Fairplay Sanitation District

Design Criteria, Technical Specifications and Construction Details

ADOPTED: September 21, 2015

Fairplay Sanitation District, 1507 County Road 16, Fairplay, Colorado 80440

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EFFECTIVE DATE

These Design Criteria, Technical Specifications, and Construction Details of the Fairplay Sanitation District affect the health, safety and general welfare of the inhabitants of the Fairplay Sanitation District; therefore, the provisions hereof shall have full force and effect upon the date of their adoption by the Fairplay Board of Trustees as Managers of the District.

Adopted this day of , 20

Name: Date:

Title:

SECTION 1 GENERAL REQUIREMENTS

1.1 SCOPE

A. These Design Criteria, Technical Specifications, and Construction Details (Criteria) are adopted by the Fairplay Sanitation District in accordance with the authority conferred by the Colorado's Special District Act, Title 32, Article 1 of the Colorado Revised Statutes.

B. The purpose of these Criteria are to provide for the control, management and operation of the wastewater treatment and collection systems of the Fairplay Sanitation District, including additions, extensions and connections thereto.

C. The Board of Directors of the Fairplay Sanitation District expressly declares that the adoption of these Criteria serves a public purpose and are necessary for the health, safety, security and general welfare of the Customers of the Fairplay Sanitation District.

D. These Criteria shall be treated and considered as new and comprehensive and shall supersede all prior Criteria of the District. The Board of Directors of the Fairplay Sanitation District reserves the right to make rulings concerning matters not covered herein as and when appropriate, in the opinion of the Board.

E. It is intended the Criteria shall be liberally construed to affect the general purpose set forth herein, and that each and every part thereof is separate and distinct from other parts. No omission or additional material set forth in these Criteria shall be construed as a waiver, alteration, or deviation from any grant of power, duty or responsibility, limitation or restriction, imposed or conferred, upon the Board of Directors by virtue of statute now existing of subsequently amended, or under any contract or agreement existing between the District and any other governmental entity. Nothing contained herein shall be so construed as to prejudice or affect the right of the District to secure full benefit and protection of any law now enacted or which may subsequently be enacted by the Colorado General Assembly or as decided by the Appellate Courts of Colorado, pertaining to governmental or proprietary affairs of the District or its Activity Enterprise.

F. These Criteria may be amended, altered, repealed, or reenacted at any regular or special meeting of the Board and set forth, in writing, signed by the President of the Board. Such action shall not be deemed as an amendment to the Criteria, unless expressly set forth in such writing. Prior notice of such amendments shall not be required to be provided by the District.

G. If any section, subsection, paragraph, clause, or other provisions of this Criteria shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such section, subsection, paragraph, clause, or other provision shall not affect any of the remaining provisions.

1.2 DEFINITIONS AND ABBREVIATIONS

A. AASHTO – American Association of State Highway and Transportation Officials

B. ACTUAL COST - All direct costs applicable to construction of given facilities including construction, engineering, inspection, plans, approval fees, required bonding, "as-built" drawings and other costs incurred necessary for completion.

C. ACTIVITY ENTERPRISE – That water activity enterprise established pursuant to C.R.S. 37-45.1-101 et seq., which was created by the District to operate the wastewater collection and treatment facilities of the District; sometimes referred to as the "Enterprise."

D. ADMINISTRATIVE ASSISTANT – Person responsible for daily management of the business affairs of the District and Enterprise.

E. APPLICANT – Any real property Owner, whether an individual or individuals, firm, corporation, partnership, association, government entity, association, or other entity requesting sewer service to be provided by the District/Enterprise.

F. APPROVED – Acceptable under specification or standards stated in the Criteria, as determined by the Board of Directors or its designated representative.

G. APPROVED TESTING AGENCY – Organization primarily established and certified for the purpose of testing to approved standards and approved by the Board.

H. ASTM – American Society for Testing and Materials

I. AS-CONSTRUCTED DRAWINGS – Drawings reflecting actual conditions and information after construction is complete. Also referred to as As-Built Drawings.

J. AWWA – American Water Works Association

K. BLEEDING – Continuous discharge of a potable water system of a household or building.

L. BOARD – Board of Directors

M. BOARD OF DIRECTORS – Elected governing body of the Fairplay Sanitation District.

N. BUILDING DRAIN – That part of the lowest horizontal piping of any building's plumbing/drainage system from the stack or horizontal branch, exclusive of storm sewer, extending to a point not less than five (5) feet outside the building. This does not include any discharge from any roof or exterior collection system or internal sump system; these systems are strictly forbidden from discharging into any Service Line which discharges to the District's wastewater collection system.

O. BUILDING SEWER SERVICE SYSTEM – The building sewer line that is part of the horizontal piping of the building drainage system which extends from the end of the building drain, to the Service Line, and which receives the discharge of the building drain and conveys it to the District's wastewater collection system.

P. CDOT – Colorado Department of Transportation

Q. COLLECTION MAIN – See Sewer Main.

R. COLLECTION SYSTEM – See definition for Public Sewer.

S. COMMERCIAL USE – The following uses shall be deemed "Commercial Use," including, but not limited to: hotel, motel, lodge, dormitory, condo-tel, rooming house, bed and breakfast, café, hospital, bar, private club, filling station, garage, laundry, restaurant, industrial building, office building, car wash, and any other User not providing permanent residential dwelling space.

T. CONNECTION PERMIT – Written authorization by the Board of Directors to connect to the District's wastewater collection and treatment system in accordance with and for so long as the User complies with the Criteria of the District.

U. CONTRACTOR – A person, firm, corporation, partnership, association, or entity performing

work within the District. Contractors must be licensed to perform the type of work to be undertaken.

V. CRITERIA – The Fairplay Sanitation District adopted "Design Criteria, Technical Specifications, and Construction Details."

W. CROSS CONNECTION – Connection or arrangement, physical or otherwise, between a potable water supply system and any building drain or building sewer carrying used or polluted water.

X. CUSTOMER – Any real property Owner, whether an individual or individuals, firm, corporation, partnership, association, or other entity authorized to connect to the District's wastewater collection and treatment system pursuant to a revocable Connection Permit issued by the Board of Directors. Also referred to as "User" or "Owner."

Y. DESIGN ENGINEER – The partnership, corporation, or individual who is registered as a Professional Engineer, according to Colorado statutes, who is hired by the Developer or Owner to conduct engineering design services and may be empowered by the Developer or Owner to act as his agent.

Z. DEVELOPER – Shall mean any real property Owner, whether an individual or individuals, firm, corporation, partnership, association, governmental entity or other entity bearing the actual costs of construction of Sewer Line(s) on a particular property.

AA. DIP – Ductile Iron Pipe

BB. DISTRICT – The Fairplay Sanitation District or its Activity Enterprise.

CC. DISTRICT ENGINEER – Individual or representative of an engineering firm who is a Professional Engineer retained by the District responsible for consultation with the Board of Directors regarding feasibility studies, design and construction of sewer services, main line extensions, inclusions, and plant expansions.

DD. DISTRICT FACILITIES – The District's sewer lines, treatment works, and all easements and appurtenances thereto. The term does not include Service Lines.

EE. DOMESTIC – Refers to any water use by temporary or permanent residential use of property which is not a Commercial use, which results in wastewater discharge to the Public Sewer.

FF. EASEMENT – An acquired legal right for the specific use of land owned by others.

GG. ENTERPRISE – See definition for Activity Enterprise.

HH. EQR – Equivalent Residential Unit

II. FIXTURE UNIT – Any plumbing unit supplying wastewater to the District's collection system such as, but not limited to: sinks, toilets, dishwashers, urinals or water fountains, as described by the International Plumbing Code (IPC).

JJ. GOVERNMENT/EXEMPT USER – A Customer or potential Customer of the District, which pays regular service charges to the District for use of the District's services, but is not subject to those property taxes which would otherwise provide revenues to the District, which revenues are used only to defray District expenses, as well as provide financial reserves for repair, replacement or mandatory future improvements.

KK. GPCD – Gallons per capita per day

LL. GRADE – The slope or fall of the line or pipe as measured from the point where the Service Line leaves the building to the point where it taps the District's wastewater collection system or in the case of Sewer Mains, the pipe slope between manholes.

MM. GREASE TRAP/INTERCEPTOR – A pluming appurtenance that is installed on a sanitary Sewer Service to intercept oily and greasy waste from wastewater discharge. Also referred to as a Grease Trap.

NN. INSPECTOR – That person acting under the direction and authorization of the Board of Directors, whose duties shall include inspection of all excavations, installation of, and repairs to any tap of a building's Service Line or Sewer Mains.

OO. IPC – International Plumbing Code

PP. MANAGER – Person responsible for the daily operations of the District's wastewater collection and treatment facilities.

QQ. OWNER – The record Owner of any property receiving, required to receive, or which will, upon some action (e.g., physical connection after payment of all fees and charges) receive wastewater collection, treatment, or related service from the District. Although others may act on the Owner's behalf, (e.g., one who applies for a Connection Permit or uses the Owner's property, such as a tenant), the Owner is the party which is ultimately responsible for compliance with the District's Criteria, including payment of all fees and charges. May also be referred to as "Customer" or "User."

RR. PARTY – See definition for Person.

SS. PERSON – Any individual or individuals, firm, company, corporation, partnership, association, governmental authority or agency, or other entity.

TT. PROFESSIONAL ENGINEER – Engineer licensed in the State of Colorado according to State of Colorado statutes.

UU. PUBLIC SEWER – Any sewer collector lines, mains, appurtenances or accessories owned by the District.

VV. PVC – Polyvinyl chloride pipe.

WW. REAL PROPERTY – All lands or interest in lands to which title or the right of title has been acquired from the government of the United States or from sovereign authority ratified by treaties entered into by the United States or from the State of Colorado.

XX. RULES AND REGULATIONS - The Fairplay Sanitation District adopted "Rules and Regulations."

YY. SAND INTERCEPTOR - A pluming appurtenance that is installed on a sanitary Sewer Service to intercept sand and grit from wastewater discharge. Also referred to as a Sand Trap.

ZZ. SDR – Standard Dimension Ratio

AAA. SERVICE LINE – That private sewer line extending from the building being served by the District to the Sewer Main.

BBB. SEWER LINE – See Sewer Main.

CCC. SEWER MAIN – Any pipe or conduit for carrying wastewater, as so designated by the District, to which the District may allow the connection of Service Lines. Such sewer mains are part of the Public Sewer/Collection System.

DDD. SHALL – Means "mandatory."

EEE. SPECIFICATIONS – The technical specifications, as adopted or accepted by the District, for the design, installation and construction of sewer lines, services, and appurtenances.

FFF. STUB OUT – A portion of Service Line extending from the Sewer Main to the boundary of a property to be served or a portion of Sewer Main extending from a manhole, installed for the convenience of the Developer or property Owner.

GGG. SYSTEM INVESTMENT FEE (SIF) – A charge established and assessed by the District upon each potential User, based upon the number of Equivalent Residential Units (EQRs) or portions thereof, which are charged to compensate the District for any and all capital costs, including, without limitation, reserve funds, sinking funds and associated debt service costs of the District's treatment plant and collection system, associated with provision of new or expanded connection permits.

HHH. TAP – The physical connection between the private Service Line and the District's Sewer Main.

III. UNCC – Utility Notification Center of Colorado

JJJ. USER – Any real property Owner, whether an individual or individuals, firm, corporation, partnership, association governmental entity or other entity to whose property sewer service is supplied by the District. Also referred to as "Customer" or "Owner."

KKK. USER FEE – The monthly fee/charge paid by all Customers for the revocable privilege of using lines, equipment, and treatment services provided by the District.

1.3 MINIMUM STANDARDS

A. The District's review and acceptance will only be to determine if the plans and specifications conform to the District's requirements. The District's review and acceptance will not relieve the Developer, Design Engineer and Contractor from responsibility for any variation from the District requirements or adequate design standards.

B. The District's review and acceptance shall not constitute any assumption of responsibility or liability for the design or construction. It is the intent and purpose of these Criteria to obtain high quality construction throughout, with the completed work complying with the District's Criteria.

1.4 RELATIONSHIP TO OTHER STANDARDS

A. Whenever a provision of these Criteria, and any other provision in any law, ordinance, resolution, rule, policy, or regulation of any kind contain any restrictions covering any subject matter within these Criteria, the most restrictive standard shall apply.

B. The provisions of these Criteria are minimum requirements that do not preclude the use of more restrictive standards by the Design Engineer.

C. Adherence to these Criteria does not remove the Developer's responsibility to investigate and obtain any other regulatory permits or approvals, from either local, regional, state, or federal agencies, that may be required for a particular project.

1.5 REVIEW AND ACCEPTANCE

A. All construction drawings, specifications, and supporting documents submitted to the District for review, comment, and acceptance shall be prepared by, or under the direct supervision of, a Professional Engineer registered in the State of Colorado. Said Professional Engineer shall be responsible for the design, preparation of the construction drawings and reports, determining material specifications as required, and reviewing the as-constructed field survey for accuracy.

B. The construction drawings and specifications shall be reviewed by the District for general compliance with these Criteria and the District shall provide comments to the Developer or their agents regarding corrections, additions, and omissions.

C. After final corrections are made and the plans are accepted, the plans set shall be signed by the District. The signing of the plans will constitute acceptance. The acceptance is qualified in that the plans are reviewed and accepted for concept only and the plan acceptance does not imply responsibility by the District for accuracy and correctness. The plans acceptance does not imply that quantities of items indicated on the plans are the final quantities required. The plans acceptance shall not be construed for any reason as acceptance of financial responsibility by the District for additional items not shown that may be required during construction.

D. If the Design Engineer responsible for the plans disagrees with any requested changes to the submitted plans that may be required by the District for acceptance, such disagreement shall be brought to the attention of the District, and if required by the District, in writing.

E. The Seal of the Design Engineer on plans so corrected and accepted for construction will signify that the Design Engineer has reviewed, approved, and authorized said corrected plans for construction.

SECTION 2 SUBMITTAL REQUIREMENTS

2.1 GENERAL

A. The requirements provided in this section are the minimum for sanitary sewer system design and are not meant to be all-inclusive. Other requirements may be needed for a complete design.

B. The Design Engineer shall consider operational and maintenance aspects of the sewer system, as well as, constructability in their design.

2.2 CONSTRUCTION DRAWINGS

A. General

1. All construction drawings shall be legible and submitted on 24" x 36" sheets.

2. Construction drawings shall be prepared using the Colorado State Plane Coordinate System, 1983, Central.

3. Furnish to the District for review, an electronic copy (pdf) and three (3) full size, hardcopies of all plans, supplemental specifications, and supporting data for facilities to be installed under these Criteria. One (1) hardcopy will be returned to the Applicant with review comments.

B. Cover Sheet

1. Project name and location.

2. A vicinity map specifying the project's geographical location with north arrow and adequate graphic scale and detail to be clear and uncluttered.

3. A legend describing all line types, symbols, and abbreviations.

4. Sheet index.

5. Name of Owner/Developer.

6. Name of the Design Engineer responsible for the design and preparation of the Construction Drawings and the Land Surveyor responsible for the project survey information.

7. Project benchmark and two (2) horizontal control points to serve as the basis of the project horizontal control.

8. Any additional information deemed necessary by the Design Engineer or District.

9. Construction notes from Appendix D.

C. Utility Plan

1. A general overview of the entire project including, but not limited to, streets (complete with names), alleys, lot and block numbers, all proposed and existing utilities on and within 100 feet of the project site, all existing and proposed

easement, rights-of-way on and adjacent to the project site, and storm water facilities.

2. The entire project shall be shown on one (1) sheet unless the project is too large to show sufficient detail.

3. Proposed project phasing for utilities and structures.

4. Proposed point(s) of connection for sanitary sewer mains, to the existing system. All existing sanitary sewer lines shall show existing manholes, complete with rim and invert elevations, and pipe diameter.

5. Any other information deemed necessary by the Design Engineer or District.

D. Construction Plan View

1. A key map shall be required on each sheet to aid in drawing orientation and locating the sheet construction in relation to the overall project.

2. Provide a north arrow and horizontal graphic scale.

3. Provide existing and proposed roads and alleys complete with names and label proposed lot and block numbers.

4. Provide existing wet and dry utilities.

5. Show and label proposed and existing easements, rights-of-way, and property lines.

6. List the name of adjacent developments or lots and their property Owners.

7. Provide linear stationing along the proposed sanitary sewer mains.

8. Provide match lines indicating references to adjacent sheet(s) of design.

9. Any other information deemed necessary by the Design Engineer or District.

E. Construction Profile View

1. Show all existing and proposed utility crossings. Existing utility crossing locations and elevations shall be obtained from the current project design field survey. Existing utilities shall be potholed as required to perform complete and accurate design prior to construction plan acceptance. Field obtained elevations shall be provided on the Construction Drawings complete with when the field information was gathered, the exact location where it was collected, the firm that performed the potholing and surveying, and the date the survey was conducted.

2. Provide the diameter, type of pipe material, length of pipe between manholes, provide pipe slope, manhole inverts in and inverts out (main and service line), rim elevations, and manhole stationing for proposed sanitary sewer lines.

3. Vertical and horizontal grids showing the existing ground surface (dotted) and proposed surface (solid).

4. Provide match lines indicating references to adjacent sheet(s) of design.

5. Any other information deemed necessary by the Design Engineer or District.

F. Standard Drawing Sheets

1. Include all project applicable District Construction Details as part of the construction plans set. Construction Details are provided as part of these Criteria.

2. Where Standard Drawings are not applicable to the work, provide project specific construction details. These shall include construction details of critical connections, atypical crossings, special structures, and any other details deemed necessary by the Design Engineer or District.

2.3 HYDRAULIC REPORT

A. General

1. A hydraulic analysis for the sanitary sewer collection system for a given project shall be submitted by the District, as a report, for review and acceptance. The hydraulic analysis report shall be submitted with the Construction Drawings and will be reviewed by the District in the same review and acceptance process provided in these Criteria.

2. Projects that move forward without an accepted sanitary sewer collection system hydraulic analysis report are subject to possible design changes, including but not limited to, pipe re-alignment, upsizing, extensions, and additional stub outs.

B. Title Page

1. Report title.

2. Project name and location.

3. The name, address, and phone number of the Owner, Developer and Design Engineer that prepared the report.

4. Report preparation date.

C. Engineer Certification Sheet

1. The report shall be prepared by or under the supervision of a Professional Engineer, licensed to practice in the State of Colorado, possessing adequate experience in the design of sanitary sewer collection systems. The report shall contain a certification sheet with the following statement to be signed and sealed by the Design Engineer:

2. "I understand that acceptance by the Fairplay Sanitation District does not relieve the Design Engineer's responsibility for errors, omissions, or design deficiencies for which the Fairplay Sanitation District is held harmless."

Registered Professional Engineer
(Affix Seal)

D. Table of Contents

E. Project Description and Location

1. Clearly state the location of the project. Provide a site vicinity map specifying the project's geographical location and the project area in acres.

2. State the land use zoning, estimated number of residential lots or living units and commercial square footages.

3. Indicate if the project will be phased. Elaborate on the anticipated timing for each project phase and the phase's associated building and infrastructure construction.

4. Identify the location of sewer system connections and the pipe diameter.

F. References and Appendices

1. Provide a page referencing all design criteria, resources, equations, and modeling software used in preparing the hydraulic report.

2. Provide appendices, as necessary, to include modeling result printouts, spreadsheet calculations, copies of demand assumption data, and hand calculations.

G. Analysis of Sanitary Sewer Systems

1. If the development is phased, the sanitary sewer system shall be analyzed for full build out. This evaluation shall include the development's sanitary sewer flows and anticipated offsite sanitary sewer flows impacting the sanitary sewer system within the development.

2. Evaluate the development's sanitary sewer sizing for capacity to convey offsite flows.

3. Undeveloped areas shall have sanitary sewer flows calculated based on the current or anticipated land use or zoning of the property.

H. Conclusions

1. Discuss analysis results for all pipe evaluations.

2. Confirm that acceptable pipe velocities and flow depth criteria are met.

3. If design constraints arise and pipe velocity, flow depth, minimum allowable slope per pipe diameter, or any other criteria requirements cannot be maintained, the Design Engineer shall provide the District written explanation as to why the criteria is violated, why the non-standard sewer system design should be accepted, and request a variance.

4. Discuss any sanitary sewer main oversizing required by the District over and above what is necessary for the development needs.

5. Discuss potential impacts that upstream developments may have on the sanitary sewer capacity through the proposed development. Explain the capacity issues within the development and the proposed solutions for resolving them.

I. Supplemental Engineering Calculations

1. These calculations shall include, but are not limited to, pipe restrained lengths, external pipe load analysis, traffic loadings, and casing pipe wall thickness.

2. Any calculations deemed necessary by the Design Engineer or District.

2.4 EASEMENTS

A. When it is not feasible for sanitary sewer main installations to be in a dedicated public right-of-way, the installation shall be made within a dedicated easement.

B. The minimum acceptable easement width shall be twenty (20) feet or twice the depth to the invert of the pipe, whichever is greater.

C. The mains within the easement shall be located a minimum ten (10) feet from the edge of the easement or equal to the depth to the pipe invert, whichever is greater.

D. There shall be no detention ponds, berms greater than three (3) feet, permanent structures, fences, trees, shrubs with mature height greater than three (3) feet, or other obstructions that will impede the ability of the District to adequately maintain and service the main(s) located within the easement.

E. Upon the discovery of any structure erected, constructed, installed or placed within an easement, the District shall notify the Owner of such structure, in writing, and the Owner shall have ten (10) days to remove the offending structure at the Owner's expense. Any structures not removed in ten (10) days shall be removed by the District and the cost of such removal shall be assessed to the Owner of said structure. Failure to pay such costs within thirty (30) days shall result in a perpetual statutory lien for such costs being filed against the Owner's property.

F. Easements not dedicated with a plat, shall be dedicated by separate document and recorded prior to District acceptance of the Construction Drawings. Easement dedication by separate document shall include:

1. Easement Dedication Form. An easement dedication form shall be completed by the Developer. A standard easement dedication form is provided in Appendix E. The easement dedication form must be signed by the property Owner and notarized.

2. Exhibit Map. An exhibit map (8 ½" x 11") with sufficient description information to establish the legal boundary of the easement shall be provided. The exhibit map shall show and label all existing easements, property lines, and public rights-of-way. The District may request additional information, not listed here, for the exhibit map.

3. A Written Legal Description of the dedicated easement boundary.

2.5 SUPPORTING DOCUMENTS

A. Submit with the plans and specifications all necessary supporting documents required to fully construct the proposed project. This data shall include but not be limited to:

1. Geotechnical Report

   a. A geotechnical soils evaluation, prepared by or under the supervision of a Geotechnical Engineer, licensed in the State of Colorado, shall be submitted to the District for review and shall be accepted by the District prior to final Construction Drawing acceptance. The geotechnical soils report shall describe the classifications and characteristics of the soils encountered on the project and include recommended methods of backfilling and compaction.

   b. The Geotechnical Engineer shall evaluate groundwater conditions for the site and provide recommendations for underdrains and sanitary sewer main groundwater barriers.

2. A copy of the recorded plat of the subdivision in which the improvements are proposed to be installed.

3. Copies of necessary permits from other governmental or private agencies having jurisdiction in the area of the proposed work.

4. Grease trap/interceptor and/or sand/oil separator sizing and design calculations.

5. Any other documents deemed necessary by the Design Engineer or District.

2.6 AS-CONSTRUCTED RECORD DRAWING REQUIREMENTS

A. The Contractor and Design Engineer shall be responsible for recording As-Constructed information on a set of Record Drawings kept at the construction site. A representative of the Developer shall monitor construction to assure that changes in construction (as approved in writing) and other pertinent details, such as horizontal location of manholes, manhole inverts and rim elevations, service tap locations, location of the end of a stub out, the location of the service line on the property, pipe sizes, depths, etc. are kept current on the As-Constructed Record Drawings.

B. The As-Constructed Record Drawings shall show the original design information as well as the As-Constructed information. The original design information shall be shown as "lined through". The As-Constructed information shall be located in the same areas as the design information and shall be either "clouded" and/or made with a heavier line weight as the design information for clear differentiation. The month and year of the construction shall also be noted.

C. Upon completion of construction and prior to acceptance by the District, an electronic copy in both AUTOCAD and pdf formats, a mylar copy, and three (3) full size paper copies of the As-Constructed Record Drawings, including profiles, shall be submitted to the District for record.

D. The As-Constructed drawings shall be complete with all "as-constructed" information, together with a certification, by the party responsible for construction, that all data thereon is accurate and represents actual "as constructed" conditions.

E. As-Constructed drawings shall be prepared in the same coordinate system as the design drawings.

SECTION 3 DESIGN CRITERIA

3.1 GENERAL

A. The purpose of this section is to provide information for the design of a sanitary sewer collection system.

B. This section is not intended to be inclusive of all situations. The Design Engineer may be required to use additional engineering judgment to meet the overall design intent for constructability, operations, and maintenance. **This Design Criteria typically applies to sanitary sewer mains fifteen-inches (15") in diameter and smaller.** The Board reserves the right to make final determinations of the system design based on the best interest of the District.

3.2 DESIGN FLOW

A. The wastewater flows presented in this section are minimum criteria and the District reserves the right to modify these criteria, at any time, for the design of specific projects.

Table 1 – Sanitary Sewer Design Flow

Use	Average Day Flow	Occupancy per Unit	EQR Equivalent (300 gpd)
Residential	100 gpcd	3.0 persons	1.0
Commercial	Based on EQR Equivalent, See Schedule of User Classifications and EQR Equivalents provided in the Rules and Regulations.		

B. Peaking Factor

1. A peak flow shall be based on Peak Flow Curve "G" from "ASCE Manual of Practice – No. 60."

$$pF = \frac{18 + \sqrt{p}}{4 + \sqrt{p}}$$

P = Population in thousands

2. For determining commercial peaking factors, commercial average day flow based on an EQR Equivalent shall be converted to population using the residential EQR flow and the occupancy per unit.

3.3 INFILTRATION/INFLOW (I/I)

A. Infiltration is groundwater entering the sewer system from defective joints, cracked pipes, and service connections.

B. Inflow is surface water entering the sewer system from storm runoff, roof drains, and natural drainage.

C. 100 gallons per day per inch-diameter per mile of pipe shall be added to the peak flow as the allowance for I/I.

3.4 HYDRAULIC DESIGN

A. Manning's Equation shall be used to determine required pipe size:

$$Q = \frac{1.49}{n} AR^{2/3}\sqrt{S}$$

Where:

Q = Flow (cfs)
n = Manning's Coefficient of 0.013
A = Flow Area (ft^2)
R = Hydraulic Radius (A/P)
Where P = Wetted Perimeter
S = Slope (ft/ft)

B. All sewer pipes shall be designed to a maximum of half full (d/D = 0.5) where d = depth of flow and D = pipe diameter.

C. All sewers shall be designed to transport average sewage flows at mean velocity of two feet per second (2 ft/s).

3.5 PIPE SIZE AND SLOPE

A. No public sewer main shall be less than eight (8) inches in diameter.

B. No building sewer service shall be less than four (4) inches in diameter.

C. The slope between manholes shall be uniform. In no case shall the slope be less that the following for sewer mains and services.

Table 2 – Minimum Sanitary Sewer Main Slopes

Pipe Diameter (in)	Minimum Slope (%)
4"	2% or ¼ inch per foot
6"	1% or 1/8 inch per foot
8"	0.40%
10"	0.28%
12"	0.22%
15"	0.15%

D. In the case where sewer slopes are over 15%, special provisions shall be made to prevent displacement. Such high velocity protection shall be shown on detailed drawings and approved by the District.

3.6 DEPTH OF BURY

A. Sewers shall be designed deep enough to drain basements and to prevent freezing.

B. No public mains shall be less than eight (8) feet deep measured from the top of the pipe unless insulation protection is provided.

3.7 LOCATION OF COLLECTION MAINS

A. When possible, line extensions shall be installed in roads or streets which the Town of Fairplay, Park County, Colorado Department of Transportation, or other public agency, has dedicated for installation and maintenance as public right-of-way, in easements created for public utilities, or in easements granted to the District.

B. The standard location of sewer main, unless some major interference is present, is along the center line of the street, easement or right-of-way.

C. Proposed sewer mains which may conflict with the placement of other underground facilities will require prior approval of the sewer placement location from the District and by the controlling agencies whose facilities will be affected.

3.8 PHASED INSTALLATION AND STUB OUTS

A. Sewer Main stub outs from manholes shall not exceed twenty (20) feet except lines which will be extended in the future.

B. Whenever practical, designs to complete the manhole run shall be submitted for review to insure proper grade and alignment for future construction.

C. Future extension of sewer main and service line stub outs shall be of like material using the same grade and alignment.

D. Service Line stub outs from sewer mains shall be extended to each property at a point two (2) feet inside the property line and generally fifteen (15) feet upstream of the low lot corner.

E. Service stub outs for flag lots shall be extended through the flag stem to the main body of the lot except where approved otherwise by the District.

F. Stub outs from the sewer main may be made to an unoccupied lot provided it is part of an officially platted and recorded subdivision. Such stub outs shall be extended to two (2) feet inside the property line and plugged with a watertight cap or plug insert.

G. As-builts of the depth and locations of the end of the service stub out shall be recorded by the District for future reference.

H. Stub outs installed for developments approved in the past, may not be located in the proper place should the land uses change. The existing stub out may need to be replaced, at the property Owner's expense.

I. Stub outs installed for developments approved in the past, may not be located in the proper place should the land uses change. The existing stub out may need to be replaced at the property Owner's expense.

3.9 PIPE MATERIAL

A. Sanitary sewer collection mains (up to fifteen inch (15")) shall be polyvinyl chloride (PVC) SDR 35 pipe (Pipe Stiffness 46 psi) suitable for sanitary sewer flows.

B. Alternative pipe materials shall only be used in the following situations with approval from the District:

1. Where sanitary sewer collection mains are installed less than four (4) feet measured from the finished ground elevation to the top of pipe, gravity sewer ductile-iron pipe shall be used.

2. Where sanitary sewer collection mains are installed deeper than twenty (20) feet at the invert, polyvinyl chloride (PVC) SDR 26 shall be used.

   a. For alternative pipe material installation situations, external load (earth and live load) analysis is required to verify that the minimum alternative pipe material is suitable for the specific project conditions. If the alternative pipe material is unsuitable, the Design Engineer shall specify an acceptable pipe material.

   b. External pipe load calculations shall be submitted to the District for review and acceptance.

3. Changes between pipe materials are not permitted along a continuous sewer main. The alternative pipe material shall be installed from manhole to manhole.

3.10 MANHOLE LOCATION AND SIZE

A. General

1. Manholes shall be located so as to limit possible storm water entrance.

2. Manholes shall be installed at the end of each sewer line, at all sewer line intersections, grade changes, alignment changes, or where sewer mains change diameter.

B. Manhole Location

1. All manholes shall be located within a dedicated street right-of-way or within a dedicated easement of appropriate width.

2. Manholes must be located to allow unassisted, all weather access by the District maintenance vehicles which range in size from ½ ton to 2½ tons. At a minimum, all-weather roads shall be ten (10) feet wide with four-inches (4") of compacted aggregate base course.

3. If the all-weather road terminates at the manhole it provides access to and is longer than fifty (50) feet, an appropriately sized turn-around shall be provided.

4. The Design Engineer shall design the all-weather road based on these requirements and for the specific project conditions.

5. Manholes located in areas where access, in the opinion of the District, is not possible, will not be approved for construction.

C. Manhole Size and Spacing

1. The following table provides the diameter of standard manholes and the maximum manhole spacing for each sanitary sewer pipe diameter:

Table 3 – Standard Manhole Diameter and Spacing

Sewer Pipe Diameter (in)	Manhole Diameter (ft)	Manhole Spacing (ft)
Up to 12"	4 ft	400 ft
15"	5 ft	400 ft

2. External drop manholes will be permitted only in extreme and special conditions where approval is granted by the District. The external drop sections must be totally encase in reinforced concrete and placed on an adequate foundation.

3.11 MANHOLE INVERTS

A. All manhole inverts shall be designed with a 0.1 foot drop except where cast-in-place manholes are permitted by the District to be installed over existing sanitary sewer mains. In such cases, the existing sanitary sewer pipe grade determines the elevation drop across the manhole by constructing the cast-in-place manhole over the existing straight sewer main and removing the upper half of the pipe.

B. Changes in alignment in excess of thirty (30) degrees shall have a 0.3 foot drop in the invert through the manhole.

C. Changes in direction at manhole intersections shall not be greater than ninety (90) degrees.

D. Where a smaller sanitary sewer main joins a larger one, the smaller sanitary sewer main crown elevation shall match the crown elevation of the larger sanitary sewer main. This includes sanitary sewer Service Lines.

E. Where the invert elevation difference between the invert in and invert out is twenty-four inches (24") or more, an external drop manhole shall be provided.

3.12 GROUNDWATER BARRIERS

Groundwater barriers shall be installed across the sanitary sewer collection main, ten (10) feet upstream of every manhole, in areas where high groundwater is anticipated or where underdrains are installed.

3.13 SEWER MAIN AND SERVICE ENCASEMENTS

A. No general statement can be made to cover all encasement conditions, therefore only typical encasement situations are addressed in this section. Encasement requirements shall ultimately be determined by the District on a case by case basis.

B. An encasement shall be considered the open trench installation of a casing pipe.

C. Where sanitary sewer lines cross beneath potable water lines with less than eighteen-inches (18") clearance, sanitary sewer lines cross above potable water lines, or the ten (10) feet horizontal clearance between potable water lines and sanitary sewer lines cannot be maintained, pipe encasement shall be designed and constructed so as to protect the potable water line.

D. The encasement pipe shall extend a minimum ten (10) feet on either side of the crossing measured from the outside diameter of the crossed pipe. Longer casing pipes may be

required depending on the encasement situation. C-900 is an acceptable replacement for concrete encasement.

E. For any atypical encasement situations, the Design Engineer shall size the encasement pipe such that the inside clearance is at least one-inch (1") greater than the maximum outside diameter of the casing spacer runners.

F. Encasements Required by Other Agencies

1. For sewer mains crossing another agency's right of way or easement, the encasement requirements for that crossing shall be specified by the agency granting permission to cross.

   a. Such crossings shall be subject to approval by the District to avoid conflicts in requirements or standards between the District and the agency granting permission to cross.

   b. A letter, permit, or approved crossing application from the agency granting permission to cross, must be provided to the District before the crossing is approved by the District.

   c. The District shall not accept any crossings imposed with an annual User or crossing fee from the agency granting permission to cross. All crossing fees, if applicable, shall be paid by the Developer prior to installation of the encasement.

3.14 SEWER MAIN BORINGS

A. Installation of sanitary sewer mains through another agency's right-of-way, easement, or other, may require a bored or jacked casing pipe to facilitate main installation. The type of bored casing material and its properties will be specified by the agency granting permission to cross. Such crossings shall be subject to approval by the District to avoid conflicts in requirements or standards between the District and the agency granting permission to cross.

1. A letter, permit, or approved crossing application from the agency granting permission to cross, must be provided to the District prior to the boring.

2. The District shall not accept any bored crossings imposed with an annual User or crossing fee from the agency granting permission to cross. All bored crossing fees, if applicable, shall be paid by the Developer prior to the boring.

3. The minimum requirements for bored casings shall be in accordance with the technical specifications and must be accepted by the District.

4. The proposed boring method shall be submitted to the agency granting permission to cross and the District for acceptance. The boring method shall allow for installation of the casing pipe to meet the line and grade requirements provided in these Criteria.

5. The required bore length of casing pipe shall be determined by the agency granting permission to cross and the District.

B. If the bored casing must cross another utility line, the crossing shall have a minimum twenty-four inches (24") of vertical clearance from the outside diameter of the casing pipe to the outside diameter of the crossed utility line.

3.15 SEWER SERVICES

A. Sanitary sewer services shall be polyvinyl chloride (PVC) SDR 35 pipe (Pipe Stiffness 46 psi).

B. Four (4) inch diameter Service Lines shall have a maximum length of two hundred and fifty (250) feet.

C. Service Lines projected to be longer than two hundred and fifty (250) feet in length shall have pipe six (6) inches in diameter or as otherwise required by the District.

D. A cleanout, the same diameter as the Service Line diameter, shall be installed on the Service Line at one hundred (100) foot intervals.

E. For cleanout access, a prefabricated formed wye with a riser pipe shall be installed to the finished grade. Cleanout shall have a proper waterproof cap.

F. A cleanout shall be installed near the building foundation (exterior) on all Service Lines.

G. Sewer Service Lines shall not be installed in trenches with other conduit/utilities.

H. Sewer Service Lines shall be located a minimum ten (10) feet downstream of water services, wherever feasible.

I. No sanitary sewer Service Line shall cross property lines.

3.16 SEWER MAINS/SERVICES IN RELATION TO HIGHWAYS AND OTHER UTILITIES

A. Sanitary sewer services and collections mains shall have a minimum ten (10) feet horizontal and eighteen-inches (18") vertical separation from all utilities measured from outside diameter.

B. Where sanitary sewer lines cross beneath potable water lines with less than eighteen-inches (18") clearance, sanitary sewer lines cross above potable water lines, or the ten (10) feet horizontal clearance between potable water lines and sanitary sewer lines cannot be maintained, pipe encasement shall be designed and constructed so as to protect the potable water main.

C. Stream and Drainage Channel Crossings

1. All sewer line crossings below stream and drainage channels shall, at a minimum, be restrained sewer ductile iron pipe within a steel encasement, where the steel encasement is further encased in reinforced concrete. Stream and drainage channel crossings shall require special design by the Design Engineer based on the crossing conditions. All details of the design shall be submitted to the District for review and approval.

2. Where the sewer line crossing will be above the stream or drainage channel flow line, special design will be required by the District. All details of the design shall be submitted to the District for review and approval.

D. Highway Crossings

1. All work shall be accomplished in accordance with the appropriate permit issued by

the responsible agency have jurisdiction over the work.

2. Crossings under highways shall consist of restrained sewer ductile iron pipe laid inside a steel casing, which is jacked or bored beneath the roadway.

3. Casing pipes shall be designed and installed in accordance with these Criteria.

3.17 GREASE TRAP/INTERCEPTORS, SAND AND OIL SEPARATORS

A. A grease trap or interceptor is required for all food service establishments engaged in activities of preparing, serving, or otherwise making available for consumption foodstuffs that use one or more of the following preparation activities: cooking by frying (all methods), baking (all methods), grilling, sautéing, rotisserie cooking, broiling (all methods), boiling, blanching, roasting, toasting, or poaching, infrared heating, searing, barbequing, and any other food preparation or serving activity that produces a consumable food product in or on .a receptacle requiring washing to be reused. A grease trap or interceptor shall be required to receive the drainage from fixtures and equipment including pot sinks, pre-rinse sinks, soup kettles or similar devices, wok stations, or sinks into which kettles are drained, automatic hood wash units and dishwashers without pre-rinse sinks. A grease trap or interceptor will be required in non-cooking or other commercial establishments if they meet the definition of a Non-Cooking Establishment.

B. Non-Cooking Establishments shall be defined as those establishments engaged in the preparation of pre-cooked foodstuffs that do not include any form of cooking on-site; but that may produce a consumable food product in or on reusable plates or utensils requiring washing to be reused.

C. Any biological additive (s) placed into the grease trap or building discharge line including but not limited to enzymes, emulsifiers, de-emulsifiers, surface active agents, commercially available bacteria, or other additives designed to absorb, purge, consume, treat, liquefy, or otherwise eliminate fats, oils, and grease shall not be allowed. Chemical treatments such as drain cleaners, acid, or other chemical solvents designed to dissolve or remove grease shall not be allowed to enter the grease trap.

D. Maintenance of Grease Traps and Grease Interceptors shall be done only by a business professionally normally engaged in the servicing of such plumbing fixtures. An individual property owner may be permitted to accomplish maintenance specified by the Regulation on a case-by-case basis with written permission from the District. Written records of grease trap or interceptor maintenance will be maintained for three years. All such records will be available for inspection by the District at all times. These records shall include:

1. Facility name, address, contact person, phone number
2. Company name, address, phone number, and contact person responsible for performing the maintenance, cleaning, pumping or repair of the grease trap or interceptor.
3. Types of maintenance performed.
4. Dates maintenance was performed
5. Frequency of service
6. Approximate amount of grease removed
7. Destination of grease removed
8. The District shall provide a customer and/or business with a form for recording Grease Trap/Grease Interceptor maintenance. The business or customer shall provide on copy of the completed form to the District immediately following maintenance of any Grease Trap/Grease Interceptor within the District.

E. No grease trap shall be installed which has an approved rate of flow more than 55 gallons a minute. Flow control devices shall be so designed that the total flow through the grease trap is no greater than the rated capacity of the trap or interceptor. No flow control device having adjustable or removable parts shall be allowed. For the purpose of this section, the term fixture shall mean and include each plumbing fixture, appliance, apparatus or other equipment required to be connected to or discharge into a grease trap or interceptor. The minimum acceptable volume for a grease interceptor shall be not less than one thousand (1,000) gallons.

F. When determining the minimum size of Grease traps required, the following shall be considered by the District and the District has the sole discretion to determine which sizing method is appropriate under the circumstances:

1. Fixture Capacity Method: The physical size of each fixture compartment to be connected to the grease trap shall be measured and the capacity determined. The drainage load in gallons shall then be computed assuming the drainage load to be equal to 0.75 times the total physical capacity. The sum of the drainage loads for each fixture compartment to be connected to a single Grease Trap will be the total divided by the drainage period for the fixture compartments connected to determine the flow rate to the Grease Trap in gpm. Multiply the Grease Trap flow rate thus determined, or the rated capacity of the flow control device, by the minimum retention time (15 minutes) to determine the required liquid capacity of Grease Trap to be installed.

2. Fixture Unit Method: Under this method the fixture compartment outlet or trap arm size shall be utilized to determine the fixture compartment drainage load in gpm, assuming one (1) fixture unit equivalent produces a flow rate of 7.5 gpm. The sum of the drainage loads for each fixture compartment to be connected to a single Grease Trap or the rated capacity of the flow control device will be the total drainage load in gpm. Multiply this total drainage load in gpm by the minimum retention time (15 minutes) to determine the required liquid capacity of the Grease Trap to be installed. The following fixture unit equivalent values shall be utilized when sizing Grease Traps under the Fixture Unit Method:

Fixture Outlet Trap or Trap Arm size	Fixture Unit Equivalent Value
1-1/4"	1
1-1/2"	3
2"	4
2-1/2"	5
3"	6
4"	8

Maximum Number Of Fixtures Connected	Capacity of Fixtures in Gallons
1	110
3	335
4	450
5	560
6	675
8	900

G. Grease traps and interceptors shall be cleaned, as a minimum according to the following schedule (this may be adjusted on a case by case basis by the District):

Cleaning Frequency	
Up to 450 Gallons (small under sink stand-alone)	Every 4 months
560 to 1000 Gallons	Every 6 months
1500 Gallons	Every 9 months

H. Sand, Soil and Oil Interceptors: All carwashes, truck washes, garages, service stations, car and truck maintenance facilities, fabricators, utility equipment shops, properties on which occurs vehicle parking or storage, automotive service or repair, machine shops, and/or mechanics providing service to the general public, including but not limited to service stations, truck stops, gasoline stations, automotive/car care centers, auto body shops, automotive dealerships, motorcycle shops, machine shops, welding shops, tractor/farm implements dealerships, bus barns, or any facility that generates sand, grit and/or petroleum by-product waste that would discharge into the wastewater collection system and other facilities that have sources of sand, soil, and oil shall install a sand, soil and oil trap interceptor. The system shall be sized to effectively remove sand, soil and oil at the expected flow rates. The establishment will provide to the District the manufacturer's cleaning recommendations for each sand/oil interceptor.

I. Sand/Soil/Oil Interceptors shall be maintained by regularly scheduled removal of accumulated sand and oil so that they properly operate as intended to intercept sand and oil for the customer's wastewater and prevent discharge of sand and oil to the District's collection system. Maintenance of sand/oil interceptors shall be done only by a business/professional normally engaged in the servicing of such plumbing fixtures. An individual property owner will not be permitted to accomplish maintenance specified by this Regulation.

J. Maintenance shall be performed before the retention capacity of the interceptor is exceeded. Detailed and accurate records of maintenance shall be maintained on-site. The records shall include detailed information relating to the amount of sand and oil removed compared to the size of the Sand/Oil Interceptor and one copy of the completed form shall be provided by the customer to the District immediately following completion of maintenance of any Sand/Oil Interceptor within the District.

K. A copy of the invoice from the business professional reporting the date the interceptor was cleaned, the amount of oil and/or sand removed and a recommendation of how frequently the interceptor should be cleaned must be sent to the District after each cleaning. A copy of all Sand/Oil Interceptor cleaning invoices are to be on file at the business being served and available to the District upon request.

L. As a minimum, any Sand/Oil Interceptor in service in the District shall be served every 120 days. A variance from this requirement may be obtained when the Affected Property owner can confirm that there is no normal use during any given 120 calendar day period. With written authorization from the District, the maximum time variance between services is 365 calendar days.

M. Biological treatment, emulsification of oil/or grease with enzyme treatments shall not be a substitute for servicing of Sand/Oil Interceptors at the frequency determined by the District and is not allowed. The District may inspect the Sand/Oil Interceptor monthly to determine the load on the fixture and the effectiveness of maintenance activities. These inspections may determine that more frequent maintenance than previously specified is required.

N. The District shall have the right to enter the premises of all establishments having grease traps, grease interceptors or Sand/Soil and Oil Interceptors for the purpose of inspecting the installation, operation, maintenance and records. Users shall provide documentation of grease trap cleaning within 30 days of notice by the District. The District will assess a 50 percent monthly service fee surcharge to all customers failing to provide documentation of grease trap, grease interceptor or sand/oil cleaning.

O. Any extraordinary costs incurred by the District due to interference, damage or special processing necessary in the treatment and/or collection system shall be paid by the business. The direct cost of labor, equipment and materials incurred in rectifying the interference or damage shall be billed directly to the business by the District.

3.1 UNDERDRAINS

A. Underdrain systems are not maintained by the District. The Developer/Owner shall accept all liability and responsibility for underdrain installation.

B. Underdrains shall not be connected to the sanitary sewer collection system. Underdrains shall only discharge into the storm drainage system or designed detention areas.

3.2 WASTEWATER PUMPING STATIONS (LIFT STATIONS)

A. Design of wastewater pumping stations (lift stations) within the District's collection system shall be accomplished on a case by case basis.

B. Preliminary considerations and rationale for the need of the pump station shall be reviewed in detail with the District's Board prior to proceeding with preliminary and final design.

C. Lift stations design shall be prepared by or approved by the District Engineer. The cost of engineering and construction shall be the responsibility of the entity requiring the facility.

SECTION 4 TECHNICAL SPECIFICATIONS

4.1 COORDINATION OF WORK

PART 1 - GENERAL

A. Description

This section generally describes the project coordination of work.

B. Interruption of Utility Service

1. Coordinate any interruption of utility services with the utility Owner.

2. Make connections to the existing system requiring the interruption of service during the time designated by the utility Owner.

C. Permits and Regulations

1. The Owner/Developer shall be responsible for obtaining all permits necessary to accomplish the work. This includes all permits by any Local, Regional, or State general purpose governing agency relative to excavation and construction within public right-of-way, permits required by the State of Colorado Water Quality Control Division, including necessary site approvals.

2. The Owner/Developer shall comply with all applicable regulations of the State, County, and Municipality, including all ordinances concerning subdivision development and excavation requirements.

3. All Criteria of the District shall be applicable to all construction and operations of sanitary sewerage facilities within the boundaries of the Fairplay Sanitation District and those which are proposed for acceptance by annexation to the District. These Criteria shall be supplemented by all Rules and Regulations of the State of Colorado, Water Quality Control Division, insofar as they do not conflict with these Criteria. Any conflict shall be governed by interpretation and ruling by the Board whose decision shall be final.

D. Detours and Other Traffic Controls

1. When construction operations are located within streets make provisions at cross streets and walks for free passage of vehicles and pedestrians by bridging or other approved methods. Do not block streets or walks without prior approval.

2. Maintenance of access through the construction site by the traveling public shall be maintained by the Contractor unless a street closure is approved in writing by the local governing authority. Access to all abutting residences and properties shall be maintained to the maximum extent possible. It shall be the responsibility of the Contractor and/or Developer to coordinate access to all adjacent private properties with the respective Owners.

3. The Contractor shall furnish sufficient signs and other controls including flagman to facilitate the directing of traffic controls, and shall be in accordance with the "Manual on Uniform Traffic Control Devices", latest edition; and the provisions of all local governing authorities including the Town of Fairplay, State of Colorado, and Park County.

E. Protection of Existing Facilities and Utilities

1. It is the Contractor's or Owner's responsibility to call for utility locates. Call UNCC by dialing 811.

2. Before commencing work, obtain information concerning location type, and extent of concealed existing utilities on the site and adjacent properties. Consult records and personnel of local utility companies, municipal utility department, and telephone company. File "Notice of Excavation" with these agencies prior to commencing work.

3. Protect from damage any underground pipes, utilities or structures encountered during construction. Restore any damaged underground obstructions to their original condition at no cost to the District unless evidence of other arrangements satisfactory to all parties is presented to the District.

F. Construction Inspection

1. All work to be accomplished shall be done under the review and inspection of the District or its representative.

2. Notification to the District shall be made by the Contractor and/or Developer indicting proposed schedules and times of work. Work accomplished without prior notification and review by the District's representative may not be acceptable to the District.

3. It shall be the responsibility of the Owner/Developer to adequately demonstrate to the Fairplay Sanitation District that all facilities have been constructed in accordance with the Criteria of the District. Any costs relative to testing and/or inspection of such facilities which are requested to be accepted by the District, but were not inspected by the District representative at the time of construction, shall be borne by the Owner/Developer.

PART 2 – MATERIALS (Not Used)

PART 3 – EXECUTION (Not Used)

4.2 TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

A. Description

This section covers excavation and trenching, including but not limited to dewatering, preparation of subgrade, pipe bedding, backfilling, compacting, groundwater barriers, materials testing, and finish grading for underground pipelines and appurtenances.

B. Construction Staking

1. All work shall be constructed in accordance with lines and grades shown on the drawings and as established by the Design Engineer and/or District. These lines and grades may be modified by the Design Engineer only after re-approval by the District.

2. Line and grade stakes shall be set for each manhole or other appurtenances and at each twenty-five (25) foot station along the pipeline proceeding upstream. The

Contractor shall check the elevation at each grade stake and at intervals between stakes from a string line placed between the grade stakes. Should a variance from the design elevation be found, the pipeline shall be removed to a point where vertical and horizontal alignment is satisfactory and reconstruct in accordance with these specifications.

3. All facilities, equipment and assistance shall be furnished by the Contractor and/or Developer to facilitate checking alignment and grade of the pipe by the District's representative and workmen involved in the construction.

C. Job Conditions

1. Drainage and Groundwater

a. Maintain the excavation and site free from water throughout the work. Remove any water encountered in the trench to the extent necessary to provide firm subgrade, to permit joints to be made dry at the final grade and to prevent entrance of water into the pipeline. Accomplish the forgoing with the use of sumps and gravel blankets, well points, and/or lines.

b. All work must be done in a dry trench and no water will be permitted to discharge down the pipe previously laid.

c. The discharge from groundwater pumping shall be released to an approved natural drainage channel or other location to prevent drainage into the sanitary sewer facilities and damage to public or private property.

2. Blasting

a. Should the use of explosives be necessary, employ only competent, experienced personnel.

b. Comply with all Local and State requirements.

PART 2 - MATERIALS

A. General

1. All material shall be free from frozen matter, stumps, roots, brush, other organic matter, cinders, corrosive material, debris, broken asphalt and concrete, and any other objectionable material that is not suitable in the opinion of the District.

2. If job excavated material is not sufficient or suitable, suitable material shall be imported.

B. Stabilization Material

1. If the existing soil in the trench bottom is judged to be unsuitable by the District or the Design Engineer, at a minimum, the top six-inches (6") of the trench subgrade shall be removed and replaced with stabilization material.

2. Stabilization material shall be crusher-run rock, conforming to CDOT #357 (AASHTO M43).

Table 5 – Stabilization Material – CDOT #357

Sieve Size	Percent Passing by Weight (%)
2-1/2 inch	100
2 inch	95 -100
1 inch	35 – 70
½ inch	10 – 30
No. 4	0 – 4

3. Stabilization material shall be compacted to seventy percent (70%) relative density.

C. Geotextile (Filter) Fabric

1. Geotextile fabric shall be placed between foundation stabilization material and pipe bedding material.

2. Geotextile fabric shall conform to CDOT, Road and Bridge Construction Specifications, latest revision, section 712.08.

D. Bedding Zone Material

1. Embedment Method – Class B

Table 6 – Well-Graded Pipe Bedding Material

Sieve Size	Percent Passing by Weight (%)
3/8 inch	100
No. 4	70 – 100
No. 8	36 – 93
No. 16	20 – 80
No. 30	8 – 65
No. 50	2 – 30
No. 100	1 – 10
No. 200	0 - 3

Table 7 – Squeegee Pipe Bedding Material

Sieve Size	Percent Passing by Weight (%)
3/8 inch	100
No. 200	0 – 3

2. This material shall be compacted to seventy percent (70%) relative density.

E. Groundwater Barrier

1. Unified Soil Classification GC – clayey gravels, clayey sandy gravels

2. Unified Soil Classification SC – clayey sands, clayey gravelly sands

3. Unified Soil Classification CL – inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, clean clays.

4. Flowable Fill

F. Flowable Fill

1. Flowable fill (flowfill) shall be a controlled low-strength, self-leveling concrete material consisting of a mixture of portland cement, aggregate, fly ash, water, and admixtures conforming to the following:

   a. Portland Cement: ASTM C150, Type II, maximum of 50 pounds per cubic yard.

   b. Aggregate: Concrete sand, selected material from the excavation, imported material, or a combination thereof. Aggregate size shall meet the following gradation:

Table 8 – Flowable Fill

Sieve Size	Percentage Passing by Weight (%)
1 ½ inch	100
1 inch	80 to 100
¾ inch	60 to 100
3/8 inch	50 to 100
No. 4	40 to 80
No. 100	10 to 40

   c. Soluble Sulfate Content: shall not exceed 0.3% by dry weight.

   d. Water: Potable quality.

   e. Water-Cement Ratio: 3.5:1 maximum.

   f. Fly Ash: Class C per ASTM C618, maximum of 300 pounds per cubic yard.

   g. The minus No. 200 Sieve fraction shall be nonplastic.

2. Proportion the flowfill to be a flowable, nonsegregating, self-consolidating, nonshrink slurry.

3. The water content shall not exceed that required to provide a mix that will flow, can be pumped, and will maintain the soil in suspension without segregation of the aggregate while it is being placed.

4. Proportion the aggregate, cement, and water either by weight or volume.

5. Use as little cement for each cubic yard of material produced as necessary to make the flowfill flowable.

6. The temperature of the flowfill discharged into the trench shall be below 90°F.

7. The unconfined compressive strength at seven (7) days shall be a minimum of fifty (50) psi and a maximum of three-hundred (300) psi per ASTM D4832.

8. Flowfill shall not be used as pipe bedding material under any circumstance.

G. Insulation Board

1. Insulation board shall be extruded polystyrene foam board with a minimum thickness of four-inches (4").

2. Insulation board shall be suitable for in-ground geotechnical applications.

3. Manufacturers: Dow Chemical Company STYROFOAM or approved equivalent.

H. Trench Backfill

1. Suitable backfill material shall be soil obtained from the excavation that is free of frozen material stumps, roots, brush, other organic matter debris, and other items.

2. Backfill materials that are obtained from trench excavated materials to the extent such material is available, shall be screened if particles larger than three (3) inches are present. Screening shall be performed either while backfilling directly into the trench or during the trenching operation. If screened during trenching, the material shall be maintained free of unscreened material during the handling and backfilling process. Hand selecting rocks from the backfill as it is placed into the trench will not be permitted in lieu of screening. Backfill shall be moisture conditioned prior to being placed in the trench.

3. Compaction and moisture requirements in the trench backfill shall comply with the following:

    a. State Highway – 100% relative compaction in paved and shouldered areas; 95% relative compaction in all other areas. Moisture content +/- 2%.

    b. Paved roadways, sidewalks and other areas to receive pavement – Top twelve (12") to 95% relative density; remainder 90% relative density. Moisture content +/- 2%.

    c. Gravel Roadways – 90% relative density for entire trench length.

    d. Sodded or lawn areas – 90% relative density. Moisture content +/- 2%.

PART 3 - EXECUTION

A. Preparation

1. Clearing

Remove stumps, roots, brush, other vegetation and debris from areas that will be disturbed by the construction operations.

2. Pavement Removal

a. Remove any pavement, curbs, gutters, sidewalks and other surface improvements necessary to install the pipeline and appurtenances.

b. Remove bituminous pavement to clean, straight lines at locations necessary to accommodate the work. Width of removal for pipelines shall be kept to a minimum as dictated by trenching operations but shall extend six inches (6") to twelve inches (12") beyond the limits of trenching excavation. Make pavement cuts with spade-bitten air hammer, saw or other approved method so as to provide a straight and square edge. Should a cut edge become damaged during the course construction, the edge will be re-cut prior to pavement replacement.

c. Remove concrete surfacing materials to neatly sawed edges with saw cuts made to a minimum depth of 1½ inches or as otherwise required to neatly remove surfacing materials. Make saw cuts in straight lines and at right angles to the alignment of sidewalks or curb and gutter. If the saw cut should fall within thirty inches (30") of an existing construction joint, expansion joint or edge, the concrete shall be removed to the joint or edge.

3. Sod Removal

In lawn areas, cut and roll back sod before trenching. Store sod for re-installation after completion of backfilling operations.

4. Top Soil Removal

a. Strip existing topsoil from areas to be disturbed by construction operations.

b. Stockpile in areas designated by the Design Engineer. Keep topsoil segregated from non-organic trench excavation materials and debris.

c. Do not compact topsoil during stripping, stockpiling or placing.

5. Sheeting, Shoring and Bracing

a. Except where trench banks are cut back on a stable slope, provide and maintain all sheeting necessary to protect adjoining grades and structures from caving, sliding, erosion or other damage all in accordance with applicable codes and governing authorities.

b. Do not remove any sheeting unless the pipe strength is sufficient to support the trench loads based on trench width measured to the back of sheeting.

c. Remove sheeting and shoring as excavations are backfilled in a manner to

protect the construction or other structures, utilities or property. Do not remove any sheeting after backfilling.

B. Trench Excavation

1. Dewatering

a. The Contractor shall be responsible for obtaining all permits required for dewatering and shall be responsible for all associated dewatering costs.

b. Provide and maintain means and devices to remove and dispose of water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe, and until the pipe and trench zone backfilling has been completed. These provisions shall apply during both working and nonworking hours, including lunch time, evenings, weekends, and holidays. Dispose of the water in a manner to prevent damage to adjacent property and in accordance with regulatory agency requirements.

c. Do not drain trench water through the pipeline under construction. Do not allow groundwater to rise around the pipe until pipe and trench zone backfilling is complete.

d. Good surface drainage shall be provided around temporary excavation slopes to direct surface runoff away from the excavations. In no case shall water be allowed to pond at the top of excavations along the alignment. Slopes shall also be protected against erosion.

2. Trench Widths

a. Excavate trenches to provide pipe clearance for proper pipe installation, jointing and embedment.

b. Provide a minimum clearance of twelve inches (12") on each side of the pipe.

c. The maximum allowable width of trench at one foot (1') above the top of the pipe shall not be greater than the outside diameter of the pipe plus thirty-six inches (36") for all sizes.

3. Length of Open Trench

a. Limit the length of open trench to the amount of pipe which can be installed in one (1) working day.

b. Pipeline installation shall follow trench excavation within 100 lineal feet (100').

c. Trench backfill shall follow pipe installations within 100 lineal feet (100').

d. Approved cleanup shall follow trench excavations within 400 lineal feet (400').

4. Excavation

a. Unless otherwise indicated on the drawings, all excavations shall be made by open cut. Provisions for installations of sanitary sewer lines and appurtenances in other than open cut conditions shall be specifically detailed in the drawings and construction documents for the project.

b. Over-Excavation

i. Whenever wet or otherwise unstable material that is incapable of supporting pipe is encountered in the bottom of the trench, over excavate such material to a depth suitable for construction on stable pipe bedding.

ii. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade with pipe bedding or stabilization material. Place the material over the full width of trench to the established bottom of trench grade in compacted layers not exceeding six (6) inches deep.

c. Rock Excavation

i. Where rock excavation is necessary, over excavate the trench bottom a minimum of six inches (6") below the bottom of the pipe twenty-four (24) inches in diameter or less and nine inches (9") for pipe larger than twenty-four (24) inches.

ii. Backfill over-excavation with compacted pipe bedding or stabilization material.

C. Backfilling and Pipe Installation

1. Foundation Stabilization

a. Backfill areas over-excavated due to unsuitable subgrade material with stabilization material. Place stabilization material over the full width of the trench and compact in layers not exceeding six (6) inches deep up to the required bottom of trench grade.

b. Place geotextile fabric on top of the stabilization material prior to placement of the bedding material.

2. Installing Buried Piping

a. Accurately grade trench bottoms to provide uniform bearing and support for each section of pipe on undisturbed ground at every point along its entire length.

b. Provide a smooth uniform surface in the pipe subgrade where bedding material will be placed.

c. Dig bell holes and depressions for joints after the trench bottom has been brought to final grade. Bell holes and depressions shall be only of such length, depth and width as required for properly making the particular type of joint.

d. The use of earth mounds for bedding the pipe and adjusting for grades shall not be allowed.

e. Embedment material shall be placed in the trench on prepared subgrade in accordance with requirements of these specifications. The embedment material shall be brought to a density beneath the proposed pipeline as required herein.

f. Shape the pipe bedding material to provide a continuous uniform bearing support at all points along its length except at required bell holes.

g. The embedment material shall be placed a minimum of twelve inches (12") over the pipe.

h. Place backfilled material above embedment materials in a manner to prevent damage or misalignment of the pipeline. Place in lifts of a thickness to acquire the specific backfill density or in conformance with other regulatory requirements.

i. Unless otherwise specified or required by local governing authority, all backfill should be placed in a manner to achieve the required compaction.

3. Method of Compaction

a. Use compaction methods and equipment appropriate for the backfill material. Do not use equipment or methods that will transmit damaging shocks to the pipe.

b. Compaction by jetting shall not be permitted unless material is of suitable material as determined by the District. In no case will compaction by jetting be permitted in state highways or paved or gravel roadways.

c. Do not use mechanical compacting equipment in the zone above the horizontal centerline of the pipe and below a plane one (1) foot above the top of the pipe.

d. Rock and bedrock encountered in the excavation shall not be used in backfill.

D. Field Quality Control

1. Density Testing and Control

a. Density testing as may be required by the District's representatives shall be the responsibility of the Contractor and/or Developer.

b. Results of such density testing shall be reported directly to the District by the testing agency. All reports shall be submitted with the seal and signature of a registered Professional Engineer experienced in the testing of soil materials.

c. Density tests in the vicinity of vaults or manholes shall be performed at a minimum of one (1) foot away from the edge of vault/manhole sections or valve boxes.

i. Tests shall be performed in random directions from the vault, manhole, or valve box, on separate lifts.

ii. A minimum of one (1) test shall be performed, on opposite sides of the vault, manhole or valve box, for every two (2) feet of backfill material.

2. Soil Compaction Tests

   a. Conduct soil testing in accordance with the requirements of ASTM C698 or AASHTO T99, "Standard Method of Test for Moisture-Density Relations of Soils Using a 5.5 lb. Rammer and a twelve inch (12") Drop". Use AASHTO T99 method A, B, C, or D as appropriate on soil condition and judgment of the testing laboratory.

   b. Samples tested shall be representative of materials to be placed (or altered). Obtain optimum moisture density curve for each type of material or combination of materials encountered or utilized.

   c. Testing shall include Atterberg Limits, grain size determination, and specific gravity. Use test results for a basis for compaction control.

   d. Conduct tests for density control during compaction operations in accordance with the requirements of ASTM D2922, ASTM D1556, or ASTM D2167.

3. Test Frequency

   a. The District representative shall determine the location of all density testing to be performed.

   b. As a minimum, three (3) tests for every 1,000 lineal feet of trench shall be performed. The Contractor and/or Developer shall excavate material to the depth directed by the District representative to the testing and backfill test holes in accordance with these specifications.

A. Surface Restoration

1. Fine grade all areas disturbed by the construction operations after completion of backfilling and compacting. Areas which are to receive pavements, surfacing, topsoil or landscaping shall be graded as required to allow installation of the specific surface treatment. Grade all other areas to match the existing ground line.

2. Replace suitable topsoil to the depth of stripping over all areas disturbed by the construction that do not receive other surface treatment.

B. Restoration

1. Restore to their original conditions all surface improvements encountered during trenching or construction. Said improvements shall include but not be limited to the following: surfacing, sidewalks, curb, valley gutters, trees and shrubs, other surface vegetation, driveways, mailboxes, utilities, signs or other improvements.

2. Meet the requirements specified for the particular type of improvement to be repaired or replaced.

3. All surface improvements shall meet the requirements of the local governing agency and/or the requirements shown on the contract drawings approved by the District.

4.3 SANITARY SEWER MAIN AND SERVICE INSTALLATION

PART 1 – GENERAL

A. Description

This section addresses the installation of sanitary sewer collection mains and services and construction practices that may be used for installation.

B. Job Conditions

1. Pipe delivered for construction shall be strung so as to minimize entrance of foreign material.

2. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of a day's work or for other reasons, such as rest breaks or meal periods. Do not allow debris, tools, clothing or other materials to enter the pipe.

3. Use effective measures to prevent uplifting or floating of the pipeline prior to completion of backfilling operations.

4. Do not install pipe when the trench contains water or when the trench bottom is unstable. Water that is encountered in the trench shall be removed to the extent necessary to provide a firm subgrade.

PART 2 – MATERIALS

A. Pipe – Refer to pipe material specifications herein.

B. Manholes – Refer to manhole specifications herein.

C. Service Lines – Refer to sewer Service Line specifications herein.

PART 3 - EXECUTION

A. Trenching, Backfilling, and Compaction

Refer to trenching, backfilling, and compaction specifications herein.

B. Connections to the Existing System

1. Connections to the existing sewer system shall be made at an existing manhole or by setting a new manhole on the existing line.

2. At locations where a connection to an existing sanitary sewer collection main is to be made, the Contractor shall locate the existing main both vertically and horizontally and verify its exact size and material prior to start of construction.

C. Sewer Main Installation

1. The only acceptable method for laying sanitary sewer lines shall be with a laser.

2. Begin pipe laying at the lowest point, unless directed otherwise by the District, and install the pipe with the spigot ends pointing in the direction of the flow and bells pointing uphill.

3. Lay the pipe true to line and grade.

4. As each length of pipe is placed in the trench, the joint shall be completed in accordance with the pipe manufacturer's recommendations.

5. The offset between the invert shall be less than 1% of the inside pipe diameter.

6. Secure the pipe in place with the specified bedding material tamped under and around the pipe. Do not walk on small diameter pipe or otherwise disturb any piping after jointing has been completed.

7. All foreign matter or soil shall be removed from the inside of the pipe before it is lowered into its position in the trench and shall be kept clean at all times during and after laying. All openings along the line of the sewer shall be securely closed and during suspension of work at any time, suitable pipe plugs or closures shall be placed to prevent water, soil or other materials from entering the pipeline.

8. Where the depth of public sewer main is less than eight (8) feet deep measured from the top of the pipe to the finished ground surface, four inches (4") of blueboard insulation protection shall be provided.

D. Sewer Service Installation

1. Sanitary sewer service connections to the collection system shall be made with a wye or tapping saddle and shall be separated by at least five (5) feet along the sewer main length, including connections on the opposite side of the collection main.

2. Connect all Service Lines to mains with a wye or saddle in the top one-half of the sewer main. Connections made in the lower half or at mid-point of the main shall have prior approval of the District and may require the installation of a backflow prevention device.

3. Connection of Service Lines to mains shall only be accomplished with the use of an acceptable tapping machine or hole saw. Wye saddles will be permitted when holes are cut using the appropriate hole template and the cuts are no larger than ¼" larger than template outline.

4. Plug all Service Lines stub outs with an air cap or plug unless the Service Line will be immediately connected to a building sewer.

5. All basement drains are required to have a check or backflow valve.

6. Building sewer services less than eight (8) feet deep in snow removal areas shall be installed with four inches (4") of blueboard insulation protection.

7. Fittings, Couplings, Wyes, and Saddles

   a. Fittings, couplings, wyes and saddles shall be the same material as the pipeline or as specifically manufactured for the particular installation.

b. Jointing of dissimilar materials shall be permitted only with approval of the District representative. Jointing of such dissimilar materials shall be through the use of fittings, couplings, wyes, saddles, adapters or adhesives specifically manufactured for such transitions.

4.4 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER LINE

PART 1 - GENERAL

A. Description

This section is a minimum guideline for furnishing and installing polyvinyl chloride (PVC), non-pressure pipe and fittings.

B. Pipe Markings

1. The following shall be clearly shown on the exterior of the pipe:

a. Manufacture's name.

b. Appropriate ASTM designation.

c. SDR number.

C. Delivery, Storage and Handling

1. Avoid damage to pipe from impact, bending, compression or abrasion during handling and storage.

2. Store pipe on flat surface which provides even support for the pipe barrel with bell end overhanging. Do not stack pipe higher than five feet (5').

3. Do not store pipe and fittings in direct sunlight for extended periods (greater than two or three weeks). Any discoloration of the pipe material shall be evidence of ultraviolet damage and shall be reason for rejection.

4. Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and the direct rays of the sun.

5. Use only nylon protected slings to handle pipe. The use of hooks, bare cables or chains will not be permitted.

D. Criteria for Acceptance

1. Pipe which has any of the following visual defects shall not be accepted:

a. Improperly formed pipe such that pipe intended to be straight has an ordinate, measured from the concave side of the pipe exceeding 1/16" per foot of length.

b. Pipe which is out-of-round to prohibit proper jointing.

c. Improperly formed bell and spigot ends.

d. Pipe which is fractured, cracked, chipped or damaged in any manner.

e. Pipe or fittings not properly marked.

2. The manufacturer will provide a certification to the District that all products supplied to the project are in conformance with these specifications.

PART 2 - MATERIALS

A. Pipe Material

1. Sanitary sewer collection mains and services shall be polyvinyl chloride (PVC) with a maximum Standard Dimension Ratio (SDR) of 35 (Pipe Stiffness 46 psi).

2. All four-inch (4") through fifteen-inch (15") PVC shall conform to ASTM D3034.

B. Joints

1. Joints shall be bell and spigot, push-on with single rubber gasket. Joints shall conform to ASTM D3212.

2. Joining of dissimilar pipe materials shall be accomplished with a specially manufactured rubber connection with stainless steel tightening bands.

3. Manufacturers: Mission Rubber Company, Fernco, or equivalent.

4. Solvent cement joints may be used for four inch (4") and six inch (6") pipe.

PART 3 – EXECUTION

Refer to sanitary sewer pipe and service installation specifications herein.

4.5 DUCTILE IRON GRAVITY SEWER LINE

PART 1 – GENERAL

A. Description

This section is a minimum guideline for furnishing and the installation of gravity sewer ductile iron pipe (DIP) and appurtenances.

B. Pipe Markings

1. Manufacture's name.

2. Appropriate ASTM designation.

3. Gravity sewer DIP shall be marked with the date of the lining system application and the numerical application sequence of that date.

C. Delivery, Storage and Handling

1. Avoid damage to pipe from impact, bending, compression or abrasion during handling and storage.

2. Store pipe on flat surface which provides even support for the pipe barrel with bell end overhanging. Pipe shall be stored on a surface that provides even support for the pipe barrel. Pipe shall not be stored in such a way as to be supported by the bell.

3. Do not stack pipe higher than five feet (5').

4. Use only nylon protected slings to handle pipe. The use of hooks, bare cables or chains will not be permitted.

5. Do not skid or roll pipe into pipe already on the ground.

6. Do not damage pipe coating or lining.

7. Store and use pipe lubricants in a manner which will avoid contamination.

8. Pipe, gaskets, and all other installation materials shall be stored in accordance with the manufacturer's specifications.

D. Criteria for Acceptance

1. Pipe which is fractured, cracked, chipped or damaged in any manner shall not be accepted.

2. The manufacturer will provide a certification to the District that all products supplied to the project are in conformance with these specifications.

PART 2 - MATERIALS

A. Pipe Material

1. Gravity sewer ductile iron pipe (DIP) shall be manufactured in accordance with AWWA C150 and AWWA C151.

2. Gravity sewer DIP shall have an exterior asphaltic coating, minimum one (1) mil thick, on the pipe exterior.

B. Lining

Gravity sewer DIP shall be interior lined with ceramic epoxy, forty (40) mil nominal thickness. (Protecto 401 Ceramic Epoxy Lining or equivalent.)

C. Joints

1. Pipe joints shall be push-on gasket in conformance with AWWA C111.

2. Restrained joints shall be mechanical joint, restrained joint or restrained slip joint.

3. The use of flanged joints are not permitted.

D. Fittings

Fitting shall be furnished in accordance with AWWA C104, C110, and C111.

E. Polyethylene Encasement

1. All buried DIP shall be encased in polyethylene in accordance with AWWAC105, Method A.

2. Polyethylene encasement shall be eight (8) mil minimum thickness.

PART 3 – EXECUTION

Refer to sanitary sewer pipe installation specifications herein.

4.6 SANITARY SEWER SERVICE LINES

PART 1 – GENERAL

This section addresses the furnishing and installation of sanitary sewer service lines, clean-outs, and other appurtenances.

PART 2 – MATERIALS

A. Pipe

1. Refer to PVC pipe material specifications herein.

2. Services for new construction shall have tee or wye connections.

B. Tapping Saddle

1. Tapping saddle shall be manufactured from specially formulated high durometer polyvinyl chloride (PVC).

2. Saddle shall be supplied with T-300 stainless steel clamps for attaching the saddle to the main line.

3. Tapping saddle shall be tee style.

4. Manufacturers: Ferno Flexible Tap Saddles (Tee Style) or equivalent.

C. Coupling

1. Flexible coupling may be used when bell and spigot joints cannot be made.

2. Flexible couplings shall be made from elastomeric polyvinyl chloride (PVC).

3. Coupling shall be supplied with T-300 stainless steel clamps.

4. Manufacturers: Fernco or equivalent.

D. Cleanouts

1. Cleanout shall be rated for HS-20 traffic loadings.

2. Cleanout riser shall be the same material and diameter as the service piping and solvent welded.

3. Cleanout riser shall be capped with a threaded brass cleanout plug.

4. Cleanout riser shall be installed in a cast iron or ductile iron service box. Service box lid shall be marked with an "S" or "Sewer."

5. Service Box Manufacturers: Tyler-Union or equivalent.

PART 3 – EXECUTION

Refer to sanitary sewer service installation specifications herein.

4.7 MANHOLES

PART 1 - GENERAL

A. Description

1. This section addresses sanitary sewer manholes and includes the acceptable products, materials, and construction practices to be used in the construction and installation of manholes.

2. Manholes shall be furnished with all accessories, including base, cone section, gaskets, and ring and cover.

B. Delivery, Storage and Handling

1. Manholes shall be handled, stored, and protected in such a manner as to prevent damage to materials.

2. All joint surfaces shall be free from dirt, oil, and grease at the time of installation.

PART 2 - MATERIALS

A. Precast Concrete Manholes

1. Except as otherwise specially approved by the District, manholes shall be precast concrete and manufactured in accordance with the referenced specifications.

2. Precast manhole bases, barrels, and cone sections shall be manufactured in accordance with ASTM C478, and shall be made with Type I/II cement. All cone sections shall be the eccentric type with the exception of shallow (flat top) manholes.

3. Refer to concrete specifications herein.

B. Ring and Cover

1. Standard iron ring and covers shall be HS-20 load capable cast iron conforming to ASTM A48.

2. All rings shall be maximum eight-inches (8") and minimum four-inches (4") in height.

3. The word "SEWER" shall be cast in the cover.

4. Pick-hole shall be one and on-half inch (1 ½") wide by one-half inch (½") deep.

5. Manholes outside of road rights-of-way shall have a locking type cover and ring bolted to the concrete cone.

6. Cast iron ring and cover shall be supplied with a bituminous coating.

7. Covers shall be a non-perforated, non-skid pattern.

8. Manufacturers : Neenah Foundry - Stock No. R-1706; Castings, Inc. – Stock No. MH-400-24 C.I.; Hutchinson Foundry and Steel Inc. – MH-400 or equivalent.

C. Steps

1. Step shall be made of a minimum of 3/8-inch diameter grade 60 steel reinforcing rod completely encapsulated in a copolymer polypropylene plastic, conforming to ASTM A615, ASTM C478, and ASTM D4101.

2. Manhole steps shall have a maximum vertical spacing of twelve inches (12") unless otherwise specified by the District.

3. Manufacturers: M.A. Industries, Inc PS2-PFS, PS2-PF, or equivalent.

D. Grade Adjustment Rings

1. Precast grade adjustment rings shall be manufactured in accordance with ASTM C478, and shall be made of Type I/II cement.

2. Grade adjusting rings shall be sealed with approved sealer and grouted inside and out.

3. Grade adjustment rings between the ring and cover shall not exceed twenty-four inches (24") to the first step.

E. Mortar

1. Mortar shall be Sand-Cement grout, using the following ratio of ingredients:

a. One (1) part Portland Cement conforming to ASTM C150, Type I/II.

b. Two (2) parts sand conforming to ASTM C144.

c. One-half (1/2) part hydrated lime conforming to ASTM C207, Type S.

F. Grout

G. Grout shall be pre-mixed or job-mixed nonmetallic and nonshrink.

H. Preformed Plastic Gaskets

1. All preformed plastic gaskets shall conform to Federal specifications SS-S-00210 (210-A), Type I, rope form, 1.5 inches (1.5") diameter.

2. Manufacturers: Henry Ram-nek or equivalent.

I. Modular Mechanical Seals

1. Modular mechanical sealing devices shall utilize interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe sleeve or coring and the passing pipe. Assembled links shall form a continuous rubber belt around the pipe, with a pressure plate under each bolthead and nut.

2. Manufacturers: Pipeline Seal and Insulator, Inc., Linkseal; Advance Products & Systems, Inc., INNERLYNX, or equivalent.

J. Manhole Encapsulation System

1. Heat-shrinkable sleeves shall be high shrink irradiated and cross-linked polyethylene impermeable backing, coated with protective heat activated adhesive.

2. Manufacturers: WrapidSeal or equal.

K. Interior Coating

1. Manholes that may be subject to deterioration from hydrogen sulfide (H_2S) shall be interior coated with an approved coating material as specified by the Design Engineer.

2. The Design Engineer shall determine if conditions require an interior coating to protect the manhole from corrosion.

L. Intermediate Platforms

1. Manholes having twenty (20) feet or more from manhole rim to invert may require intermediate manhole platforms.

2. Intermediate platforms shall be designed by the Design Engineer. Platform design shall be submitted to the District for review and approval.

M. Marker Post

Marker post shall be USA BlueBook, Rhino Fiberglass for Sewer, Stock Number 70460.

PART 3 - EXECUTION

A. Manhole Installation

1. Provide segmental precast concrete barrel sections a maximum of four feet (4') in length with preformed flexible gasket material between each barrel section as jointing material.

2. Provide one, one foot (1') high barrel section beneath a reducing ring or cone cap to bring the manhole ring and cover to within eight inches (8") of desired grade.

3. Provide precast concrete two inch (2") high grade adjustment rings to the ring and cover to the desired grade.

4. Where the pipeline passes through a manhole in straight alignment without changing directions, the sanitary sewer pipe may be laid through the manhole base and the top of the pipe cut out after a cast-in-place concrete base has been installed. The bottom of the manhole shall be smoothly shaped to conform to the pipe as shown on the Construction Details.

5. Concrete floors in the manhole shall have a broom finish.

6. Where intersecting pipelines or pipelines requiring deflections at manholes require that inverts on the manholes be shaped to match the pipe sections, such construction shall be accomplished in accordance with the Construction Details.

7. Form the flowline configuration of intersection pipes to allow for free uninterrupted flow of sanitary sewerage through and out of the manhole. All channel inverts shall be finished smooth by steel troweling. All inverts shall be placed and finished with a single pour of cast-in-place concrete.

8. Placement of grout and/or other material to repair and/or reshape the manhole invert shall not be permitted unless specifically approved by the District.

9. Cast-in-place concrete bases for manholes shall be constructed in a manner to provide for a smooth level surface on which a vertical barrel section shall be placed. Completely watertight joints shall be made utilizing preformed flexible gasket material or a precast concrete base section may be utilized.

10. A marker post shall be placed a minimum two (2) feet, maximum three (3) feet, behind the manhole facing the street.

11. Install an external drop manhole where the invert elevation difference between the invert in and the invert out is twenty-four inches (24") or more.

4.8 CONCRETE

A. Cement

1. All cement shall be Portland Cement conforming to ASTM C150, Type II.

B. Aggregate

1. All fine and coarse aggregate shall conform to ASTM C33.

C. Water

All water shall be free from objectionable quantities of silt, organic matter, alkali, salts, and other impurities and conform to ASTM C94.

D. Admixtures

1. Air-Entraining Admixtures

a. Air-entraining agents will be permitted and shall conform to ASTM C260.

b. Total air content: 5.0% to 6.5%

2. Water Reducing Admixtures

   a. Water reducing admixtures may be utilized if approved by the District.

   b. Water reducing admixtures shall be in conformance with ASTM C494, Type A.

3. Fly Ash

   a. When fly ash is used in concrete, the cement replacement shall not exceed 20%.

   b. Fly ash shall conform to ASTM C618, Class F.

E. Reinforcing Materials

1. All reinforcing materials shall conform to ASTM A185, ASTM A615, and ASTM A996.

2. All bars shall be Grade 60.

F. Mix Design

1. All concrete shall have a minimum 28-day compressive strength 4,000 pounds per square inch (psi).

2. The water-cement ratio shall be 0.45.

3. Slump shall be maintaining between one-inch (1") minimum to three-inch (3") maximum for all concrete.

4.9 TESTING SANITARY SEWER PIPELINES AND APPURTENANCES

PART 1 – GENERAL

A. Description

1. This section addresses the testing of sanitary sewer collection mains, manholes, and appurtenances.

2. All sanitary sewer pipelines shall be air tested per these specifications.

3. All sanitary sewer manholes shall be vacuum tested per these specifications.

4. All sanitary sewer collection systems shall be mandrel tested for deflection, lamp tested for straight and true alignment and video inspected per these specifications.

PART 2 – MATERIALS (Not Used)

PART 3 - EXECUTION

A. General

1. Testing shall be conducted when:

a. Backfill and compaction has been completed but before paving and curb gutter improvements are installed.

b. Line and manholes have been thoroughly cleaned of all foreign material.

2. The Contractor shall furnish all equipment, labor, and incidentals necessary to perform tests. The pressure gauge shall be capable of indicating pressure to the nearest 0.1 pounds per square inch (psi) increment.

B. Pipeline Testing

1. Alignment Testing

a. Each section of pipeline between manholes will be subject to testing by lamping to determine where proper alignment has been accomplished and whether any displacement of the pipe has occurred during construction.

b. The Contractor and/or Developer shall provide suitable assistance for the District representative to observe this work.

c. The Contractor and/or Developer shall be responsible for repairing and retesting any alignment, displaced pipe or other defects discovered during this testing in accordance with these specifications.

d. "Full moon" shall be visible for vertical grade alignments. No less than "half moon" shall be visible for horizontal alignments.

e. The determination of the acceptability of the pipeline. Alignment by lamping shall rest solely with the District's representative and his decision shall be final.

2. Deflection Testing

a. Each section of sanitary sewer shall be tested for deflection by an independent testing firm as hired by the Contactor prior to District acceptance and as deemed necessary within the warranty period by the District.

b. The Contractor and/or Developer shall provide all necessary equipment, labor, and other facilities to accomplish testing. A mandrel certified by the pipe manufacturer's representative for dimensional quality shall be utilized.

c. The maximum allowable deflection for District acceptance is 5% of the base internal diameter.

d. The maximum allowable deflection at the end of the warranty period shall be 7.5% of the base internal diameter.

e. Mandrel outside diameters in inches is as follows:

Table 9 – Allowable Pipe Deflection – Mandrel Test

Pipe Size (in)	Nominal I.D. (in)	5% Deflection Mandrel	7.5% Deflection Mandrel
8"	7.920	7.524	7.326
10"	9.900	9.405	9.158
12"	11.780	11.191	10.897
15"	14.426	13.705	13.344

f. Should the vertical deflection of the pipe be found to exceed 5% of the internal diameter, the Contractor will remove the pipe, install proper bedding, replace the pipeline material and properly place and compact all backfill material in accordance with these specifications. Any areas removed and replaced shall be subject to retesting.

3. Air Test

a. Conduct air tests in conformance with ASTM F1417 and these specifications.

b. All pressures in this section assume no groundwater back pressure. If groundwater is present, increase test air pressures to compensate for the back pressure. Each foot of groundwater produces approximately 0.433 psi back pressure. For groundwater in excess of five feet (5') above the pipe crown an infiltration test shall be used in lieu of air testing.

c. Preparation for Tests

i. Flush and clean the sewer line prior to the testing in order to wet the pipe surfaces and produce more consistent results.

ii. Plug and brace all openings in the main sewer line and the upper end of any connections. Check all leakage.

iii. If leaks are found, release the air pressure, eliminate the leaks and start the test procedure over again.

d. Testing Procedure

i. Conduct tests in conformance with ASTM F1417 and these specifications.

ii. Add air until the internal pressure of the sewer line is raised to approximately four (4) psi gauge at which time the flow of air shall be reduced and the pressure maintained between 3.5 and 4.5 psi gauge for a sufficient time to allow the air temperature to come to equilibrium with the temperature of the pipe.

iii. After the temperature has stabilized, the pressure shall be permitted to drop to 3.5 psi gauge at which time a stop watch or a sweep second hand watch shall be used to determine the time lapse required for the air pressure to drop to 2.5 psi gauge.

iv. Determine the time required for the air pressure to drop from 3.5 psig to 2.5 psig. The time elapsed shall not be less than:

$$T = 0.085 \frac{DK}{Q}$$

Where:

T = shortest time(s) allowed for the air pressure to drop 1.0 psig. K = 0.000419DL but not less than 1.0
Q = leak rate in cubic feet/minute/square feet of internal surface = 0.0015 CFM/SF
D = measured average inside diameter of pipe (in)
L = length of test section (ft)

v. The following table contains the test durations for pipe diameters between eight-inches (8") and fifteen inches (15"), for pipe lengths up to 500 feet.

Table 10 – Specified Test Duration for Length of Pipe Indicated (Duration in min:sec)

Pipe Diameter (in)	Pipe Length (ft)					
	0 -150	200	250	300	350	400
8	7:34	7:34	7:34	7:36	8:52	10:08
10	9:26	9:26	9:53	11:52	13:51	15:49
12	11:20	11:24	14:15	17:05	19:56	22:47
15	14:10	17:48	22:15	26:42	31:09	35:36

vi. All plugs must be sufficiently braced to prevent blowouts and the pipeline must be completely vented before attempting to remove the plugs.

vii. As a precaution, pressurizing equipment shall be provided with a regulator set to five (5) psi to avoid over-pressurizing and damaging an otherwise acceptable line.

4. Infiltration Test

a. If groundwater exists in excess of five feet (5') above the pipe crown an infiltration test for leakage shall be used.

b. The Contractor shall provide a pre-approved device capable of measuring flow in the pipe in fifteen (15) minute intervals and providing a total flow at the end of the testing period.

c. Flow measurement shall be twenty-four (24) hours minimum and shall be conducted only after backfill and trench/area dewatering operations are complete and groundwater has returned to normal elevations.

d. The maximum allowable infiltration for sanitary sewers shall not exceed 50 gallons per day/inch nominal diameter pipe/mile (0.95 gpd/inch/100ft).

C. Manhole Testing

1. Vacuum Testing

   a. Manholes shall be tested before the ring and cover and grade adjustment rings are installed, and after backfill and compaction is complete.

   b. Conduct tests in conformance with ASTM C1244 and these specifications.

   c. Preparation for tests:

      i. All lift holes, joints, and other imperfections shall be filled with an approved non-shrink grout, to provide a smooth finish appearance.

      ii. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manholes.

   d. Test Procedure:

      i. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendation.

      ii. A vacuum of ten-inches (10") mercury (Hg) shall be drawn in the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off.

      iii. The time shall be measured for the vacuum to drop to nine-inches (9") mercury (Hg).

      iv. The manhole shall pass if the time for the vacuum reading to drop from ten-inches (10") mercury (Hg) to nine-inches (9") mercury (Hg) meets or exceeds the values indicated in the following table:

Table 11 – Manhole Vacuum Testing Durations

Depth (ft)	Diameter (in)		
	48	60	72
	Time (seconds)		
8	20	26	33
10	25	33	41
12	30	39	49
14	35	46	57
16	40	52	67
18	45	59	73
20	50	65	81
22	55	72	89
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121

v. If the manhole fails any test, necessary repairs shall be made by an approved method and the manhole shall be retested until a satisfactory test is obtained.

D. Televising Sewer Mains

1. All sanitary sewer mains shall be televised three (3) months prior to the end of the warranty period or as deemed necessary within the warranty/construction period by the District.

2. The televising shall be made by the Contractor or a Sub-consultant to the Contractor and the recording shall be submitted to the District for review and acceptance.

3. The recording shall be made using a color camera, self-propelled or other, having sufficient light to show detail of problem areas and joints. Camera shall have a swivel head capable of looking up each service connection.

4. All recordings will have location (i.e. manhole # to manhole #), time, date, and footage displayed.

4.10 BORINGS AND ENCASEMENTS

PART 1 – GENERAL

A. Description

1. This section addresses the installation of a casing pipe by boring (or jacking) or as an open trench encasement and includes the acceptable products, materials, and construction practices.

2. The specifications provided in this section are the minimum requirements for casing pipe borings and encasements.

B. Design Considerations

1. The Design Engineer shall specifically design each casing pipe boring (or jacking) installation.

   a. Casing pipe thicknesses specified in this section are based upon superimposed loads and not upon the loads which may be placed on the casing pipe as a result of jacking operations.

   b. Provide increased casing pipe strength as necessary to withstand jacking loads.

2. The Design Engineer shall size the casing pipe such that the inside clearance is at least one-inch (1") greater than the maximum outside diameter of the casing spacer runners.

C. Requirements of Regulatory Agencies

1. The type of casing pipe material and its properties will normally be specified by the agency granting permission to cross. Such crossings shall be subject to approval by the District to avoid conflicts in requirements or standards between the District and the agency granting permission to cross.

   a. The Contractor shall provide a letter, permit, or an approved crossing application to the District from the agency granting the crossing approval.

   b. The Contractor shall obtain the necessary bonds, insurance or indemnity required by the crossing permit for protection against damage, interference with traffic, or service that may be caused by the construction activities.

PART 2 - MATERIALS

A. Carrier Pipe

1. The carrier pipe shall be the same nominal diameter as the system main on either side of the casing pipe.

2. For situations where more than one (1) pipe joint falls within the casing pipe, the carrier pipe shall be restrained through the casing.

3. Casing spacers are required on all carrier pipes.

B. Casing Pipe

1. AWWA C900 Polyvinyl Chloride (PVC) Pipe

2. AWWA C905 Polyvinyl Chloride (PVC) Pipe

3. AWWA C151 Ductile-Iron Pipe (Polywrapped)

4. Steel Pipe

   a. The casing pipe shall be new, smooth steel conforming to ASTM A139, Grade B (no hydro.)

   b. Minimum Yield Strength – 35,000 psi

   c. Exterior Coating – Not required.

5. The following table indicates what minimum casing pipe diameter and material to use in relation to the carrier pipe diameter. It also provides steel casing pipe minimum wall thicknesses and specifies when to use casing spacers and end seals. The Design Engineer shall confirm the required casing pipe diameter to use, especially when the carrier pipe has joint restraint.

Table 12 – Casing Pipe Specifications

Carrier Pipe Diameter (in)	Casing Pipe Diameter (in)	Boring and Encasement	Encasements Only
		Steel Casing Pipe – Minimum Wall Thickness (in)	Allowable Casing Pipe Materials
4"	8"	0.322	C900 PVC, C151 DIP, Steel
6"	12"	0.375	C900 PVC, C151 DIP, Steel
8"	16"	0.375	C900 PVC, C151 DIP, Steel
10"	20"	0.375	Steel
12"	24"	0.500	Steel
15"	30"	0.500	Steel

6. End seals are required on all casing pipe installations.

C. Accessories

1. Casing Spacers

   a. Casing spacers shall be in a "centered-restrained" configuration in the casing pipe.

   b. Casing spacers shall be sized such that the height of the risers and runners have no less than one-inch (1") clearance from the inside wall of the casing pipe.

   c. Band

      i. Casing spacers shall be constructed of circular stainless steel bands that bolt together to form a shell around the carrier pipe.

      ii. Material – T-304 stainless steel

iii. Minimum Thickness – 14 gauge

iv. Use an eight-inch (8") band width for carrier pipes twelve-inches (12") in diameter and smaller, unless otherwise recommended by the manufacturer.

v. Use a twelve-inch (12") band width for carrier pipes larger than twelve-inches (12") in diameter, unless otherwise recommended by the manufacturer.

d. Liner

i. Material – Polyvinyl Chloride (PVC)

ii. Minimum Thickness – 0.090-inches

iii. Hardness-Durometer – 85-90

iv. Electrical Properties – 1,380 V/min

e. Risers (Support Structures)

i. a. Material – T-304 stainless steel

ii. b. Maximum Thickness – 10 gauge

f. Assembly Hardware

i. Bolts – 5/16" - 18 x 2 ½" T-304 stainless steel or plated

ii. Nuts – Hex, 5/16"

iii. Washers – 5/16" SAE 2330

g. Runners

i. Material - Glass Filled Polymer or Ultra High Molecular Weight (UHMW) Polyethylene.

ii. Minimum Width – Two-inches (2")

iii. Runners shall be mechanically bolted to the risers.

h. Manufacturers: Cascade Waterworks Mfg., PSI Pipeline Seal & Insulator, Inc. or equivalent.

2. Casing Pipe End Seals

a. Material - Seamless neoprene rubber

b. Minimum Thickness – 1/8"

c. Type – Pull on

d. Bands and clamps – T-304 stainless steel

e. Size shall be specific to the casing-carrier pipe combination.

f. Manufacturers: Cascade Waterworks Mfg., PSI Pipeline Seal & Insulator, Inc. or equivalent.

3. Anode Bag

a. 45-lb prepackaged zinc anode, two (2) inches square by a minimum 45-inches long.

b. Anode lead wire shall be AWG No. 12 stranded copper wire with THWN insulation conforming to UL 83. Wire shall be attached to the steel core with silver brazing material. The connection shall be encapsulated in a heat shrinkable sleeve. Anode lead wire shall be of sufficient length to extend from the anode to the designated termination point without a splice. Wires with cut or damaged insulation will not be accepted, and replacement of the entire lead will be required at the Contractor's expense.

PART 3 - EXECUTION

A. Carrier Pipe Installation

1. Carrier pipe shall be installed at the elevations and grades shown on the Construction Drawings.

2. Install the carrier pipe in accordance with the pipe material's specification.

3. Restrain the carrier pipe within the casing pipe, as required in accordance with this specification.

4. Install casing spacers one (1) to two (2) feet on either side of the bell joint and one (1) every six (6) to eight (8) feet apart thereafter, for a total of three (3) casing spacers per pipe length unless otherwise specified by the manufacturer or District.

5. Casing spacers are required on all pipes.

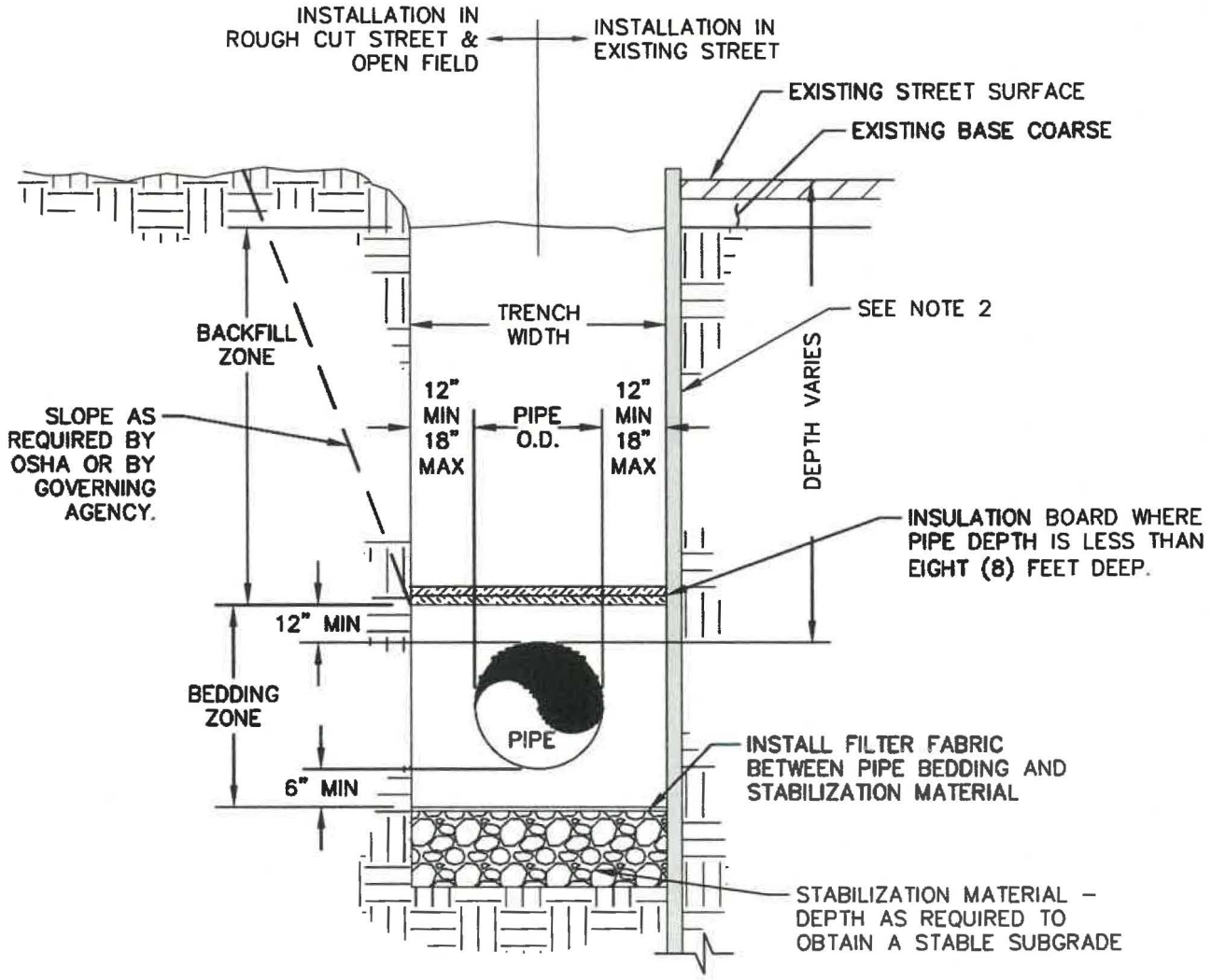
6. E. Seal the ends of the casing pipe with casing pipe end seals. End seals are required on all casing pipe installations.

B. Casing Pipe Installation

1. Casing pipe shall be installed to the grade and alignment shown on the approved Construction Drawings.

2. Grade and alignment shall not deviate more than 0.3 feet horizontally and 0.1 foot vertically from that shown on the Construction Drawings.

SECTION 5 CONSTRUCTION DETAILS



NOTES:

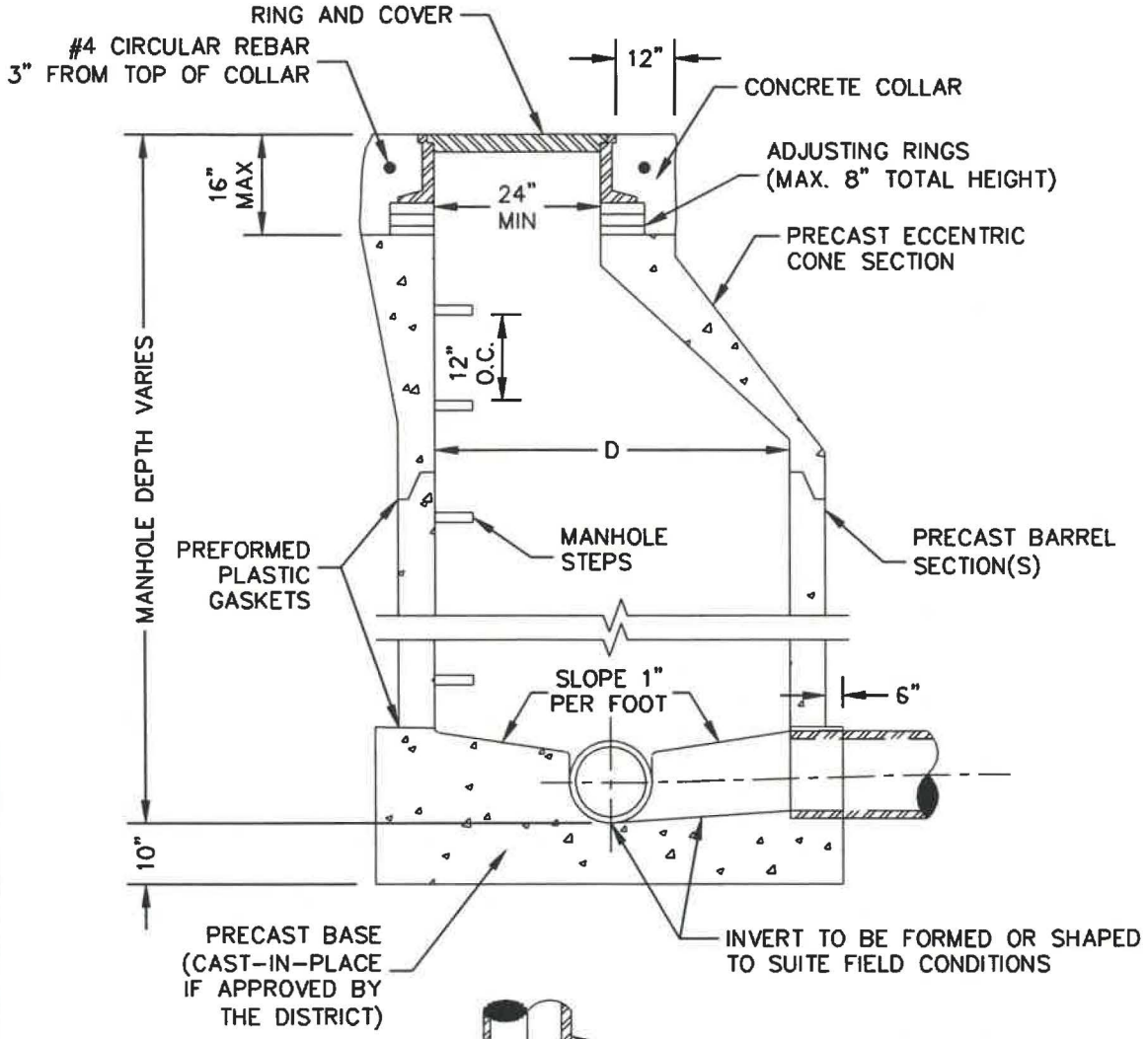
1. REFER TO FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR STABILIZATION, FILTER FABRIC, BEDDING, BACKFILL MATERIAL, AND COMPACTION REQUIREMENTS. FOR ANY CONFLICT BETWEEN FAIRPLAY SANITATION DISTRICT BACKFILL MATERIAL SPECIFICATIONS AND COMPACTION REQUIREMENTS AND OTHER GOVERNING AGENCY REQUIREMENTS, THE MORE STRINGENT SPECIFICATION SHALL APPLY.
2. TRENCHES SHALL BE SHORED, BRACED, OR SHEETED AS NECESSARY FOR THE SAFETY AND PROTECTION OF PERSONNEL AND OTHER UTILITIES.

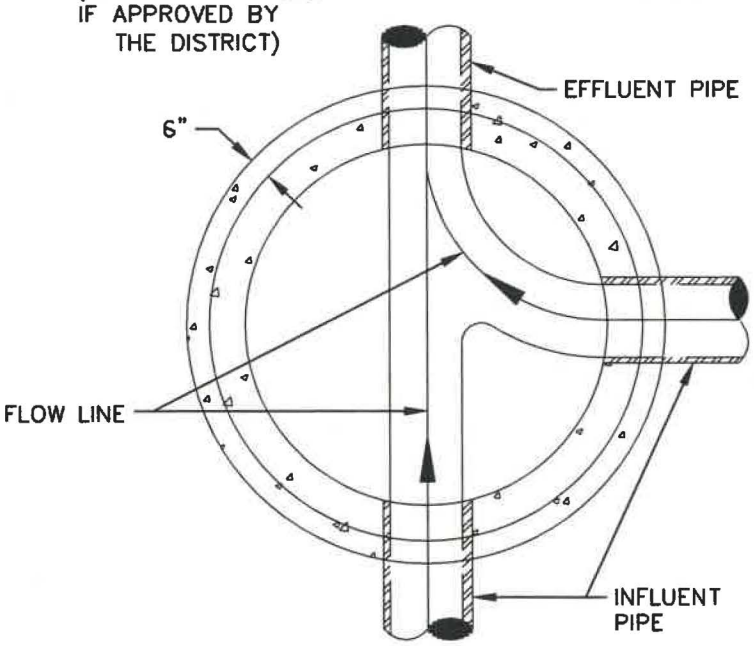
TRENCH DETAIL

DETAIL NO. S-1

DATE: APRIL 2014

SCALE: N.T.S.





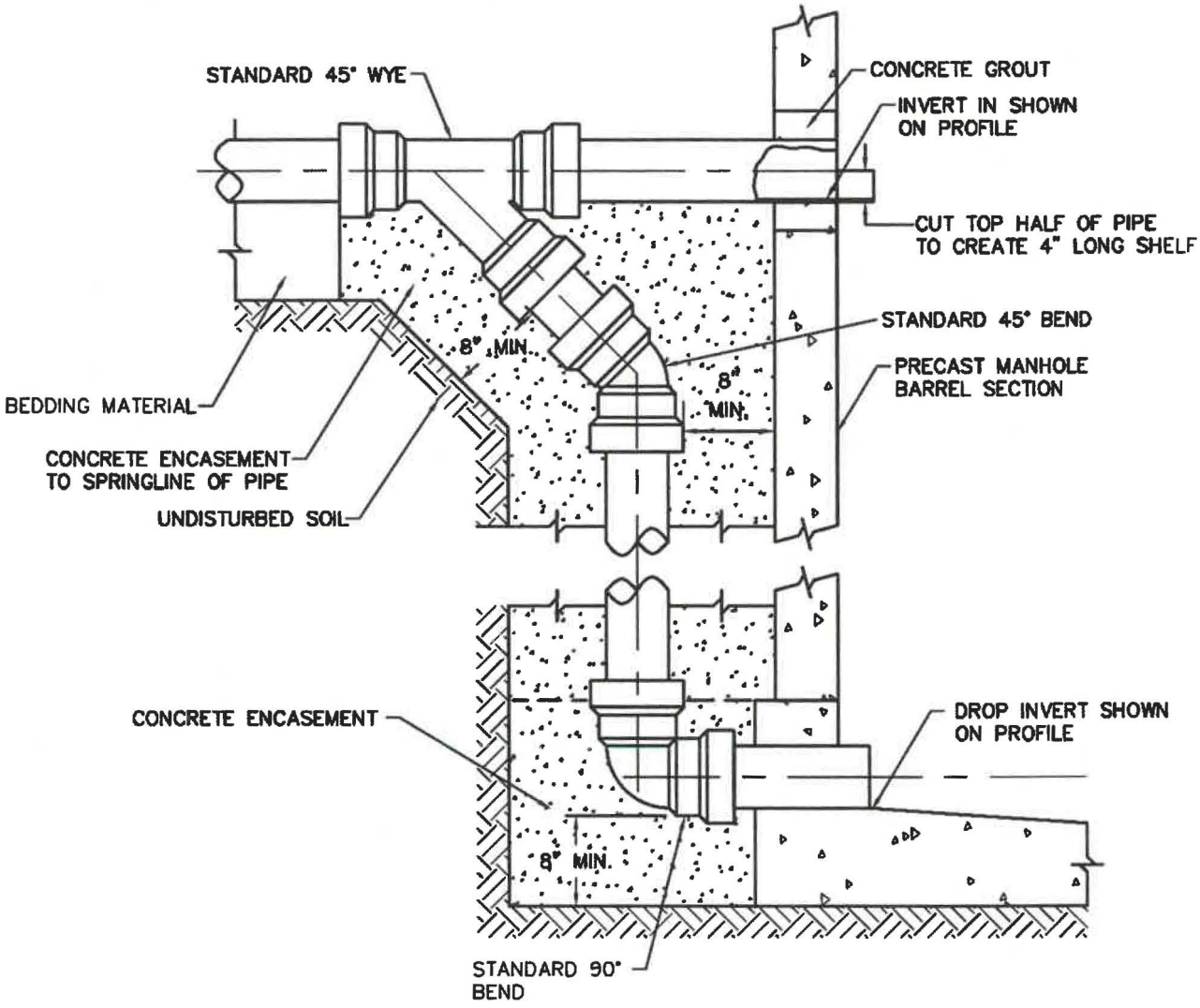
NOTES:

1. REFERENCE FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR MINIMUM MANHOLE DIAMETER (D) AND MATERIAL/INSTALLATION REQUIREMENTS.
2. MANHOLES INSTALLED IN GROUNDWATER ABOVE THE BASE SHALL HAVE ALL MANHOLE SECTION JOINTS SEALED PER FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS.

STANDARD SANITARY SEWER MANHOLE

DETAIL NO. S-2

DATE: APRIL 2014 SCALE: N.T.S.



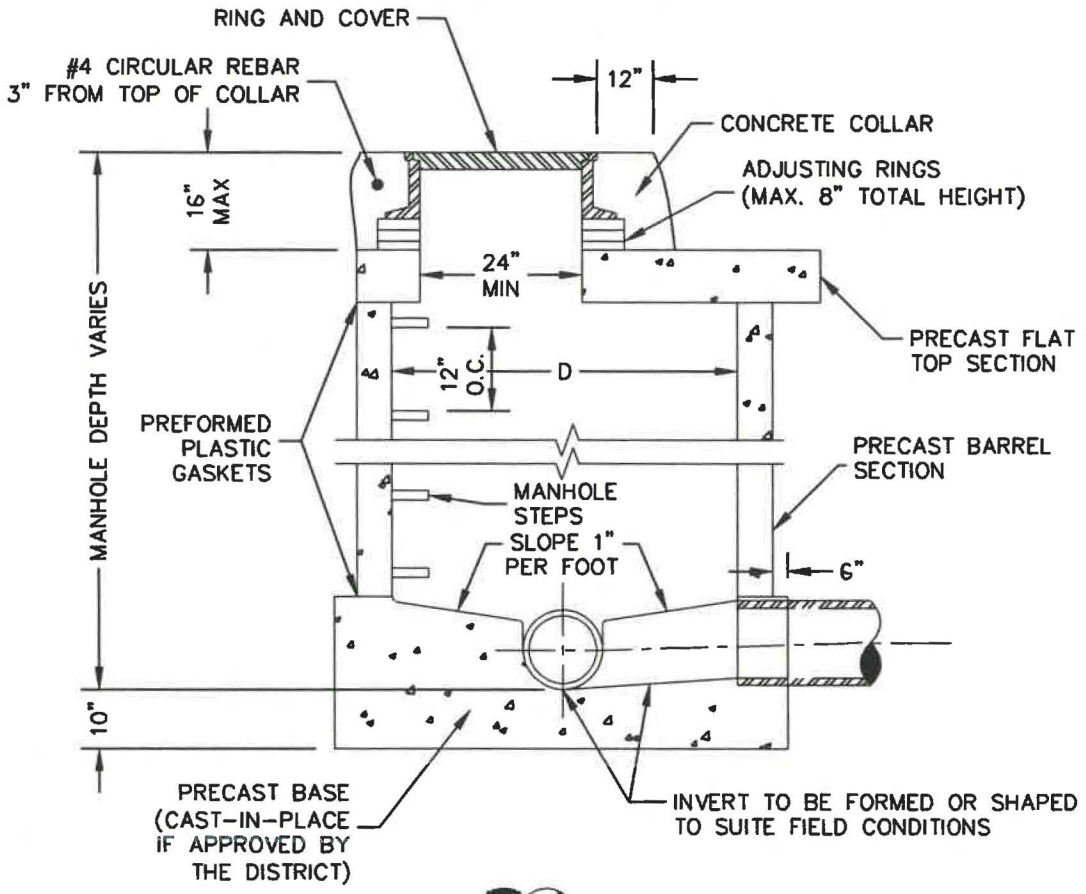
NOTES:

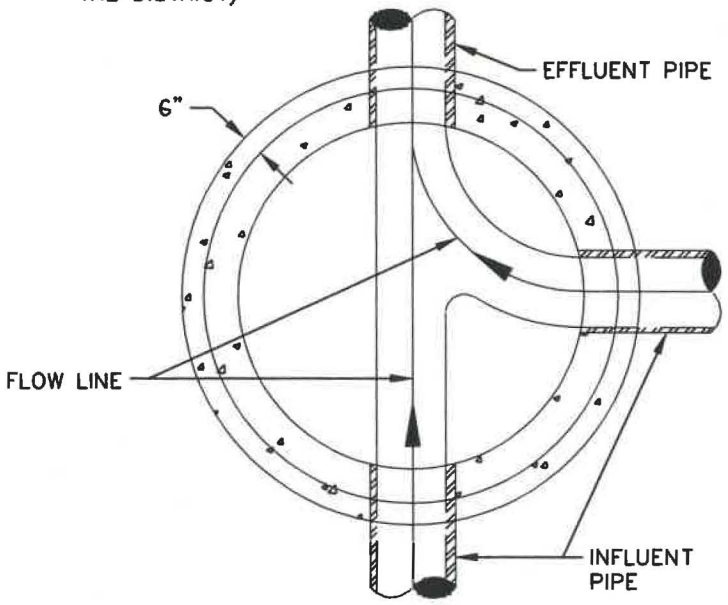
1. PVC (ASTM D-3034 SDR-35) OR SEWER D.I. PIPE AND FITTINGS SHOWN.
2. CONCRETE ENCASEMENT SHALL BE MIN. 8" THICK ALL AROUND DROP.
3. MAXIMUM ALLOWABLE DROP SHALL BE SUBJECT TO THE APPROVAL OF THE DISTRICT ENGINEER.
4. DIAMETER OF DROP PIPE SHALL NOT BE LESS THAN THE LINE DIAMETER.
5. ANY DROP OVER 4'-0" REQUIRES VERTICAL AND HORIZONTAL REINFORCEMENT (#4 @ 1'-6" O.C. 3" CLEAR).

OUTSIDE DROP MANHOLE

DETAIL NO. S-3

DATE: APRIL 2014 SCALE: N.T.S.





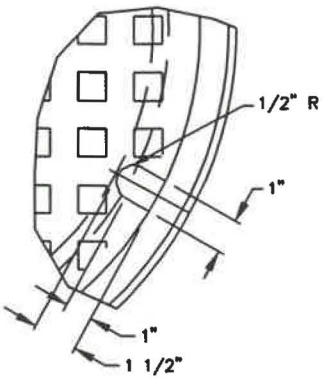
NOTES:

1. THIS DETAIL SHALL BE USED WHEN THERE IS LESS THAN SIX (6) FEET OF COVER OVER THE TOP OF THE PIPE.
2. REFERENCE FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR MINIMUM MANHOLE DIAMETER (D) AND MATERIAL/INSTALLATION REQUIREMENTS.
3. MANHOLES INSTALLED IN GROUNDWATER ABOVE THE BASE SHALL HAVE ALL MANHOLE SECTION JOINTS SEALED PER FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS.

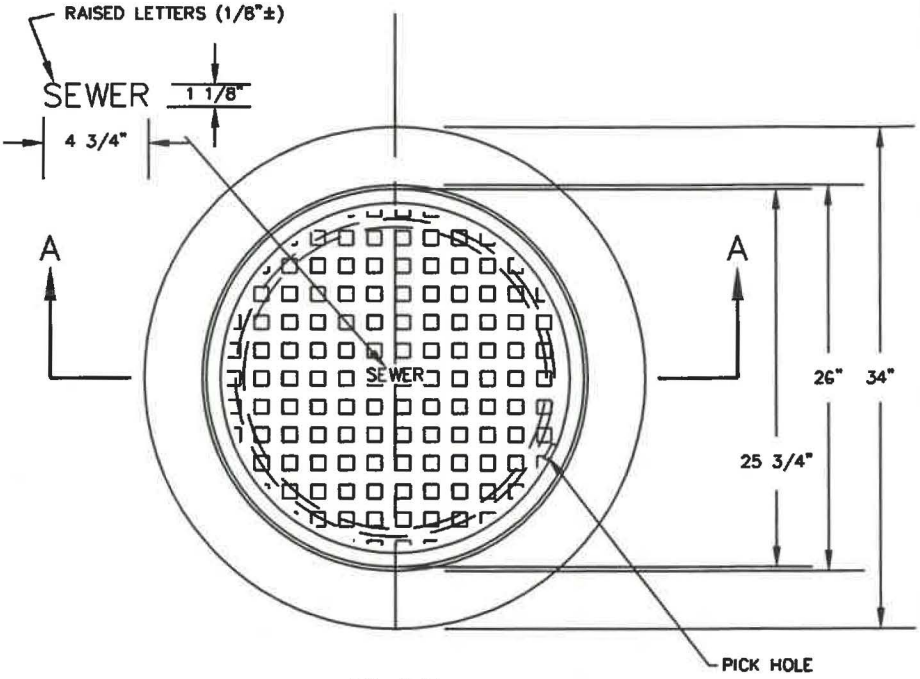
SHALLOW SANITARY SEWER MANHOLE

DETAIL NO. S-4

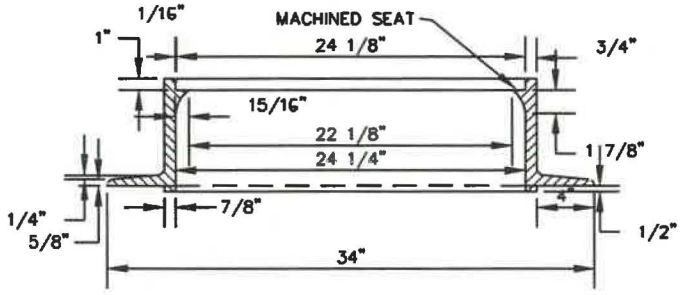
DATE: APRIL 2014 SCALE: N.T.S.



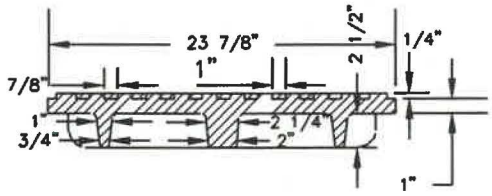
PICK HOLE



PLAN



SECTION A–A



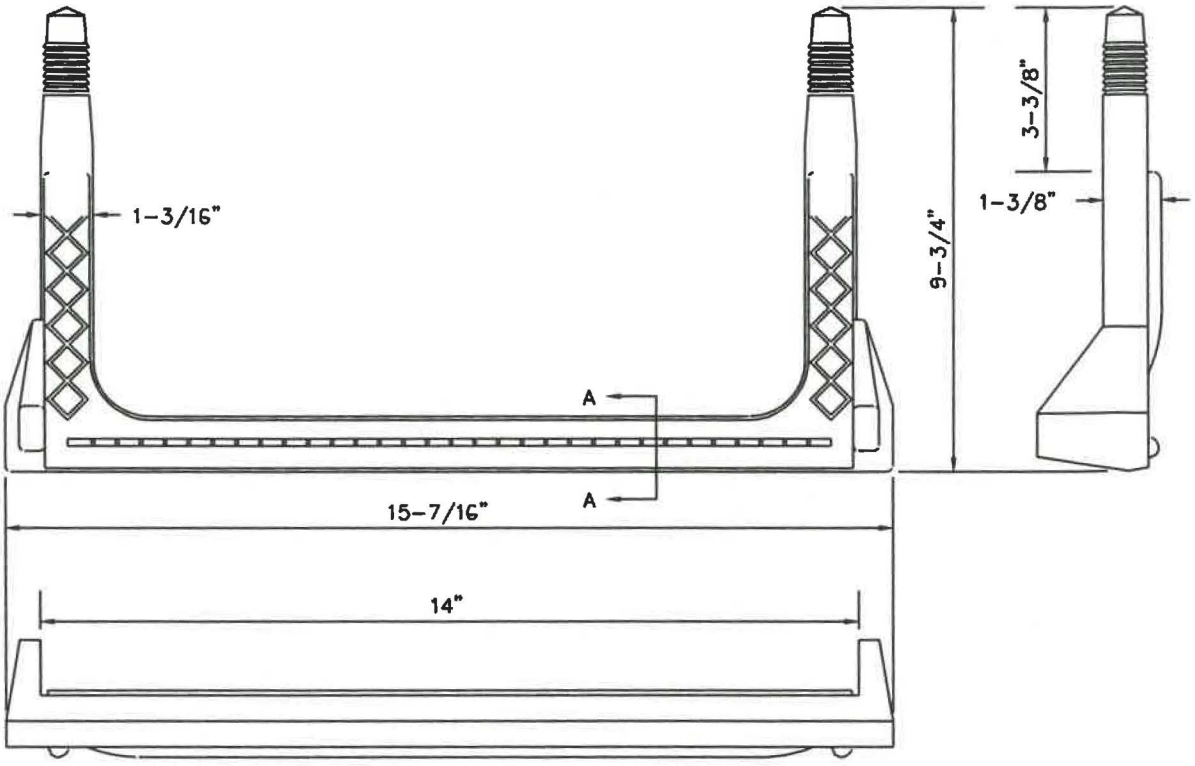
NOTES:

1. CASTING SPECIFICATIONS: ASTM A–48 WITH A MINIMUM TENSILE STRENGTH OF 25 KSI (CLASS 25).
2. ALL CASTINGS TO BE DIPPED IN ASPHALT BASE PAINT (OR APPROVED EQUAL).
3. CASTINGS SHALL BE AS SPECIFIED IN THE FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS.

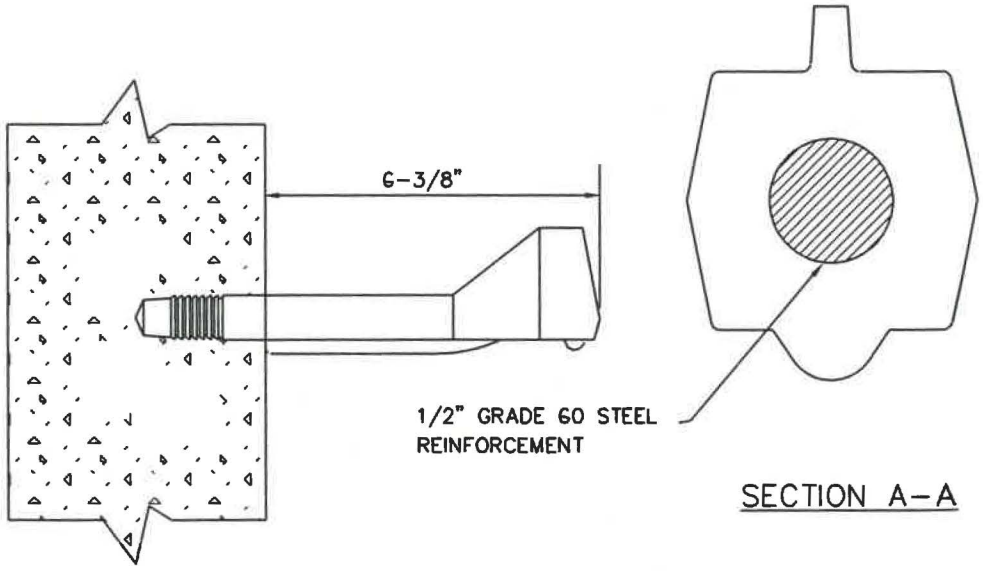
MANHOLE RING AND COVER

DETAIL NO. S-5

DATE: APRIL 2014 SCALE: N.T.S.



COPOLYMER POLYPROPYLENE PLASTIC



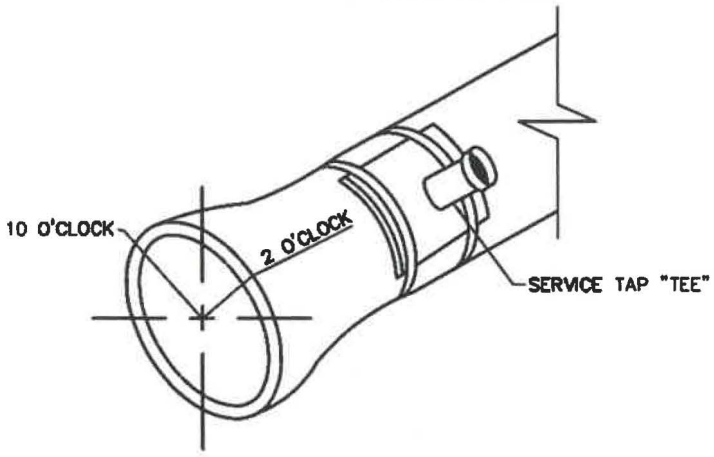
SECTION A-A

MANHOLE STEPS

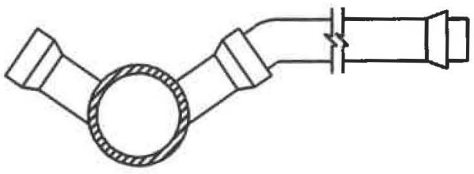
DETAIL NO. S-6

DATE: APRIL 2014

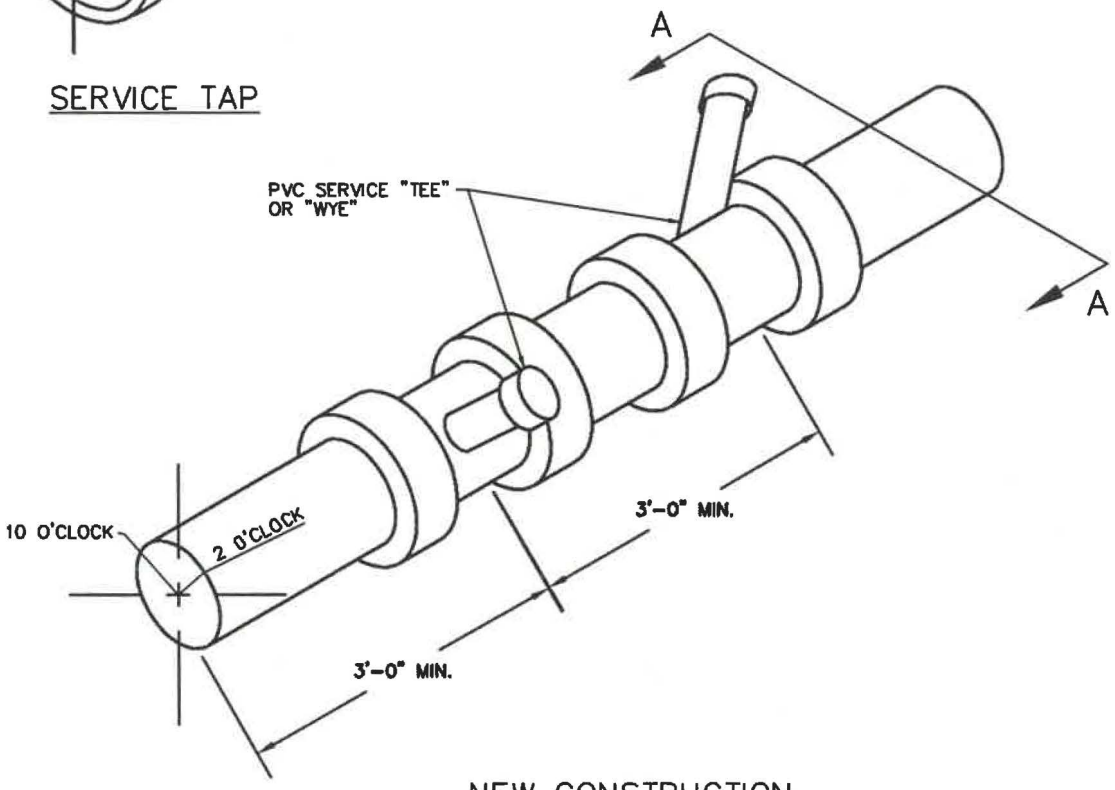
SCALE: N.T.S.



SERVICE TAP



SECTION A–A



NEW CONSTRUCTION

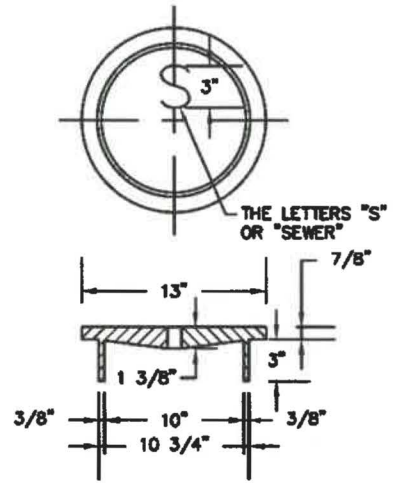
NOTES:

1. SANITARY SEWER SERVICE TAPS SHALL BE LOCATED ON THE MAIN AT THE 2 O'CLOCK OR 10 O'CLOCK POSITION.
2. THE MINIMUM DISTANCE BETWEEN ANY TWO CONSECUTIVE FITTINGS SHALL BE 3 FEET, MEASURED BETWEEN FITTING CENTERLINES.
3. SANITARY SEWER SERVICE TAPS SHALL NOT BE MADE WITHIN 5 FEET OF A PIPE JOINT, OR 5 FEET FROM EDGE OF MANHOLE BASE.
4. A MAXIMUM OF FOUR SERVICE TAPS ARE ALLOWED PER 20 FOOT LENGTH OF PIPE.
5. IN NO CASE SHALL THE SERVICE PIPE BE ALLOWED TO PROTRUDE INTO THE PIPE.

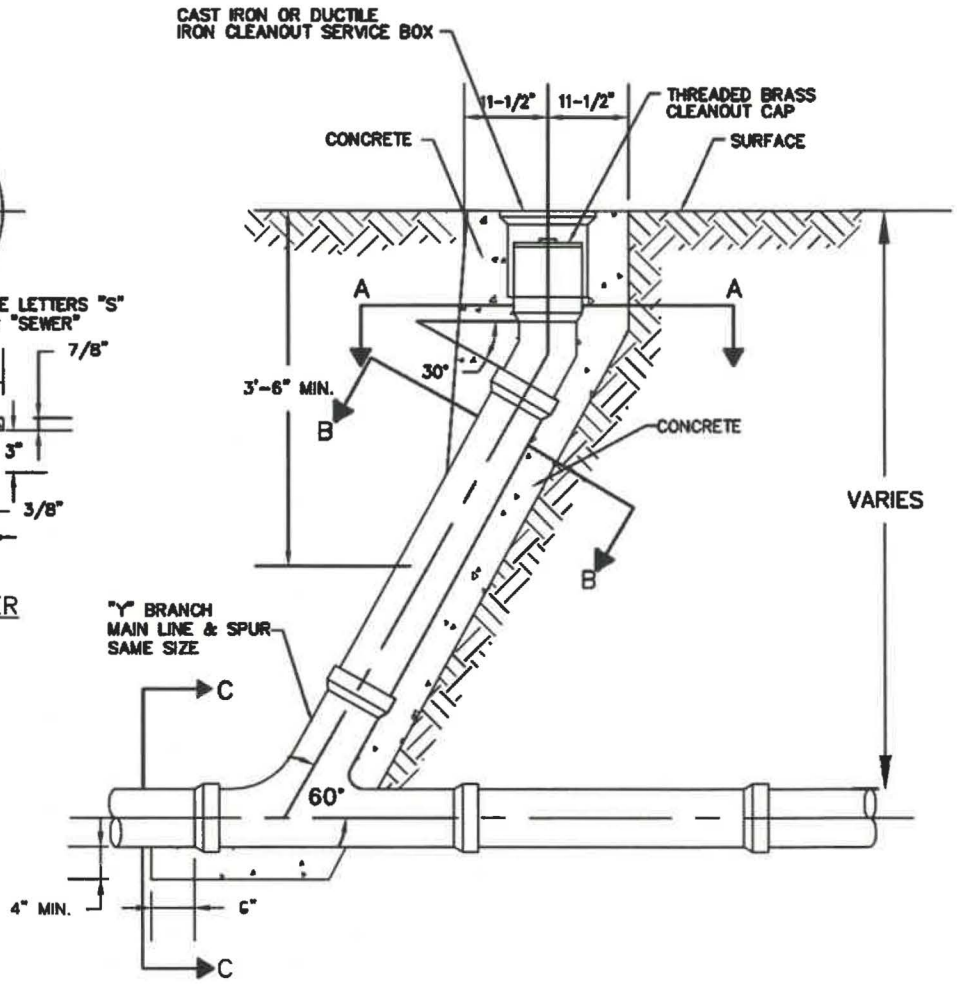
SANITARY SEWER SERVICE CONNECTION

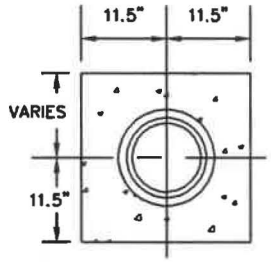
DETAIL NO. S-7

DATE: APRIL 2014 SCALE: N.T.S.

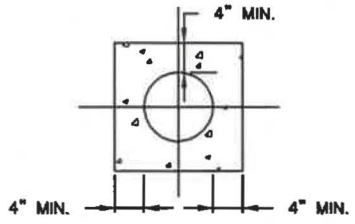


SERVICE COVER

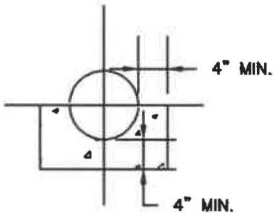




SECTION A–A



SECTION B–B



SECTION C–C

NOTE:

1. REFER TO FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR MATERIALS AND INSTALLATION REQUIREMENTS.

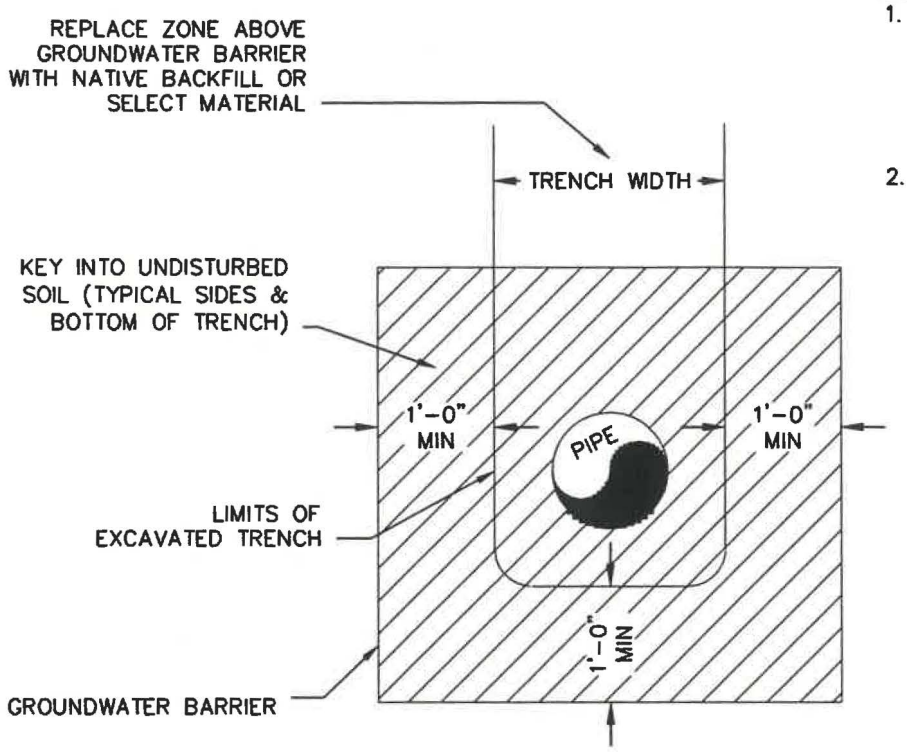
SANITARY SEWER SERVICE CLEANOUT

DETAIL NO. S-8

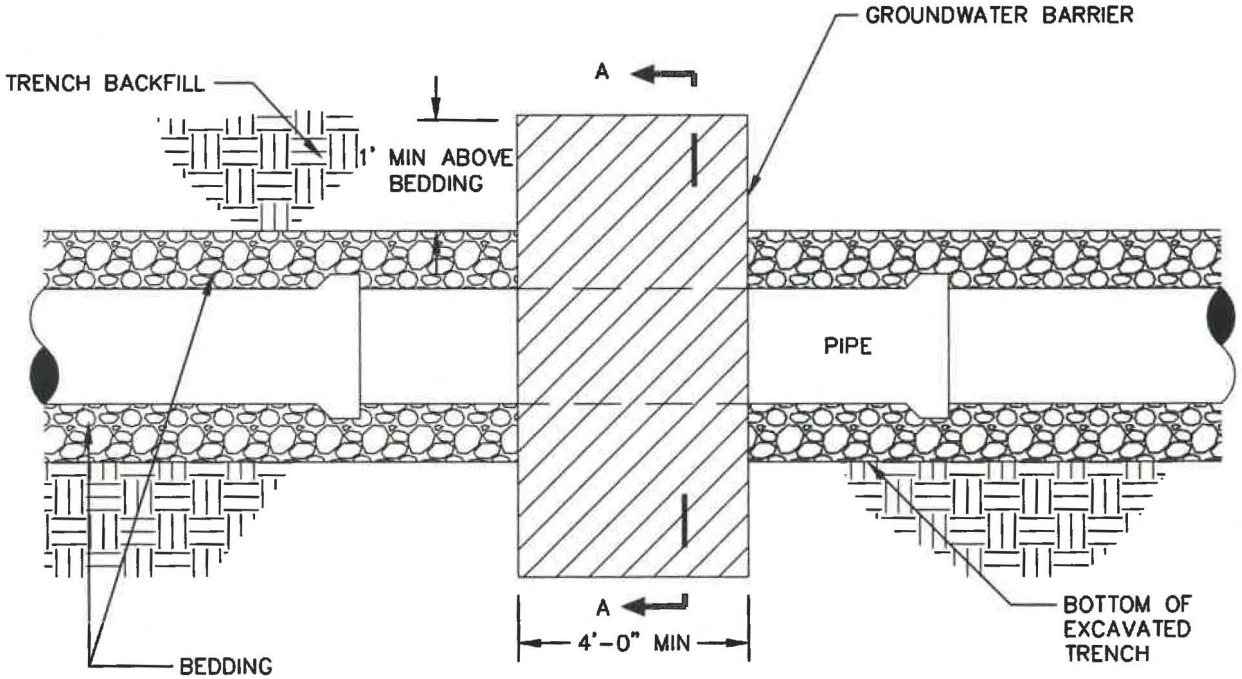
DATE: APRIL 2014 SCALE: N.T.S.

NOTES:

1. REFER TO FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR GROUNDWATER BARRIER MATERIAL AND COMPACTION REQUIREMENTS.
2. LOCATE GROUNDWATER BARRIERS PER ACCEPTED CONSTRUCTION DRAWINGS AND FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS.



SECTION A–A

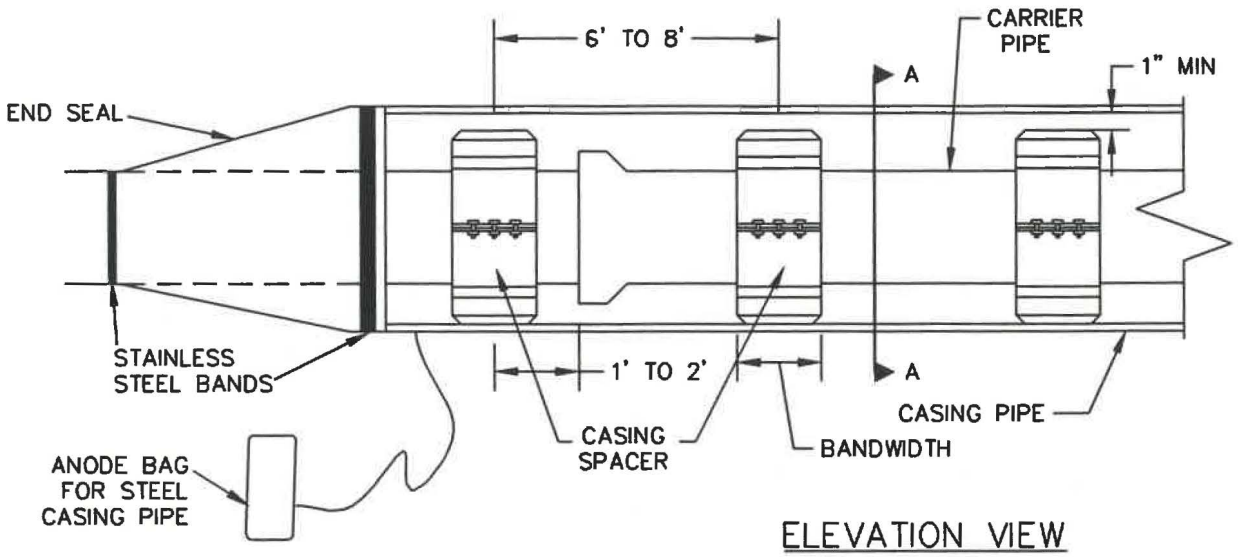


ELEVATION VIEW

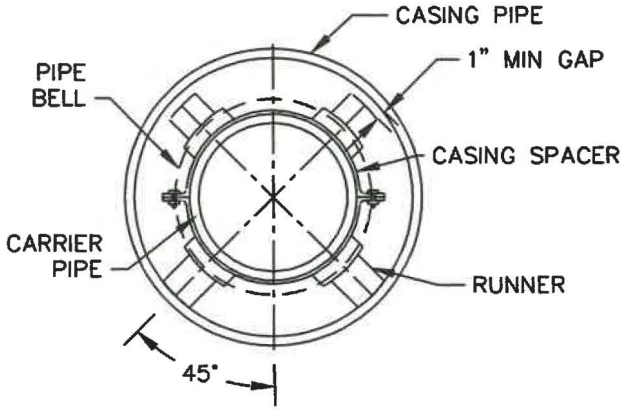
GROUNDWATER BARRIER

DETAIL NO. S-9

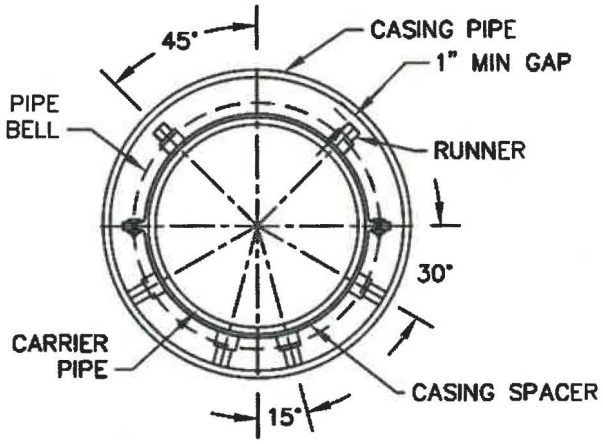
DATE: APRIL 2014 SCALE: N.T.S.



ELEVATION VIEW



FOR CARRIER PIPES 4"–12"



FOR CARRIER PIPES 15"

SECTION A–A

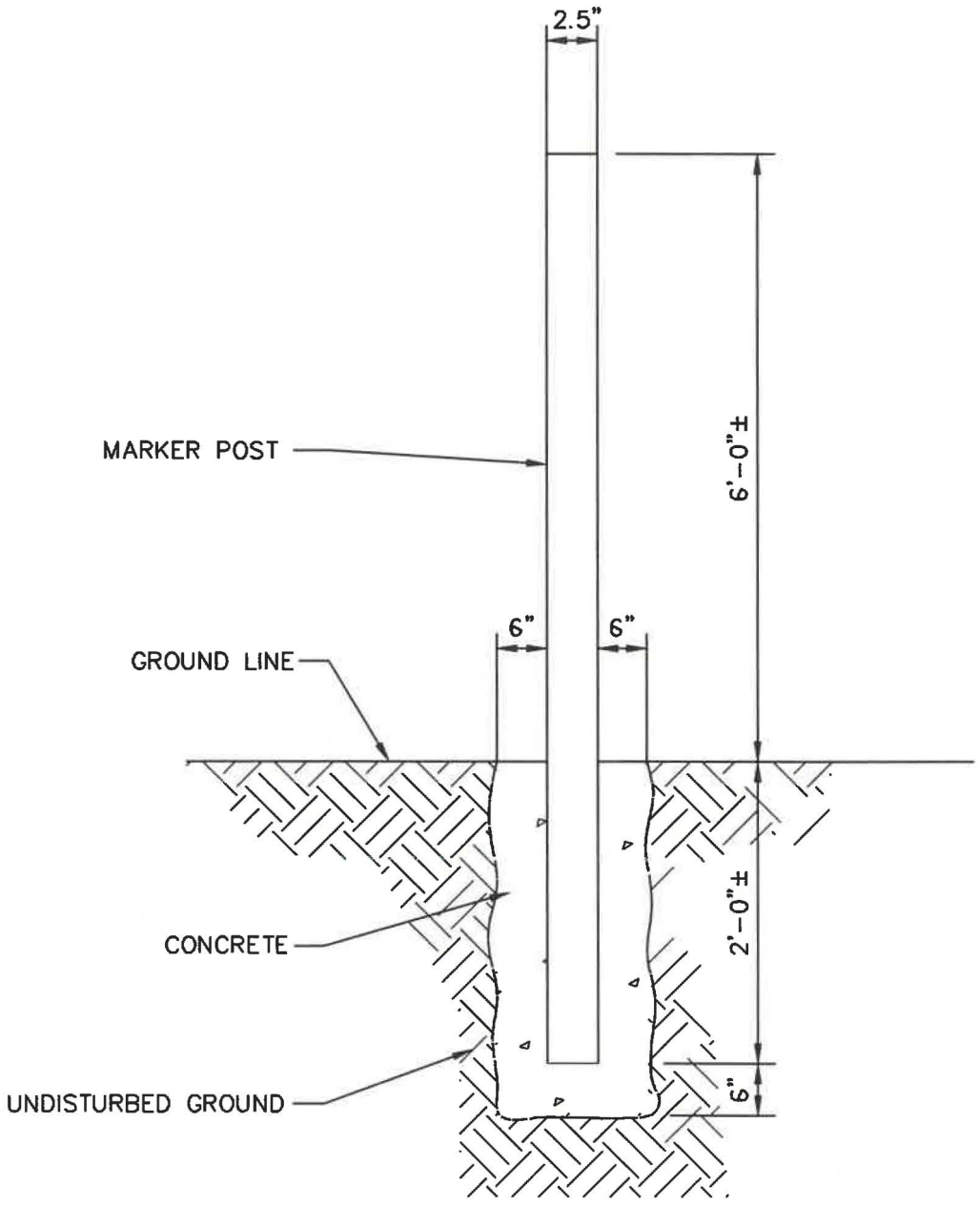
NOTES:

1. CASING PIPE, CASING SPACERS, END SEALS, AND ANODE BAG TO BE SUPPLIED AND INSTALLED PER FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS.
2. RECOMMENDED CASING SPACER POSITIONING – PLACE ONE CASING SPACER 1–2 FT ON EITHER SIDE OF THE BELL JOINT AND ONE EVERY 6–8 FT APART THERE AFTER FOR A TOTAL OF 3 CASING SPACERS PER PIPE LENGTH UNLESS OTHERWISE SPECIFIED BY THE MANUFACTURER OR CITY.
3. FOR 12" DIAMETER AND SMALLER CARRIER PIPES USE 8" CASING SPACER BANDWIDTH.
4. FOR CARRIER PIPES LARGER THAN 12' DIAMETER USE 12" CASING SPACER BANDWIDTH.
5. CASING SPACERS TO BE IN THE "CENTER RESTRAINED" POSITION.
6. POLYWRAP DIP CASING PIPES.
7. ALL BORINGS & ENCASEMENTS WILL REQUIRE END SEALS AS SHOWN.

BORINGS AND ENCASEMENTS

DETAIL NO. S-10

DATE: APRIL 2014 SCALE: N.T.S.



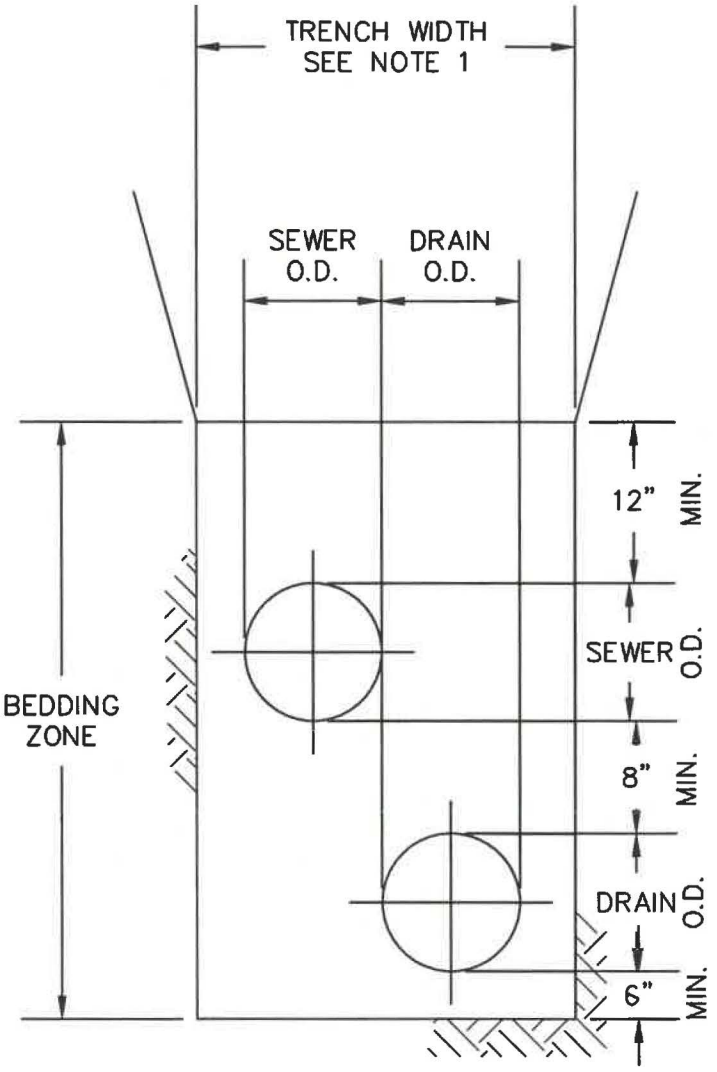
NOTES:

1. POST SHALL BE PLACED A MINIMUM 2 FEET, MAXIMUM 3 FEET BEHIND THE MANHOLE WITH FLAT SIDE FACING THE STREET.
2. SEE FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR MARKER POST REQUIREMENTS.

MARKER POST DETAIL

DETAIL NO. S-11

DATE: APRIL 2014 SCALE: N.T.S.



TYPICAL CROSS SECTION

NOTES:

1. THIS DETAIL TO BE USED IN CONJUNCTION WITH THE TRENCH DETAIL.
2. REFER TO FAIRPLAY SANITATION DISTRICT TECHNICAL SPECIFICATIONS FOR BEDDING MATERIAL REQUIREMENTS.

UNDERDRAINS

DETAIL NO. S-12

DATE: APRIL 2014

SCALE: N.T.S.

APPENDIX A POLICIES IMPACTING NEW SEWER SERVICES

Policies listed below are intended to provide guidance in meeting the minimum requirements for new Service Lines. The items described in the list are not all inclusive; therefore, additional items may be required.

A. The sewer within the Town of Fairplay is handled by the Fairplay Sanitation District. Regular office hours are: Monday – Thursday: 7:00 AM – 3:00 PM; Friday – 7:00 AM – 1:00 PM.

Fairplay Sanitation District
P.O. Box 207 – 1507 P.C.R. 16
Fairplay, CO 80440
Tele: (719) 836-2445
Fax: (719) 836-9004

B. The Contractor is responsible for calling in utility locates. UNCC dial 811.

C. The System Investment Fee (SIF) payable to the District. There is a sliding fee schedule for commercial uses. A set of plans for the floor layout is required in order to calculate the EQR value and the System Investment Fee.

D. A road cut permit must be obtained from the Town of Fairplay for any digging within the Town limits.

E. All Service Line taps and installation are required to be inspected by the District. The District shall be provided adequate notice to schedule inspections. A Reinspection Fee will be charged if the Contractor is not ready at the scheduled inspection appointment time. Fee must be paid in advance of reinspection.

F. All sewer service piping shall be a minimum SDR 35 PVC, and shall require freeze protection with blue board insulation if installed less than eight (8) feet deep. Sewer services shall be installed in accordance with the District's standard Trench Detail.

G. A cleanout is required at the outside of the building and every one-hundred (100) feet out to the sewer main. The minimum grade for a 4" line is 2% or 1/4" per foot. There is no maximum grade.

H. No sewer service shall be backfilled until the District has inspected the installation of the tap. If backfill is done before inspection, the District will require that the tap be exposed.

I. An as-built drawing indicating the location of the service tap on the main, the service line in relation to the building and how it lays on the lot to the tap, and the depths of the line and cleanouts shall be submitted to the District. It is important the information be as accurate as possible to enable the District and future Owners to locate the line on the property.

J. All food preparation businesses shall require a grease trap/interceptor. All sinks and dishwashers shall be connected to the grease trap/interceptor.

K. All car washes are required to have a sand/oil separator.

L. Refer to the Fairplay Sanitary District Rules and Regulations for additional requirements.

APPENDIX B SERVICE LINE CONNECTION CHECKLIST

Items provided in this checklist are intended to provide guidance in meeting the minimum requirements for new Service Line connections. The items described in the checklist are not all inclusive; therefore, additional items may be required.

- ☐ Copy of District Rules and Regulations
- ☐ Application for Sewer Connection Completed and Submitted
- ☐ Site/Remodeling Plans Submitted
- ☐ Additional EQR Fees: Amount_ Date Paid_ _ (EQR fees are determined based on the plans submitted at the time of application. Additional EQR fees may be due prior to the issuance of the Certificate of Occupancy if construction is different than shown on plans.)
- ☐ Contractor's Proof of Liability submitted/on file (minimum $500,000 coverage)
- ☐ Release of Lien Form (Provided in Appendix F)
- ☐ Copy of Forms to Applicant
  - o Application
  - o Release of Lien Form
- ☐ As-Built Drawings submitted in accordance with the District Rules and Regulations before a Certificate of Occupancy will be issued.

APPENDIX C MAIN LINE EXTENSION CHECKLIST

Items provided in this checklist are intended to provide guidance in meeting the minimum requirements for new mainline extension. The items described in the checklist are not all inclusive; therefore, additional items may be required.

- ☐ Copy of District Rules and Regulations
- ☐ Formal Application
  - o Developer/Owner makes Formal Application to the Board.
  - o Developer/Owner prepares and submits design plans to be reviewed by the District Engineer.
  - o Developer/Owner prepares final plans.
  - o The Board approves plans.
- ☐ Inclusion into the District
  - o File a Petition for Inclusion.
  - o A Hearing is set and Notice is published.
  - o The Hearing is held.
  - o The Board approves and signs the Petition for Inclusion.
  - o The approved Petition for Inclusion paperwork is submitted to District Court for approval.
  - o After the Petition for Inclusion is approved by District Court, record it in the Park County Records.
- ☐ Line Extension Agreement
  - o Developer/Owner submits signed and notarized Line Extension Agreement.
  - o The Line Extension Agreement is approved and signed by the Board.
  - o The Line Extension Agreement is recorded in the Park County Records.
  - o Developer/Owner pays required fees:
    - Line Extension Fee
    - Fees for recording the Line Extension Agreement with Park County Records.
- ☐ Performance Bond
- ☐ System Investment Fee (SIF) payment
- ☐ Proof of Liability Insurance submitted/on file (minimum $500,000 coverage)
- ☐ Permits
- ☐ Recorded Easements
- ☐ Utility Locates – UNCC Dial 811.
- ☐ Line Acceptance Agreement:
  - o Developer/Owner submits signed and notarized Line Acceptance Agreement.
  - o The Line Acceptance Agreement is approved and signed by the Board.
  - o Developer/Owner submits one (1) year warranty
  - o Conditions of Line Acceptance Agreement are met:
    - Developer/Owner submits statement of project costs.
    - Developer/Owner posts 10% maintenance bond.
    - Developer/Owner submits as-built drawings in accordance with the District Rules and Regulations
- ☐ One (1) Year Warranty Period Expires
  - o Conditions not met – bond is held
  - o Conditions are met – bond is returned

APPENDIX D SANITARY SEWER CONSTRUCTION NOTES

1. All construction work to be accepted by the District shall conform to the Fairplay Sanitation District Rules and Regulations.

2. Contractor shall verify all utility locations prior to construction. Dial 811 for UNCC utility locates 48 hours prior to any excavation Work.

3. Maintain a minimum of ten (10) feet horizontal clear distance separation between potable water mains/services and sanitary sewer mains/services. Potable water mains/services are to be located 18 inches minimum above the sanitary sewer mains/services. If field conditions vary from those shown on these plans and the sanitary sewer mains/services cannot be located below the water main/service, a clear vertical distance of eighteen (18) inches below cannot be maintained, or a minimum ten (10) foot horizontal separation cannot be achieved, the District shall be contacted immediately to review the situation.

4. All sewer service wyes and taps shall be staked by a survey crew and furnished and installed by the Contractor. The Contractor shall furnish to the District "as-constructed" location of taps.

5. At least one (1) week prior to the start of construction, a pre-construction meeting will be held at the District office and attended by the Contractor and representatives of the District and other approving agencies. It will be the responsibility of the Contractor to schedule this meeting.

6. Should any variations before or during construction to the sanitary sewer collection system designs be considered, notice must first be given to the District to determine if it needs acceptance by the District. If so, a new plan shall be drawn and submitted to the District for acceptance by the District 72 hours prior to construction.

7. The Contractor shall have in his possession at all times one (1) signed copy of the plans which have been approved by the Fairplay Sanitation District.

8. The Contractor shall verify existing pipe or manhole inverts at tie-in points prior to making connections.

9. All materials and workmanship shall be subject to inspection by the Fairplay Sanitation District. The Fairplay Sanitation District reserves the right to accept or reject any materials and workmanship that does not conform to its Rules and Regulations.

APPENDIX E EASEMENT DEED

KNOWN BY ALL MEN PRESENT THAT_

whose address is _
hereinafter referred to as the "Grantor", FOR AND IN CONSIDERATION OF TEN DOLLARS ($10.00) and other good and valuable considerations, the receipt of which is hereby acknowledged, hereby, TRANSFERS, CONVEYS, AND QUITCLAIMS to THE FAIRPLAY SANITATION DISTRICT, a Special District organized and operating under the laws of Colorado, it's assessors and assigns, hereinafter referred to as the "Grantee," the following described real property situated in Park County, State of Colorado, for a sanitary sewer easement. Below is a description of the easement:

SEE ATTACHED LEGAL DESCRIPTION AND EXHIBIT

The Grantor reserves the right to the use and the enjoyment of the surface of the easement and the right-of-way provided that such use shall not unreasonably interfere with the Grantee's construction, operation, repair, replacement, removal, and maintenance of the sewer line and the manhole, including without limit, installation of permanent structures thereon, and the planting of trees and large shrubs. In the event of the Grantee's exercise of its right to repair, maintain, replace, or remove the line and/or manhole, Grantee shall restore the surface of the easement and the right-of-way, at the Grantee's cost and expense, to a condition substantially similar to the condition existing prior to Grantee's activities. The Grantee shall provide reasonable advance notice of the need for repair, maintenance, replacement, or removal of the line or manhole.

IN THE WITNESS WHEREOF the Grantor has hereunto set their hand and seal SIGNED THIS
_ DAY OF _ , 20_ .

GRANTOR: __

STATE OF COLORADO)
COUNTY OF PARK) ss

The foregoing instrument was acknowledged before me this _ day of _,
20 , by___ _ _ .

WITNESS MY HAND AND MY SEAL
MY COMMISSION EXPIRES_

_ _
(NOTARY PUBLIC)

APPENDIX F RELEASE OF RIGHT OF LIEN

Fairplay Sanitation District
P.O. Box 207 – 1507 P.C.R. 16
Fairplay, CO 80440
Tele: (719) 836-2445; Fax: (719) 836-9004

RELEASE OF RIGHT OF LIEN

(print until signature)

I, _ _ _ , dba -
_ _ (Contractor Company Name) hereby release the **FAIRPLAY SANITATION DISTRICT,** from all claims of a mechanic's lien for labor, services, machinery, tools, equipment, or materials heretofore furnished for the construction, alterations, improvement, addition to or repair or the sewer system, streets, structures or improvements at:

_____

(Street Name or Location)

For Lot:_ , Block:_ , in_
Also known as:_

in the **FAIRPLAY SANITATION DISTRICT**, County of Park and State of Colorado.

REINSPECTION FEE IS $75.00 PLUS TRAVEL

Date:_ _

Print Name:_ _

Signature:__ _

Address:__ _ _

- _

Telephone:__ _ _

Email: _