recordation of the Final Map or Parcel Map. If a private sewer will be installed and there will be no subdivision (and so no Final Map or Parcel Map) then a Maintenance Agreement shall be recorded against the properties having interest in the sewers.

### **III. SEWER MAINS - GENERAL**

- A. Sewer systems will be designed in public streets whenever possible. When not in public streets, the following conditions must be met:
  - 1. Ductile iron pipe must be used from manhole to manhole when outside of roadways except PVC may be used for gravity mains located between 5 and 12 feet below the surface; and
  - 2. In general, lateral connections will not be allowed in easements except where authorized by the City Engineer. Any lateral connections in easement must be accessible and easy to locate; and
  - 3. Lockable lids are required on all manholes.
  
- B. Private sewer systems vs. public sewer systems:
  - 1. In general, private sewer systems will be used on private property and public sewers will be used on public property.
  
- C. Extent of sewer main improvements will be as follows:
  - 1. Any offsite, downstream sewer system improvements needed to serve the project must be shown on the improvement plans, including upgrades to existing mains that may be required as a result of an approved capacity study or modeling effort.
  - 2. In general, sewer mains must be designed across the full property frontage.
  - 3. When a sewer main extension ends at a manhole and the sewer will be extended further in the future, include in the design a 3-foot long stub-out of the manhole with a plug or cap.
  
- D. Gravity sewer mains within 50 feet of a well or 200 feet from a stream shall be constructed to Waterworks Standards using AWWA C900 PVC, Fusion Welded HDPE or Ductile Iron Pipe. Ductile Iron Pipe will be used in areas outside of roadways except PVC may be used for gravity mains located between 5 and 12 feet below the surface.

### **IV. CONNECTION TO AN EXISTING PUBLIC SEWER MAIN**

- A. Except where an existing stub-out exists for future connections, connect new mains to existing at existing manholes or by constructing a new manhole over the point of connection. When making a connection to an existing manhole, reconstruct and form channel and bench for smooth flow transition and maintenance access.
  
- B. There are locations in the City where mains have been extended for future use. Where connecting to such a main, remove the existing plug, cleanout, or rodding inlet and install a manhole. The designer is responsible for inspecting the existing main prior to use. If the main does not meet City standards it must be replaced to the first existing manhole in accordance with City standards. The main must be

videotaped prior to connecting to verify condition. Submit disc to Engineering Services Department.

- C. Where an existing sewer main manhole stub-out is to be extended, the designer is responsible for inspecting the existing stub-out prior to use. The stub-out must be on the same line and grade, the same size and the same material as the new sewer main. Any existing stub-out not meeting City standards must be replaced in accordance with City standards.
- D. Elevations of mains connecting to existing sewer mains at manholes will be as follows:
  - 1. Side sewer mains connecting to an existing main will be at least 0.1-foot higher than the existing.
  - 2. Connect sewer mains so that the crown of the smaller main is no lower than the crown of the larger main.
- E. Where laterals are the same size as the main, connection must be made with a manhole. Use a wye for all other lateral connections except as in “F” below.
- F. For lateral connections to existing mains 12 inches and larger, use taps and saddles per City Standard 513. Taps and saddle shall have watertight gaskets and 316 stainless steel hardware. If existing laterals are to be utilized, they shall be video taped prior to connection as to verify their condition. If defects are observed, the lateral shall be repaired or replaced per City Standards.
- G. Lateral connections to trunk sewers 15 inches and larger are generally not allowed except with the specific approval of the City Engineer. When allowed, connections shall be at a manhole.
- H. Approved alternatives for multiple connections, such as for grouped flag lots or multiple lots off private driveways, are:
  - 1. Up to 2 joint trenched sewer laterals may be connected to the main using wyes at least 1-foot apart. (Taps or saddles where allowed must be a minimum 1-foot apart.)
  - 2. A private 6-inch main may connect to the public main at a manhole and extend to the services onsite. This alternative requires a joint maintenance agreement or homeowner’s association, if serving more than one property.
  - 3. Up to 4 laterals may connect to a junction structure similar to Standard 502.
- I. Where the street surface is less than 5 years old, installation methods other than open cutting shall be required. For major streets, installation methods other than open cutting may be required. The City Engineer will determine the requirements based on the condition of the existing street.

## **V. MATERIALS**

- A. Street laterals shall be Polyvinyl Chloride (PVC) or ductile iron pipe.
- B. Gravity sewer mains up to and including 18 inches will be PVC (SDR 26 minimum), or fusion-welded HDPE. PVC joints shall be wrapped with 60 mil 6-inch wide corrosion tape. Exceptions must be approved by the City Engineer.
- C. Materials for pipes larger than 18 inches must be approved by the City Engineer.
- D. Sewer force mains shall be constructed to Waterworks Standards using AWWA C900 PVC, Fusion Welded HDPE, or a Polyurethane or Epoxy lined Ductile Iron Pipe.
- E. If a gravity sewer main is installed outside of a paved roadway, ductile iron pipe and sewer identification tape is required.
- F. In general, use the same pipe material from structure to structure.
- G. Use of Asbestos Cement Pipe is not allowed under any circumstances.
- H. Gravity sewer mains within 50 feet of a well or 200 feet from a stream shall be constructed to Waterworks Standards using AWWA C900 PVC, Fusion Welded HDPE or Polyurethane or Epoxy lined Ductile Iron Pipe in areas outside of roadway.

## **VI. ALIGNMENT**

Any deviation in clearances from the requirements of the Standard Drawings, the “California Waterworks Standards” and criteria for water main separation set forth under Title 22 of the California Code of Regulations, must be approved in advance of the plan submittal by the California Department of Public Health (CDPH) and the City Engineer. Additional requirements may be imposed for such deviations.

- A. Horizontal
  - 1. Horizontal separation from other utilities, such as gas, underground electric, underground television cable, etc., will be a minimum of four feet clear between the pipes except at crossings. Horizontal separation from other sewer lines and storm drains shall be 5 feet.
  - 2. In general, design public sewer mains in straight street sections to run parallel to the street centerline. All public mains must be a minimum five feet clear from all structures, building overhangs, gutters, property lines or edge of easements and 3 feet clear from all monuments, and/or lips of gutters. The alignment will be designed so that any 48-inch manhole shall be centered a minimum of 3 feet from the lip of gutter and any 60-inch manhole shall be centered a minimum of 4-foot from lip of gutter.

3. In curved streets, design the sewer alignment generally on one side of the centerline to allow installation of other facilities such as water, storm drains, etc. without using transverse crossings. Provide an alignment such that no part of the sewer main is less than 1 foot from the lip of gutter.
  4. Horizontal curves in gravity sewer mains are not allowed. Sewers and manholes must be designed in accordance with subsection VI-A(2) above.
  5. All sewer main trenches that are parallel to and deeper than the footing of any adjacent structure must be at least 45 degrees from the footing as required in the Uniform Plumbing Code. Any exceptions must be approved in writing by the City.
- B. Vertical
1. Vertical curves in gravity sewer mains are not allowed.
- C. Potholing
1. Pothole of all existing utilities to verify minimum separation requirements are satisfied shall be performed during the design stage of a project.
  2. Potholing must be performed during the design-phase to minimize unforeseen subsurface conditions during construction. Verification of horizontal and vertical locations, by the design engineer, by surveying junction structures may be accepted in lieu of potholing.
  3. Provide a schedule on the design drawings that shows the following pothole/survey information:
    - a) Horizontal coordinates that reference the same datum used on the design drawings.
    - b) Depth to existing utility.
    - c) Size and type of existing utility.

## **VII. MAIN SIZING CRITERIA**

- A. Public mains will be sized to serve the entire tributary area at buildout densities conforming to the General Plan. Engineers for large developments may be required to provide trunk or collection system calculations or have a wastewater model run performed.
- B. The design flows will be based on the following criteria:
1. Population density for multi-family units will be 2.0 people per unit and 3.2 people per single-family residential home. Average domestic flow will be 100 gallons per person per day.
  2. Non-residential use: flows as presented in Appendix A.
  3. Peaking factor: the ASCE 1986 Standards used in the Water Agencies Standards (San Diego). Refer to Appendix B.
  4.  $I/I=1.4$  gpm/acre.



- C. The minimum nominal sewer diameter is 8 inches. For mains over 8 inches, design all gravity sewers to achieve a minimum velocity of 2 fps at average dry weather flow (ADWF) and a maximum velocity of 10 fps using design flows. Less than 2 fps velocities require the approval of the City Engineer. When analyzing the existing or proposed sewer systems, use Manning's Formula to determine the design flow and velocity. Use  $n = 0.013$ .

## **VIII. SLOPE OF SEWER MAINS**

- A. The sewer must be designed with a slope to be able to serve its entire tributary area. The preferred minimum slope for gravity sewers is 0.005. When conditions require, flatter slopes may be approved as an exception by the City Engineer with engineering calculations. Calculations shall show a minimum of 2 fps velocity is achieved daily.
- B. The maximum slope for gravity sewers is 0.15, or 15-foot per 100-foot. Considering relevant factors such as steep terrain, steeper sewers may be allowed with the following conditions:
  - 1. Use of restrained joints.
  - 2. Provide trench dams and drainage measures to prevent a buildup of hydrostatic pressure in trenches.
  - 3. When a sewer with a slope greater than 0.15 passes through a structure with a horizontal change of direction in excess of 30 degrees, a special design of the base channelization is required to prevent overflows and yet allow for routine maintenance operations.
- C. Slopes through manholes:
  - 1. When sewers of uniform slope pass through a manhole, the slope will be maintained and the invert at the center of the manhole will be given.
  - 2. When sewers change slope at a manhole, incoming and outgoing invert elevations will be given, in addition to the center of the manhole.
  - 3. Provide sufficient drop through a manhole to compensate for energy loss caused by change of alignment. A minimum drop of 0.1 foot is required for a change of alignment greater than 30 degrees.
  - 4. When pipe sizes change at structures, design the inlet crown at least as high as the outlet crown.

## **IX. MAIN/LATERAL COVER**

- A. Cover is the distance from the top of the pipe to final finished grade measured directly over the pipe.
- B. Minimum cover for all sewer mains and laterals will be three feet. Maximum cover shall be 20 feet. The City Engineer may approve shallower installations but in no case will cover be less than 24 inches.

- C. Where cover is less than 36 inches, special construction techniques must be approved such as concrete encasement, use of ductile iron pipe, or concrete cap over the trench.
- D. All sanitary sewer trenches in roadways or paved areas shall be bedded with an approved bedding and backfilled using City approved CDF.

**X. MANHOLES AND RODDING INLETS**

- A. A manhole is required at every horizontal or vertical change in alignment, and at changes in pipe size or pipe material.
- B. Maximum distance between manholes is 350 feet. Spacing of 500 feet is allowed with permission of the City Engineer for lines over 15 inch in diameter.
- C. A manhole is required at the end of every main in excess of 200 feet in length per City Standard 500.
- D. Rodding Inlets may be installed in lieu of manholes at the end of a sewer main where the distance is less than 200 feet to the nearest manhole and the main size is 10 inches or less. The rodding inlets shall be furnished with a shallow manhole per City Standard 505.
- E. 60-inch diameter manholes are required for mains 27 inches or larger in diameter.
- F. The manhole will be designed such that the angle in the horizontal plane between the downstream and any incoming sewer is a minimum of 90 degrees.
- G. Stubs provided out of manholes for future extension will have rodding inlets provided, per City Standard 505, when more than one length of pipe is installed or where service laterals are connected to the stub. Where the extension will be used in a future phase of construction, scheduled within two years, City Standard 506 may be used.
- H. Standard inside drop manhole installations are required when the difference in elevation between the incoming and outgoing sewer is greater than 2 feet. While not encouraged, drop manholes may be required because of some physical restraints. They may not however, be used to merely avoid extra depth of trenching unless unusual circumstances exist. Upstream slope changes should be used to avoid the need for a drop manhole.
- I. When one drop connection is required, use a 60-inch diameter manhole. When two or more drop connections are required, use a 72-inch diameter manhole.
- J. Minimize the number of drop manholes.

## **XI. SEWER LATERALS**

### **A. Definitions:**

1. “Building sewer” means a sewer serving a specific building or property extending from 2 feet outside the building to either the street lateral or the private sewer.
2. “City sewer” means any public sewer located within an easement or public right-of-way which is maintained by the City.
3. “Private sewer” means a common sewer privately owned that connects one or more building sewers to the public sewer. A private sewer includes sewer main, manholes and all appurtenances.
4. “Sewer lateral” means all or part of the sewer service lateral.
5. “Sewer main” means the portion of the sewer that collects and conveys flow from the sewer laterals to the City’s terminal pump station. A sewer main can be a "public sewer" or a "private sewer."
6. “Sewer service lateral” means that portion of the sewer system which connects the user's premises to the public sewer or a private sewer. This includes the building sewer and the street lateral.
7. “Street lateral” means the portion of the City sewer that connects the sewer main to the building sewer at the property line.

B. Provide a separate sewer service lateral for each lot.

C. The minimum sewer service lateral size is 4 inches.

D. Sewer service laterals will have a two-way cleanout at the property line.

E. Sewer service laterals will be sized according to requirements of the Uniform Plumbing Code, the City Engineer and determinations by the Design Engineer.

F. Sewer service laterals will be located on the property frontage, defined as either the front or side boundary line of a parcel which abuts on a street.

G. Sewer service laterals will not be located in easements when gravity service can be provided to the property frontage.

H. Multiple lots may be served by a private main, providing approval by the Building Official and the City Engineer is received and appropriate maintenance agreements are approved by the City Engineer. Private mains must connect to the public main at a manhole.

I. The minimum slope of sewer service laterals is 2% or 1/4 inch per foot for 4-inch laterals and 1% or 1/8 inch per foot for 6-inch laterals, unless otherwise approved by the Building Department, and will be designed at a depth sufficient to serve the entire building envelope of the parcel. Provide the slope and/or invert grade at the

cleanout for any service lateral that must be installed at a slope and/or depth different from the minimums shown on the City Standard Plans.

- J. All street laterals, from property line or edge of easement to the point of connection with the main line or a manhole, will generally be perpendicular to the curb alignment or easement and will have an angle of intersection with the downstream section of sewer of no less than 90 degrees. No lateral alignments adverse to the flow of the main will be permitted.
- K. Locate sewer laterals outside of driveway areas where possible and where driveway locations are known. In general, sewer laterals will be in the center third of lots when driveway locations are unknown and a minimum of 10 feet from trees whenever possible. For hillside development, place sewer laterals on the low side of property frontages when not in proposed driveway.
- L. Sewer service laterals serving lots, buildings or parts of buildings with a potential for plumbing fixtures below the nearest upstream sewer manhole rim require an approved backwater valve device. Multi-level buildings require the upper floors to be drained and connected to the downstream side of the backwater valve device, pursuant to 2007 California Plumbing Code section, 710.0 and 710.1

## **XII. EXISTING SEWER LATERAL INSPECTION AND TESTING**

- A. Sewer laterals for this section are defined as that portion of pipe running from the building to the sewer main. As part of any project, existing sewer laterals shall be inspected and tested as required in the municipal code, conditions of approval, or as directed by the City Engineer. Sewer laterals which fail to meet minimum standards shall be repaired or replaced. Testing shall be as described herein.
- B. CCTV Inspection:
  - 1. Prior to performing the CCTV inspection, the sewer lateral shall have been cleaned by flushing the lateral with water. Grease, oil, sediment, or solids shall be removed to permit the visual review and recording of the inside wall of the sewer lateral. The cleaning work is to be performed by a licensed contractor pursuant to the provisions of Section 7026 of the State of California Business and Professions Code.
  - 2. Sewer lateral CCTV inspection recordings that are to be submitted to the City for review and the eventual issuance of a Sewer Lateral Certificate of Compliance are to be performed by contractors who are licensed and experienced to perform CCTV inspections or other inspection service providers and technicians who are permitted by law to perform such inspections.
  - 3. CCTV sewer lateral inspection recordings shall be DVD format and shall be in color. All recordings shall be in focus, properly illuminated with good contrast, adequate color and tint, if colored recording, without distortion or outside interference. The camera lens must be kept clean and clear. Any other unidentified defect such as equipment interference or

malfunction causing blurred or obscured images that detracts from the ability to completely and with reliable accuracy read the recording shall constitute a basis for rejection.

4. CCTV inspection personnel shall coordinate the work of the CCTV inspection with the property owner or resident to minimize or temporarily stop sewer discharge into the sewer lateral while recording in order to show the whole periphery of the sewer lateral. If a bypass conduit is necessary, it must receive prior approval from the City inspector, and it shall be used as the last alternative.
5. A data view display feature shall be provided capable of showing, on the DVD, the following information:
  - a) Physical address of property which the sewer lateral serves
  - b) Date and time of inspection
  - c) Name of company, firm or technician performing the CCTV inspection
  - d) Inside diameter of sewer lateral and type of pipe material
  - e) Continuous footage counter accurate within 3 percent
  - f) Identification of access and starting point for video inspection such as upstream cleanout and location of cleanout. Vent lines will not be acceptable as access points.
6. The preferred direction of the CCTV inspection is forward from upstream to downstream.
7. The CCTV inspection DVD shall show the whole periphery of the pipe. Video televising of the entire length of the sewer lateral is required. Inability or failure to do so because of obstructions in the line, collapsed pipe, out of alignment joint offsets, or lack of acceptable access points will result in the rejection of the CCTV inspection report.
8. An acceptable access point is defined as a cleanout constructed in accordance with the plumbing code and City of Rohnert Park Standards. If there are no acceptable access points, installation of new sewer lateral cleanout meeting the requirements of the adopted plumbing code and the City of Rohnert Park Standards will be required in order to perform a video inspection of the sewer lateral.
9. The DVDs shall be labeled and the labels shall be typewritten or legibly hand printed and shall include the following information:
  - a) A "CCTV Sewer Lateral Inspection" title
  - b) Street address of the property to which the sewer lateral serves
  - c) Date of inspection
  - d) The name of the Company, Firm or Individual responsible for the CCTV Inspection.
10. The CCTV inspector or operator shall identify all illicit connections to the sewer lateral observed in the CCTV inspection such as roof drains, area drains, french drains, swimming pool drains, basement drains, and footing drains by physically inspecting the property for visible evidence. The findings shall be noted in the CCTV Inspection Report
11. Sewer lateral lengths shall be measured from cleanout to sewer main.

12. The camera shall be moved through the sewer lateral at a uniform rate not exceeding 30 feet per minute. The camera shall be stopped for a minimum of 5 seconds at broken or cracked pipe sections, root intrusion, miss aligned joints, connections to the lateral or other pipe defects. The camera shall be stopped for a full minute at any flowing connections and if necessary, pulled back and re-televised to ensure a clear recording of the connection. Camera units shall have adjustable supports and shall be set so the camera axis is generally at the centerline of the pipe.
13. The operator shall clearly identify the location of all wye or tee connections, taps, breaks, roots, or other defects.
14. An inspection report is to be submitted with the CCTV inspection recording. General information including property address, date, time, operator name, and recording ID shall be provided. A diagram or a drawing showing the street, approximate location of the cleanout(s) and building face is to be provided. Pipe diameter, pipe material, shape of the pipe, pipe length, and televised footage.
15. Continuous footage readings for identifying the location of defects must be accurate to within 3 percent tolerance. The following defect identifications are to be called out and recorded to the nearest full foot:
  - a) Cracked Pipe (longitudinal, radial, spiral, multiple)
  - b) Broken Pipe, Hole in Pipe, Deformed Pipe, Collapsed Pipe
  - c) Separation in Pipe Joint (roots, earth movement, collapsed pipe section)
  - d) Pipe Obstruction (cause for failed inspection)
  - e) Infiltration (observable, evidence of, seeps into line, runs into line)
  - f) Debris or Sediment in the Pipe (flow undisturbed or disturbed, unable to continue)
  - g) Grease (flow undisturbed or disturbed, unable to continue)
  - h) Scaling (flow undisturbed or disturbed, unable to continue)
  - i) Side Connections (attempt to identify)
  - j) Cleanouts (existing or missing and location)
  - k) Settlement of pipe (sags or bellies)

C. Sewer lateral testing:

1. Sewer laterals requiring pressure testing are as follows:
  - a) All pressure laterals shall be pressure tested at 1.5 times the operating pressure and no pressure loss shall be detected within a 10 minute test.
  - b) Gravity lateral testing will be accomplished by either a water exfiltration test or an air test.
  - c) Smoke tests are also required for private gravity sewers.
2. Exfiltration Pressure Test:
  - a) To perform a pressure test using the Exfiltration Pressure Test, the sewer lateral must have a cleanout located near the building footing which is served by the sewer lateral. If the cleanout does not exist, one must be installed by a licensed contractor under a

plumbing permit issued by City Building Department. The contractor may perform preliminary pressure tests prior to completing the backfill operations; however, the final pressure test shall be performed after the completion of the backfill operations.

- b) The contractor shall plug the sewer lateral and riser at the City cleanout and then surcharge the line with water to a point equal to the foundation grade (floor joist level) or slab floor level. The minimum height of the water level shall be two feet (2'-0") above the lateral at the City cleanout. If necessary, a stand pipe shall be fitted to the top of the cleanout to achieve the required testing water level. If there is any fixture inside the structure lower than the testing water level, the contractor shall have to either plug the fixture or the lateral at the building. An approved backwater valve shall be installed if there are any plumbing fixtures below the level of the City cleanout. A Plumbing Permit is required for this work. The contractor may also install or use an existing cleanout near the structure at the foundation grade (floor joist level) or slab floor level to establish the minimum two feet (2'-0") water level.
- c) The building sewer will have passed the pressure test if the testing water level within the testing standpipe does not drop more than the indicated rate for the given diameter of testing standpipe indicated below. The allowed leakage per sewer lateral is 85 gpd or 3.54 gph or .059 gpm or 13.63 cubic inches per minute. No increase or allowance is allowed for long laterals or for laterals larger than the 4-inch minimum size.
  - 1. 3" Diameter: 2 inches per minute
  - 2. 4" Diameter: 1 inch per minute
  - 3. 6" Diameter: 0.5 inch per minute

3. Air Pressure Test

- a. Air test equipment shall be approved by the City. The contractor shall clean the pipe and plug the lateral at the building line and the end of the sewer lateral. (If a cleanout is within two feet (2'-0") of the building, the lateral may be plugged at the cleanout.)
- b. Air shall be slowly supplied to the plugged lateral until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe. The air pressure shall be regulated by a suitable regulator valve. Gauges shall be 10 psi maximum with increments of 0.2 psi.
- c. At least two minutes shall be allowed for temperature stabilization before proceeding further. The rate of air loss shall then be determined by measuring the time interval for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe.

- d. The lateral shall be considered acceptable if the time interval measured for the internal pressure to drop from 3.5 to 2.5 pounds per square inch is 10 seconds or greater.

### **XIII. EXISTING SEWER LATERAL REPAIR OR REPLACEMENT**

- A. Materials used in the repair or replacement of existing sewer laterals which have failed to pass an inspection and/or test shall be made of pipe materials, fittings, couplings, and other joining materials which have been approved for use pursuant to the Plumbing Code adopted by the City and as modified and specified in the City of Rohnert Park Manual of Standards Details and Specifications.
- B. The approved pipe materials, fittings and joining methods for the street lateral are:
  - 1. Approved Pipe Materials:
    - a. Polyvinyl chloride (PVC) plastic pipe type Drain-Waste-Vent (DWV), SDR26 minimum; manufactured in accordance with ASTM D 2241.
    - b. Cast Iron Pipe conforming to ASTM A 888 or CISPI 301 when the lateral is outside paved areas.
  - 2. Approved Pipe Fittings:
    - a. PVC conforming to ASTM D 2665; ASTM D 3311; ASTM F 1866
    - b. Grey or ductile iron conforming to AWWA C 110
  - 3. Approved Pipe Joining:
    - a. Joints between PVC pipe and between pipe and fittings shall be made with mechanical joints having an elastomeric seal conforming to ASTM C 1173, ASTM D 3212, or CSA B602.
    - b. Joints between cast iron pipe and between pipe and fittings shall be made with compression gaskets for hub and spigot pipe and fittings conforming to ASTM C 564 and shall be compressed when the pipe is fully inserted or joined with mechanical joint couplings for hubless pipe and fittings conforming to CISPI 310, ASTM C 1277 or ASTM C 1540. The elastomeric sealing sleeve shall conform to ASTM C 564 or CSA B602 and shall be provided with a center stop.
    - c. Joints between different pipe materials shall be made with a mechanical joint of the compression or mechanical sealing type conforming to ASTM C 1173, ASTM C 1460 or ASTM C 1461. Connectors and adaptors shall be approved for the application and such joints shall have an elastomeric seal conforming to ASTM C 443, ASTM C 564, ASTM C 1440, ASTM D 1869, ASTM F 477, CSA A257.3M or CSA B602.
- C. The approved pipe materials, fittings and joining methods for the building sewer shall comply with the California Plumbing Code adopted by the City of Rohnert Park with the following exceptions as stated herein and as described in the City of Rohnert Park Manual of Standards, Details and Specifications.



1. The following pipes materials are prohibited for new construction. If the below pipe types are damaged or fail to pass inspection or pressure tests they shall be removed in their entirety from the wye at the sewer main to a cleanout located near the footing of the structure being served.
    - a. Asbestos Cement Pipe
    - b. Vitrified Clay Pipe
    - c. Orangeburg pipe
    - d. Hubless concrete
    - e. Pipes without gasketed or glued bell and spigot joints
    - f. ABS glued or gasketed couplings
    - g. Grey iron drainage pipe with gasketed couplings.
  2. The following Joints and Connections are prohibited:
    - a. Cement, cement mortar, or concrete joints
    - b. Mastic or hot pour bituminous joints
    - c. Caulked joints
    - d. Oakum or hemp joints filled with lead
    - e. Lead joints
    - f. Joints made with fittings not approved for the specific installation
    - g. Joints between different diameter pipes made with elastomeric rolling O-rings.
    - h. Solvent cement joints between different types of plastic pipe.
- D. Sewer laterals may be repaired with an approved cured in place pipe lining system. At the conclusion of relining the sewer lateral must pass specified pressure tests.
- E. Sewer laterals may be replaced in their entirety with approved pipe materials. At the conclusion of the replacement, the sewer lateral must pass specified pressure tests.
- F. The replacement of damaged pipe sections with approved materials, fittings, and couplings is only acceptable if the sewer lateral can pass the required pressure test after the repairs are complete.
- G. Whenever a sewer lateral is either repaired, replaced, or re-lined, cleanouts shall be provided at the property line, within 2 feet of the structure being served by the lateral, at intervals not to exceed 100 feet in straight runs, and for each aggregate horizontal change in direction exceeding 135 degrees in accordance with the City Standards.
- H. Approved trenchless technologies such as “pipe bursting” may be utilized to replace sewer laterals. Pipe bursting shall not be used for pipes containing asbestos. Asbestos cement pipes shall be removed and replaced with approved materials.
- I. Spot repairs consisting of the placement of metal or other sheeting materials and concrete or mortar will not be accepted.

- J. Re-mortaring of joints as a repair method is not acceptable.
- K. Pipe and pipe couplings shall be joined and installed in accordance with the manufacturer's recommendations. Pipe repairs shall be made in a manner which provides the least number of pipe joints.
- L. Sewer laterals with the following types of pipe damage must be repaired or the pipe sections must be replaced:
  - 1. A separation or offset in the pipe joint including any fish mouth condition at the joint.
  - 2. Holes or cracks in the pipe bell, barrel, or coupling
  - 3. For PVC pipe, a deflection in the pipe cross-section exceeding 1/4".
  - 4. Root penetration into the pipe.
  - 5. Infiltration
- M. Where the sewer pipe repair option selected is pipe lining, repairs shall be made to the lateral prior to the installation of the liner and shall correct the following deficiencies:
  - 1. A separation or offset in the pipe joint including any fish mouth condition at the joint which the lining system cannot bridge based on the liner manufacturer's recommendations.
  - 2. Holes in the pipe bell, barrel, or coupling that the lining system cannot bridge.
  - 3. For PVC pipe, a deflection in the pipe cross-section exceeding 1/4".
  - 4. Other lateral defects which the manufacturer of the lining system recommends be corrected prior to the placement of the liner.

#### **XIV. INSPECTION AND REPAIR OF PRIVATE SEWERS**

- A. When new development, buildings or changes in use create the need to tie into existing private sewers, the private sewer shall be inspected and, if necessary, repaired.
- B. When existing private sewers require inspection and testing they shall be inspected using the procedure for video inspection for new construction in Standard 530. Private sewers shall also be smoke tested to detect cross connections or excessive inflow and infiltration.
- C. Private sewers shall be repaired in accordance with the City Standards for new sewer construction if the following defects are noted except that the infiltration quantity can be up to 200 gallons/inch-mile/day:
  - 1. Smoke testing indicates any cross connections or excessive inflow or infiltration.
  - 2. Television inspection notes any of the following defects:
    - a. Excessive inflow or infiltration
    - b. Joint separations
    - c. Damaged joints that expose the gasket

- d. Cracks
  - e. Root intrusion
  - f. Substantial deterioration of the lines
  - g. Improper pipe grade leading to clogging of the line, inflow, infiltration of extraneous water.
- D. After repair or replacement of the defects, the entire section (from manhole to manhole) where the repair was made shall be inspected and tested in accordance with City Standards for new sewer construction. Any defects will require correction.

## **XV. ABANDONMENT OF SEWER MAINS AND SERVICES**

- A. Any existing sewer mains and service laterals that will not be used will be abandoned and the following must be noted on the Improvement Plans:
- 1. Sewer mains that are to be abandoned will be securely closed at all pipe ends and at manholes with a concrete plug or masonry plug if 12” or larger per current City Standard 507. Further, mains 8 inches and larger must be broken every 50 feet, filled with a sand slurry or other suitable material per current City Standard 507.
  - 2. Sewer laterals in streets that have been constructed or overlain within the last five (5) years will be plugged behind the curb line or outside the edge of pavement.
  - 3. Sewer laterals in streets that have not been constructed or overlain in the last five (5) years will be abandoned by excavating at the main, removing the wye, and repairing the main. If the connection to the main is a tap or saddle, it will be removed and a full circle repair clamp installed. When a wye is removed that is within 18 inches of a pipe joint, the repair will be extended to include the joint.

## **XVI. EASEMENTS**

- A. An easement must be provided over any public sanitary sewer when it is installed outside a public right-of-way.
- B. The easement must be a minimum of 20-foot wide (or wider if directed by City Engineer). The easement will be dedicated as a “public sewer easement.”
- C. Easements must be configured to encompass all publicly-maintained appurtenances, such as street laterals up to the cleanout, and will be generally centered over the facility. Separate access easements may be required depending on site conditions. When sanitary sewers are to be installed along a property line the easement will be wholly contained on one parcel.
- D. All property restrictions placed as a result of dedication of easements will be so noted on the supplemental sheet of the Subdivision Map, or on the Easement

Deed if the easement is not dedicated as part of a subdivision. Typical required notes as applicable are:

1. No structures may encroach on, above, or below the surface of the ground in any public easement. This includes footings of foundations, eaves from the roof of any adjacent structure, pools, ponds or outbuildings on slabs or foundations. Decks, sheds, or other structures which may be easily removed for maintenance of the sewer system may be allowed at the discretion of the City Engineer.
2. No trees may be planted in a public sewer easement without first obtaining approval of the City Engineer. Trees may be allowed to the extent that damage to the sewer system does not occur from root intrusion and adequate access can be provided for maintenance and repair vehicles.
3. The Utilities Department will take due caution when performing maintenance or repair of sewer systems in easements, but will not be responsible for repairs or replacement of trees, landscaping or structures not specifically approved by the City Engineer.

## **XVII. ACCESS ROADS**

- A. Clear access must be provided and maintained to all structures on the sewer system:
  1. All-weather vehicle access roads are required to every structure on the sewer system. Access roads must be a minimum of 12 feet in width and must be provided with turnarounds as directed by City Engineer. City Standard 206 may be required when the back-up distance for any maintenance vehicle exceeds 100-foot.
  2. The design of access roads must be included with the sewer system design plans. At a minimum, the design will conform to the requirements of City Standard 216. Include adequate drainage measures in the design to prevent damage to the access roads from storm water.
  3. Gates must be provided for access through any fence crossing a public sewer easement. Minimum 14-foot wide gates shall be provided, with sliding gates preferred. For secondary entrances where vehicular access is not required, 4-foot wide gates for pedestrian access shall be provided and will be located to permit visual access between sewer structures.
  4. The maximum grade allowed at any point on an access road is 15%. The maximum cross-slope for any access road is 5%.

## **XVIII. SEWER FORCE MAINS**

- A. Locator boxes will be placed at every horizontal change in alignment and a maximum of every 500 feet. No. 12 insulated copper wire will be laid on top of and along the entire length of all nonmetallic pipe and will be extended to the surface at all box locations and manholes sufficiently for locator equipment to be attached. Fasten the wire to the top of the pipe so as not to be displaced or broken

during backfilling, such as by affixing the wire to the pipe with duct tape at approximately 10 feet intervals.

- B. Boxes will conform to valve box requirements per City Standard 877 with the lids clearly marked "sewer."
- C. Private force mains must connect to the City sewer system per City Standard 515, and may not discharge directly into sewer manholes. Public force main connections must be detailed on the plans. Public force mains will drop down into gravity flow prior to connection to main at a manhole.
- D. Provide details for a swab launching station for force main preventative maintenance. Launching facility will be detailed on lift station plans and must accommodate using lift station pumps for propulsion. Provide necessary valving. Contact Engineering for suggested design requirements.
- E. Force main pipes must be marked or labeled as sewer in a permanent fashion.
- F. Sewer force mains shall be equipped with dual Vent-O-Mat type RBX ARV's for waste water force mains at all high points per City Standard Detail 534.
- G. Sewer force mains shall be equipped with blow offs at all low points.

#### **XIX. INDUSTRIAL WASTE DISCHARGE PERMITS**

- A. Most commercial uses require Industrial Waste Discharge Permits which may be obtained from the Environmental Services Division of the Utilities Department of the City of Santa Rosa.
- B. Grease traps, grease and sand traps, grease interceptors, and sampling structures as may be required by the Division of Environmental Services must be shown on the plans submitted for permit approval, or referred to appropriate City Standard Plans.
- C. Trash enclosures and other outdoor pad areas used for washing will be plumbed to the sanitary sewer system at grease interceptor or other connection point approved by the Division of Environmental Services. Preventive measures shall be taken to eliminate the intrusion of any rainwater or surface runoff from trash enclosure area to the storm drainage system.
- D. Wash pad areas will be diked and/or sloped so that the smallest area possible drains to the sewer.
- E. A fixed roof will be installed over the wash area. The Division of Environmental Services may consider alternatives to a roof where it is not feasible.

## **XX. LIFT STATIONS (For Force Mains 3-inches and larger)**

### **A. General**

Plans and specifications for all lift stations are to be prepared by a Registered Professional Engineer and submitted to the City for review and approval. Lift stations that will be owned, operated and or maintained by the City shall also be required to meet the design standards herein.

### **B. Hydraulics**

1. Firm-capacity for the lift station is defined as the pumping capacity for the facility with the largest pump out of service.
2. The preferred-operating-region (POR) for a given pump is between 70% and 120% of the flow at the best-efficiency-point (BEP). Use the pump-speed affinity relationships to estimate the BEP at reduced speeds.
3. Design the lift station to serve the entire tributary area using build-out densities that conform to the City's latest General Plan.
4. The lift station must be capable of operating within the POR at all flows between the firm-capacity and one quarter of the firm-capacity.
5. The ratio of minimum net positive suction head available (NPSHa) to net positive suction head required at BEP (NPSHr) must be 2.0 or greater.
6. Pump station design calculations shall address surge and "waterhammer," and, if required, surge control shall be provided.
7. Unless waived by the City Engineer, a hydrogen sulfide study will be required. Corrosion control and odor control may be required based on the results of the hydrogen sulfide study.

### **C. Pumps and Motors**

1. All pumps shall be designed to handle solids, and must be capable of passing a minimum 3-inch diameter sphere.
2. All pumps shall be identical.
3. All pumps shall be fitted with 460 VAC, 3-phase, premium-efficiency, inverter-duty motors except as approved by the City Engineer.
4. Brake horsepower shall not exceed the nominal rating of the motor between shutoff and the maximum flow shown on the manufacturers' published performance curves.
5. The service factor for all motors shall be 1.15.
6. Provide thermal overload protection for all pump motors.
7. Provide a spare mechanical seal and other spare parts as recommended by the pump manufacturer.

### **D. Wet Well**

1. Working capacity of the wet well is defined as the volume between the maximum and minimum normal operating levels.
2. Wet well shall have enough working capacity to prevent any pump from starting more than four times per hour.

3. Wet wells shall be designed in accordance with Hydraulic Institute Standard No. 9.8 (Pump Intake Design), except as noted otherwise in this standard.
4. Set the high-level alarm at the invert elevation of the nearest upstream manhole. Provide a minimum clearance of 6-inches between the maximum normal operating level and the high-level alarm.
5. Set the low-level alarm at least one foot above the motor (for submersible pumps), and at least three feet above the suction bell. Provide a minimum clearance of 6-inches between the minimum normal operating level and the low-level alarm.
6. Design the wet well to counteract the effects of buoyancy due to high groundwater conditions. The groundwater elevation used for design shall be determined by a licensed geotechnical engineer. Ground surface may be used as groundwater level in lieu of a Geotechnical Report.
7. Wet well shall be constructed using reinforced concrete. Concrete mix design shall be suitable to resist damage from sulfides.
8. Wet wells shall be lined with GSE 5 mm HDPE studliner.
9. Penetrations into the wet well shall resist infiltration and exfiltration, and conform to City Standard 533.

#### E. Piping and Valves

1. Provide a control gate or plug valve on the wet well inlet to permit isolation of the wet well.
2. Provide a plug valve and rubber-flapper style check valve on the discharge of each pump. Plug valves shall be non-lubricated neoprene faced eccentric. Check valves shall be installed in the horizontal plane.
3. Buried pressure piping shall be AWWA C151 ductile iron or C900/C905 PVC with AWWA C110 mechanical joint fittings.
4. Provide mechanical joint restraint at all fittings and pipe joints. Thrust blocks are permitted only if mechanical joint restraint is not feasible.
5. Design pressure piping to maintain velocities between 2 ft/s and 8 ft/s.
6. Design gravity piping in accordance with the City's standard for sewer construction.
7. Provide a connection to the forcemain to permit bypass pumping. Coordinate sizing and connection details with City staff.
8. Provide restrained flanged coupling adapters to permit removal of all valves, meters, and other mechanical equipment connected to the piping.
9. City Engineer will determine if swabbing or pigging facilities are required at the lift station. If so, all downstream piping and related equipment shall be designed to accommodate this appurtenance. Launching facility will be detailed on lift station plans and must accommodate using lift station pumps for propulsion. Provide all necessary valving. Contact Engineering for suggested design requirements.

#### F. Electrical Equipment

1. Install all major electrical equipment including utility meter and main circuit breaker enclosures, panelboards, control panels, and motor control centers outside of hazardous areas as defined in the National Electric Code, Article 500.
2. Provide utility meter and main circuit breaker in an overall 316 stainless steel enclosure rated NEMA 4X with a viewing window centered on the utility meter.
3. Provide NEMA 3RX, 316 stainless steel enclosures for electrical equipment and control devices where ventilation or air conditioning of the devices is required. Provide NEMA 4X, 316 stainless steel enclosures for all other equipment and devices.
4. Provide OSHA approved rubber mat in front of all indoor control panels.
5. Provide industrial fluorescent strip fixtures in the building interior.
6. Provide an exterior light in accordance with STD #601. Provide 12-inch diameter pole-mounted luminaires at 120V, 70W HPS.
7. Provide a 6-pulse variable-speed drive for each pump. Manufacturer: Allen Bradley, or equal.

G. Instrumentation and Controls

1. Provide a magnetic flowtube (Rosemount Model No. 8705) on the lift station discharge. Connect flowtube to remotely mounted transmitter (Rosemount Model No. 8712) using manufacturer's cable.
2. Provide guided-wave radar or ultrasonic level transmitter for continuous level monitoring in the wet well.
3. Provide discrete level float switches for high-high level and low-low wet well level alarms.
4. Provide a programmable logic controller (PLC) and human-machine interface (HMI) for monitoring all instrumentation signals, alarm conditions, and pump control. Provide a minimum of 20% spare I/O capacity. Manufacturer and model shall be approved by the City Engineer.
5. Develop Wonderware screens for the Central SCADA computer, located at the Public Works office. Coordinate screen development with City staff.
6. Use a proportional-integral-derivative (PID) control loop to maintain a user-specified setpoint level in the wet well. The process variable will be the level transmitter output; the control variable will be the pump speed signal that is transmitted to the variable-frequency drives.

H. Telemetry

1. Control Panels

All control panels will have the following general features.

- a. Panel design will incorporate the following features:
  - 1) Provide a lamp with switch.
  - 2) Provide a 120 VAC duplex convenience outlet.
  - 3) Provide 120 VAC uninterruptible power supply (UPS) or an equivalent DC voltage subsystem sized for 150% of



peak load for all internal panel components for a minimum of 30 minutes run time.

- 4) Provide an 800MHz-band spread-spectrum radio to interface with the City's SCADA system. Perform radio signal strength study to verify antenna and signal transmission requirements.
- 5) Provide a dial-up telephone line and an automatic alarm dialer to annunciate critical alarms. Provide a wall mounted telephone using the same dial-up line for operator convenience.

#### I. Standby Generator

1. At the discretion of the City Engineer, a standby generator may be required. The following minimum requirements for the standby generator are as provided herein.
2. Provide permanently installed, diesel-fueled generator with an automatic transfer switch, The generator's engine must meet the Bay Area Air Quality Management District (BAAQMD) emission standards. Provide Crouse Hinds E0400-1686 Posi-lok load bank receptacles to test generator for load bank connection.
3. Generator sizing calculations will assume loading based on lead pump running, lag pump starting and full operation of all electrical equipment at the site.
4. Obtain Fire Department approval for fuel tank.
5. Provide instrumentation:
  - a. Generator voltage, frequency, and amp meters.
  - b. Oil pressure gauge.
  - c. Battery volt meter.
  - d. Water temperature gauge.
  - e. Hour meter.
  - f. External battery with trickle charge.
  - g. Dry contacts for telemetry - showing generator running.
6. Provide automatic shut-off and alarms:
  - a. Low engine oil pressure.
  - b. High engine temperature.
  - c. Over speed.
  - d. Over crank.
7. Provide sound attenuation as necessary to meet or exceed City noise standards for location. Attenuation may include silencers and/or insulation.

#### J. Details Required on Improvement Plans

1. Site Plan: Locations of power pole, transfer switch, emergency generator, grounding electrode, control panel, wet well, driveway, fencing, water service, emergency suction/discharge boxes. Provide site grading and drainage details.

2. Wet well: Influent piping (standard inside drop manhole); suction piping (min. 6 inches off bottom of manhole); emergency suction line; water/alarm levels (pump on, pump off, low level, high level), redundant high water float switch.
3. Force main discharge details.

K. Record Drawings and Manuals

1. Provide three (3) copies of approved record drawings and electronic scan of the drawings in \*.TIF or \*.PDF format with a minimum 200 dpi resolution, and an electronic copy in AutoCAD latest version.
2. Provide three (3) copies of O&M Manuals plus an electronic copy when available.

L. Building Structure

1. Pump station buildings shall be constructed of split-face concrete masonry unit (CMU) with standing-seam metal roofing.

**XXI. LIFT STATIONS (2-INCH FORCE MAINS)**

A. System Description

Provide packaged sewer lift station system, shop assembled with basin, submersible, non-clog grinder pumps and single automatic control for in ground installation. Provide duplex system (one operating pump and one installed spare pump).

B. General Requirements

1. Plans and specifications for lift stations shall be prepared by a California registered professional engineer and submitted to the City for review and approval.
2. Materials shall be corrosion resistant and rated for sewage service. Metal exposed to sewage environment must be stainless steel.
3. Manufacturer: Company specializing in manufacturing of packaged lift stations with minimum three years experience.
4. Environmental: Comply with State of California, Department of Public Health Water Main Separation Criteria (Title 22).
5. Provide and install an approved reduced pressure (RP) backflow assembly for potable water service line to lot in conformance with STD-876.

C. Hydraulics

1. Firm-capacity for the lift station is defined as the pumping capacity for the facility with the largest pump out of service.
2. Design the lift station to serve the lot at the maximum planned occupancy.
3. Design Conditions:
  - a. Minimum force main velocity: 2 fps
  - b. Maximum force main velocity: 8 fps
  - c. Minimum inlet pipe slope: 2%

D. Product Requirements

1. General

- a. Packaged sewer lift station must have a cartridge type, easily removable core assembly containing: pump, motor, grinder, motor controls, check valve, anti-siphon valve, electrical quick disconnect and wiring. Provide lifting hooks, mechanical and electrical disconnects with easy disconnect accessibility.
- b. Packaged sewer lift station must be maintainable without entry. Entrance is not permitted without appropriate OSHA confined space permits.
- c. Packaged sewer lift station shall be free from electrical and fire hazards.
- d. Packaged sewer lift station shall be free from noise, odor or health hazards and shall have been tested by an independent laboratory to certify its capability to perform in sewer system applications. Provide NSF International seal on product as evidence of compliance.

2. Pump

- a. Provide identical, submersible, non-clog grinder pumps with stainless steel impellers, shredding rings, cutters, shafts and hardware.
- b. Pump capable of delivering negative total dynamic head without overloading the motor(s). Use of in-line piping or valves to create false apparent head is not permitted.

3. Motor

- a. 120/240V, 60Hz, single phase, 1800rpm max, non-overloading.
- b. Service factor: 1.15
- c. Provide thermal overload protection.

4. Basin

- a. Working capacity of the basin is defined as the volume between the maximum and minimum normal operating levels.
- b. Basin shall have enough working capacity to prevent pumps from starting more than four times per hour.
- c. Basin shall have capacity for emergency storage to accommodate a 1-day (24-hour) lift station outage during maximum day demand.
- d. Design basin to counteract the effects of buoyancy due to high groundwater conditions. The groundwater elevation used for design shall be determined by a licensed geotechnical engineer. Ground Surface may be used as groundwater level in lieu of a Geotechnical Report.
- e. Basin shall be suitable to prevent damage from sulfides and use custom molded HDPE or fiberglass reinforced polyester resin.
- f. Penetrations into the basin shall resist infiltration and exfiltration.
- g. Basin shall be dual contained with a smooth internal wall to promote scouring.

- h. Basin seams shall be thermally welded, factory tested and leak-proof.
  - i. Basin shall be sufficient to withstand saturated soil loads at maximum burial depth.
  - j. Basin Cover must be lockable and sufficient to withstand live load of 150 psf minimum. If basin cover potentially accessible to vehicular traffic, provide HS20 rated cover.
  - k. Basin shall have integral bug-free vent, an inlet piping connection and a discharge piping connection
5. Packaged Lift Station Piping and Valves
- a. Provide stainless steel discharge piping and hardware.
  - b. Provide non-clog check valve.
  - c. Provide anti-siphon valve.
  - d. Provide full port, stainless steel isolation valve.
6. Site Piping and Valves
- a. Force main piping: HDPE (SDR 11) or PVC (Schedule 80) with a minimum depth of cover of 3 feet.
  - b. Provide plug-style isolation valves for buried service with corrosion resistant valve stem extension, riser and cover plate labeled “sewer” for basin inlet and force main to permit isolation of the basin.
  - c. Provide non-clog check valve immediately upstream of force main plug valve.
  - d. Connect to inlet and force main piping to basin with flexible connector.
  - e. Valves and appurtenances shall use either of the following bolts and nuts:
    - 1) Fluoropolymer coated carbon steel: bolts (ASTM A307, Gr. B) and nuts (ASTM A563, Gr. A)
    - 2) 304 stainless steel: bolts (ASTM A193 Gr. B8M) and nuts (ASTM A194 Gr. 8).
  - f. Refer to STD-515 for force main discharge.
7. Operations
- a. Level control: non-fouling level detection with no moving parts in direct contact with wastewater.
  - b. Level control points: “pump on,” “pump off,” and “high level” in basin. Start pump automatically when “pump on” setpoint is activated. Stop pump automatically when “pump off” setpoint is activated. Signal alarm condition automatically when “high level” setpoint is activated.
  - c. “High level” alarm shall be visual and audible.
    - 1) Audible alarm to be silenced with externally mounted push-button.

- 2) Visual alarm to remain illuminated until sewage level drops below the “pump off” setting. Mount visual alarm in top of enclosure. Maintain NEMA 4X rating.
    - d. Sound, Vibration, and Thermal Control: Dampen or suppress noise, absorb vibration, accommodate thermal expansion and stresses, and adjust or correct for misalignment in piping systems.
  - 8. Electrical
    - a. Power/Alarm cable:
      - 1) Provide NEMA 6P quick disconnect.
      - 2) Provide cable shroud and strain relief cord connector.
      - 3) Provide cable for direct burial use.
    - b. Back-up power: As an alternate to providing emergency storage within the basin, provide back-up power source to ensure continuous operations in the event of a power outage.
    - c. Alarm/Disconnect Panel
      - 1) Corrosion resistant NEMA 4X rating
      - 2) UL listed.
    - d. Wiring: in accordance with requirements of National Electrical Code.
- E. Installation Requirements
  - 1. Install per manufacturer’s standard printed instructions.
  - 2. Seal cover penetrations with manufacturer’s recommended sealant.
  - 3. Set cover frames and covers level without tipping, to correct elevations.
  - 4. Provide Basin anchorage.
- F. Startup, Initial Testing and Operations
  - 1. Notify City Public Works Department three days prior to testing. Coordinate and operate pumps in conjunction with City.
  - 2. Provide startup and initial testing of system. City must be present to observe testing (including retests).
  - 3. Hydraulically test station to performance requirements by receiving, pumping and discharging 500 gallons of water to/from basin.
  - 4. Correct failures during test by repairing or replacing malfunctioning parts or equipment or faulty workmanship.
  - 5. After correcting failures, re-test until failures are eliminated.
  - 6. Confirm general sequencing of pump and level control operations at basin and control panel are in accordance with performance requirements.
  - 7. Document and certify lift station system startup and initial testing results in startup report. Submit startup report to City for review and permitting approval. Do not operate lift station without a City approved permit.
- G. Protection of Finished Work: Do not allow access to general public. Provide secure, lockable access.
- H. Details Required on Improvement Plans

1. Site plan: Location of packaged sewer lift station, driveway, fencing, water services within 120 ft. Provide site grading and drainage.
  2. Basin inlet piping and force main discharge details.
- I. Record Drawings
1. Provide three (3) copies of approved record drawings and electronic scan of the drawings in \*.TIF or \*.PDF format with a minimum 200 dpi resolution and an electronic copy in AutoCAD latest version.

**Appendix A**  
**Non-Residential Sewer Flow Rates**

<b>Assumed Sewer Generation for Non-Residential Uses</b>		
	<b>Flow (gpd)</b>	<b>Unit</b>
Assembly Hall	5	seat
Auditorium, Halls, Lodges	120	1000 GSF
Auto Dealership	100	1000 GSF
Bakery	300	1000 GSF
Bar	20	seat
Bowling Alley	200	alley
Cafeteria	66	seat
Car wash self serve	280	stall
Commercial (other)	100	1000 GSF
Commercial (service)	150	1000 GSF
Dry Cleaners	300	1000 GSF
Garages	100	Bay
Grocery	240	1000 GSF
Gyms/Health Clubs	240	1000 GSF
Hotel	125	Room
Laundromat	280	washer
Motel	125	Room
Offices	110	1000 GSF
Offices: Medical, Dental, Massage	160	1000 GSF
Places of Worship	80	1000 GSF
Restaurant	66	seat
Restaurant take out	570	1000 GSF
Retail Area	112	1000 GSF
Service Stations	40	pump
Schools	14	student
Theater	5	seat
Warehouse	40	1000 GSF

## Appendix B Peaking Factor Rates

