

# **CITY OF LAKEWOOD WATER AND SEWER RULES AND REGULATIONS**



**Lakewood**

Engineering Division  
Department of Public Works  
City of Lakewood, Colorado

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## **CHAPTER 1            REVENUE AND FINANCE**

### **Part 1 BUDGET**

101.1. Budget. The City Council shall annually adopt a budget for the Water and Sewer Funds for the ensuing year.

### **Part 2 RATES, CHARGES, AND FEES**

102.1. Water and Sewer Rates and Charges. The City Council shall establish standards of service and by resolution shall fix rates for water and sewer service. Rates shall be sufficient to pay for the operation, maintenance, reserves, debt service, additions, betterments, including those reasonably required for anticipated growth, and to provide for the general welfare. The rates shall also be sufficient to provide for the accumulation of reserves for improvements and obligations of such magnitude that they cannot be acquired from the surplus revenues in a single year. Rates and connection charges may vary according to demand, quality and volume, but shall be uniformly applied to the end that all persons receiving like services shall pay the same rates and connection charges except that a rate differential may occur to meet obligations which relate to a specific group of customers or properties. The City Council shall establish fees for the extension of service to properties not then being served by the City.

102.2. Rates for Service. Rates for water and sewer services will be established in accordance with Parts 3 and 4 of this chapter.

102.3. Charges for Extensions. The cost of extensions to the City's water distribution or sanitary sewer collection system will be borne by the applicant receiving the benefit. Included are the costs of design, inspection, construction, and other associated costs.

102.4. Requirement for Meters. Meters will be required and water and sewer service provided under the following conditions:

(a) All connected water services will be metered by the installation of water meters provided by the City in accordance with City price schedules. Each meter will be the same size as the connection to the City main unless the City determines otherwise.

(b) Each building will be metered individually. In addition, buildings with multiple owners or tenants shall have a separate meter for each owner or tenant. The City may waive this requirement if it can be shown that billing for all owner will be paid by a single entity in perpetuity.

(c) The first and original meter pit, appurtenance facilities and piping will be purchased by the owner and become a part of the property served. This meter will be used to measure water use during construction, and subsequently the water delivered to the owner.

(d) The City may remove or exchange the meter for purposes of testing and servicing.

(e) The cost of meter pit repair and repair of all appurtenance facilities and piping shall be the responsibility of the owner.

(f) The cost of normal servicing, repairing, and replacement of water meters will be paid by the City. The cost of repairs resulting from abuse, freezing, hot water, or other causes will be paid by the owner.

(g) Water meters should not be installed in driveways, sidewalks, or parking lots. If there is no alternative location, then heavy duty recessed meter pit rings and lids will be used as specified in City engineering specifications. All costs associated with relocating or upgrading existing meter pits to heavy duty shall be at the owner's expense.

(h) The City in accordance with industry standards shall determine the meter flow accuracy limits.

(i) It is unlawful for any person to interfere with or remove a water meter from any service connection without first obtaining written approval from the City. Whenever any meter is removed with such approval, the meter will be immediately returned to the City. In the event that a meter is missing from a location where a meter had previously been installed, the owner of the premises shall be required to install a new meter and pay all costs for such installation.

(j) Water service lines to buildings for fire protection will be fitted with a detector check system. The owner will furnish engineering calculations to the City substantiating the fire flow requirements for sizing the tap and service line. The tap fee will be based on the domestic flow requirement and not the fire flow requirement.

(k) Should the City perform any work or incur any expense for the installation, removal, replacement, servicing, relocation, or maintenance of a water meter and any such work expense is deemed the responsibility of the owner, the City is authorized to recover the actual cost of such work or expense.

(l) Meter Reading. The amount shown on the meter shall be presumed to be the amount consumed by the owner unless the meter can be shown to be reading inaccurately.

(m) Sewage Meters. When it is essential for purposes of establishing sewage collection and treatment charges to commercial or industrial owner, the City may require installation of a flow meter and/or sampler. The meter/sampler shall show all contributions to the sewage system from the metered property.

(n) It is the responsibility of the owner of property served by a water or sewer meter to provide the City with access to such meter. The City's duly authorized representatives will at all reasonable times have access to the customer's premises for the purpose of reading utility meters, for the purpose of inspection and repair of meters or the utility system or any part thereof, and for the purpose of connecting and disconnecting service. If the meter becomes obstructed by bushes or other material or if the owner of the property has otherwise failed to provide access to the meter within 14 days following written notification of the access problem from the City to the owner of the property, sent by certified mail; water service, if provided by the City, may be discontinued. The City may also cause such obstructions to be removed and levy the charge against the property owner. If the City provides water service, service will not be restored until access is provided to the meter and until the owner has paid the cost of disconnection and reconnection.

102.5. Fees. All tap, permit, inspection and other fees must be paid in advance of the service performed unless alternate payment arrangements are approved by the City.

102.6. Charges Applicable while Service Connected. In addition to usage charges, a fixed water and/or sewer charge will be made to all properties so long as the service lines to such properties are intact and available for service, regardless of the extent of occupancy or use of such property. The City, upon request of the owner and provided the property is not occupied, may inactivate water service when the turn-off fee is paid; however, the fixed service charge will continue.

102.7. Turn-On-/Turn-Off Fees. Fees for turning on and turning off water service shall be sufficient to compensate the City for actual cost and may be charged whether done at the request of the owner or in enforcement of these rules and regulations.

102.8. Fees for Other Services. The City may establish fees for other services provided that are not covered in these Rules and Regulations. All fees so established will be sufficient to reimburse the City for the actual cost of the services.

102.9. Billing Procedure. Rates, charges, and fees shall accrue for water and/or sewer service as either or both are utilized. Billings shall be prepared, issued, and become due and delinquent in accordance with the following:

- (a) Water and sewer service due when billed, delinquent if unpaid after 30 days.
- (b) Extension of services due and payable with application.

- (c) Meters and appurtenances due and payable with application.
- (d) Turn-on, turn off charge is due when levied, delinquent if unpaid after 30 days.
- (e) Charges for other services due and payable when charge is levied, delinquent if unpaid after 30 days.
- (f) Permit to tap and inspections due and payable with application.
- (g) Late charges due and payable as billed.
- (h) Fixed service charges shall begin upon final inspection and acceptance of a water or sewer tap by the City.

102.10. Responsibility for Payment. Owners of property receiving water or sewer service shall be responsible for payment of all rates, charges, and fees. The fact that the person receiving the service may not be identified on the billing by name shall not in any manner make the charge uncollectable or change the condition that the service is at the request of the property owner. As a convenience, billings to the owner may be made against tenants, lessee, or other non-owners when the property owner submits a request to the City. Whenever the term "owner" is used in the rules and regulations in reference to cost responsibility, the final cost responsibility shall accrue to the property owner.

102.11. Past Due Accounts. All money due the City for water or sewer service shall be due and payable on billing. If unpaid after 30 days from the billing date, the account will be considered past due.

(a) Special Billing. Accounts, which remain unpaid 30 days from date of billing, will be subject to a notice and special billing at 30-day intervals until collected.

(b) Collection Costs. Past due accounts will be assessed for the cost of special billing and collection. A fee for each special billing will be assessed in an amount sufficient to compensate the City for its expenses. If a past due account is turned over to an attorney for collection, attorney's fees will be assessed in addition to accumulated charges. If an account is turned over to the county treasurer for collection, the treasurer's cost of collection will also be assessed. All costs of collection through the courts will also be assessed.

(c) Order of Payment. Money received from a customer will be applied first to the payment of special billing and collection costs; thereafter, the surplus shall be applied to payment of the sewer service; and thereafter the surplus shall be applied to payment of the water bill, if such exists.

(d) Enforcement of Charges, Discontinuance of Water Service. In addition to other means provided by law, the City may enforce the payment of any charges by discontinuing water service to the premises at which the charge arose without regard to the ownership or occupancy of such premises. Payment in advance or a security deposit may be required by the City to ensure prompt payment of amounts due for water or sewer service. Any discontinuance of water service shall occur only after notice has been provided to the customer and an opportunity for a hearing with the Director of Finance or his/her designee has been provided in accordance with this chapter.

(e) Waiving of Fees. All or a portion of the fee for turn-on, special billings, or costs of collection may be waived for good cause or other mitigating circumstances. Such waiver may be made only by the Director of Finance or his/her designee.

(f) Interest. Past due accounts will bear interest at 1.5% per month.

102.12. Enforcement of Charges. Collection of past due accounts may be done by any lawful method, including but not limited to the following:

(a) Liens. Charges for all water or sewer services or other services rendered shall be a charge upon the property to which service is delivered until paid. Connection of service shall be declaration by the owner of responsibility for payment of such charges, and billings of such service to other than the owner shall not release the owner from responsibility for such charges. The City will not release its charge upon the property upon change of ownership, until all past due accounts are paid or guarantee of payment made.

(b) Mechanics Liens. The City may file past due accounts as a lien on the property for collection and foreclosure as provided by the mechanics lien laws of Colorado. Such lien will not be released by the City until the account and all charges have been paid in full.

(c) Certified with Taxes. Past due charges for water or sewer services may be certified to the county commissioners and the county treasurer as part of the ad valorem taxes on such property. The county treasurer may sell the property to satisfy payment of the charges. The lien of the City will not be released until all past due charges are paid in full.

(d) Bankruptcy. In the event of the bankruptcy, insolvency, or receivership of the owner of property receiving service, the amounts due the City will be certified as a claim secured by the property receiving service.

(e) Collection through Court. The City may direct that the past due accounts be turned over to an attorney for collection by any lawful process. The City may incur attorney's fees to be assessed to the customer as part of the cost of collection. An amount ordered by judgment may be recorded as a lien against the property and the property foreclosed to satisfy the judgment.

102.13. Review. Frequent adjustment of rates, charges, and fees is undesirable and should not be made more often than necessary. Consequently, rates, charges, and fees will be forecast to the extent possible to adjust costs and provide proper fiscal management. In the event an adjustment is made in the wholesale price of water or sewerage treatment, the wholesale portion of the price increase may be added to sewer or water rates by passage of a resolution as soon as reasonably possible after such wholesale price increase. All customers will be advised of the adjustment as soon as it is in effect and the adjustment will be applied to all service during the billing cycle in which the adjustment takes effect.

102.14. Adjustment of Billings. When it is called to the City's attention that the amount of a bill may be in error, charges will be reviewed. If it is determined that an error exists an adjustment will be made. If an error results in money due the City, the amount due will be reflected on the next regular bill. Should an error result in a refund, the amount will be credited to the customer's account or if requested, a refund payment will be made.

If the billing discrepancy is due to property owner or customer neglect or abuse of a water meter or any other device used to determine charges, the City will determine the charges to be made.

102.15. Payment of Account. If payment to the City is made on a non-existent account, with insufficient funds or other dishonored instrument the following will apply:

(a) If payment is for an account, which is not otherwise considered to be a delinquent account, the owner will be requested to make the payment good.

(b) If the payment is for an account which is otherwise considered delinquent, the owner will be notified and allowed one normal working day to make payment by cash, cashiers check, certified funds, or money order, or the delinquency will be treated as provided by that portion of these rules and regulations pertaining to delinquent accounts.

### **Part 3 WATER RATES**

102.1. Owner Classes. All water owners shall be placed into one or more owner classes so that the costs of operating and maintaining the water system are fairly apportioned to each class of owner.

103.2. Billing Cycle. Billings for water and/or sewer service may be on a monthly, bimonthly or quarterly basis as determined most practical by the City. More frequent readings and billings may be requested and the cost charged to the owner.



103.3. Water Rates. The water rate is composed of two cost elements; a fixed service charge and a water usage charge for each whole 1,000 gallons used since the previous reading. The cost elements considered in developing rates may from time to time be adjusted or consolidated to reflect appropriate cost accounting practices.

(a) Fixed Service Charge. A charge which varies by meter size shall be established for all owners of the water system, regardless of water usage. The fixed service charge shall reflect the costs of administration, meter reading, billing, accounting, and meter maintenance.

(b) Water Usage Charge. In addition to the fixed service charge a uniform rate of charge shall be established for each 1,000 gallons of water consumed.

103.4. Determination of Charges. The water bill for each customer will be calculated as follows:

(a) Fixed Service Charge. The fixed service charge will be the indicated charge for an owner based on meter size and billing frequency. The fixed service charge is also the minimum billing.

(b) Water Usage Charge. The water consumed will be determined from meter readings and a charge calculated using the established rate for each 1,000 gallons and the number of 1,000 gallon units in excess of the 1,000 gallon units shown on the previous reading.

(c) Total Water Bill. The total charges for water service will consist of the fixed service charge, water usage charge, and all other charges or fees then due the City.

(d) Partial Billing Period. Upon change of ownership or responsibility for payment, or when requested, the City will make final meter readings, and submit a bill to the responsible party. The bill will include the pro rata fixed service fee and the full charge for water consumption since the previous billing date.

103.5. Water Rates for Other Uses. The City will, by permit, make water available for construction, fire sprinkler, fire hydrants and other miscellaneous uses at rates sufficient to compensate for the actual cost of use. The conditions of service will be set forth at the time the permit is issued.

#### **Part 4 SEWER RATES**

104.1. Owner Classes. All sewer owners shall be placed into one or more classes of owners so that the costs of operating and maintaining the sewer system are fairly apportioned to each class of owner.

104.2. Billing Cycle. To the extent practical, billing for sewer services shall be combined with billing for water service. Billings for water and/or sewer service may be on a monthly, bimonthly or quarterly basis as determined most practical by the City. The City may contract with other agencies providing water service to submit to owners a combined water usage and sewer service billing.

104.3. Fixed Sewer Use Charge and Volume Charge. The total owner charge is composed of two cost elements; a fixed sewer charge and a wastewater volume charge for each 1,000 gallons of measured or estimated wastewater volume. The cost elements considered in developing rates may from time to time be adjusted or consolidated to reflect appropriate cost accounting practices.

(a) Fixed Sewer Charge. A fixed sewer charge, which varies by water meter size, shall be established for all owners of the sewer system, regardless of wastewater volume contributed. The fixed service charge reflects the costs of administration, billing, accounting, and customer related infiltration/inflow.

(b) Wastewater Volume Charge. A uniform rate of charge shall be established for each 1,000 gallons of normal domestic strength wastewater contributed to the sewerage system.

104.4. Commercial - Industrial. Owner costs for major commercial and industrial owners may be determined on an individual basis taking into consideration the impact the wastes and wastewater have on the collection system and wastewater treatment charges. When the costs of providing wastewater collection and treatment are not recovered in an equitable manner by the use of standard charges, actual costs may be determined on an individual basis or applied to all owners similarly situated. The costs may be based on equivalent household fixture units, seating capacity, number of meals served, flow, biological oxygen demand (BOD), chemical oxygen demand (COD), total Kjeldahl nitrogen, suspended solids (SS), grease, wastewater constituents, or any other reliable basis.

104.5. Experience Rating. All owners of sewer service who are provided water through a meter will have calculated or assigned an annual experience rating which will reflect the approximate volume of wastewater which is discharged into the sewer system.

(a) Water Usage History Available. The experience rating will be determined as the average of all water used during selected months in which substantially all water used will normally be discharged into the sewer system.

(b) Water Usage History Not Available. Owners who have not established an experience rating will be temporarily assigned a rating that will be based on the average of experience ratings of similar owners. When information is available to determine an experience rating, previous sewage service charges will be evaluated and if appropriate, billing adjustments initiated.

(c) Exceptions. When appropriate due to non-typical circumstances, the calculated experience rating may be adjusted on an individual basis. Either the City may initiate the establishment of such experience rating or the owner based upon information sufficient to determine accurately the amount of wastewater contributed to the sewer system.

104.6. Pretreatment. When directed by the City owners shall, through the use of owner installed owned and maintained pretreatment facilities, reduce strengths and constituents to levels determined by the Metro Wastewater Reclamation District (Metro). Pretreatment facilities are subject to the provisions of these rules and regulations and the rules and regulations of Metro.

104.7. Other Charges. Other charges may include such items as fees for collecting past due accounts, turn-on, turnoff, repair and maintenance of owner owned equipment, or other non-typical contributions such as swimming pools. Charges for services outlined will be sufficient to compensate the City for providing the services.

## **Part 5 ENFORCEMENT OF WATER RESTRICTIONS AND SPECIAL PERMITS**

105.1. General: It is a contract obligation of the City to enforce the curtailment of water usage when deemed necessary by the Denver Water Board.

105.2. Plan for Restriction: The City will review the Denver Water Board restriction program and as appropriate will adopt rules regarding restriction of water usage. The City reserves the right to adopt an alternate plan to meet the general needs of the City, while at the same time retaining the scopes, purpose and intent of a program for reduction in water usage. Should a customer fail to comply with the water restriction program the City may curtail water service.

105.3. Special Permits: The City may issue special permits for water usage in excess of the Denver Water Board's restriction program consistent with the program of the Denver Water Board. In order to compensate the City for providing this service, a charge will be levied for each permit issued.

## **Part 6 ADMINISTRATIVE APPEALS**

106.1. Prior to the City discontinuing water service for failure of a customer to abide by City ordinances or rules and regulations, notice shall be sent to the customer informing him that water service will be discontinued if the customer does not come into compliance with the ordinances and/or rules and regulations within fourteen (14) days of mailing of said notice.

106.2. Said notice shall be sent to the customer's billing address and shall contain an itemization of the specific violations of the ordinances and/or rules and regulations which the customer has violated. Said notice shall further describe the customer's right to appeal.

106.3. Any person may appeal to the Director of Finance. Any person who wishes to appeal after receiving notice that his water service may be discontinued must file an appeal within fourteen (14) days of receipt of the notice to discontinue service. Said appeal shall be filed with the Director of Finance in written form.

106.4. The Director of Finance shall schedule a hearing date within ten (10) days of receipt of the notice of the appeal. At the hearing, the Director or his/her designee shall hear all relevant evidence and testimony presented by the appellant or his spokesperson and any other relevant evidence necessary to decide the appeal. The hearing will be informal in nature and will be recorded. The Director or his/her designee shall render a decision within ten (10) days of the hearing.

106.5. The decision of the Director or his/her designee shall be sent by certified mail, return receipt requested, to the appellant. Any appeal from said decision shall be to Jefferson County District Court.

## **CHAPTER 2                    EXTENSION OF SERVICES AND NEW SERVICE**

### **Part 1 COSTS OF EXTENSIONS**

201.1. Policy. It is the policy of the City to allow for extensions of the water distribution system and sanitary sewer collection system as necessary to provide for required expansion of service.

201.2. Cost of Extension. The cost of extensions to the City water distribution or sanitary sewage collection system will normally be borne totally by the applicant. The City may make a determination that cost sharing by the City is appropriate.

201.3. Oversizing. In those cases where it is desirable to oversize or install other system improvements, which exceed the owner's responsibilities, the City may participate in the costs of oversizing and improvements. Conditions, circumstances, and extent of City participation shall be determined when considering the application. The City may also authorize a partial or complete rebate program as described in this chapter.

201.4. Application. Prior to initiating design for system expansion, the owner will make application for system extension. The application will outline the proposed area of service, proposed facilities to meet anticipated demands, and compatibility with surrounding areas and service. The City Engineer will review the application to determine whether it meets proper criteria.

201.5. Curtailement of System Expansion. The City may curtail extensions for the following reasons:

(a) City facilities are not capable of accommodating the proposed extension. Curtailement of this nature will be for the time necessary to acquire funding and develop and install adequate capability.

(b) When the expansion of service area is restricted by agencies from which the City receives treated water or wastewater treatment service.

## **Part 2 ENGINEERING DESIGN**

202.1. Design. The applicant will have a Professional Engineer licensed in Colorado perform and seal an engineering design for facilities required to provide the additional service. Design will take into consideration the applicant's area plus adjacent areas that would in the future area served by the system extension.

(a) Coordination. During preliminary design the applicant's engineer will coordinate with the City Engineer so that the proposed extension will be compatible with existing systems and an integrated water or sanitary sewer system.

(b) Oversizing. If the City Engineer determines that oversizing of facilities is needed, the oversizing will be incorporated into the final design.

(c) Standards, Rules and Regulations. All designs for extending the City's system will be in accordance with City approved Water and Sewer Rules and Regulations, which are a part of Lakewood Engineering Regulations, Construction Specifications and Design Standards. The proposed design must also meet requirements of water supply and wastewater treatment agencies serving the area.

In order to accommodate unusual circumstances unique to a specific location, the applicant's engineer may request specific modification from design standards. Requests must be accompanied by a report that details the manner in which a proposed alternative is compatible with the intent of City design standards.

202.2. Project Engineering by the City. Design of system expansions and improvements may be undertaken by the City for the applicant after suitable contracting arrangements have been made. When performing engineering for the applicant, the City will secure all necessary approvals, except for those which must be received by the applicant, prepare bid specifications and perform construction inspection. A fee will be paid by the applicant in an amount necessary to reimburse to the City all engineering, other direct and indirect costs, and administrative overhead expended in order to accomplish the work.

## **Part 3 CONSTRUCTION AND ACCEPTANCE**

203.1. Construction. All construction shall be done in conformance with the Engineering Regulations, Construction Specifications and Design Standards of the City or other standards which the City Engineer shall prescribe.

203.2. Acceptance. Acceptance of improvements will follow the procedures in Chapter 14.13 of the municipal code and other applicable City rules and regulations.

#### **Part 4 APPLICATION FOR NEW SERVICE**

204.1. Policy. It is the policy of the City to provide water and sanitary sewer service to all those who apply for service within the service area managed by the City.

204.2. Applications for Water and Sewer Service. The owner or his authorized representative must complete and file with the City an Application for Service and pay the appropriate fees and charges.

Upon receipt of a request for sewer or water service, the City will evaluate the capability of the system to accommodate the new demand. If there are no system deficiencies or other causes for curtailment, a "Certificate of Availability" will be approved and issued to the owner/applicant. Prior to issuance of a Plumbing Permit the owner/applicant will pay all charges and fees and will receive permission to attach to the City water or sewer system. In the event service is not available the owner/applicant will be advised why service is not available, and the conditions that must be satisfied in order to attach to the water or sewer system.

204.3. Limitation of New Water or Sewer Taps. In the event that the City is unable to authorize new taps onto its system by virtue of curtailments imposed by other agencies the following will be implemented:

(a) Applications for service will be considered on a first come, first serve basis with consideration given to prepaid taps, need and/or previous taps awarded to the owner/applicant. In order to be considered the owner/applicant must have first completed and filed with the City an Application for Service. The application will be noted as to date received. The date received will establish priority for service.

(b) The City will notify eligible applicants 30 days prior to the anticipated allocation date. No less than ten days prior to the allocation date the owner/applicant will deposit with the City funds sufficient to purchase taps of the number and size requested, calculated on the current schedule of rates, charges, and fees.

(c) If the denial of a tap results in a hardship, the owner/applicant may request that the particular situation receive additional review and consideration. Determinations made by the City are final.

(d) When the recipient of an approved tap is either unwilling or unable to utilize the tap in the time period allocated, the permit may be revoked and an award made to the next eligible applicant.

(e) In the event the owner/applicant does not obtain a tap from the supply agency, the deposit with the City shall be refunded.

(f) Applications with the City shall be recognized until the tap is secured or the application is withdrawn by the applicant. If the owner/applicant withdraws an application or does not purchase the tap when available, the application is deemed withdrawn.

204.4. Denial of Application for Service. The City can refuse to accept an Application for Service for the following reasons:

(a) City facilities are not capable of properly accommodating the proposed increase. Applications will be denied for the time necessary to acquire funding and develop and install adequate capability.

(b) When the application for service is restricted by agencies from which the City receives treated water or wastewater treatment services.

## **Part 5 LINE EXTENSION REBATE**

205.1. General. When it is necessary to extend the City water or sewer systems to provide service, the City will determine whether the extension is primarily for the benefit of a specific property or to the City system as a whole. When it is determined that the benefit is primarily to a specific property, the City will not share in the costs of such extension and such extensions will be paid for by the property owner receiving the benefit.

When an extension benefits property other than that owned by the applicant, the applicant is eligible for reimbursement of certain costs incurred when facilities are 1) constructed at the applicants expense, 2) accepted by the City and 3) have the capability of serving property owned by others than the applicant.

This rule is formulated solely for the purpose of providing for the recovery of line extension costs incurred by the original applicant and is not to be considered as limiting or committing to the availability of service.



205.2. Recovery of Costs. Recovery of costs will be based on the total number of equivalent taps that the extension may serve, including the applicant's. The number of taps and the recovery per tap will be determined by the City at the time the application to extend the system is approved. The total amount of recovery to which the applicant may be entitled shall not exceed the entire cost of design, construction and all other related costs, less that portion of the total cost attributable to the applicant's property. Recovery of costs under this rule shall not be made after seven years from the date service is first received. If at the end of the seven-year period there remains potential for recovery, the applicant may request an extension for an additional 3 years.

205.3. Records and Collection of Money. The City shall keep records for those extensions where cost recovery is provided. The City will notify and assess future applicants for the amount to be paid and forward funds to the original applicant. The assessment amount shall be adjusted by the difference in the ENR Construction Cost Index from the time of original construction to the time of assessment. In the event the City is unable after a reasonable search to locate the original applicant, the funds shall be returned to the payee.

205.4. Responsibility of the Original Applicant. It shall be the responsibility of the original applicant, heirs or assigns to inform the City as to the name and address of persons who should receive payment. Should this not be done, rights to make a claim for reimbursement are waived.

## CHAPTER 3 WATER AND SEWER SYSTEM CRITERIA AND STANDARDS

### Part 1 WORDS, PHRASES AND ABBREVIATIONS

301.1. General. Words, phrases and abbreviations used herein that are not defined below shall carry the meaning normally attributed to them in a technical and engineering capacity.

301.2. Definitions.

(a) Words & Phrases.

- (1) Average Daily Water Consumption. Average of the total amount of water consumed each day during a one-year period in the area being designed.
- (2) Average Daily Sewage Contribution. Average of the total amount of sewage contributed each day during a one-year period in the area being designed.
- (3) Cul-de-Sac. A dead-end local street with a special enlarged circular vehicular turn around at the closed end.
- (4) Lakewood. City of Lakewood.
- (5) Maximum Daily Consumption Rate. Rate of water used during the 24-hour day which is the maximum daily. This maximum daily consumption rate is also the average rate of consumption on the maximum day.
- (6) Peak Design Consumption Rate. The maximum rate of water consumption at the time of peak usage during the peak day or days when the maximum daily consumption occurs.
- (7) Peak Design Rate-Sewage Contribution. The maximum rate of sewage contribution at the time of peak flow during the peak day or days throughout the year when the flows are highest.
- (8) Sewage Contribution. Human wastes and wastewater conducted away from residences, public buildings, commercial buildings and industrial buildings. These wastes do not include storm waters.
- (9) Water Consumption. The amount of treated water used for domestic, public, commercial, industrial, irrigation and fire protection purposes.

(b) Abbreviations.

- (1) AWWA - American Water Works Association.
- (2) ASTM - American Society for Testing Materials.
- (3) CDPHE - Colorado of Public Health and Environment.
- (4) gpd - Gallons per day
- (5) gpm - Gallons per minute.
- (6) psi - Pounds per square inch.
- (7) WMFPD - West Metro Fire Protection District.

301.3. Modifications. The City Engineer may allow modification of these criteria and standards when necessary to accommodate site specific conditions and provided such modifications continue to provide water and sewer service conforming to the intent and purpose of these criteria and standards.

## **Part 2 WATER AND SEWAGE QUALITY STANDARDS**

302.1 Water Standard. It is intended that these standards and criteria will result in a water supply and distribution system that will deliver domestic water of a quality meeting or exceeding the applicable provisions of the Laws and Regulations applying to Potable Drinking Water Systems, Potable Water Distribution Systems and Disinfection of Public Water Supplies as promulgated by the CDPHE.

302.2. Sewage Standard. It is intended that these standards and criteria will result in a sewage collection and disposal system that will remove sewage from the area under consideration in a manner that meets or exceeds the applicable provisions of the Criteria Used in the Review of Waste Water Treatment Facilities as promulgated by the CDPHE.

**Part 3 ENGINEERING CRITERIA**

303.1. Land Use Criteria.

(a) Land Use Designation.

(1) Land use for design of new facilities will be based on the zoning classification as designated by Lakewood, modified to account for any foreseeable change in use that might take place within the next 10 years.

(b) Land Use Density. For residential zoning classification, population densities shown in Table 303.1-1 will be used as a basis for evaluation and design.

TABLE 303.1-1			
Zoning Classification	Units Per Gross Acre	Persons Per Unit	Persons Per Gross Acre
R1A	1	3.25	3.3
RR	1.5	3.25	4.9
1R	3.5	3.25	11.4
2R	7.3	3.25	23.7
3R	7.3	3.25	23.7
3RA	8.3	2.5	20.8
4R	11.9	2.5	29.8
4RA	17.9	2.0	35.8
5R	24.9	2.0	49.8
5RA	unlimited; see (c) below		
6R	18.0	2.5	45.0

(c) Other Residential. For uses or conditions not included or adequately covered by Table 303.1-1, a reasonable evaluation will be made for each use area using the specific land use proposed and the above tabulation as a guide to population densities.

(d) Office, Commercial, Industrial and Planned Development. For office, commercial, industrial or planned development classifications, the proposed land use will be the basis for

determining the water consumption and sewage contribution.

### 303.2 Water Usage Criteria.

(a) General. As set forth in this chapter, the water supply and distribution system shall provide each potential owner with a dependable supply of water, adequate in quantity for all domestic, sanitation, and fire protection needs, and a reasonable level of irrigation at pressures as uniform as local conditions and topography permit. Sample calculations are shown as guidelines only. The City Engineer shall approve all design assumptions.

(b) Design of New Facilities. For design of new facilities, all components shall have adequate capacity to serve total ultimate development in conformance with the existing or planned zoning classifications and increased densities that reasonably could take place in the following 25 years.

(c) Quantity. The water supply and distribution system shall be adequate to supply and maintain the maximum daily consumption rate plus the required fire flow rate simultaneously, or the peak design consumption rate, whichever is greater. The City Engineer may modify these standards based on 1) conditions unique to a site and 2) sound engineering principles.

(d) Pressures. Water lines shall be adequately sized, and storage and pumping facilities located, so as to provide water to the owner at a minimum pressure of 35 psi during peak usage periods. Except in unusual cases, a minimum static pressure of not less than 50 psi and a maximum static pressure not to exceed 100 psi shall be maintained. Pressures are measured at the street side of the building site.

303.3 Residential Water Consumption. Residential water consumption for any given area will be determined by using the projected population in accordance with Part 3 of these standards and an average per capita consumption of 75 gpd. This consumption does not include such items as irrigation and fire protection use.

303.4 Office, Commercial, Industrial and Planned Development Water Consumption. Projected average daily consumption shall be based on projections of water consumption in the planned facilities. When the facilities are not known, Table 303.4-1 will be used to determine the average daily consumption rate of water:

<b><u>Zoning Classification</u></b>	<b><u>Average Daily Consumption</u></b>
Office	* 4,000 gals per ac.
Commercial 1C to 5C	* 4,000 gals per ac.
Industrial IN	* 6,000 gals per ac.
PD	** Based on Official Development Plan Land Use

\*Does not include water for irrigation, fire purposes, pipe line flushing and pipe line leaks.

303.5. Irrigation Consumption. Irrigation is the use of water from a public water system to enhance vegetation growth in connection with any land use. Daily consumption for irrigation use will be taken at 4,000 gpd per net acre of irrigable land. Rate of flow for the high day during the high week shall be taken at 1.5 times the average daily consumption or 6,000 gpd per net acre equivalent to 4.2 gpm per net acre. For the determination of net irrigable land Table 303.5-1 will be used. Acreages are gross zoned acres.

<b>IRRIGABLE LAND BY ZONE DISTRICT</b>	
<b><u>Zoning</u></b>	<b><u>Irrigable Area ( percentage of zoned area)</u></b>
R1A	80%
RR	70%
1R	65%
2R, 3R, 3RA	55%
4R, 4RA, 5R, 5RA	45%
6R	25%
OF, 1C, 2C, 3C, 4C, 5C, IN	20%
PD	Based on Official Development Plan

303.6. Fire Protection Requirements. The fire district in which land is located will make determination of fire flows. For the majority of Lakewood, this agency is the West Metro Fire Protection District.

303.7. Unaccounted for Water. Unaccounted for water includes such items as water used for fighting fires, pipe line flushing, leakage in piping, malfunctioning of meters, etc. For purposes of evaluation and design add 5% to average daily consumption rates of flow for domestic and irrigation purposes to account for this item.

303.8. Water Flow Calculations.

(a) Maximum Daily Consumption Rate. The following steps are involved in the determination of the maximum daily consumption rate:

- (1) Select the area to be considered for design.
- (2) By using the land use classification and the population density given in Table 303.1-1 and the water consumption for residential, irrigation, commercial and industrial classifications given in Paragraphs 303.3, 303.4 and 303.5 plus the unaccounted for water given in Paragraph 303.7 determine the maximum daily consumption rate. The total will be the maximum daily consumption rate imposed on the system.
- (3) Example of Calculation. For an example of the steps, assume an area of 520 acres in size with the following zoning classification and acreage's.

ZONE	AREA	PERSONS PER GROSS ACRE	POPULATION	PORTION OF AREA TO BE IRRIGATED	IRRIGATED ACRES
1R	350 AC	11.4	3,990	.65	228
2R	100 AC	23.7	2,370	.55	55
4R	35 AC	29.8	1,043	.45	16
2C	15 AC	4,000 gpd/acre		.20	3
IN	20 AC	6,000 gpd/acre		.20	4
TOTALS	520 AC		7,403		306

Calculation of maximum daily consumption rate:

Residential:	7,403 persons x 75 gpd divided by 1440	386 gpm
2C, Commercial:	15 acres x 4,000 gpd divided by 1440	42 gpm
IN, Industrial:	20 acres x 6,000 gpd divided by 1440	83 gpm
Irrigation:	306 acres x 4.2 gpm	<u>1,285 gpm</u>
Sub Total		1,796 gpm
Plus 5% for unaccounted for water		<u>90 gpm</u>
Maximum Daily Consumption Rate		1,886 gpm

(b) Required Fire Flow Plus the Maximum Daily Consumption Rate. Determine the required fire flow by referring to the appropriate fire protection district. There may be more than one rate within a given area.

(1) Example of Calculation. Continuing with the example: Assume that the required fire flow for the 1R and 2R areas is 1,500 gpm. Assume the required fire flow for the 4R and Commercial and Industrial areas to be 3,000 gpm.

In order to evaluate or design the water system serving the subject area add the larger required fire flow to the maximum daily consumption rate.

Required Fire Flow	3,000 gpm
Maximum Daily Consumption Rate	<u>1,886 gpm</u>
Total	4,886 gpm

(c) Peak Design Consumption Rate. Determine the peak design consumption rate by using the maximum daily consumption rate and multiplying by a peak factor of 1.7. The result of this multiplication is the peak design consumption rate.

(1) Example of Calculation. Continuing with the example.

Maximum Daily Consumption Rate	1,886 gpm
Multiply by peak factor	<u>x 1.7</u>
Peak design consumption rate	3,206 gpm

(d) Conclusion:

Required fire flow plus the Maximum Daily Consumption Rate.	4,886 gpm
Peak Design Consumption Rate	3,206 gpm

For the conditions assumed, the required fire flow plus the maximum daily consumption rate of



4,886 gpm would be used to design the piping system supplying water to the area.

303.9. Sewage Contribution Criteria.

(a) General. The sewage system shall provide dependable facilities having sufficient capacity to transport all domestic sewage, at time of peak flow, from all owners to the place of treatment or to the place where another entity accepts it for treatment. In some instances, sewage pumping stations or sewage treatment facilities may be a part of the sewage system in which case these facilities shall have capacities for the function they are to perform. The City Engineer shall approve all design assumptions.

(b) Design of New Facilities. For design of new facilities, all components shall have adequate capacity to serve total development in conformance to the existing zoning classifications and increased densities that reasonably could take place in the following 25 years.

(c) Supplemental Criteria. The entire sewage system including the collection sewer lines, pumping stations, outfall lines and treatment facilities shall be designed and constructed in accordance with these standards supplemented by the applicable provisions of Criteria Used in the Review of Waste Water Treatment Facilities published by the CDPHE.

303.10 Sewage Contributions. The following criteria will be considered as the acceptable minimum for design of the sewage system:

(a) Residential. Residential contribution will be based upon an average daily sewage contribution of 75 gallons per capita.

(b) Office, Commercial, Planned Development and Industrial. Table 303.10-1 will be used to determine the average daily rate of sewage contribution.

<u>Zoning Classification</u>	<u>Average Daily Contribution</u>
Office/Commercial	4,000 gal per ac.
IN	6,000 gal per ac.
PD	Based on Official Development Plan

(c) Infiltration. Infiltration for the construction of new sewer lines shall not exceed 200 gallons per day per inch of diameter per mile of sewer line.

(d) Peak Flows. The above contribution criteria are average daily flows. In order to use these flows for design purposes, they must be converted into flow rates expressed in gallons per minute (gpm). Further, the rates must be converted from average flow rates to peak flow rates as

shown in the “Peak Flow Factors” in Table 303.10-2. Interpolation may be used for flows not listed in Table 303.10-2 or in the alternative, the formula at the bottom of the table may be used.

Table 303.10-2			
PEAK FLOW FACTORS			
AVERAGE FLOW GALLONS PER MINUTE	PEAK FLOW FACTOR	AVERAGE FLOW GALLONS PER MINUTE	PEAK FLOW FACTOR
80	5.08 (max)	400	3.87
96	4.93	560	3.66
112	4.80	720	3.51
128	4.70	880	3.39
144	4.60	1040	3.30
160	4.52	1200	3.22
176	4.45	1360	3.15
192	4.38	1520	3.09
208	4.33	1680	3.04
224	4.27	1840	2.99
240	4.22	2000	2.95
256	4.18	2400	2.86
272	4.13	3200	2.73
288	4.09	4400	2.58
312	4.04	5200	2.51

Peak Flow Factor = 10.66 divided by (Average Flow in gpm)<sup>0.169</sup>

303.11. Sewage Contribution Calculations.

(a) Average Daily Contribution Rate. The following steps are involved in the determination of the average daily sewage contribution rate:

- (1) Select the area to be considered for design.
- (2) By using the land use classification and the population density given in Table 303.1-1 and in Table 303.10-1 determine the average daily sewage contribution. Convert this average daily contribution to an average rate in gallons per minute.
- (3) Enter Table 303.10-2 with the average rate to determine the peak factor. Multiply the average daily contribution rate by the peak factor to obtain the peak rate of sewage contribution.
- (4) Determine the amount of infiltration by actual length of line needed. In the event that actual length is undetermined at this design point, an assumed length of 150 feet per acre can be used. By using the length of pipe, assumed size of pipe and the infiltration rate per 303.10(c), the daily infiltration contribution can be calculated. This daily flow must be converted to gpm. This flow is fairly constant throughout the day, therefore no peak factor is applied.
- (5) Add the peak rate of sewage contribution to the rate of infiltration contribution to obtain the peak design rate of sewage contribution.

(b) Example of Calculations.

- (1) Assume an area of 585 acres, which will drain by gravity to a single point, with the following zoning classifications and acreages.

ZONE	AREA	PERSONS PER GROSS AREA.	POPULATION
RR	350 AC	4.9	1,715
2R	100 AC	23.7	2,370
3R	80 AC	23.7	1,896
4C	35 AC	4,000 gpd/acre	
IN	20 AC	6,000 gpd/acre	
TOTALS	585 AC		5,981

(2) Calculate average daily contribution

5,981 persons x 75 gpd	448,575 gpd
35 Ac Commercial x 4,000 gpd	140,000 gpd
20 Ac Industrial x 6,000 gpd	<u>120,000 gpd</u>
Total Contribution	708,575 gpd

Average daily rate 708,575 gpd divided by 1,440 = 492 gpm

From Table 303.10-2 peak factor = 3.75 (by interpolation)

Peak rate of sewage contribution = 3.75 x 492 gpm = 1,845 gpm

(3) Approximate length of sewer line would be 585 acres x 150 feet per acre = 87,750 feet or 16.62 miles. Infiltration would be based on 200 gpd per inch-mile, or (assuming 8-inch pipe) 1,600 gal/mi/day. Infiltration = 16.62 miles x 1,600 gal/mi/day = 26,592 gpd divided by 1,440 or a rate of 18 gpm.

(4) To obtain the peak design rate of contribution add the following rates:

Peak rate of sewage contribution	1,845 gpm
Daily rate of infiltration contribution	<u>18 gpm</u>
Peak design rate of contribution	1,863 gpm

#### Part 4 WATER SYSTEM FACILITIES CRITERIA

304.1 General. The water supply and distribution system shall be designed as a whole with supply, treatment, transmission lines, pumping, reservoirs and distribution lines coordinated with each other to provide a totally integrated system. The total system shall provide adequate water to maintain the critical flows defined in section 303.8. All facilities shall conform to the Design Criteria for Potable Water Systems published by the CDPHE.

(a) Supply. Supply facilities include: diversion works at natural streams; supply ditches or conduits; wells, and raw water storage facilities.

(b) Treatment. Treatment facilities include any one or any combination of the controlled processes of coagulation, sedimentation, absorption, filtration, disinfection and other processes which are used to produce a water meeting the quality requirements of the CDPHE.

(c) Transmission Lines. Transmission facilities are pipelines and conduits that are used to transport treated water from treatment facilities to distribution reservoirs, or between distribution reservoirs. Transmission facilities may, under some conditions, be used as a part of the distribution system.

(d) Pumping. Pumping facilities are used to transport water from a supply source or a

service level at a given elevation to a higher service level.

(e) Distribution Reservoir. Treated water storage facilities which are enclosed structures and are directly connected into the distribution system. They serve to stabilize pressure within a service level defined by a given differential in elevation.

(f) Distribution Lines. The distribution facility is that network of pipe lines that deliver water directly to the owner.

#### 304.2. Supply Facilities.

(a) General. These criteria apply to water obtained from sources other than Denver Water.

(b) Adequacy of Supply. Generally a raw water supply is available physically because there is a legal right to divert, store and otherwise use the water. Ownership of water rights and facilities must be demonstrated by the water provider. Colorado water courts and the State Engineer determine the quantities of water, which may be legally diverted and/or stored without injury to other vested water owners. Proof of ownership, court decrees and administrative determinations, the amount of water physically available under the priority system and the number of equivalent single family taps is information that must be provided to and confirmed as correct by the City before issuing building permits.

Due to phasing or other conditions, there may not be a direct relationship between build out design of a water system and the water supply initially available; however, any required water supply, whether for a phase or full build out, shall provide a perpetual water supply. In determining the realistic quantity of water that is available for domestic use, all decrees and administrative determinations that would affect the quantity must be considered. Design shall be based on allowable densities under the zoning classifications in effect or projected in relation to a perpetual water supply.

(c) Nothing contained herein shall be construed as a guarantee by the City of delivery of a given volume of water at a given pressure. This responsibility remains with the water supplier.

304.3. Treatment Facilities. Water treatment facilities, together with treated water storage reservoirs, shall be adequate to maintain design flows determined as required in Section 303.8.

(a) Fire Flow Requirements. The appropriate fire district shall determine duration and quantity of required fire flow.

(b) Storage and Replacement. The amount of storage and rate of replacement of water shall be determined as a function of treatment, pumping capacity and demand.

304.4. Transmission Lines, Pumping Facilities, and Distribution Reservoirs. These facilities shall be adequate to deliver the maximum daily consumption rate plus the basic fire flow, or peak design consumption rate, whichever is greater.

(a) Pumping Facilities. Pumping stations shall be provided with a minimum of two pumps for alternate operation and to accommodate pump repair or outage. Where reservoir storage or gravity supply is not available to provide service during a temporary electrical power failure, standby power shall be required.

(b) Storage Reservoirs. Provisions shall be made for continued service during the time a storage reservoir is out of service. Acceptable alternates are more than one reservoir in single service area; and/or pumping capacity to adequately serve facilities.

304.5. Distribution Lines. The lines in the distribution network shall have adequate capacity to deliver the required design flows to any given point.

(a) Valve Spacing. Piping in the distribution system shall consist of a network of interconnected lines with valve spacing provided such that breaks or failures will not affect more than 500 feet of line in commercial and industrial districts or 800 feet of line in residential districts.

(b) Minimum Line Sizes.

(1) Minimum size of lines in low density residential R1A, RR, IR, 2R, 3R and 3RA areas shall be 6 inch.

(2) Minimum size of lines in other residential, office, commercial and all industrial areas shall be 8 inch.

(c) Dead End Lines. Dead end lines not serving a fire hydrant shall be provided with a positive means of periodically flushing such lines.

(d) Fire Hydrant Spacing. The appropriate fire protection district shall determine fire hydrant spacing.

(e) Friction Coefficients. Evaluation and design of lines will be based on the following friction coefficient:

Ductile iron pipe (cement lined)	C=120
PVC pipe	C=140
Concrete Pipe	C=120
Steel pipe (cement lined)	C=120

**Part 5 SEWAGE SYSTEM FACILITIES CRITERIA**

305.1. General. The sewage system consists of sewage collection lines, sewage pumping stations, sewage treatment facilities and outfall sewers.

(a) Sewage Collection System. The sewage collection system consists of a system of sewer pipes, with all the necessary appurtenances, used for the collecting and transporting of all domestic sewage from residences and buildings to a common outfall line or a treatment facility.

(b) Sewage Pumping Station. A sewage pumping station consists of pumping equipment and appurtenances and the structure housing the equipment and appurtenances, used for moving sewage to a higher level.

(c) Outfall Sewers. Outfall sewers are sewer lines used to carry sewage in the following ways:

- (1) From the collection system to the place where another entity accepts it for treatment;
- (2) From the collection system to the sewage treatment facility;
- (3) From the sewage treatment facility to the point of discharge into a receiving stream.

305.2. Systems Criteria.

(a) Sewage Collection System. All elements of the sewage collection system shall be designed to meet Design Criteria Considered in the Review of Wastewater Treatment Facilities published by CDPHE. Sewers 12 inches and less in diameter shall be designed to meet the criteria and carry design peak flow rates while flowing one-half full. Sewers 15 inches and greater in diameter shall be designed to meet the criteria and carry design peak flow rates while flowing three-fourths full.

(b) Sewage Pumping Stations. Sewage pumping stations shall be evaluated and designed in accordance with the applicable provisions of Design Criteria Considered in the Review of Wastewater Treatment Facilities published by the CDPHE and subject to the following criteria.

- (1) All pumps in any pumping station shall be of the same design and manufacture and of equal capacity to facilitate interchange of repair parts.
- (2) Wet well type sewage pumping stations may be used provided that a) all pumping equipment and motors, except the impeller, pump shaft and assembly and all control equipment, except probes, be located above the wet well cover; b) that the entire pump assembly can be removed for maintenance and repair; c) that the pump impeller be open non-clog type; d) that the wet well cover be gas tight so that no gas can reach the operating floor from the wet well; and e) that the wet well and the operating section be separately and adequately ventilated.
- (3) Two separate power supplies or a stand-by generator are required.

(c) Collection Lines. The minimum size for sewage collection systems shall be 8 inches.

(d) Outfall Lines. Outfall lines conveying treated sewage will be evaluated or designed by standard engineering principles governing pipe lines.

## **Part 6 WATER SYSTEM CONSTRUCTION STANDARDS**

306.1. General. These standards are intended to provide basic guidelines for the design of the water supply and distribution system and are not complete construction specifications. All materials shall meet applicable AWWA, ASTM or ANSI standards. Construction specifications will be prepared for each project; however, pipe material for all lines 24 inch or smaller shall be ductile iron, PVC or cement lined steel. These rules and regulations shall be a minimum standard, which may be superseded. In the absence of water system construction standards and specifications within these rules and regulations, design and construction shall adhere to the Denver Water Department Engineering Standards or other provisions of the City of Lakewood Engineering Regulations, Construction Specifications and Design Standards. That document by reference adopts current editions of the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction and the Colorado Department of Transportation Construction Manual.



### 306.2. Pipe.

(a) Soil Corrosion and Electrolysis. Metallic pipes are susceptible to electrolytic action. At locations where the history of performance indicates any degree of deterioration of the pipe or in areas where the reaction of the soil to metallic pipe is unknown, a soil resistivity survey shall be made. Based on the results of such a survey, a determination of the type of pipe, the need for protection of metallic pipe and the type of protection against deterioration of metallic pipe shall be made. All ductile iron pipe shall be wrapped in polyethylene encasement for purposes of minimum corrosion protection. Polyethylene material shall not be less than 8 mils in thickness and shall meet the requirements of ASTM D-1248, Type 1, Class A or C.

#### (b) Ductile Iron Pipe and Fittings.

- (1) Ductile Iron Pipe shall conform to AWWA C151, class 52 thickness, with the added requirement that all pipe shall have a standard thickness cement mortar lining conforming to AWWA C104.
- (2) Fittings for underground ductile iron pipe shall be ductile iron or cast iron fittings with mechanical joint ends and shall conform to AWWA C110 or C153.

#### (c) Plastic Pipe and Fittings.

- (1) Four-inch through 12 inch Polyvinyl Chloride (PVC) plastic pipe shall meet the requirements of AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe. Pipe pressure classes shall be selected to meet the design requirements of each application, but in no case shall be less than pressure class 150 (SDR18). The pipe shall also meet Uni-Bell Standard Uni-B-2-72.
- (2) Fourteen-inch through 24-inch PVC pipe shall meet the requirements of AWWA C905, Polyvinyl Chloride Transmission Pipe. Pipe shall be selected to meet the design requirements of each application, but in no case shall be less than Pressure Class 200 (SDR18).
- (3) Fittings for plastic pipe shall be ductile iron or cast iron fittings with mechanical joint ends, and shall conform to AWWA C110 or C153.

### 306.3. Valves and Hydrants.

(a) Gate Valves. Gate valves shall be double-disc iron body, fully bronze-mounted, resilient seat with non-rising stem conforming to AWWA C500. Valve end connections shall be mechanical joint. Gate valves shall be provided with suitable valve boxes.

(b) Butterfly Valves. Butterfly valves shall conform to AWWA C504.

(c) Pressure Reducing and Regulating Valves. Pressure reducing and regulating valves that are a part of the distribution system shall be a type capable of maintaining preadjusted downstream pressures with varying rates of flow and upstream pressure without causing water hammer. Valves shall be piston type, not spring operated, with flanged end connections, globe body, fully bronze mounted, external pilot operated with the following requirements:

- (1) Installed in a concrete vault.
- (2) Be fully powered by water from the pipeline in which they are installed.
- (3) Pressure gages installed both upstream and downstream.
- (4) Not be dependent on diaphragms, liners or springs for piston movement or positioning.
- (5) Have an external valve piston position indicator.
- (6) Be constructed so as to facilitate repairs and internal dismantling without removal of valve from pipeline.
- (7) Be constructed to provide easy access to the pilot to allow its removal while main valve is under pressure.
- (8) Be provided with bypass of smaller pipe size with pressure reducing and regulating valve to accommodate low flows.

(d) Check Valves. Check valves shall be of the swing check type and shall be used wherever the flow of water must be in only one direction and reverse flow must be prevented. Check valves shall be of the outside spring and lever type. Check valves shall be furnished with flanged end connections and shall be installed in a concrete vault that allows easy access for inspection, adjustment and maintenance.

(e) Fire Hydrants. Fire hydrants shall be manufactured in conformance with AWWA C502. Hydrants shall be cast iron with full bronze mounting and shall have a bell opening to fit 6-inch branch pipe. The valve opening in the fire hydrant shall be not less than 5-inches in diameter. Hydrants shall have one 4 1/2 inch pumper connection and two 2-1/2 inch hose connections. Threads on the pumper and hose connections shall conform to the requirements of the fire department equipment of the area that they are to serve.

(f) Working Pressure Requirements. All piping, fittings, valves, hydrants and appurtenances in the water supply and distribution system shall conform to the following minimum working pressure:

Piping	150 p.s.i.
Fittings	250 p.s.i.
Valves	150 p.s.i.
Hydrants and appurtenances	150 p.s.i.

306.4. Water Main Installation.

(a) Location. All water mains shall be installed to proper line and grade within dedicated roads, streets or public ways or within easements or rights-of-ways all or a portion of which are specifically for the purpose of water main construction, maintenance and operation. The desired location is to the north and east of the centerline of the road, street, public way, easement or right-of-way. The exact location will depend on conditions such as location of existing facilities to which the main is to connect, location of other existing or planned utility lines and location of existing or planned drainage facilities.

(b) Easement Widths. Easement or rights-of-way widths shall conform to Denver Water Department Engineering Standards.

(c) Depth of Mains. Mains shall be installed so that the top of the pipe shall be not less than 4-1/2 feet below the finished grade of the street or final grade of the easement or right-of-way.

(d) Air Release. Twelve-inch and larger mains shall be constructed to slope continuously to air release valve assemblies installed at high points, to allow the expulsion of trapped air.

(e) Thrust Blocks and Harness Rodding. Concrete thrust blocks and/or harness rods shall be installed at all outlets, bulkheads, fittings, horizontal and vertical bends and branches. All concrete thrust blocks shall be designed for shape and size as required by internal pressure and load bearing capacity of the soil and shall in every instance bear against undisturbed earth. All harness rods shall be designed to resist thrust resulting from internal pressure and shall be protected by means of polyethylene wrap in any soils. Polyethylene material shall not be less than 8 mils in thickness and shall meet the requirements of ASTM D-1248, Type 1, Class A or C.

(f) Megalugs: The use of megalug restraint systems may be used in lieu of harness rods.

## **Part 7 SEWAGE SYSTEM CONSTRUCTION STANDARDS**

307.1. General. These standards are intended to provide the basic guidelines for the design of the sewage system and are not complete construction specifications. Construction specifications will be prepared for each project; however, pipe material for all lines 24 inches or less in diameter shall be PVC unless loading requirements require pipe of greater strength. In the absence of sewer system construction standards and specifications within these rules and regulations, design and construction shall follow other provisions of the City of Lakewood Engineering Regulations, Construction Specifications and Design Standards. That document by reference adopts current additions of the Colorado Department of Transportation Standard Specifications for Road and Bridge Construction and the Colorado Department of Transportation Construction Manual.

307.2. Pipe.

(a) Plastic Pipe and Fittings. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings shall conform to the requirements of ASTM Designation D3034, F679 or F794 as appropriate.

(1) Pipe shall have elastomeric gasket joints and have a minimum SDR of 35.

(2) Fittings shall have elastomeric gasket joints and have a minimum SDR of 35.

307.3. Pipe Joint Material.

(a) Plastic Pipe.

(1) PVC joints shall conform to the requirements of ASTM D3034, for elastomeric gasket joints only.

307.4. Stoppers and Closures. Stoppers shall be water tight when in place and capable of being removed for extension of the line.

307.5. Steel Pipe Casing. Steel pipe casing, to be used for encasement of sewers where boring under roadways, railroads, ditches, etc., is required and shall conform to the requirements of AWWA C200.

307.6. Manholes. Manholes shall be prefabricated concrete having a cast in place concrete base with cast iron ring and lid, and aluminum or plastic steps. The cone portion of the manhole shall be eccentric for easier access. Manhole bases shall be monolithically cast in place a minimum of 6 inches above the largest pipe. Gasketed boots at all pipes are required.

(a) Precast Manholes. Precast manholes shall conform to the requirements of ASTM C-478 constructed with Type II cement.

(b) Manhole Ring and Cover. Manhole rings and covers shall be circular, provide a clear opening of 22 inches, have the word "SEWER" cast in the cover, have a ground seat and be cast iron.

(1) Cast iron manhole rings and covers shall be gray cast iron conforming to ASTM A-48.

(2) Manhole Steps. Manhole steps shall be one of the following types:

(a) Aluminum alloy conforming to Federal Specification QQ-A-2008.

(b) Copolymer polypropylene plastic encapsulating a 3/8" Grade 60 steel bar.

#### 307.7. Sewer Collection System Installation.

(a) Location. All sewer pipes shall be installed to proper line and grade within dedicated roads, streets or public ways or within easements or rights-of-ways specifically for purpose of sewer line construction, maintenance and operation. The desired location is to the south and west of the centerline of the road, street, public way, easement or right-of-way. The exact location will depend on conditions such as location of existing facilities to which the main is to connect and location of other existing or planned utility lines. Sewer lines should be straight in alignment between manholes unless some unusual condition exists which will not permit straight alignment. Manholes shall be spaced at a maximum distance of 400 feet for 15 inch and smaller pipes and 450 feet for 18 inch and larger pipes.

(b) Pipe Laying. Pipe shall be joined in the manner prescribed by the manufacturer of the joint being used. All surfaces shall be clean and free from dirt and water at the time the joint is made. Pipe shall not be laid in water or when the trench condition or weather is unsuitable for such work.

(c) Jacking or Boring. Pipe lines under railroads, streets and roads, ditches, etc., where open trench construction cannot be used shall be installed in a steel pipe casing that has been jacked or bored into place.

(1) Design of the casing shall be such that it will resist all superimposed loads as well as stresses resulting from the jacking or boring operation.

(2) Placing sewer pipe through casing shall be accomplished by a method whereby the skids or supporting means will become the permanent support for the pipe in the casing.

## **Part 8 CONTROL OF WASTEWATER**

308.1. Policy. The City shall not permit the introduction of substances into the sewage system which may result in physical damage to the structures, interference with operation of the sewer system, cause excessive maintenance, or interfere with sewage treatment.

(a) Normal Domestic Wastewater. As used herein, “normal domestic wastewater” means wastewater which does not exceed a biochemical oxygen demand strength index of 250 parts per million by weight or a suspended solids strength index of 300 parts per million by weight. Concentrations in excess of either or both the above are deemed “unusual concentrations.”

(b) Items of Concern. Curtailment, cost recovery for treatment, or pretreatment of wastes may be required for wastes which exceed the composition of normal domestic wastewater, and which may have any adverse effects upon the collection system, treatment process, treatment works, or receiving waters, according to the following guidelines:

- (1) The quantity, composition, and strength of wastes should not interfere with the normal collection and treatment process.
- (2) Wastes should not create or increase any chemical, radiological, biological, explosive or health hazards to equipment, operating personnel, or the general public.
- (3) Wastes should not cause the treatment works to produce an effluent of such type, composition, or strength, which will not meet the water quality standards of the receiving waters, except those failures which are due to the inability to treat normal domestic wastewater.
- (4) Clear water inflow should be reduced through the elimination of non-polluted waters, unauthorized drains and surface water entry.
- (5) Wastes should not reduce the hydraulic capacity of the sewage system below designed capacity such as, but not limited to, the sudden release of large volumes of water into the system, or build-up of deposits which reduces the carrying capacity of lines.

308.2. Prohibited Wastes. The following shall not be discharged into the sanitary sewer system.

(a) Water. Foreign water including storm water, surface water, ground water, roof runoff, subsurface drainage, unpolluted cooling water, industrial process waters, or drainage from swimming pools, excluding swimming pool cleaning and filter wash waters.

(b) Chemicals.

- (1) Flammable substances, such as gasoline, benzene, naphtha, fuel oil, or any other flammable or explosive liquid solid or gas.
- (2) Toxic or poisonous solids, liquids or gases in such quantity, either singly or by interaction with other wastes as to injure or interfere with any sewage treatment processes, constitute a hazard to humans or animals, create a public nuisance or create any hazard in the receiving waters, including but not limited to cyanides or compounds capable of liberating hydrocyanic acid, hydrogen sulfide, and sulfur dioxide.
- (3) Corrosive waters or wastes having a pH lower than 5.5 or having other corrosive properties capable of causing damage or hazards to structures, equipment, and personnel.
- (4) Solid or viscous substances, organic or inorganic, dissolved or suspended, in quantities of such size as to cause obstructions to the flow in sewers or which otherwise interfere with the proper operation of the sewage works. Such substances either whole or ground by grinders, include, but are not limited to, ashes, cinders, sand, mud, straw, shavings (wood or metal), metal, glass, rags, feathers, tar, plastics, wood, garbage, whole blood, manure, hair and fleshings, entrails, paper dishes, cups, milk containers, snow or ice, food processing solids, or debris in quantities not found in normal domestic wastewater.
- (5) Sludge or other materials removed from industrial waste at waste treatment plants or water treatment plants.

308.3. Controlled Wastes. Certain wastes may be discharged into the sewage system only if it is determined that such wastes will not harm the sewers, sewage treatment equipment or process, and will not have an adverse affect upon the receiving waters or will not otherwise endanger life, or constitute a nuisance.

(a) Approval. Any person, firm, business, or corporation, which anticipates discharging any substance or material listed in (c) of this section into the sewage system, shall first make application to the City and receive approval. Evaluations for approval will give consideration to quantity of given waste in relation to existing flows and velocities, materials of construction, nature of collection system, nature of treatment process, capacity of treatment plant, degree of treatability of wastes and other pertinent factors.

(b) Alternatives. If the waters or wastes which are proposed to be discharged contain substances or possess characteristics which may have a deleterious affect upon the collection system, sewage works, processes, equipment or receiving waters or may otherwise constitute a public nuisance, any one or a combination of the following alternatives may be applied to the application:

- (1) Rejection of the wastes.
- (2) Requirement of pretreatment to an acceptable condition prior to discharge into the sewage system, but such pretreatment shall not include diluting wastes with domestic water.
- (3) Requirement of controls over quantities and rates of discharge.
- (4) Requirement of payment for the added costs of handling and treating wastes which costs may include but are not limited to treatment plant modifications.

(c) Restricted Wastes. Those wastes for which approval must be secured from the City prior to discharge and the circumstances under which they may be discharged are:

- (1) Any liquid or vapor having a temperature higher than 150°F (65°C).
- (2) Any wastes containing fats, wax, grease, or oils, whether or not emulsified, in excess of 100 milligrams per liter, or containing substances which may solidify or become viscous between 32 and 150°F (0 to 65°C).
- (3) Improperly shredded garbage.
- (4) Wastes containing undiluted acid, iron pickling wastes or concentrated plating solutions, whether neutralized or not.
- (5) Wastes containing arsenic, barium, cadmium, cyanide, lead, selenium, silver, metallic salt solutions or suspended metals or minerals, iron, chromium, copper, zinc, and similar objectionable or toxic substances.
- (6) Wastes containing phenols or other taste or odor producing substances in such concentrations that the effluent would not meet requirements of the receiving waters with regular sewage treatment of normal domestic wastewater.
- (7) Radioactive wastes or isotopes of such half-life or concentration that exceed the limits of state and federal regulations.
- (8) Wastes having a pH or 9.5 or greater, or a pH less than 5.5.



(9) Wastes which cause or contain:

- (a) Unusual concentrations of inert suspended solids such as fullers earth, lime slurries, or residues.
- (b) Unusual concentration of dissolved solids such as sodium sulfate, sodium chloride, or calcium chloride.
- (c) Excessive discoloration such as dye wastes.
- (d) Unusual concentrations of BOD, COD, which would cause a significant load or chlorine requirement on the treatment works.
- (e) Unusual volume of flow or concentration of wastes constituting "slugs," generally defined as a greater than normal release at one time of liquids or concentrations into the sewer system.

(10) Waters or wastes containing substances which are not readily treated or reduced by the normal sewage treatment process, or are capable of such limited treatment that the plant effluent would not meet water quality requirements of the receiving waters in the absence of restrictions on discharge.

308.4. Pre-treatment of Wastes. In order to prevent overloading of the treatment works or to limit the necessity of excessive preventive maintenance to the sewage collection system, the City may require installation of pre-treatment facilities. Cost of such treatment facilities are to be borne by the owner and the design approved by the City prior to installation.

(a) Types of Pre-treatment. Pre-treatment facilities shall be designed, installed, and maintained to effectively remove the offending materials or reduce their concentrations to levels treatable as normal domestic wastewater or otherwise within the capacity of the treatment process, collection system and receiving waters. The pre-treatment process will be that which has been proved to be effective, is in common usage or may be demonstrated to be effective to provide the pre-treatment required, and may include chemical processes such as adjustment of pH; or grease, oil, and sand interceptors.

(b) Maintenance. All pre-treatment facilities will be properly maintained by the owner, records maintained, and will be subject to inspection by the City.

(c) Previously Installed Devices. The City may inspect and evaluate all existing pre-treatment facilities and determine if the device is adequately performing the intended pre-treatment.

When it is determined through evaluation of wastes discharged or problems associated with collection system maintenance or treatment plant operation that the device is not adequate or properly maintained, the City may require installation of a new or modified device, modification of the processes, or institution of other procedures. The person responsible for the existing pre-treatment installation will be given a reasonable time to comply, considering requirements of state and federal law, public health, and the economic value of the facility.

308.5. Control Manholes. When needed to secure valid waste sampling and flow measurements, the owner, at his expense, may be required to install a suitable control manhole, together with all necessary meters and other appurtenances. The City prior to installation therein shall approve design of the manhole and facilities.

308.6. Measurements, Tests, and Analysis. All samplings, measurements, tests, and analyses of the characteristics of waters and wastes shall be made and determined in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater," published by the American Public Health Association, approved procedures of the Colorado Water Quality Control Commission, the Environmental Protection Agency, or other customarily accepted methods.

(a) Sampling Location. To the extent possible, samples will be taken at control manholes or other reasonably accessible and suitable locations. If a control manhole is not available at the site, sampling may be taken at the next downstream manhole. To the extent possible, the discharge being evaluated will be isolated from other wastewater by temporarily blocking lines or estimating contributions.

(b) Sampling Techniques and Frequency. Sampling shall be determined on an individual basis.

308.7. Coordination with Owners. All aspects of the City's program to eliminate deleterious materials from entering the system; classification of wastes, pre-treatment, and sampling will be coordinated with the affected owner. In addition to the City sampling the owner may at his own expense have a separate evaluation performed. If separate data and conclusions are presented by the owner, the City will consider such data together with its own, giving due weight to each, prior to making a final determination; however, the City is not obligated to recognize those results as being more accurate than its own.

308.8. Fines and Termination of Service. The City will make every effort to assist the owner in identifying prohibited and controlled wastes and arrive at a mutually agreeable solution. Failure to comply with these rules and regulations or directives of the City, may result in imposition of additional charges. If the owner fails or refuses to comply with these rules and regulations or to institute the changes needed to meet these rules and regulations, the City may terminate service or take other corrective or legal action as the circumstances may require.

308.9. Discharge of Septic or Holding Tank Wastes. No person shall discharge septic tank waste into the City's sewer system until a permit is granted and required fees and charges paid.

308.10. Owner Information. In order to properly evaluate the effect of sewage upon the collection system and treatment plant, establish fair and equitable owners charges, or determine conformity with these rules and regulations, the City may require that certain information be furnished as follows:

- (a) Peak discharge rate and volume.
- (b) Chemical analysis of wastewater.
- (c) Information on raw materials, manufacturing processes or products.
- (d) Details of wastewater pre-treatment facilities.

308.11. Volume Control. Variability in quantity or flow rates of wastewater may require the installation of equalizing or holding tanks or flow control devices in order that the capacity of the collection system or treatment works are not exceeded. Installation of such devices as required by the City and shall be the responsibility of the owner. Such installation shall be approved in advance by the City.

308.12. Accessibility. Duly designated City employees are authorized to enter all properties for the purposes of conducting inspections, observation, measurement, sampling and testing pertinent to the owner's discharge of wastes or wastewater into the City's systems. Information, the public disclosure of which would reveal a trade secret or process, shall be preserved as confidential from unauthorized persons.

## **Part 9 SANITARY SEWER SYSTEM PRE-TREATMENT DEVICES**

309.1. General. The City shall require the installation of a pre-treatment device when the strength per unit time and/or constituents of the wastewater discharge into the public sanitary sewer system exceeds that which is generally accepted to be "normal domestic wastewater" as defined in 308.1 (a) of this Chapter. The owner, renter, or lessee of the establishment shall be responsible for installing pre-treatment devices adequate to pre-treat the establishment's sewage contribution to acceptable standards.

Establishments that provide food serving, food preparation, food catering, meat cutting, animal slaughtering and other establishments capable of discharging grease into the public sanitary sewer system shall be required to install a grease interceptor.

Establishments that provide automotive repair services, truck and car wash facilities, vehicle maintenance facilities, machine shop facilities and other establishments capable of discharging grease, oil, sand and/or flammable wastes into the public sanitary sewer system shall be required to install a sand/oil interceptor.

When a pre-treatment device is required, it shall be based on one of the following determination methods:

(a) Direct Sample. A direct sample shall be used wherever possible. A sample taken at a monitoring point shall be analyzed and tested by the City.

(b) Comparison. A comparison with other businesses or industrial establishments that use similar processes and which the City has determined discharge wastewater of a similar nature, composition and volume to that of the establishment in question.

(c) Best Judgement. Best judgement shall be made where it is not possible to sample and where a similar process to which a comparison may be made does not exist. Best judgement shall be made on a reasonable knowledge of the processes involved, the nature of the wastewater produced by such processes and the amount of water consumption.

309.1 Definitions. The following definitions are applicable to pre-treatment devices:

(a) Fixture Unit. A rating in terms of gallons (gpm) per minute representing the maximum amount of water that can drain from a fixture or piece of equipment in one minute. The value of one fixture unit (F.U.) is equal to 7.5 gpm.

(b) Grease Interceptors - Type A & B. Two compartment interceptors normally located outside a building and of the following sizes:

- (1) Type "A" 320-1250 gallons capacity (Design Std. No. SA-13, Appendix A)

(2) Type "B" 1565-3445 gallons capacity (Design Std. No. SA-14, Appendix A)

(c) "In Line" Grease Trap. A prefabricated unit, generally made of metal that normally is set indoors under a sink or near the fixture connected to it, for the trapping of grease and oils.

(d) Monitoring Point. A point in the owner/operators sewer service line that is accessible for monitoring, sampling and testing the wastewater flow from an establishment.

(e) Pretreatment Facilities. Structures, devices or equipment for neutralizing or removing deleterious wastes from wastewater generated from a premise prior to its discharge into a public sewer.

(f) Sampling. A periodic collection of wastewater as it flows through a sewer.

(g) Sand/Oil Interceptors - Type I & II. Two compartment interceptors normally located outside a building and of the following sizes:

(1) Type "I" 320-1250 gallons capacity (Design Std. No. SA-15, Appendix A)

(2) Type "II" 1565-3445 gallons capacity (Design Std. No. SA-16, Appendix A)

(h) Testing. The analysis of wastewater.

**309.2 Plan Submittal and Plan Review.** If any waters or wastes are discharged, or are proposed to be discharged to the public sewers that may potentially contain substances or possess the characteristics enumerated in Part 8 or Part 9 of this chapter, it shall be the responsibility of the owner, renter, lessee or authorized representative to contact the City for the purpose of plan submittal. The plan submitted shall determine the need, method, and size of pretreatment facility required by these rules and regulations to pre-treat or otherwise control the wastes to make them acceptable for discharge into the City's sanitary sewer system. Plans for all significant owners must be reviewed and approved by Metro Wastewater.

The City may require additional plans and/or information to determine the impact on the public sanitary sewer system by the proposed wastes and to assist with calculating the size of the pretreatment facilities.

**309.3 Limitations on Wastewater Strengths.** Wastewater discharge into the sanitary sewer system shall not have or contain:

(a) Those constituents enumerated in Part 8 of this chapter.

(b) Any water or wastes containing grease, oil, hydrocarbons, fatty acids, soaps, fats or waxes which exceed 100 mg/l as determined by solvent (Freon) extraction;

(c) Any wastewater capable of raising the Lower Explosive Limit (L.E.L.) of the ambient atmosphere in any sewer to 5% for any two successive readings or to 10% for any single reading on an explosion hazard meter. Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, zylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides and sulfides.

309.4 Previously Installed Pre-Treatment Devices. If it becomes necessary for the City to require an existing business or industrial owner to install suitable waste pre-treatment units, a written explanation for the requirement shall be furnished to the owner or his authorized agent. Such a requirement may arise when it becomes apparent that the existing pretreatment facility is deficient in size, or waste emanating from the business or industry violates these rules and regulations and/or may cause harm to the public sewer system or to persons entering said system to perform maintenance, or to the treatment process and/or environment.

(a) Exceptions. The owner, renter, or lessee may request relief of the requirement to replace a previously installed pre-treatment device. The request must include a detailed plan of the proposed method of removing deleterious wastewater constituents. The proposal must assure wastewater discharged into the public sewer system is of "normal domestic strength." Should a conflict arise as to wastewater strength and/or constituents, the burden of proof for determination of strength and/or constituents will rest with the owner, renter, or lessee.

- (1) The City will periodically inspect the facility granted the exception for conformance to the approved plan. Should operations deviate from the approved plan, the City may take whatever action it deems appropriate, which may include the levying of an administrative fine or the immediate installation of an approved interceptor.
- (2) Attachment to and continued use of the public sanitary sewer system is evidence of permission to grant access to City inspectors to determine continued conformance to the approved plan.

#### 309.5 Grease Interceptors.

(a) Location/Design.

- (1) All grease interceptors shall be located outside, between 5 feet and 30 feet from the building, unless the City specifically authorizes a variance. The interceptor shall be easily accessible at all times for inspection and maintenance.

- (2) All cast-in-place grease interceptors shall be concrete with wall and floors of a single pour and shall be constructed in accordance with the detailed drawings. (See Design Standards SA-13 and SA-14, Appendix A)
- (3) In-line grease traps are not permitted unless specifically approved by the City.
- (4) Garbage disposal grinders are required to discharge to the grease interceptor if volumetric capacity of the interceptor is greater than 1,000 gallons.

(b) Calculating Interceptor Size. Size calculations are to be prepared by the owner, renter or lessee and submitted to the City per the following methods:

- (1) Where the seating capacity can be determined, compute:
  - (a) Number of seats x a full capacity factor of 0.9 x turnover rate of 2.2 per meal period = number of meals served per meal period.
  - (b) Number of meals served per meal period x 2.5 gallons per meal = volumetric water capacity of the grease interceptor.
- (2) Where food is prepared and where seating capacity or number of meals cannot be adequately determined, the following rule shall apply:
  - (a) Table 309.5-1 establishes the fixture unit values for various pieces of equipment that may require connection to a grease interceptor.
  - (b) The total number of fixture units shall be multiplied by 7.5 gpm to determine maximum rate of flow into the grease interceptor. The volumetric water capacity of the unit shall be 8 times the maximum flow rate.

Table 309.5-1		
<u>Type of Fixture</u>	<u>Minimum Trap Size (Inches)</u>	<u>Fixture Units</u>
Floor Drains	2	2
	3	3
Laundry Tubs	1-1/2	3
Clothes Washers	2	2
Receptors (floor sinks), indirect waste receptors for refrigerators, coffee urn, water stations, etc.	1-1/2	1
Receptors, indirect waste receptors for commercial sinks, dishwashers, etc.	2	3
Sinks, bar, private (1-1/2 inches minimum waste)	1-1/2	2
Sinks, commercial or industrial, schools, etc. including dishwashers, wash-up sinks (2 inches minimum waste)	2	3
Sinks, service	2	3
Wash basin (lavatory) single	1-1/4	2
Wash basins, in sets	1-1/2	2

The unit equivalent of fixtures and devices not shown on Table 309.5-1 shall be based on the rated discharge capacity in gpm in accordance with Table 309.5-2.



Table 309.5-2	
Discharge Capacity (in gpm) For Intermittent Flow Only	
0 - 7.5 gpm	1 Fixture Units (F.U.)
8 - 15 gpm	2 Fixture Units (F.U.)
16 - 30 gpm	4 Fixture Units (F.U.)
31 - 50 gpm	6 Fixture Units (F.U.)

Note: For a continuous flow into a drainage system, two F.U. shall be assumed for each gpm of flow.

### 309.6 Sand/Oil Interceptors.

#### (a) Location/Design.

- (1) All sand/oil interceptors shall be located outside, between 5 feet and 30 feet from the building, unless the City specifically authorizes a variance. Interceptors shall be easily accessible at all times for inspection and maintenance.
- (2) All cast-in-place sand/oil interceptors shall be concrete with walls and floors of a single pour and shall be constructed in accordance with the detailed drawings. (See Design Standards SA-15 and SA-16, Appendix A).
- (3) The minimum sand/oil interceptor shall be 320 gallons capacity.

#### (b) Calculating Interceptor Size:

Size calculations are to be prepared by the owner, renter or lessee and submitted to the City per the following method:

- (1) Total fixture units connected x 7.5 gpm x 5 minutes = interceptor size.
- (2) The total fixture unit values shall be based on the Table 309.6-1 on the following page:

Table 309.6-1	
<b>Type of Fixture</b>	<b>F.U.</b>
Floor Drain:	
3 inch trap	6
4 inch trap	8
Vehicle Wash Drain	8
Service bay with trough drain:	
380 S.F. or less	6
381 S.F. through 760 S.F.	12
761 S.F. through 1140 S.F.	18
etc.	

309.7 Specialized Pre-Treatment Devices. Certain chemical compounds, metals, and other substances have a deleterious effect upon the public wastewater treatment process. When such substances are identified, the owner, renter, or lessee shall be responsible at their expense to install a suitable pre-treatment device which effectively removes the deleterious substance or renders the sewage contributed to the public sanitary sewer system as being of "normal domestic strength" as defined in 308.1 (a) of this chapter.

309.8 Pre-Treatment Device Maintenance and Inspection. It shall be the responsibility of the owner, renter, or lessee of the establishment to clean, repair and maintain the pre-treatment device in an unobstructed and efficient functioning order. The owner, renter, or lessee shall maintain a record of periodic scheduled maintenance. The City will make periodic inspections to ensure compliance with the following:

(a) Grease interceptors and sand/oil interceptors shall be pumped and cleaned of the accumulated waste every three months, or more frequently, as determined by the City's representative, to ensure maximum operating efficiency.

309.9 Violations and Enforcement. Failure to comply with these rules and regulations shall constitute violation of provisions set forth in the City of Lakewood Municipal Code. Non-conforming establishments will be issued a citation. The owner, renter, or lessee in violation will be responsible for fines, additional charges, and applicable fees; and prosecuted in the City of Lakewood Municipal Court or such other legal remedies as the City Attorney should deem appropriate.

## CHAPTER 4 SERVICE LINE CONSTRUCTION STANDARDS

### Part 1 WATER SERVICE LINES - MATERIALS

401.1. General. All new or replacement water service lines and appurtenant fittings installed shall conform to the following minimum standards.

(a) Uniform Plumbing Code, Denver Water Department Engineering Standards. The basis for these rules and regulations pertaining to devices required to protect the integrity of the potable water system and sizing of service lines is the most current Uniform Plumbing Code and Denver Water Department Engineering Standards, except as herein modified or changed.

(b) Requirements for Meter and Service Line. Each building using water, regardless of occupancy or use, must be provided water by a separate service line and meter.

- (1) Exceptions may be granted in those instances where multiple buildings are under single ownership and included on a single legal description, and may more reasonably be served by a single line.
- (2) In the event that multiple buildings served by a single meter are separated, each building under separate ownership or separate title will be required to have its own service installed and be subject to charges, rules, and regulations in the same manner as if it were a new service.
- (3) An exception to the rule requiring separate meters may further be granted in case of condominium or similar multiple ownership in common of single or multiple structures provided that recorded declarations establish that a management entity exists for the structure or structures with power to enforce these rules and regulations including enforcement of charges.

(c) Access to Private Property. Application for or receipt of service from the City shall be deemed as permission by the property owner to allow City employees to enter the premises for the purpose of reading the water meter and when required, to make changes or repairs to the water meter. Denial of access during normal business hours or in case of an emergency, shall be cause for terminating service.

(d) Taps Onto Service Line. No taps will be made onto a service line which will allow for customer use of unmetered water. Service line taps ahead of the meter may be permitted only when a fire protection sprinkler system is used for which a monthly service charge is made, or under temporary, emergency circumstances when necessary to protect the public health, and only when authorized by the City.

## **Part 2 WATER SERVICE LINES - INSTALLATION**

402.1 General Requirements. Only City of Lakewood licensed contractors, operating under a current City of Lakewood utility and/or public way permit shall install water service lines. Contractors shall be responsible for complying with all applicable state, county and city laws, ordinances and regulations. Permits will be issued only after all required fees, including tap fees, have been paid. All materials and workmanship shall be performed as specified in the most current edition of the Denver Water Department Engineering Standards and the UPC.

402.2 Location. That portion of the water service line between the main and the property line shall be in a continuous straight line at approximately right angles to the line of the main. Should a right angle installation be impractical, the owner will submit the proposed service line location and secure written authorization from the City to install the water service line at some angle other than perpendicular to the main.

(a) Corner Lots. In the case of corner lots the property may be served from either the side or front under the same regulations as above.

(b) Cul-De-Sac Streets. If service is requested for a lot at the end of a cul-de-sac street, the main to be tapped will generally be not more than 15 feet from the front property line at the end of the cul-de-sac. The service line between the main and the property line shall be in a continuous straight line and will, under most conditions, enter the property a minimum distance of 5 feet from the nearest lot corner.

402.3 Backflow Prevention. Approved backflow prevention devices will be required on all new and existing service lines at the time of permit issuance for new construction or alterations to existing structures. This does not apply to any detached single family dwelling units.

402.4 Connection to Main. The connection to the water main will be accomplished and paid for by the owner.

402.5 Road Resurfacing Repair. Street pavements, curbs, gutters and sidewalks disturbed in the construction of water service lines shall be replaced and/or resurfaced as specified in the required Lakewood public way permit. Backfill and compaction of trenches under public streets shall be accomplished as specified in the required Lakewood public way permit.

### **Part 3 SEWER SERVICE LINES - MATERIALS**

403.1 General. All new or replacement sewer service lines shall conform to the following minimum standards.

403.2. Size of Service Line. The sewer service line shall not be less than 4-inches in diameter and in no instance shall such service line be smaller than the building stack to which it connects.

403.3. Sewer Pipe. Types of pipe and fittings that may be used for sewer service line construction are as follows:

(a) Plastic Pipe.

- (1) PVC pipe and fittings are acceptable and shall be SDR 35 sewer pipe, meeting the requirements ASTM D3034, F679 or F794.

403.4. Pipe Joint Material. All piping and joints shall be capable of withstanding a hydrostatic head of 10 feet of head without exceeding the standards of Section 303.10 (c) for infiltration - exfiltration requirements.

(a) Plastic Pipe.

- (1) ABS and PVC pipe joints shall be flexible to provide for longitudinal movement, and shall be locked in place with rubber sealing rings or glue. Joints and material shall be as recommended by the pipe manufacturer.

(b) Public Sewer Connection.

- (1) Connection at an existing wye branch will be made by using the appropriate type of joint herein outlined by a licensed contractor operating under a valid utility and/or public way permit. Where necessary to join unlike pipe, proper adapters shall be used. The resulting connection shall be watertight.

- (2) When connection to the public sewer is made by tapping the sewer main this will be accomplished by a City of Lakewood licensed contractor operating under a valid utility and/or public way permit. Fittings used at locations where the sewer main is tapped, shall be cast aluminum alloy, plastic or clay, and shall be capable of receiving all normally used types of pipe and joints herein specified and shall be capable of being inserted into a mechanical drilled hole not exceeding 4 1/2 inches in diameter for 4-inch service line and not exceeding 6 1/2 inches in diameter for a 6-inch service line. The fitting used shall be made in such a manner as to insure that no protrusion of the fitting into the main sewer pipe will result and shall be bonded to the main sewer with stainless steel bands. The fitting shall fit the contour of the inside of the public sewer and shall be specifically designed to fit the particular size public sewer into which it is connected. The joint material connecting the fitting to the pipe shall be an epoxy material capable of making a completely waterproof joint and capable of withstanding any condition of stress or strain likely to be encountered in normal sewer service construction or maintenance.

403.5. Grease and Sand/Oil Interceptors. Plans for proposed connections to the public sewer will be reviewed prior to issuance of a permit for such connections to determine if grease or sand/oil interceptors will be required. Interceptors may be required in order to prevent grease, fats, petroleum products, or deleterious substances from entering the public sewer system. The kind, nature and capacity of the grease or sand/oil interceptor to be installed shall conform to the applicable section of chapter, Part 9.

403.6. Sewer Meters. If it is not possible or practical by means of water usage to determine the wastewater contribution of commercial or industrial customers, the City may require installation of a sewage flow-measuring device. The City must approve the style, type, and location prior to installation.

#### **Part 4 SEWER SERVICE LINES - INSTALLATION**

404.1. General Requirements. City of Lakewood licensed contractors, operating under a current City of Lakewood utility and/or public way permit shall install sewer service lines. Contractors shall be responsible for complying with all applicable state, county and city laws, ordinances and regulations.

Permits will be issued only after all required fees, including connection fees, have been paid.

404.2. Requirements for Sewer Lines. Each building being provided sanitary sewer service, regardless of occupancy or use, must have a separate service line.

- (a) Multi-Family Usage. Service line configurations for multi-family will be determined

in the following manner:

- (1) Condominium or similar multiple ownership in common of single structures may be served by a single service line, provided that recorded declarations establish that a management entity exists for the structure with the power to enforce these Rules and Regulations, including the enforcement of charges. If a management agency does not exist, each living unit must have its own service line.
- (2) Multi-family dwellings, which are under single ownership, may be served by a single service line; however, it is preferred that when possible, each living unit be served by a separate line. As elsewhere stated by these rules and regulations, property owners are responsible for repairs and maintenance of service lines. The property owner will resolve disputes between lessees arising out of service line blockages.

404.3. Grade and Alignment. Service lines shall be laid on a uniform grade, and in straight alignment, free of abrupt bends. Grade shall not be flatter than 1% (1/8-inch per foot), without express written approval from the City of Lakewood Engineering Division. Such approval will only be granted based on sound engineering and plumbing practices.

404.4. Location. The portion of the sewer service line between the main and the property line shall be in a continuous straight line at approximately a right angle to the sewer main. Written permission must be obtained from City of Lakewood Engineering Division to install a sewer service line at any other angle to the main.

404.5. Excavation. All excavations shall be open cut except at sidewalks, curbs, or other buried utility lines. Width of trench excavation shall be a minimum of 2 feet. The foundation in the trench shall be firm earth, free from water. The pipe shall be bedded in approved bedding material, extending to a minimum of 4 inches above the top of the pipe.

404.6 Connection to Public Sewer. Each connection to the public sewer shall be made at the wye designated for that property. If no wye is designated, or if the wye cannot be located within three feet of the point of measurement furnished by the City of Lakewood Engineering Division, or if the applicant for good reason does not wish to use the wye designated for that property, the public sewer shall be mechanically tapped. At locations where the public sewer is less than 4 inches in diameter larger than the sewer service line, the connection shall be made by the use of a standard wye connection. Manholes shall meet City standards as provided in these rules and regulations. All connections to the wye branch, tapping operations, including affixing the tapping saddle, or construction of a manhole at each connection to public sewer will be accomplished and paid for by the owner.

(a) Connection at a Manhole. Attachment to the system may be made at a manhole only with prior approval from the City of Lakewood Engineering Division.

(1) Construction. All service lines attached at a manhole must meet the following:

- (a) The service line must approach the manhole in the direction of flow. The angle measured between the service line and the main line must not exceed 80 degrees; preferred is 45 degrees.
- (b) The new service line shall rest directly on the original bench and provide for a smooth, continuous flow into the main line invert. Alteration of the original bench will not be allowed. Discontinuity or abrupt changes in flow lines will not be permitted.
- (c) The manhole barrel must be core-drilled in a workmanlike manner to accommodate the service line, which shall extend into the manhole barrel at least 4 inches. The service line shall be grouted in place forming a watertight seal. Leakage or infiltration will be cause for repairs at the expense of the applicant/owner.

404.7. Laying of Pipe. Pipe laying shall progress upstream from the public sewer to the building. Pipe joints shall be made in strict accordance with the recommendations of the pipe manufacturer. Tracer wire must be firmly attached directly to the pipe from the main line to the foundation wall to permit surface detection of the pipe after backfilling. The tracer wire must be AWG size #10, Type UF or use cable, UL listed, with single copper conductor. One end of the wire shall be inserted inside the upper part of a clean-out installed on the service line just outside the foundation.

404.8. Inspection. Backfilling shall not be done until the City makes final inspection for the entire sewer service line and connection onto the main sewer line and all construction is found acceptable and approved. The City will record location of the service line.

404.9. Backfilling and Compaction. Care shall be exercised in backfilling along the sides of the pipe to properly support the pipe. Approved bedding material shall be placed and solidly hand tamped up to the top of the pipe. To protect the pipe from breaking or cracking during the remainder of the backfill operations, hand backfill using approved bedding material shall be continued at least 6 inches above the top of the pipe. The remainder of the trench shall be filled with the excavated material in layers of approximately 12 inches and compacted by mechanical tamping equipment that will insure a completely filled trench that will not result in a settlement. Backfill material shall be compacted at or near optimum moisture content. If necessary, water shall be added to the backfill to obtain near optimum moisture content. Backfill under public streets shall be accomplished as specified in the required street cut permit.



404.10 Road Resurfacing Repair. Street pavements, curbs, gutters and sidewalks disturbed in the construction of sewer service lines shall be replaced and/or resurfaced as specified in the required Lakewood public way permit. Backfill and compaction of trenches under public streets shall be accomplished as specified in the required Lakewood public way permit.

404.11. Stub-Out. In order to eliminate future excavation in the public way, the owner may make application for and install stub-outs to serve buildings for which platting has been approved zoning. Stub-outs will extend to the property line, will be marked with a location pin on surface, and be subject to the same construction, inspection, and workmanship standards cited above.

- (a) Infiltration. Particular care must be exercised when plugging a stub-out at the property line to eliminate the infiltration of sub-surface waters.
- (b) Fee. A stub-out fee may be levied for each stub-out, as set forth by a schedule of rates, charges, and fees for sanitary sewer service.



## CHAPTER 5            MAINTENANCE STANDARDS

### Part 1 MAINTENANCE OF THE SANITARY SEWER COLLECTION SYSTEM

502.1 General. The capacity of the sanitary sewer system is protected by a program of maintenance and repairs and by limiting the discharge of wastes that would block or damage the system.

502.2. Responsibility. Responsibility for maintenance and repairs of the sanitary sewer system is as outlined below:

(a) Service Lines. The service line is that portion of the collection system located between the building connection and the line's attachment to the sanitary sewer main. The property owner is responsible for correction of stoppages and any repairs needed in the total length of the service line. The City is not responsible for any repairs to service lines.

(b) Sanitary Sewer Mains and Appurtenances. The City is responsible for the operation and maintenance of all sanitary sewer mains, outfall lines, meter stations, and other system appurtenances such as lift stations and manholes, except as stipulated by other agreements or contracts.

(c) Service Line Meters. The owner is responsible for the repairs and maintenance of service line meters.

### Part 2 MAINTENANCE OF THE WATER DISTRIBUTION SYSTEM

503.2. Responsibility. Responsibility for maintenance and repairs of the water distribution system is as outlined below:

(a) Service Lines. The property owner shall be responsible for maintenance and repairs to that portion of the service line between the building connection and the meter pit. the City will maintain and repair that portion of the service line between the meter pit and the connection to the water main. The City will also repair curb stops located between the meter pit and the connection to the water main.

(b) Meters. The City will ordinarily maintain and repair water meters at no expense to the property owner. In the event condition of the meter is such that further repair is impractical, the City will replace the meter at City expense.

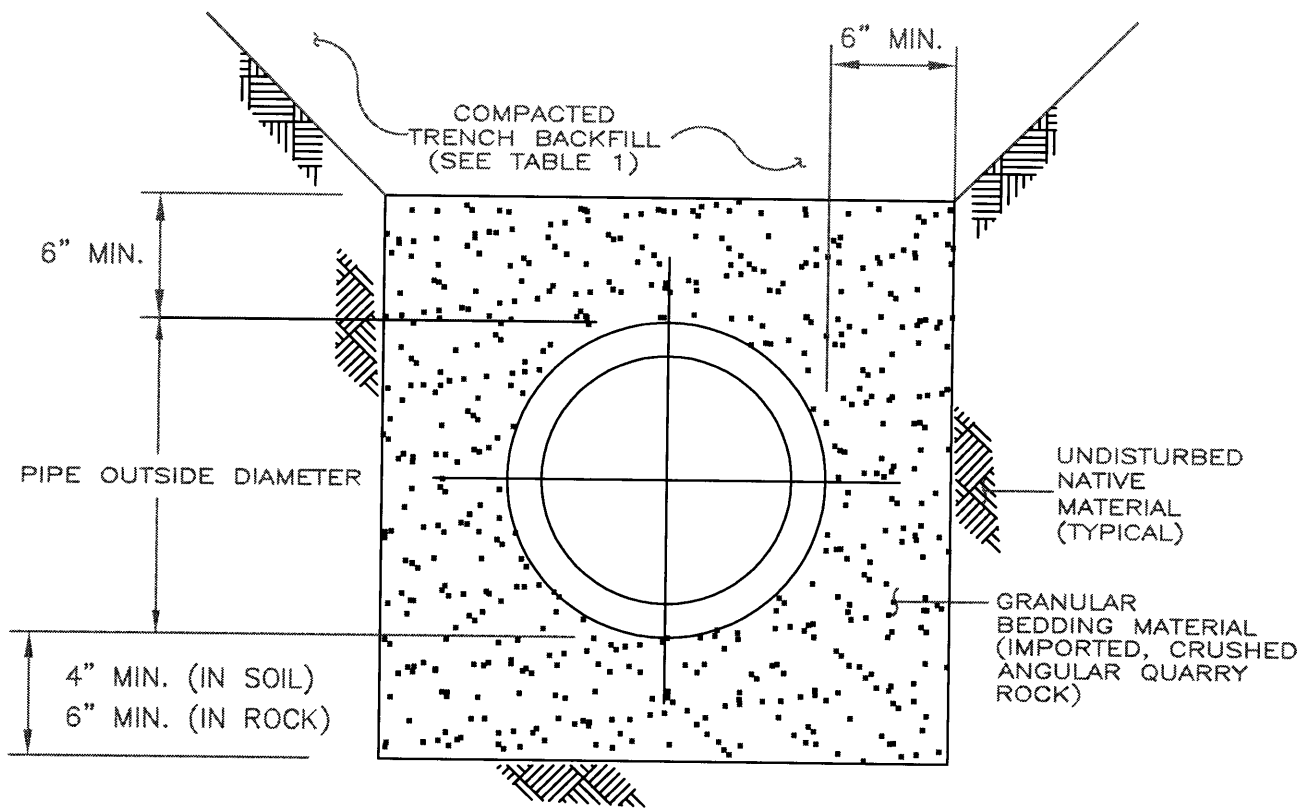
(c) Meter Setting Hardware and Vaults. The repair and maintenance of all equipment and

hardware used to install the meter and all associated vault or meter pit materials shall be the responsibility of the City.

(d) Distribution System. The City shall be responsible for repairs and maintenance of the water distribution system except as noted above.

## APPENDIX A DESIGN STANDARDS

Pipe Bedding Detail (PVC Sewer Pipe Only).....	SA-1
Standard Manhole Detail .....	SA-2
Standard Manhole Base Detail.....	SA-3
Manhole Base Detail for 90° Manhole .....	SA-4
Manhole Base Detail Branch Sewer Connection (3-Way).....	SA-5
Manhole Base Detail Branch Sewer Connection (4-Way).....	SA-6
Standard Drop Sewer Manhole Detail .....	SA-7
Standard Manhole Bolt-Down Water-Tight Frame and Cover.....	SA-8
Polypropylene Reinforced Plastic Manhole Step.....	SA-9
Sewer Service Line .....	SA-10
Lamphole and Service Line Cleanout Detail .....	SA-11
Grease Interceptor Type “A” .....	SA-12
Grease Interceptor Type “B” .....	SA-13
Sand/Oil Interceptor Type “I” .....	SA-14
Sand/Oil Interceptor Type “II” .....	SA-15
General Notes, Common to Design Standards SA-12 – SA-15.....	SA-16



NOTE: Granular bedding material shall meet the following gradation (ASTM D448, NO. 67):

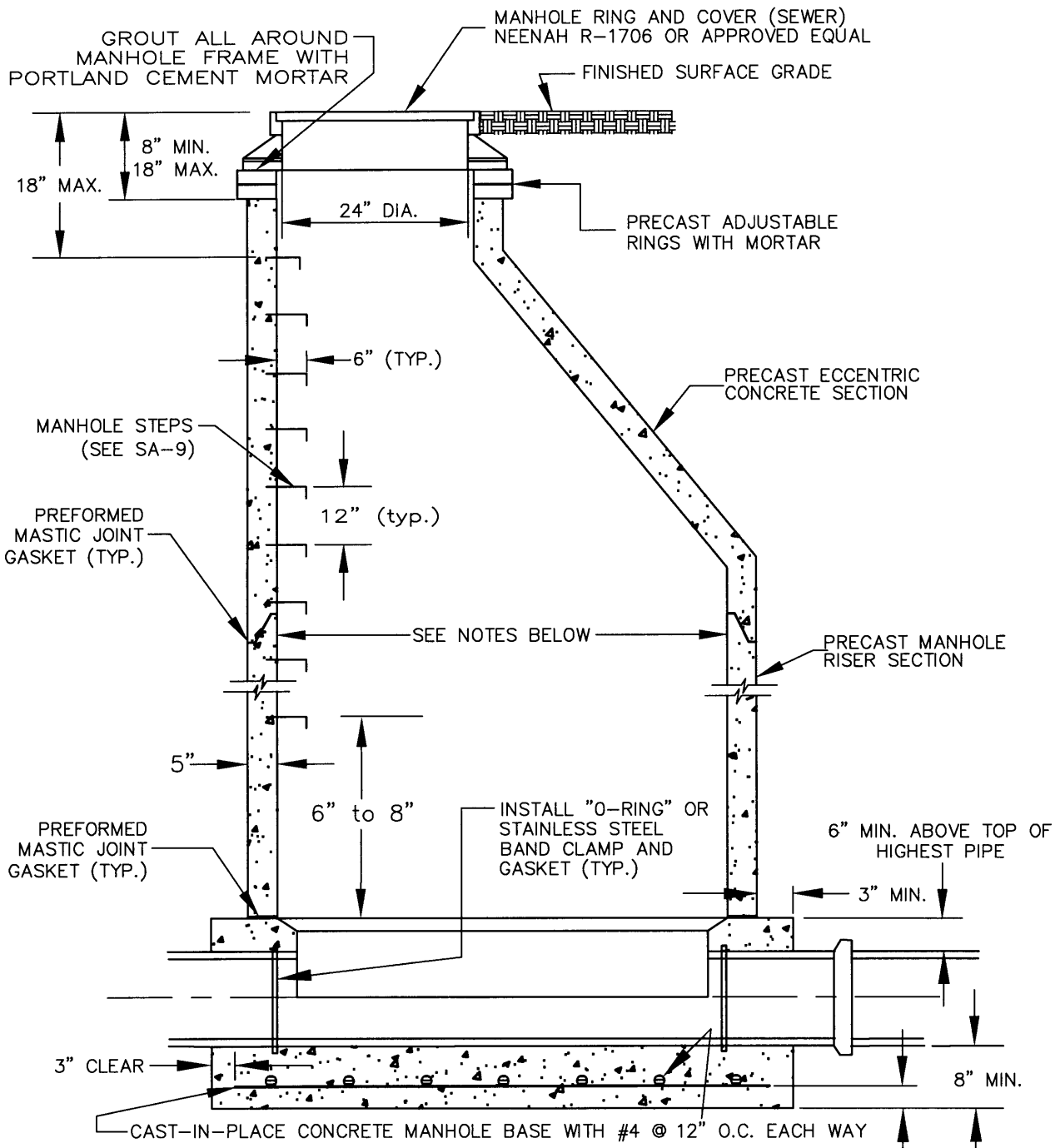
SIEVE SIZE OR DESIGNATION	TOTAL PASSING (% BY WEIGHT)
3/4-INCH	100
3/8-INCH	20-55
No. 8	0-10
No. 200	0-5

TABLE 1

BACKFILL COMPACTION AND MOISTURE REQUIREMENTS

AASHTO CLASSIFICATION	REQUIRED COMPACTION	MOISTURE CONTENT TOLERANCE FROM OPTIMUM
A-1, A-2-5, A-2-7, A-3, A-4, A-5	MIN. 95% OF AASHTO T-180	-3 TO +3
A-2-4, A-2-6, A-6, A-7	MIN. 95% OF AASHTO T-99	0 TO +3

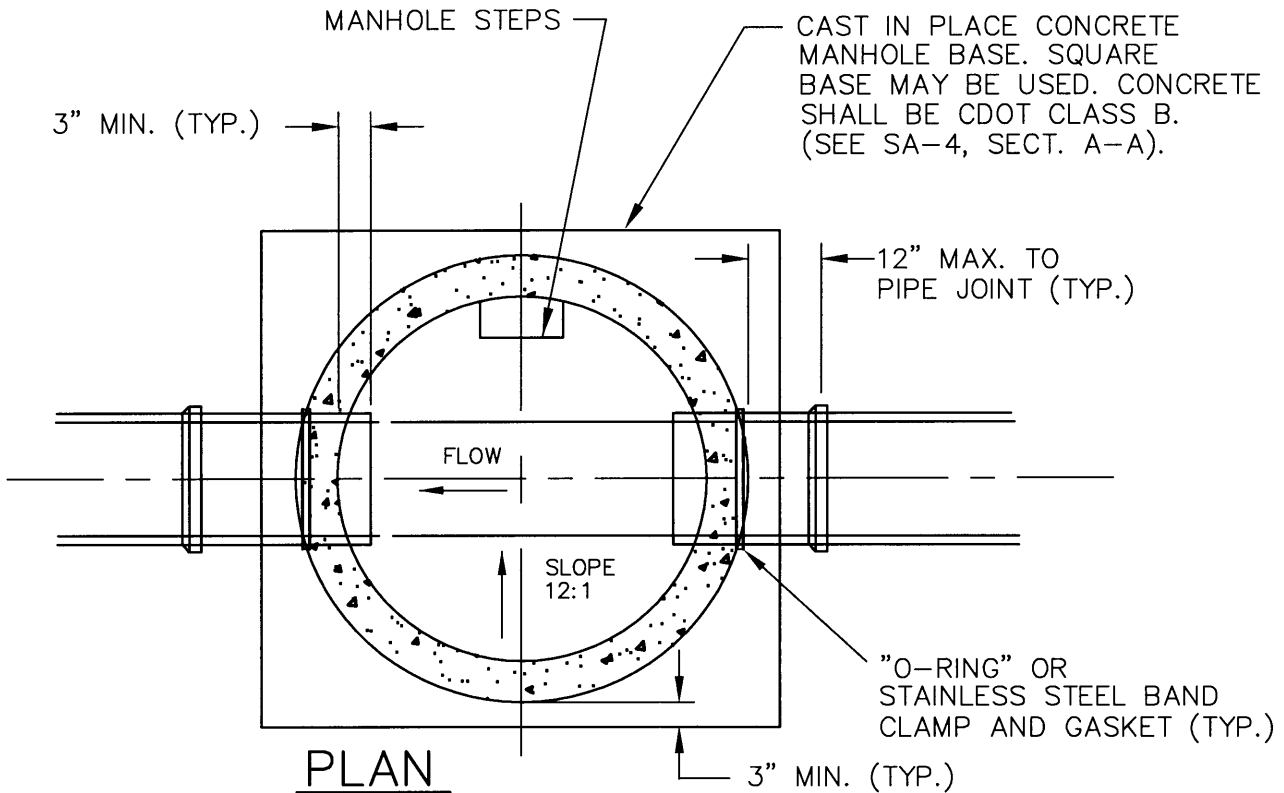
APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> <b>DEPARTMENT OF PUBLIC WORKS</b> <b>DIVISION OF ENGINEERING</b>	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>PIPE BEDDING DETAIL</b> <b>PVC SEWER PIPE ONLY</b>	DESIGN STANDARD NO <b>SA-1</b> November 2001



NOTES:

1. See Design Standards SA-3 through SA-6 for manhole bases.
2. Manhole diameter shall be: 4' for all pipes 24" inside diameter or smaller and 5' for all pipes 27" - 36" inside diameter
3. If any pipe is larger than 36" inside diameter, a specially designed manhole shall be used.

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APPROVED  _____ CITY ENGINEER	<b>STANDARD MANHOLE DETAIL</b>	DESIGN STANDARD NO <b>SA-2</b>  November 2001



**NOTE:**

1. Manholes with a depth from top of casting to invert which is less than or equal to 6' shall have flat tops with an eccentric opening.

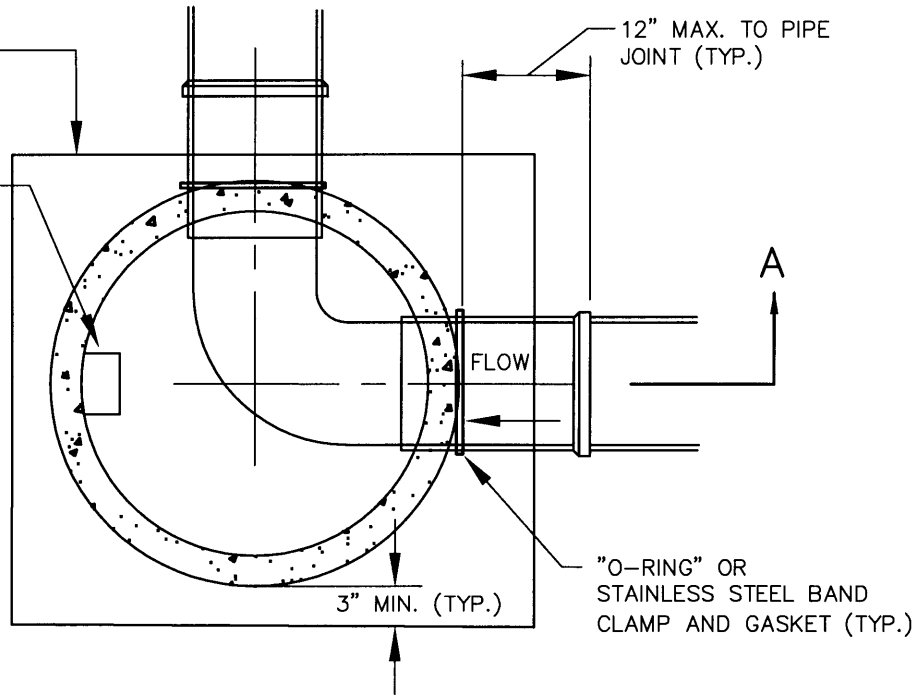
APPROVED <hr/> DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED <hr/> CITY ENGINEER	<b>MANHOLE BASE DETAIL</b>	DESIGN STANDARD NO <b>SA-3</b> November 2001



CAST IN PLACE  
CONCRETE MANHOLE  
BASE. CONCRETE SHALL  
BE CDOT CLASS B

MANHOLE STEPS

A



PLAN

PRECAST  
MANHOLE  
BARREL  
SECTION

PREFORMED MASTIC  
GASKET (TYP.)

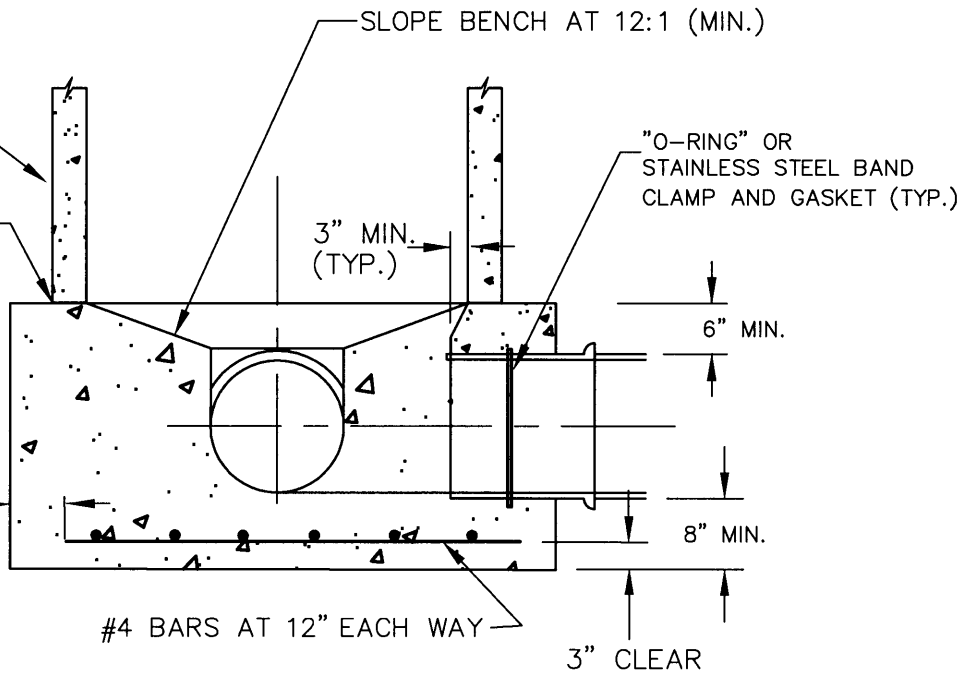
SLOPE BENCH AT 12:1 (MIN.)

"O-RING" OR  
STAINLESS STEEL BAND  
CLAMP AND GASKET (TYP.)

3" (TYP.)

3" MIN.  
(TYP.)

6" MIN.



#4 BARS AT 12" EACH WAY

3" CLEAR

8" MIN.

SECTION A-A

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DEPARTMENT OF PUBLIC WORKS  
DIVISION OF ENGINEERING

REVISIONS

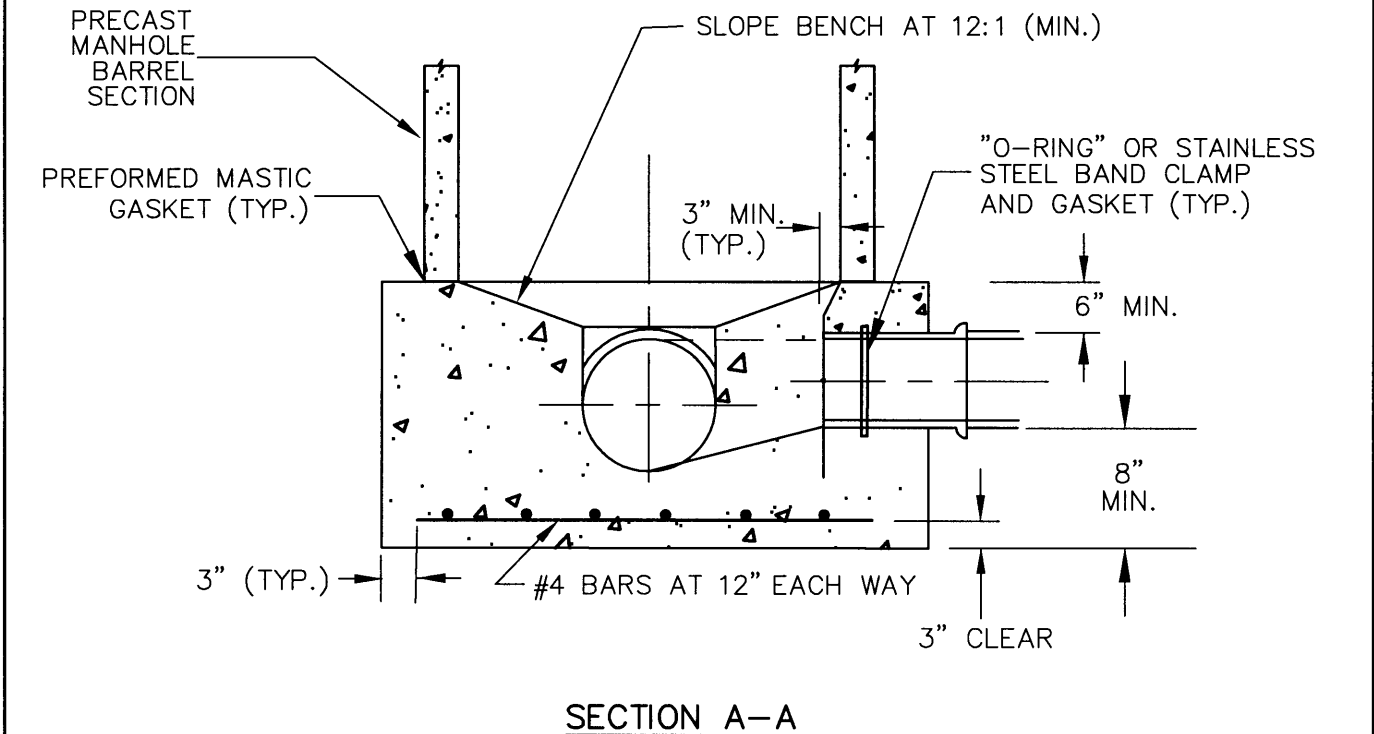
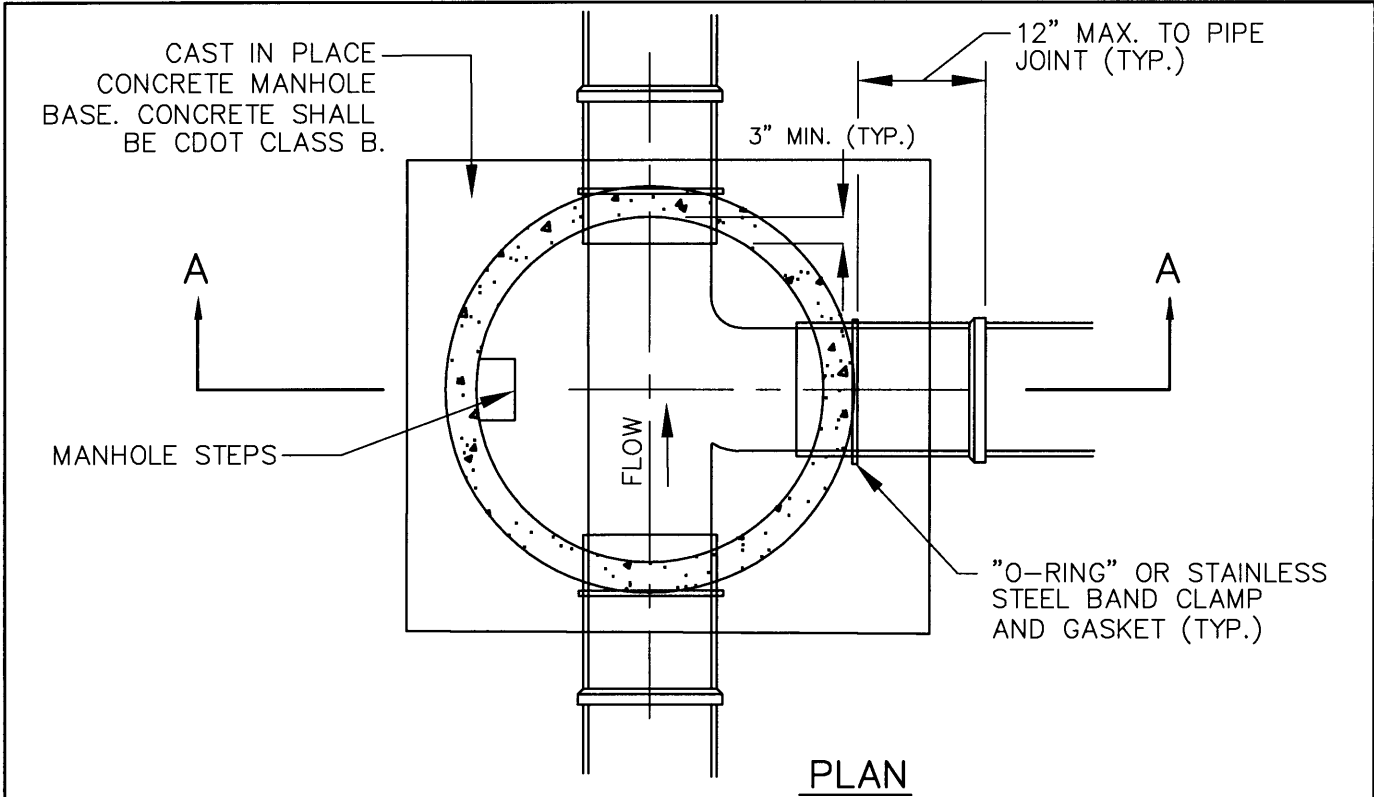
APPROVED

CITY ENGINEER

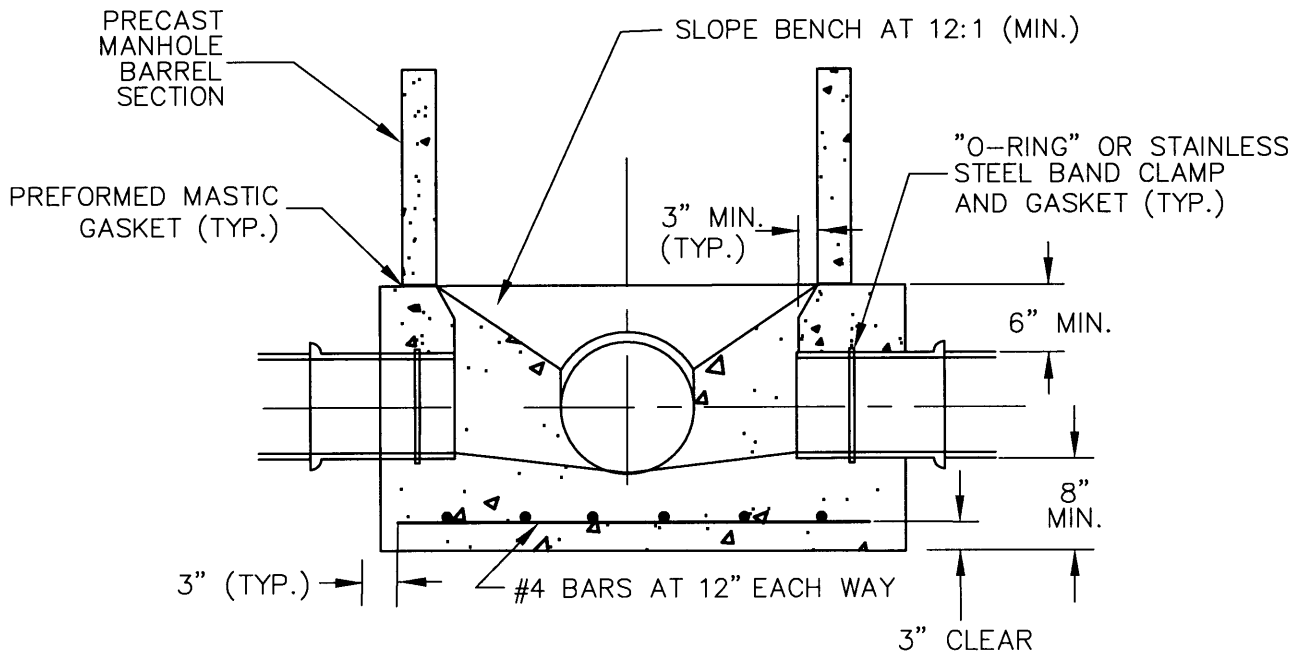
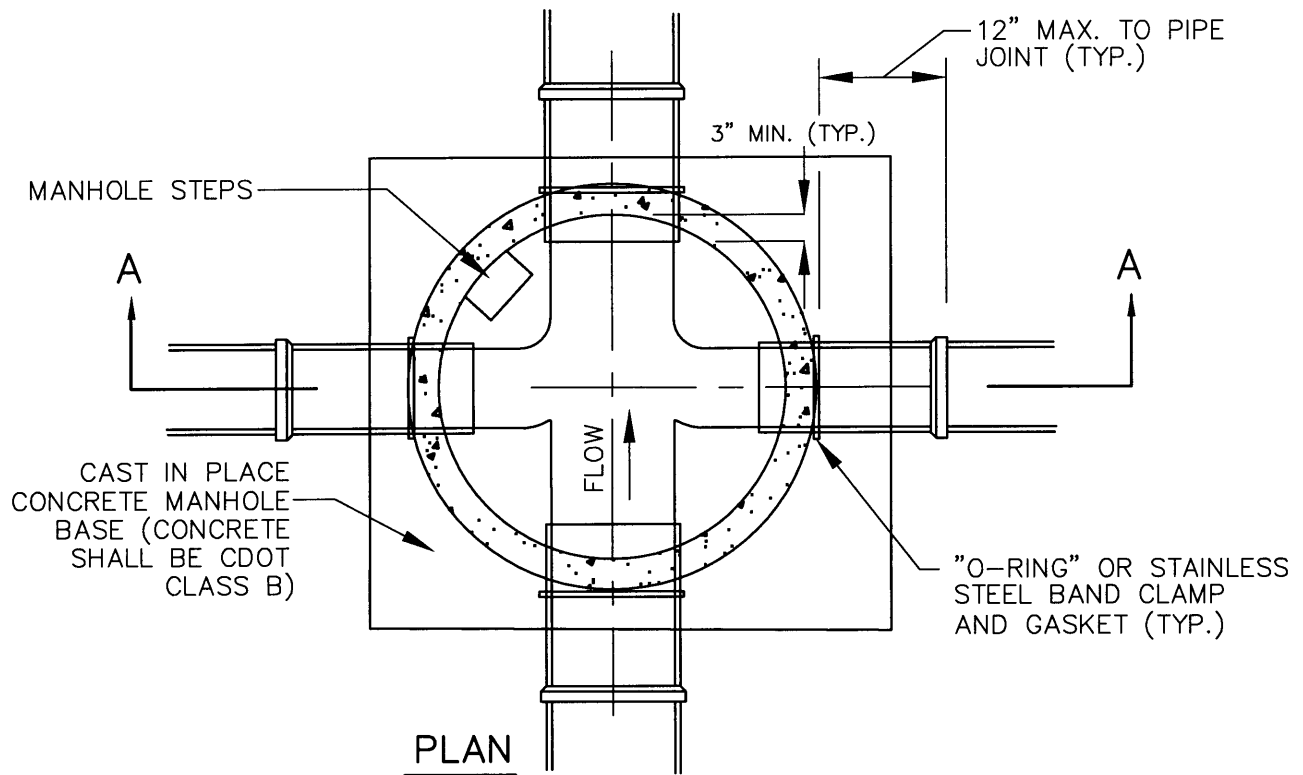
MANHOLE BASE DETAIL  
90° MANHOLE

DESIGN STANDARD NO  
SA-4

November 2001

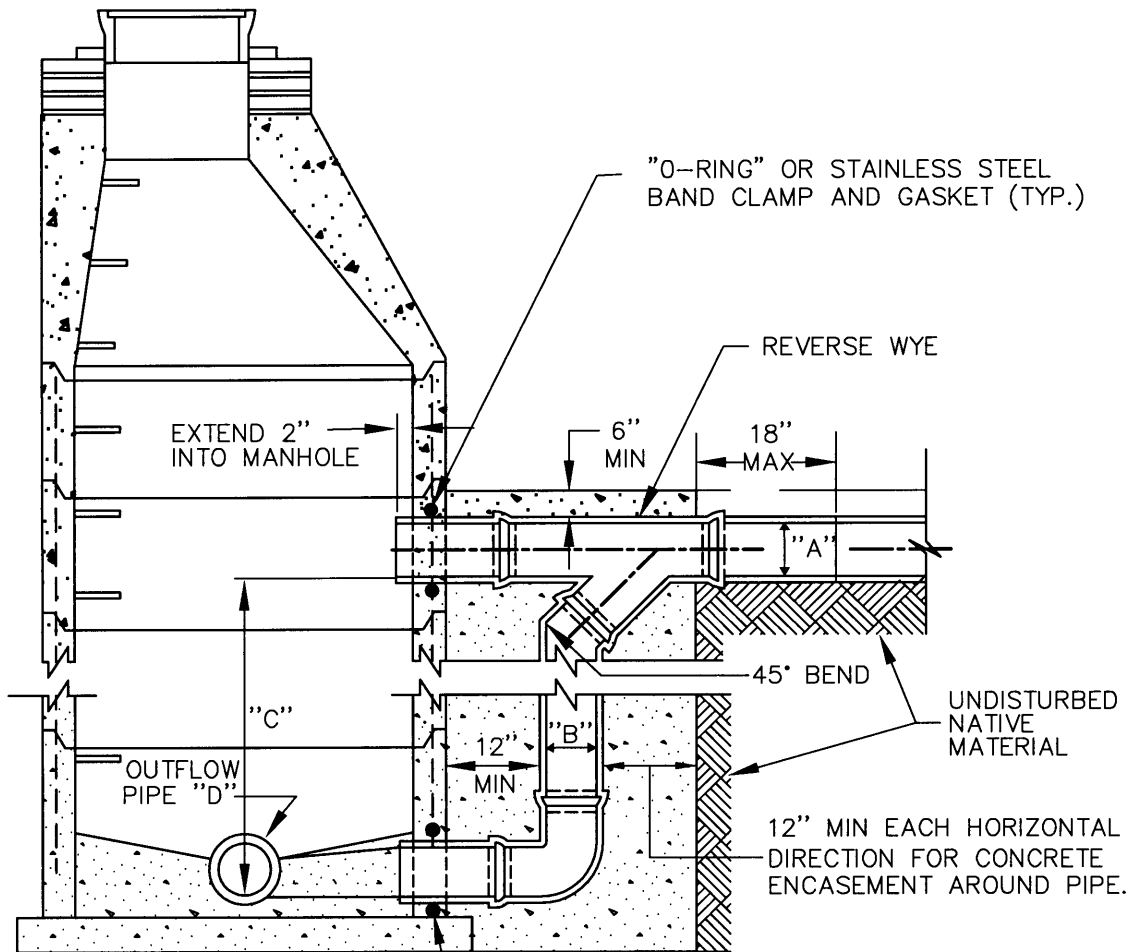


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APPROVED <hr/> CITY ENGINEER	<b>MANHOLE BASE DETAIL</b> <b>THREE PIPES</b>	DESIGN STANDARD NO <b>SA-5</b> November 2001



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APPROVED <hr/> CITY ENGINEER		DESIGN STANDARD NO <b>SA-6</b> November 2001

**MANHOLE BASE DETAIL  
FOUR PIPES**



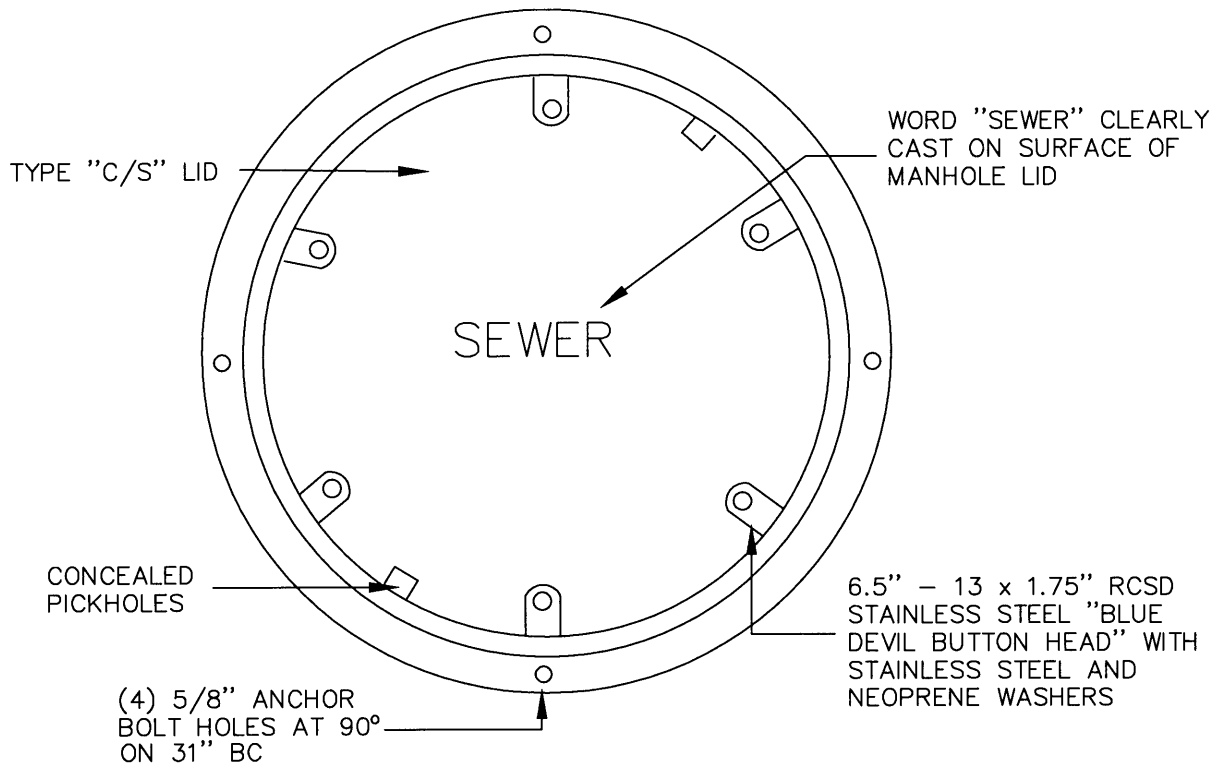
"O-RING" OR STAINLESS STEEL BAND CLAMP AND GASKET (TYP.)

**NOTES:**

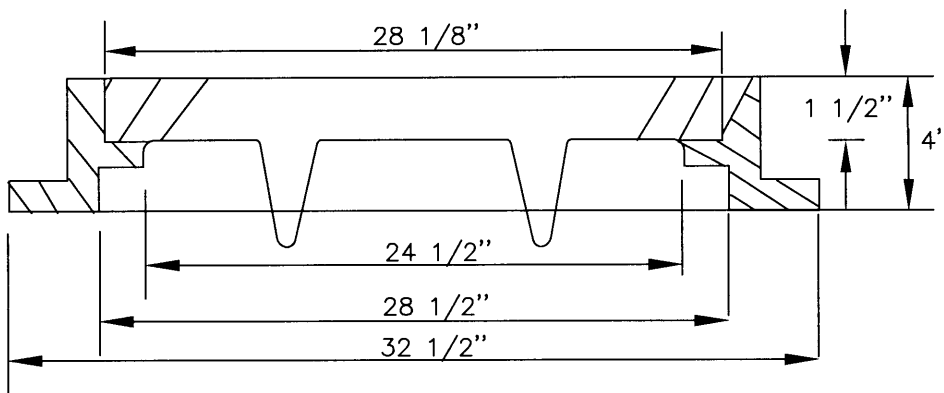
1. Drop manholes are required when "C" ≥ 2 feet.
2. See Design Standards SA-2 through SA-6 for other manhole details.
3. Crown of pipe "B" to match crown of pipe "D".

"A" PIPE DIA	"B" PIPE DIA
8"	8"
10"	10"
12"	12"
15"	12"
18"	15"
21"	18"
24"	18"
27"	18"
30"	18"
36"	18"
42"	24"
48"	30"

APPROVED  _____ DIRECTOR OF PUBLIC WORKS	CITY OF LAKEWOOD, COLORADO DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	STANDARD DROP MANHOLE DETAIL	DESIGN STANDARD NO SA-7
		November 2001

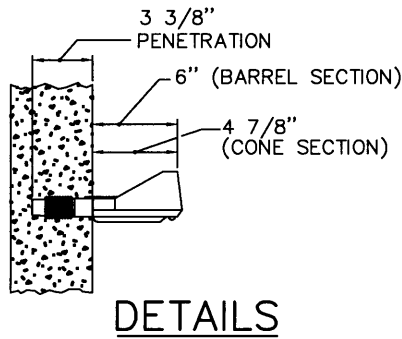
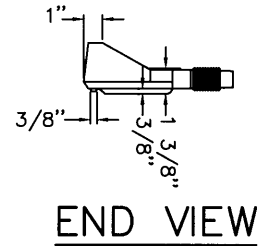
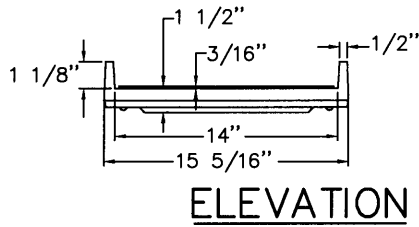
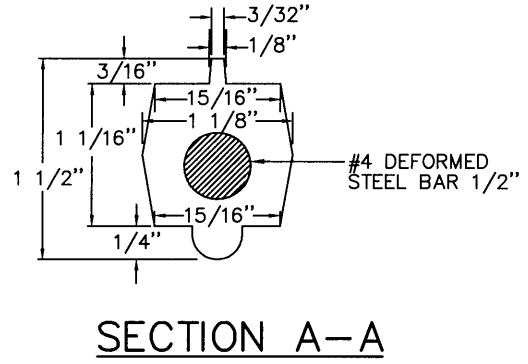
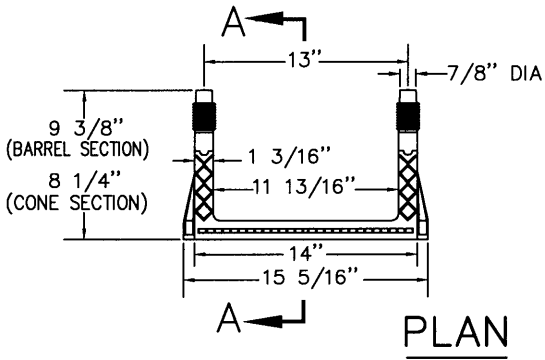


NOTE: USE THIS FRAME AND COVER FOR MANHOLES LOCATED OUTSIDE DEDICATED STREET ROW OR WHERE SURFACE RUNOFF CANNOT BE AVOIDED.



NEENAH PRESSURE TYPE ROUND MH FRAME, C/S BOLTED LID R-6462-GH OR APPROVED EQUAL (SUBMIT TO CITY FOR APPROVAL)

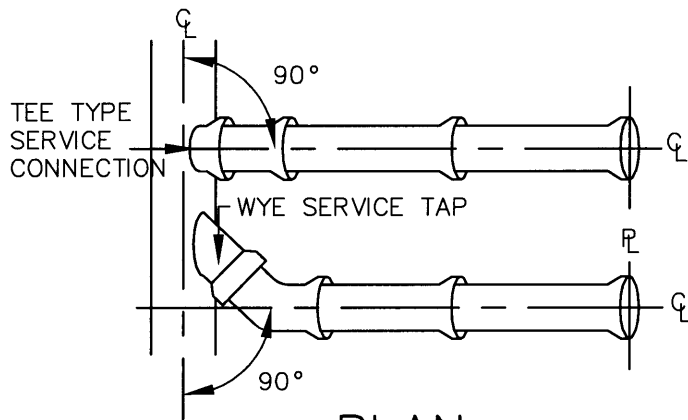
APPROVED <hr/> DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED <hr/> CITY ENGINEER	<b>STANDARD MANHOLE          BOLT-DOWN WATER-TIGHT          FRAME AND COVER</b>	DESIGN STANDARD NO <b>SA-8</b> November 2001



**NOTES:**

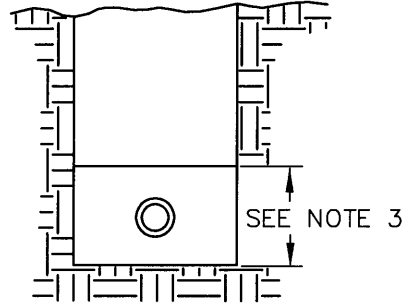
1. Steps to be cast, unaltered, in manhole wall in a straight line, vertically, at same time the barrel or cone sections are cast.
2. If steps are not cast into the manhole barrel sections as mentioned above, steps shall be installed by the "press fit" method following manufacturer's recommended procedure, and shall not be grouted in place.
3. Installed steps shall be capable of withstanding a pull out force of 2,500 lbs. per leg for a minimum period of two minutes.

APPROVED  <hr style="width: 80%; margin: 0 auto;"/> DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  <hr style="width: 80%; margin: 0 auto;"/> CITY ENGINEER	<b>POLYPROPYLENE          REINFORCED PLASTIC          MANHOLE STEP</b>	DESIGN STANDARD NO <b>SA-9</b>  November 2001

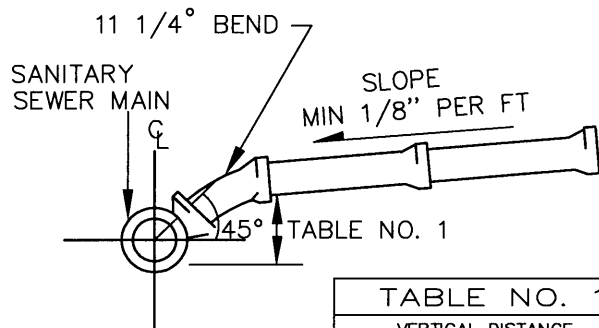


PLAN

MINIMUM TRENCH WIDTH SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 12"

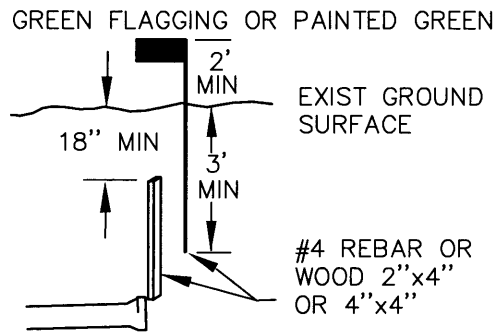


CROSS SECTION



PROFILE

TABLE NO. 1		
VERTICAL DISTANCE FROM FLOWLINE OF MAIN TO FLOWLINE OF SERVICE LINE		
MAIN SIZE	4" SERVICE	6" SERVICE
8"	6"	10"
10"	11"	12"
12"	12"	13"
15"	15"	16.5"

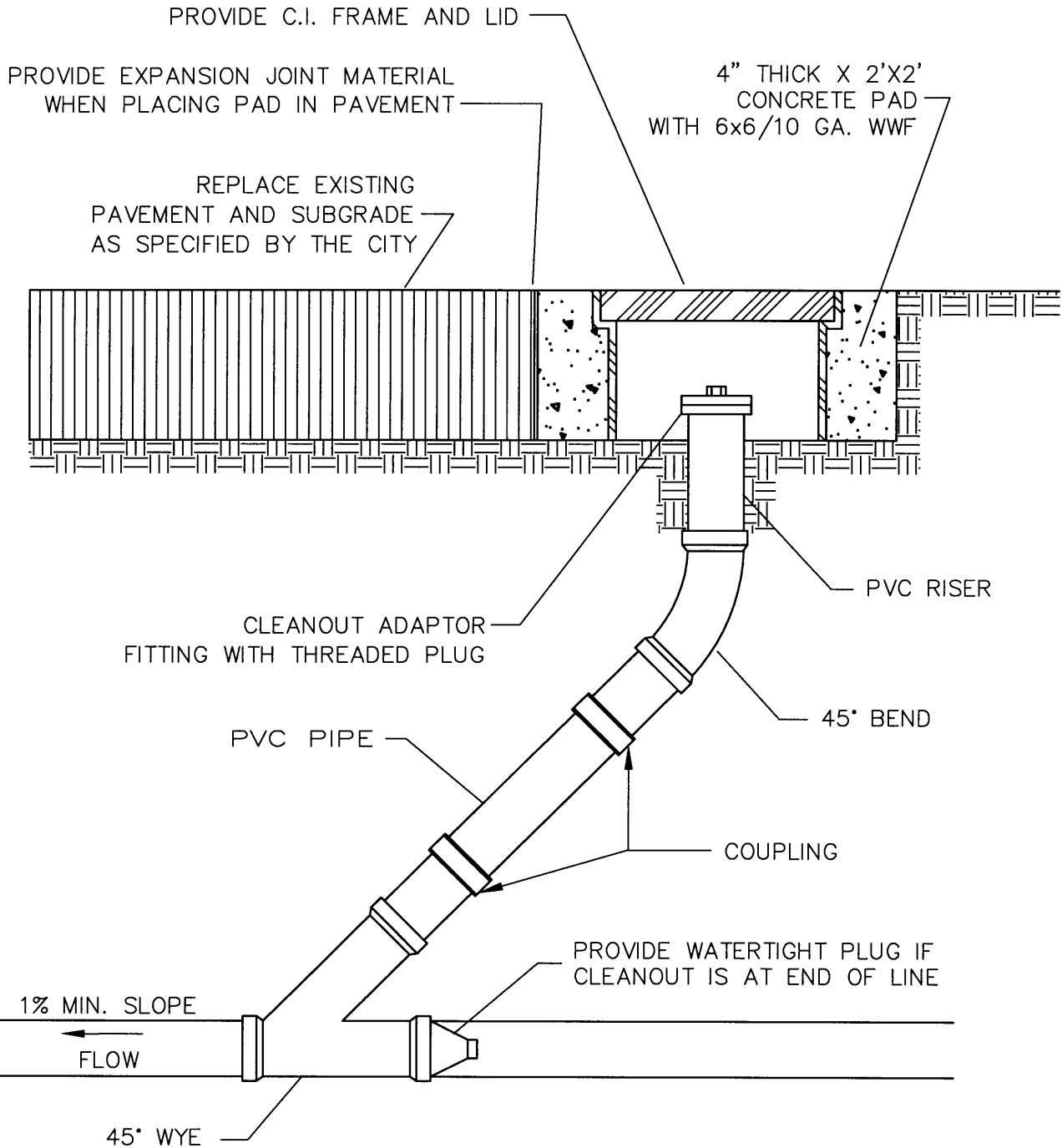


MARKER POST  
(AT SERVICE STUB OUT)

NOTES:

1. All service lines shall be 4" minimum in diameter.
2. The minimum slope for 4" or 6" service lines shall be 1\8" per foot.
3. Bedding for house connections within public right-of-way shall be the same as for sewer main. (See SA-1).
4. Tracer wire shall be attached directly to the pipe, from the main line to the foundation, in order to permit surface detection of the pipe after backfilling. The wire shall be AWG size #10, type UF or use cable, UL listed, with single copper conductor. One end of the wire is to be inserted inside the upper part of a cleanout installed on the service line just outside the foundation.
5. Service lines larger than 6" must be connected to the main at a manhole.
6. Service lines will be plugged at the property line with an appropriate plug for the type of line installed until connected to building. After abandonment of a service line, it must be plugged 5' outside of public right-of-way or easements.
7. Compaction of backfill shall be as stated in the City of Lakewood Standard Specifications.

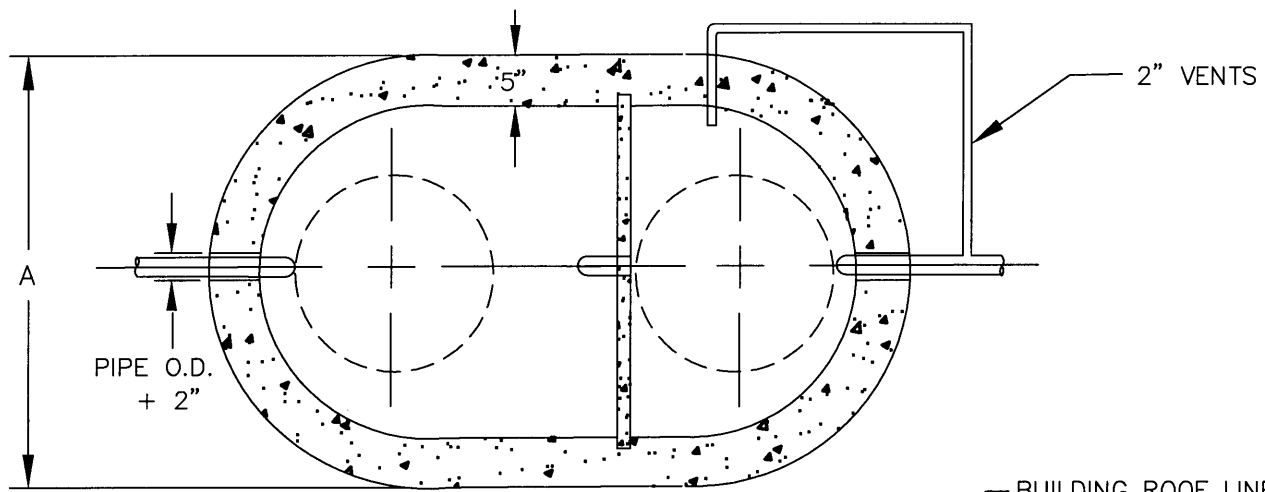
APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>SEWER SERVICE LINE</b>	DESIGN STANDARD NO <b>SA-10</b>
		November 2001



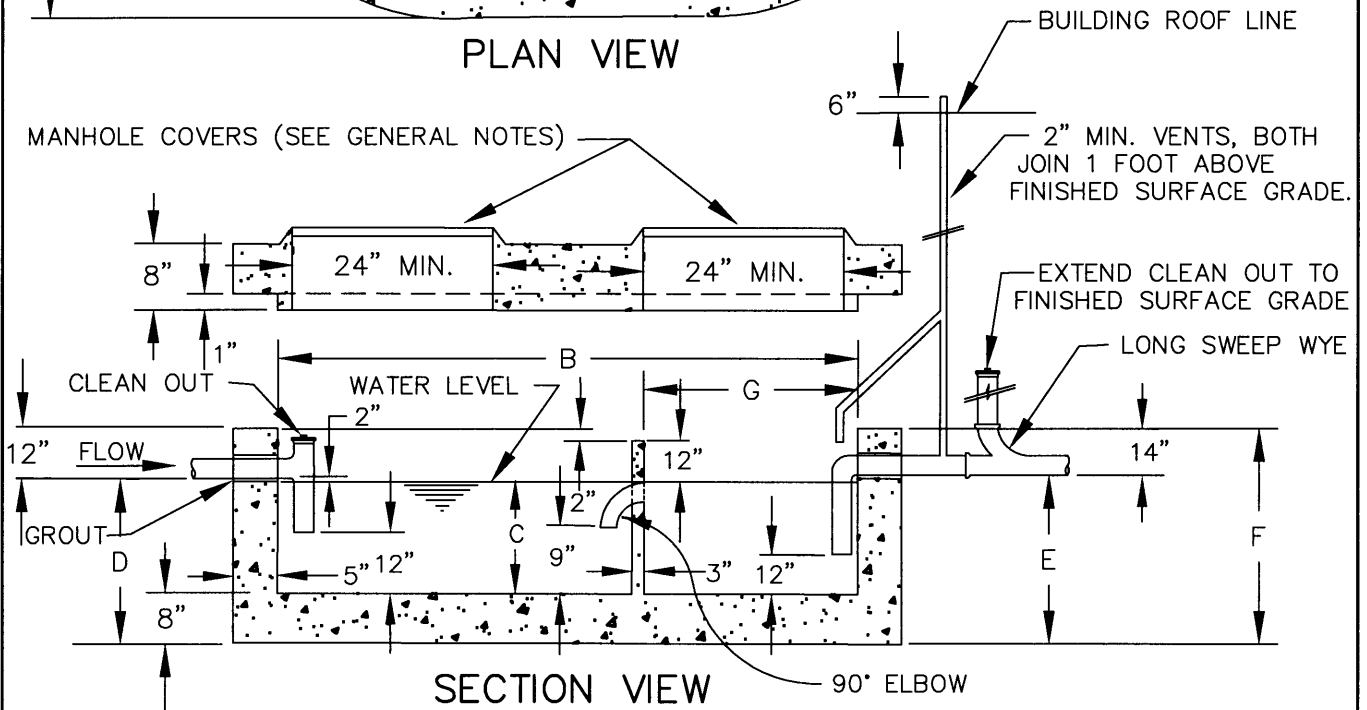
NOTE: For lamphole installation all pipe and fittings shall be the same size as the main sewer line.

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APPROVED <hr/> CITY ENGINEER	<b>LAMPHOLE AND          SERVICE LINE CLEANOUT DETAIL</b>	DESIGN STANDARD NO <b>SA-11</b> November 2001





PLAN VIEW

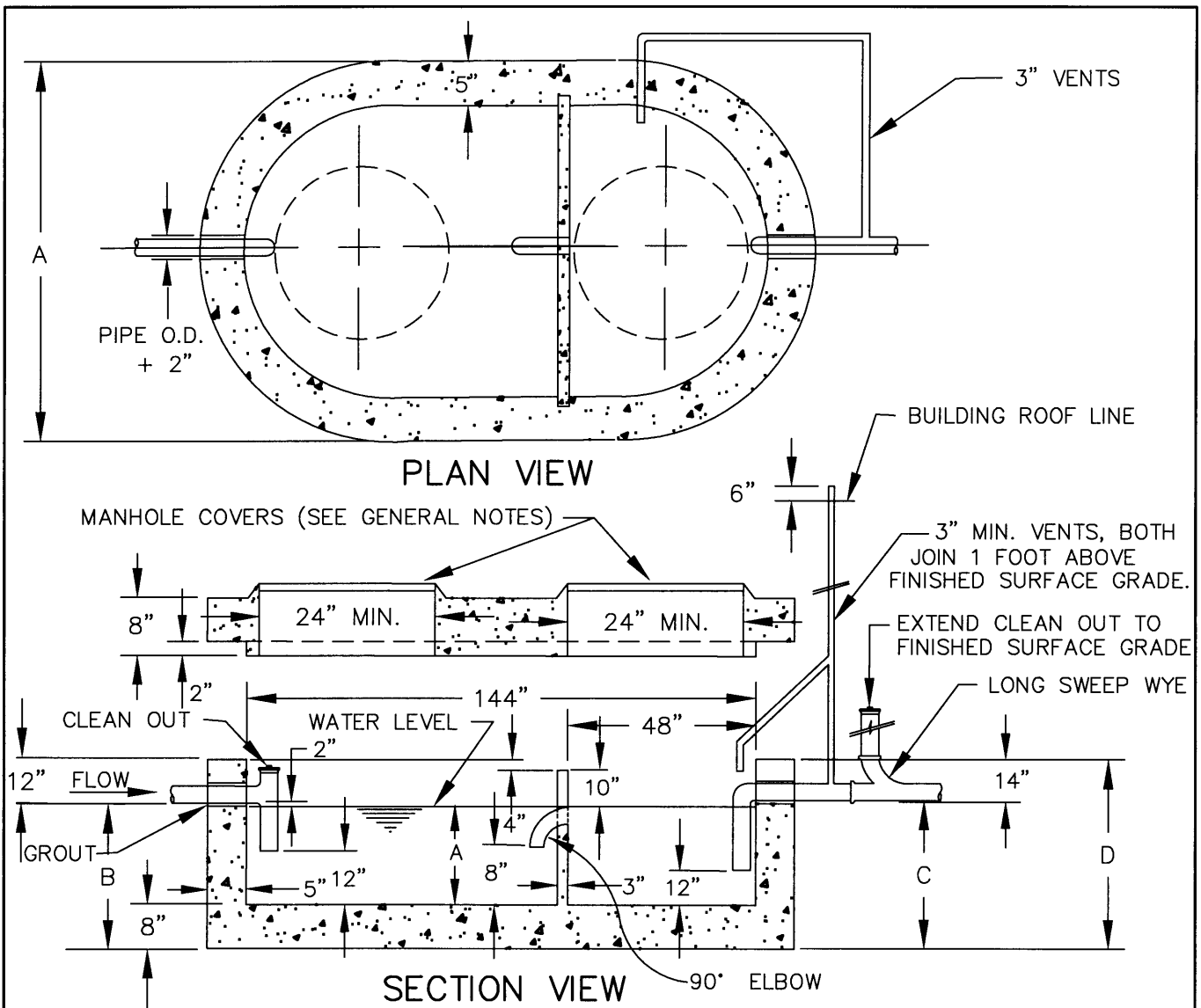


SECTION VIEW

APPROXIMATE WATER CAPACITY (GALLONS)	APPROXIMATE GREASE CAPACITY (CUBIC FEET)	TWO COMPARTMENT TANK DIMENSIONS (INCHES)						
		A	B	C	D	E	F	G
320	13	48	72	22	32	30	44	24
500	32	48	72	36	46	44	58	24
780	47	48	96	40	50	48	62	20
1060	74	72	102	34	44	42	56	30
1250	87	80	112	35	43	41	57	36

SEE GENERAL NOTES ON DESIGN STANDARD SA-16

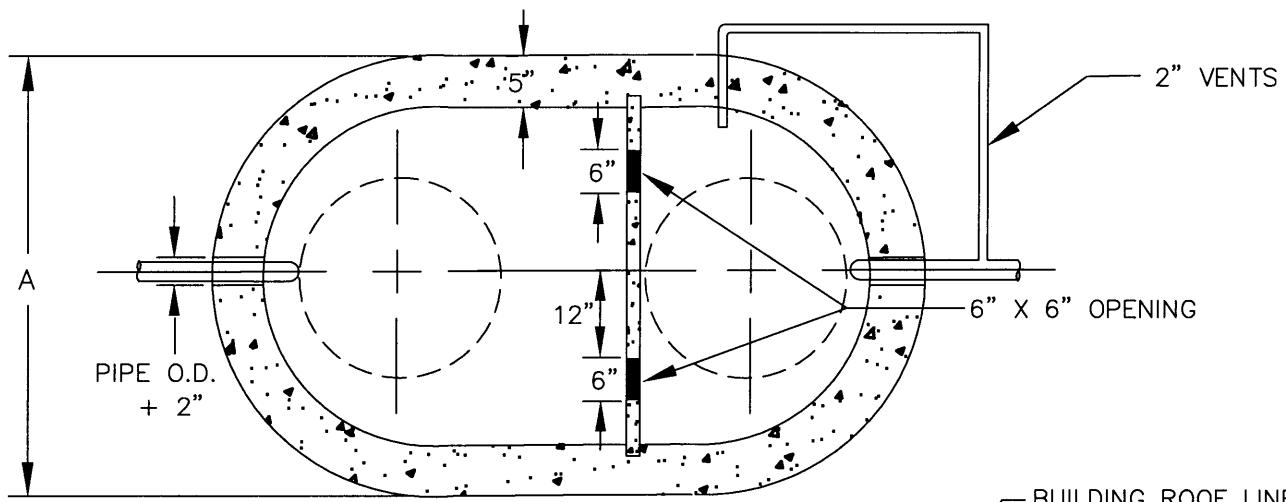
APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>GREASE INTERCEPTOR TYPE "A"</b>	DESIGN STANDARD NO <b>SA-12</b>  November 2001



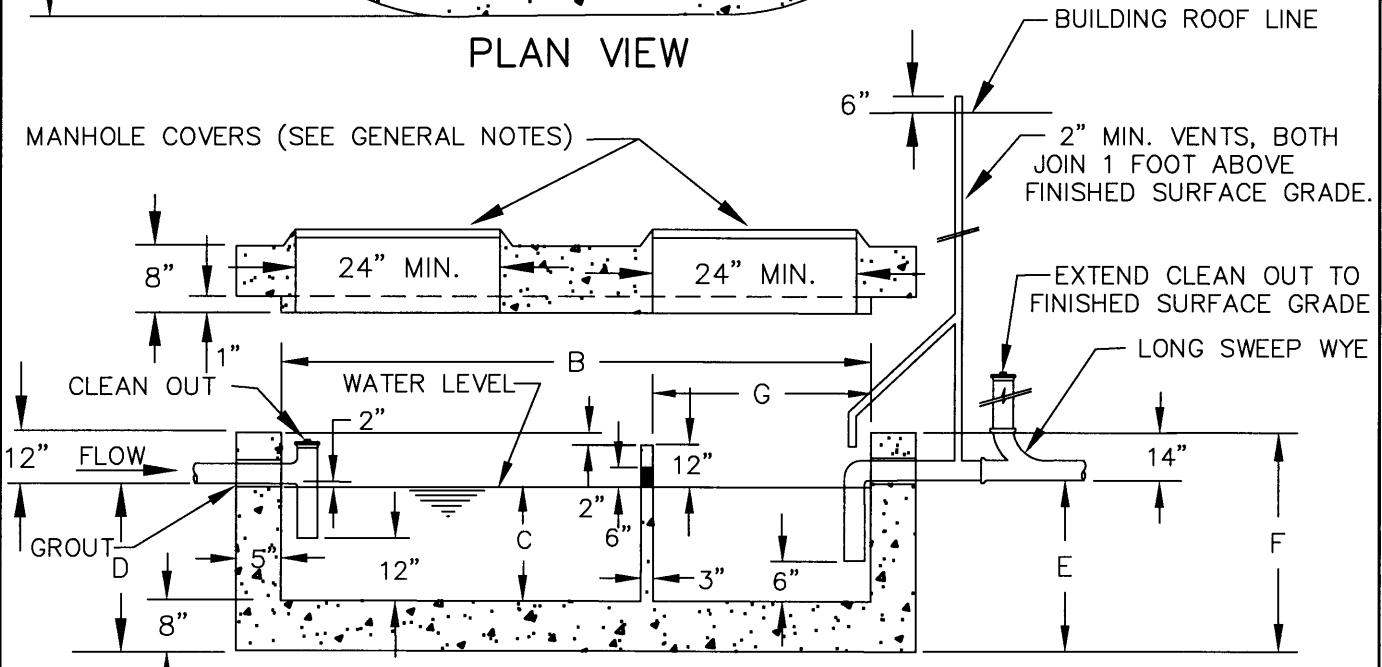
APPROXIMATE WATER CAPACITY (GALLONS)	APPROXIMATE GREASE CAPACITY (CUBIC FEET)	TWO COMPARTMENT TANK DIMENSIONS (INCHES)			
		A	B	C	D
1565	100	40	50	48	62
1800	121	46	56	54	68
2035	143	52	62	60	74
2505	186	64	74	72	86
2975	229	76	86	84	98
3210	250	82	92	90	104
3445	271	88	98	96	110

SEE GENERAL NOTES ON DESIGN STANDARD SA-16

APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>GREASE INTERCEPTOR TYPE "B"</b>	DESIGN STANDARD NO <b>SA-13</b>  November 2001



PLAN VIEW

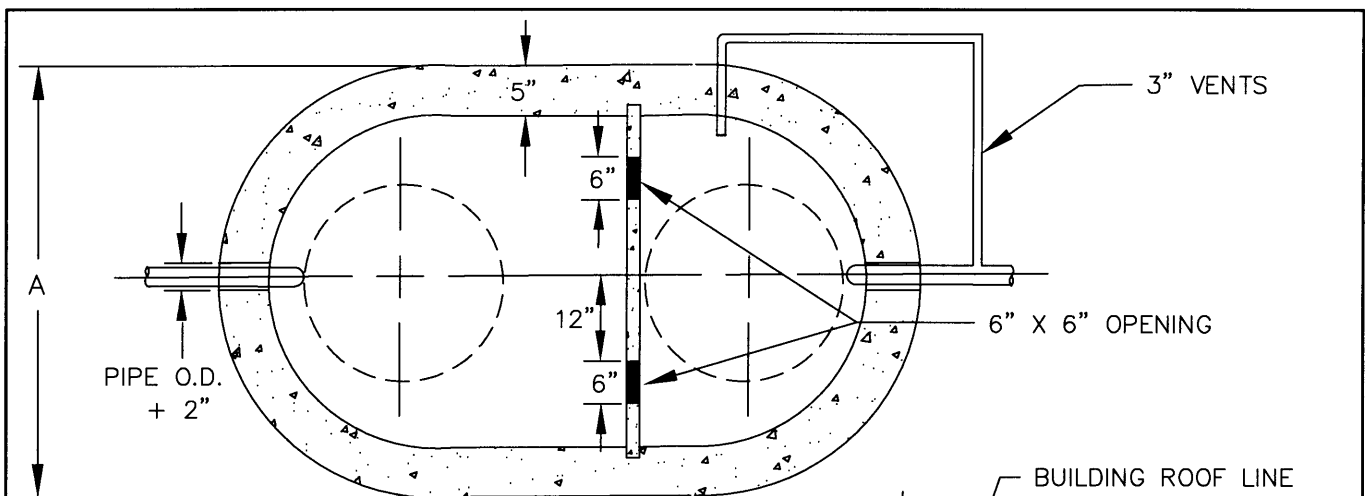


SECTION VIEW

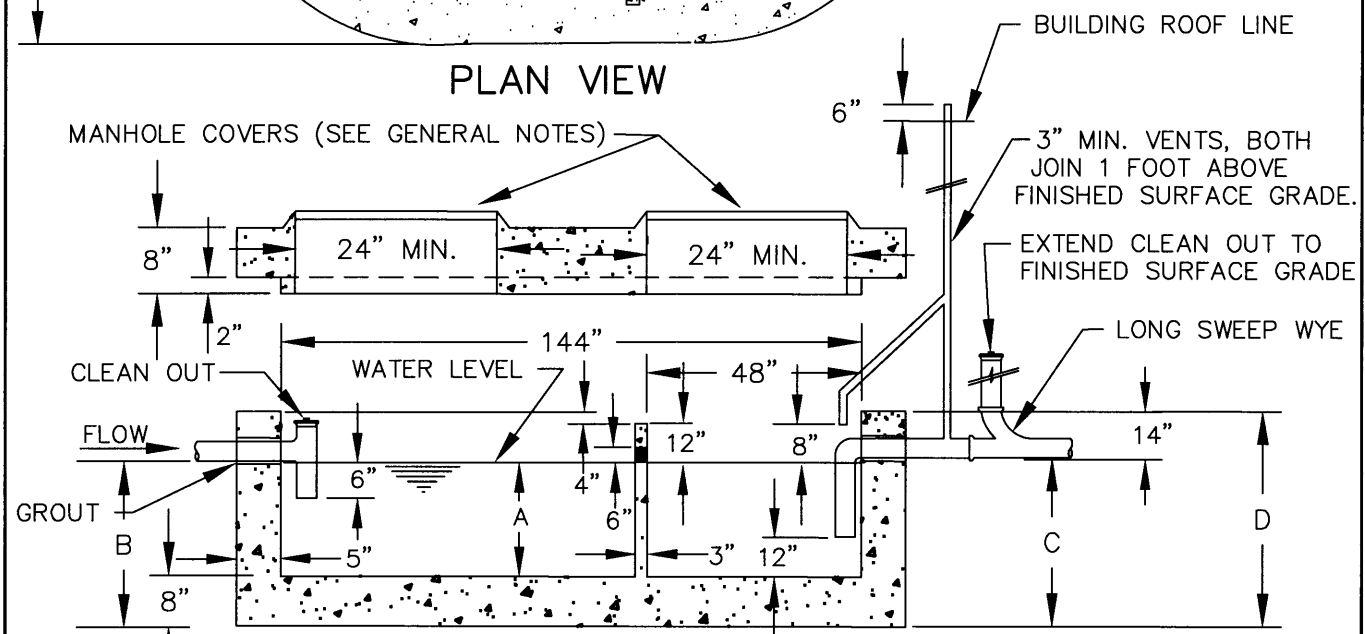
APPROXIMATE WATER CAPACITY (GALLONS)	APPROXIMATE GREASE CAPACITY (CUBIC FEET)	TWO COMPARTMENT TANK DIMENSIONS (INCHES)						
		A	B	C	D	E	F	G
320	13	48	72	22	32	30	44	24
500	32	48	72	36	46	44	58	24
780	47	48	96	40	50	48	62	20
1060	74	72	102	34	44	42	56	30
1250	87	80	112	35	43	41	57	36

(SEE GENERAL NOTES ON DESIGN STANDARD SA-16)

APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>SAND/OIL INTERCEPTOR TYPE I</b>	DESIGN STANDARD NO <b>SA-14</b>  November 2001



PLAN VIEW



SECTION VIEW

APPROXIMATE WATER CAPACITY (GALLONS)	TWO COMPARTMENT TANK DIMENSIONS (INCHES)			
	A	B	C	D
1565	40	50	48	62
1800	46	56	54	68
2035	52	62	60	74
2505	64	74	72	86
2975	76	86	84	98
3210	82	92	90	104
3445	88	98	96	110

(SEE GENERAL NOTES ON DESIGN STANDARD SA-16)

APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>SAND/OIL INTERCEPTOR TYPE II</b>	DESIGN STANDARD NO <b>SA-15</b> November 2001

1. All pipe and fittings shall be cast or ductile iron, minimum 3" diameter.
2. Walls and bottom shall be reinforced throughout with 6X6/10 ga. reinforcement mesh.
3. Concrete lid shall be reinforced longitudinally with No. 6 rebars on 6" centers lengthwise, No. 4 rebars on 6" centers widthwise and No. 8 rebars diagonally around access holes.
4. Clean out shall be an iron body ferrule with brass screw plug.
5. Vent pipe shall be ductile iron to a point 6" above building roofline.
6. Manhole ring and cover shall be Neenah R-1706 or approved equal.
7. Bolt down covers are not allowed.
8. Interceptor floors and walls shall be poured monolithically.
9. Pre-cast interceptor units are acceptable with prior approval from the City.

APPROVED  _____ DIRECTOR OF PUBLIC WORKS	<b>CITY OF LAKEWOOD, COLORADO</b> DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING	REVISIONS
APPROVED  _____ CITY ENGINEER	<b>GENERAL NOTES, COMMON TO DESIGN STANDARDS SA-12 - SA-15</b>	DESIGN STANDARD NO <b>SA-16</b>  November 2001

A BILL FOR AN

ORDINANCE ADOPTING THE CITY OF LAKEWOOD WATER AND SEWER RULES AND REGULATIONS AS PART OF THE CITY'S ENGINEERING REGULATIONS, CONSTRUCTION SPECIFICATIONS, AND DESIGN STANDARDS

WHEREAS, the City has adopted Chapter 14.20 of the Lakewood Municipal Code which adopts the Engineering Regulations, Construction Specifications and Design Standards of the City of Lakewood; and

WHEREAS, it is necessary and desirable that design and construction of water and sewer facilities within the public rights of way and easements of the City be performed in accordance with acceptable engineering practices and procedures; and

WHEREAS, adherence to such standards and procedures is essential to the protection of the public investment in such facilities and public ways; and

WHEREAS, adoption of rules and regulations regulating water and sewer design and construction within the City of Lakewood is necessary for public health, safety and welfare.

NOW THEREFORE, BE IT ORDAINED by the City Council of the City of Lakewood, Colorado, that:

SECTION 1. Pursuant to Chapter 14.20 of the Lakewood Municipal Code, the City of Lakewood Water and Sewer Rules and Regulations are hereby adopted as part of the Engineering Regulations, Construction Specifications and Design Standards of the City of Lakewood.

SECTION 2. The said Water and Sewer Rules and Regulations shall govern the design and construction of water facilities in public rights of way and easements in areas not provided treated water by Denver Water within Lakewood and no such design or construction shall be approved unless performed in accordance with said rules and regulations. For those areas served by Denver Water, Denver Water Department Engineering Standards shall apply.

SECTION 3. The said Water and Sewer Rules and Regulations shall govern the design and construction of sewer facilities in public rights of way and easements provided, however, the rules and regulations of a sanitation district or other agency providing sewer service to an area will be used in lieu of Lakewood's Rules and Regulations when the City Engineer determines that the district or agency rules and regulations equal or exceed those of the City of Lakewood.

SECTION 4. The Director of the Department of Public Works shall have and is given the authority to, from time to time, make minor additions, revisions and corrections to said Water and Sewer Rules and Regulations in accordance with good engineering standards and practice.

SECTION 5. One copy of the City of Lakewood Water and Sewer Rules and Regulations shall be on file in the City Clerk's office and open to public inspection during regular office hours.

SECTION 6. This ordinance shall take effect 30 days after final publication.

I hereby attest and certify that the within and foregoing ordinance was introduced and read on first reading at a regular meeting of the Lakewood City Council on the 22<sup>ND</sup> day of May, 2000; published in full in the Lakewood Sentinel on the 25<sup>th</sup> day of May, 2000; set for public hearing on the 26<sup>th</sup> day of June, 2000; read, finally passed and adopted by the City Council on the 26th Day of June, 2000; and signed and approved by the Mayor on the 27th Day of June, 2000.