FALL CREEK REGIONAL WASTE DISTRICT

STANDARDS

FOR

DESIGN AND CONSTRUCTION OF SANITARY SEWERS

INDEX

Appendices

Figures

Note: The following Figures are located at the end of each section. For example, Figure 3-1 can be found at the end of Section 3.

Note: A redundant set of Figures is included at the end of these standards for quick reference

Tables

Note: The following Tables are located at the end of each section. For example, Table 9-1 can be found at the end of Section 9.

Note: A redundant set of Tables is included at the end of these standards for quick reference

SECTION 1 - INTRODUCTION

1.01 GENERAL

The Indiana Department of Environmental Management is responsible for the issuance of construction permits for the installation of all sanitary sewer main facilities constructed in the Fall Creek Regional Waste District hereafter known as District. Sanitary sewer facilities shall be designed and constructed in accordance with these Standards and Ten States Standards for Sewage Works.

These Standards set forth the minimum criteria for the design and all work in connection with the construction of sanitary sewers within the jurisdiction of the District including the entire sewage system and its appurtenances from the point of connection with the building plumbing to the discharge terminus of the treatment plants' outfalls. All Ordinances of the District and Madison County shall be considered a part of these Standards; and all plans, profiles, cut sheets, easement documents, and specifications shall conform to the standards and these Standards may be issued periodically and will be distributed and made available to the public and contractors at the offices of the District. Users of this text are urged to review the latest revisions or editions to these Standards to apprise themselves of any charges/revisions.

Where the requirements of another jurisdictional authority having influence on work outside the purview of the District are greater than that provided by these Standards, the work shall conform to the greater requirement of that respective jurisdictional authority.

The Owners of affected property shall be responsible for procuring all necessary permits and licenses, paying all charges and fees, acquiring and recording all easements and giving all notices necessary and incident to the work.

1.02 PLAN SUBMITTAL AND PROCEDURE

Plan review will pertain to the sanitary sewer portion of the plans and specifications only including gravity sewers, sewage force mains, grinder pump & pressure systems, and pump stations.

A. REQUIREMENTS AND FEES

1. Two (2) sets of professionally certified Construction Drawings, Specifications, and supporting computations shall be submitted to the District, by a registered professional, for review and approval prior to the District's signing of a Capacity Allocation Letter.

2. Plan review and submittal fee schedule is a **$750.00** flat fee and this includes review of initial submittal and one (1) resubmittal, any additional submittal will result in additional fees based on the current hourly billing rate of the District's consultant engineer.

3. Plan review and submittal fee shall be required on all Commercial, Institutional, and Industrial developments. Plan review and submittal fee shall be required on all Residential developments of greater than four (4) homes. The District reserves the right to waive the residential development fees based on the complexity of the proposed development.

END OF SECTION 1

SECTION 2 - DEFINITIONS AND TERMS

2.01 DEFINITIONS AND TERMS

Whenever in these Standards or in any documents or instruments where the Standards govern, the following terms, abbreviations, or definitions are used, the intent and meaning shall be interpreted as follows:

A. ABBREVIATIONS

ASTM	American Society of Testing and Materials
AASHTO	American Association of State Highway and Transportation Officials
AWWA	American Water Works Association
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ACI	American Concrete Institute
AREA	American Railway Engineers Association
FCRWD	Fall Creek Regional Waste District
INDOT	Indiana Department of Transportation
NEMA	National Electrical Manufacturers Association
OSHA	Federal Occupational Safety and Health Act
WEF	Water Environment Federation

B. DEFINITIONS

1. ACCEPTANCE: The formal written acceptance by the District of an entire project which has been completed in all respects in accordance with the approved Plans, Specifications and these Standards including any previously approved modifications thereof.

2. ANNEXATION: The inclusion of additional property into the Sanitary District by proper legal procedures.

3. BACKFILL: Earth and/or other material used to replace material removed from trenches during construction which is above the pipe bedding.

4. BEDDING: That portion of the trench backfill which encases the sewer pipe to a minimum depth above and below the bell/barrel of the pipe, as provided in the BEDDING section of these Standards, for the purpose of properly supporting the pipe.

5. BUILDING SEWER (LATERAL): The conduit for transporting waste discharged from the building to the public sewer commencing three (3) feet outside the building walls and ending at and exclusive of the wye or tee fitting at the connection to the public sewer.

6. CONTRACTOR: Any Contractor who meets the District's requirements to enter into contracts for and to perform the work of installing sewers under the District's jurisdiction.

7. COUNTY: The county of Madison, state of Indiana.

8. DIRECTION: General Manager, FCRWD.

9. DISTRICT: Fall Creek Regional Waste District.

10. EASEMENT: Easements are areas along the line of all public sanitary sewers which are outside of dedicated sewer or road easements or rights-of-way, and are recorded and dedicated to the District granting rights along the line of the sanitary sewer. Easements shall be exclusively for sanitary sewers and no other utilities shall be constructed or encroach upon the easement except with the expressed written approval of the General Manager.

11. ENGINEER: The Engineer for the Owner.

12. INFILTRATION/INFLOW: The total quantity of water from both infiltration and inflow without distinguishing the source.

13. INSPECTOR: A direct employee of the District, or an authorized representative of that district, assigned to make detailed inspection of any or all portions of the work and materials. The inspector has full authority to reject materials and/or any portion of the work not supplied and installed in accordance with these Standards and to stop work if the work is not proceeding in accordance with these Standards.

14. LIFT STATION: Any arrangement of pumps, valves and controls that lift and/or convey wastewater to a higher elevation.

15. OBSERVER: The authorized agent of the District assigned to make detailed observation of any or all portions of the work.

16. OTHER SPECIFICATIONS AND MATERIALS: Wherever in these Standards other specifications or regulations are mentioned, it shall be understood that the materials and methods mentioned therewith shall conform to all requirements of the latest revision of the specifications so mentioned.

17. OWNER: Any individual, partnership, firm, corporation or other entity who, as property owner, is initiating the work.

18. PERMITS: Clearance to perform specific work under specific conditions at specific locations. The Owner or his duly authorized representative shall furnish to the District all necessary plans and documents required by the District to make application for permits.

19. PLANS: Construction plans, including system maps, sewer plans and profiles, cross sections, utility plans, detailed drawings, etc., or reproductions thereof, approved or to be approved by the District, which show location, character, dimensions and details of the work to be done.

20. RECORD DRAWING (AS-BUILTS): Plans certified, signed and dated by a professional engineer registered in the State of Indiana, indicating that the Plans have been reviewed and revised, if necessary, to accurately show all as-built construction and installation details including, but not limited to, key elevations, locations and distances.

21. RIGHT-OF-WAY: All land or interest therein which by deed, conveyance, agreement, easement, dedication or process of law is reserved for or dedicated to the use of the general public, within which the District shall have the right to install and maintain sewers.

22. SEWER: A pipe or conduit for carrying wastewater (sanitary sewer), storm water (storm sewer) or a combination of both (combined sewer). Wherever in these Standards the word "sewer" is used without distinguishing type, "sewer" shall mean sanitary sewer.

23. STANDARD DRAWINGS: The drawings of structures, sanitary sewer lines or devices commonly used and referred to on the Plans and in these Standards.

24. STANDARDS: The Standards for Sanitary Sewer Design and Construction within the Fall Creek Regional Waste District as contained herein and all subsequent additions, deletions or revisions.

25. TEN STATE STANDARDS: Recommended Standards for Sewage Works, latest edition, developed by the Committee of the Great Lakes – Upper Mississippi River Board of State Sanitary Engineers.

26. UNIFORM PLUMBING CODE: The Uniform Plumbing code adopted by the International Association of Plumbing and Mechanical Officials, current edition.

27. WORK: All the work to be done under District's permit, in accordance with the approved Plans, Specifications, these Standards and permit conditions.

Additional abbreviations and definitions are provided in Appendix A.

END OF SECTION 2

SECTION 3 - GENERAL RULES AND REGULATIONS

3.01 GENERAL

This section provides the general rules and policies for the design and construction of Sanitary Sewer Systems including permit requirements, water discharge, inspections, bond and insurance and correspondence among involved parties in a construction project. The Ordinance governing Sewers and Sewage Disposal within the District is provided in its entirety in Appendix A.

Section 3.02 includes provisions under Ordinance 84-2. Section 3.03 is included under Article VII.

3.02 BUILDING SEWERS

The following highlights the provisions and requirements pertaining to Building Sewers contained in the Ordinance, 84-2 as amended. All provisions of said Ordinance, whether stated herein or not, are made fully a part of the requirements. Any conflict between these regulations and the Ordinance shall be resolved in favor of the Ordinance.

A. BUILDING SEWER CONNECTION PERMIT

1. Connection Permits

The District requires connection permits to be issued by the District for all repairs and/or modifications to or connection of a building sewer to a public sewer or another building within the Fall Creek Regional Waste District. Permits shall not be granted for connection to sanitary sewers not dedicated and accepted in accordance with Section 3.03L and 3.03M of these standards.

2. Minimum Elevations for Gravity Connection

A sanitary sewer connection permit shall not be granted to homes or buildings where the lowest elevation to have gravity sanitary services is less than one (1) foot above the top of the manhole casting elevation of either the first upstream or downstream manhole on the public sewer to which the connection is to be made.

If the first upstream or downstream manhole is at a higher elevation due to the natural topography of the area, an alternate manhole will be selected for the purpose of determining this measurement (See Figures 3-1 and 3-2).

3. Permit Fee

A fee of actual cost of construction to the sewer shall be charged for a sanitary sewer connection permit per District Ordinance 84-3. This fee shall cover the costs of mandatory inspection, and any reinspection that may be necessary because of remedial construction. A current fee schedule may be obtained by contacting FCRWD at (765) 778-7544.

4. Modification of Permit Fee

The District may modify the fee for connection permits under an Ordinance Amendment or in the exercise of the District's general powers and duties to construct sewers.

5. Application for Sewer Permit

An application for sewer permit shall be made on the form prescribed by the General Manager and available from the District, 9378 S. 650 W., Pendleton, IN 46064. A sample application is included in Appendix B.

An application shall require a minimum of the following information.

a. Name and address of the Owner;

b. Name, address and telephone number of the Contractor;

c. Address of the premises for which the connection permit is being requested; and

d. Plans for the building sewer and connection, which at a minimum shall consist of the following;

(1) Connection details including location of and routing of the building sewer;
(2) Material of construction for the building sewer;
(3) Installation method; and
(4) Elevation of lower floor and building drain specifically the elevation of the lowest gravity sanitary service. All elevations shall be tied to USGS datum.

6. Who May Apply

An application for a sewer permit shall only be made by the following:

a. The home owner, builder, developer or representative of the home owner.

b. The District may deny permits to any applicant who is currently in violation of this chapter or any other applicable regulations.

c. Application by persons other than those listed above may be accepted at the discretion of the General Manager. All Sewer work and other construction actually performed on or associated with the building sewer and its connection to the public sewer shall be in accordance with the rules and regulations of the Indiana Fire Prevention and Building Safety Commission and the Standards of Fall Creek Regional Waste District.

7. Expiration of Permit

The connection permit shall expire if work is not initiated within ninety (90) days from the date of issuance. (Upon expiration, a new connection permit, including payment of the connection permit fee, shall be required.) The General Manager may for good cause extend the duration of the permit for a reasonable period.

Requests for extension of the permit period shall be submitted in writing to the District in advance of the expiration and shall state the reason for the request. Requests for extension shall be forwarded to:

Fall Creek Regional Waste District
P. O. Box 59
9378 S. 650 W.
Pendleton, IN 46064
ATTN: General Manager

B. PROHIBITION AGAINST CLEAR WATER DISCHARGES

1. Except as provided in Item 2 below, it shall be unlawful to cause or allow the connection of a building sewer when such building sewer has any of the following sources of clear water connected to it:

   a. Foundation/footing drains;

   b. Sump pumps with foundation drains connected;

   c. Roof drains;

   d. Heat pump discharge;

   e. Garage Floor Drain;

   f. Basement Floor Drain;

   g. Cooling water discharge; and/or

   h. Any other sources of clear/unpolluted water.

   Any person found violating any provision listed above shall be required to correct such connection at his expense. (Ordinance 84-2 and amendments)

2. In the event an industrial or commercial entity finds it necessary to discharge clear water consisting of cooling water and/or steam condensate into the public sewer; and the sewer has capacity to receive such clear water without affecting existing or future users, the District may enter into an Agreement for such discharge that will define a metering system and any other requirements deemed necessary to measure the flow.

C. MANDATORY INSPECTION OF BUILDING CONNECTIONS

1. <u>Notification</u>

   It shall be the duty of the holder of a sewer permit to notify the District in the manner described on the sanitary sewer connection permit that the sewer work is available for inspection. The District will conduct inspections on building sewer connections from 7:30 a.m. to 3:30 p.m. local time, Monday through Friday, except for observed District holidays. After normal working hours, weekends, and Holiday inspections will be performed on a time plus overhead basis. The building sewer, in its entirety from the foundation to the connection with the

public sewer or existing lateral, must be exposed for inspection and be properly bedded in accordance with the District's Standards to one half (1/2) the diameter of the building sewer. The responsibility for safety measures rests solely with the permit holder. All excavations shall adequately guard the public by barricades, fences, lights and other such means as necessary. The permit holder may backfill the building sewer trench if the District has not made an inspection within a four (4) hour period after notice has been given to the District. In the event the building sewer is not completed and ready for inspection upon the inspector's arrival or if the notification is made after 11:00 a.m. local time, Monday through Friday, the permit holder shall make the building sewer and connection available for a four (4) hour period on the following District work day. An inspection may be waived with or without conditions with the approval of the General Manager.

2. Right of Entry

The District shall have the right of entry to, upon or through any premises for purposes of inspection of sewer work and any other construction activity performed on or associated with the connection of the building sewer to the District Sewer including inspection for clear water discharges into the sewer.

D. BUILDING SEWER MAXIMUM LENGTH - PUBLIC RIGHT OF-WAY

No more than 100 ft. of a building sewer shall exist within a public right-of-way.

E. MAXIMUM NUMBER OF BUILDING CONNECTIONS

No more than one (1) building will be permitted to connect to a building sewer. Sewers with more than one (1) connection must be constructed as a public sewer in a dedicated easement. The District determines if an exception is justified.

F. BUILDING SEWER RESPONSIBILITY

It shall be the responsibility of the property owner(s) whose property is benefited to provide for, install and make private connections for the use of their premises to an existing public or building sewer. Further, it shall be the responsibility of the owner to make all necessary repairs, extensions, relocations, changes or replacements thereof and of any accessories thereto. These requirements may be altered, modified or waived at the discretion of the General Manager when it is shown that compliance is not possible due to extenuating circumstances.

G. EXISTING FOUNDATION DRAINS, ROOF DRAINS, DEFECTIVE BUILDING SEWERS AND PUMPS

In the event the District determines that a violation exists, the District shall notify the violator by certified mail that such violation exists. The notice shall describe the nature of the violation and the corrective action(s) that must be taken. Such corrective action shall be taken within 10 days of receipt of such notice. (Ordinance 84-2 and Amendments)

H. PENALTIES

Any person violating any provisions of Section 3.02 shall be subject to the penalties in accordance with District Ordinance 84-2 and Amendments and further, at the discretion of the General Manager, may be required to correct such violation at his expense.

I. APPEALS

Any person affected by the exercise of any discretionary authority delegated by Ordinance 84-2 to any official of the District and who objects to the decision made or action taken by such official shall be entitled to a hearing before the District Board of Trustees upon such objection.

The person desiring such hearing before the Board shall file a written request for a hearing, including a statement of his objections, with the General Manager who shall call the same to the attention of the Board. Such request must be filed with the General Manager within 10 days from the date of the action being appealed. The appeal shall be scheduled before the Board within thirty (30) days after such request is filed. Notice shall be given to the appellant identifying the time, place and date of the appeal at least ten (10) days prior to the scheduled date. The Board may hear any evidence it deems relevant. After the hearing, the Board may confirm, reverse or modify the decision or action. The order of the Board shall be final. Such order shall be made within 10 days after the hearing and shall be in writing and sent to the appellant.

3.03 CONSTRUCTION PERMITS

The provisions of this Section shall be applicable throughout the Fall Creek Regional Waste District including areas outside of such District where Agreements are executed to provide sanitary sewer service.

A. REQUIREMENTS FOR CONSTRUCTION PERMITS

1. It shall be unlawful to cause or allow the construction or modification of any sanitary sewer or sewer lift station without first obtaining a valid construction permit issued by the District and the Indiana Department of Environmental Management where required; provided, however, a sanitary sewer construction permit shall not be required for maintenance work performed by or on behalf of the District.

2. The District may deny permits to any applicant who is currently in violation of this chapter or any applicable regulations.

B. DEVELOPER'S AGREEMENT

1. Applications for Developer's Agreement shall be submitted at least sixty (60) days in advance of the proposed start of construction, provided however that a shorter time period may be approved by the General Manager.

2. Applications shall include a Certificate of Sufficiency of Plan filed by a professional engineer registered in the State of Indiana in accordance with I.C. 25-31-1.

C. CAPACITY AND DEPTH MAINTAINED

Sewer lines that are to be extended shall have the same hydraulic capacity and be constructed on the same grade line as the existing sewers unless the District determines that a reduction of capacity is justified.

Sewers shall be sized with capacity for the contiguous service area which is defined as the undeveloped and/or unsewered land capable of gravity connection to the proposed sanitary sewer or lift station, unless it is shown that such contiguous area may be equally served by an alternate existing sewer.

D. ECONOMIC ANALYSIS FOR LIFT STATIONS

A construction permit shall not be issued for a sanitary sewer lift station until an economic analysis identifies to the satisfaction of the District that the lift station exhibits a lower 50-year lifecycle costs than a gravity sewer, both of which shall be sized to serve the service area as described in Section 3.03 C. Section 4.04 B details the requirements of the Economic Analysis.

E. RIGHT TO LIMIT SEWER CAPACITY

Except to the extent that it may be preempted by state or federal laws, rules or regulations; the District may deny the issuance of a construction permit if it is demonstrated that there is insufficient dry or wet weather capacity in any/all downstream sewers, lift stations, or force mains and treatment plants, including capacity for pollutants, to accommodate the wasteload expected to be generated as a result of the proposed development.

F. POSTING OF BOND

1. The General Manager may, as a prerequisite to the issuance of a construction permit, require the posting of a performance bond from a company licensed by the State of Indiana to provide such surety. Such bond shall be equal to 100% of the contract amount or an amount established by the General Manager to provide surety for the satisfactory completion of the improvements required by the construction permit, and shall name Fall Creek Regional Waste District as party who can enforce the obligations thereunder. Said bond may be a part of the total bonding requirement by the District.

2. The General Manager may as prerequisite to acceptance of a sanitary sewer or lift station require the posting of a maintenance bond in an amount not to exceed 20% of the contract amount or, subject to the approval by, the General Manager provision for maintenance, for a period of one year from the date of acceptance by the District . Said bond shall name the Fall Creek Regional Waste District as party who can enforce the obligations there under.

3. In the instances where the General Manager has required a bond pursuant to this section, the General Manager may, as an alternative to the posting of such bond, accept other appropriate security such as a properly conditioned irrevocable letter of credit which meets the same objective as the bonds described in this section, subject to approval of any other department or agency whose interests are protected by the same bonding requirement.

4. If the surety on any bond furnished to the District becomes a party to a supervision, liquidation, rehabilitation action pursuant to I.C. 27-9 et. seq. or its

right to do business in the State of Indiana is terminated, it shall be required that, within thirty days thereafter, a substitute bond and surety be provided, both of which must be acceptable to the District. Failure to obtain a substitute bond within the stated time frame shall be cause for revocation or suspension of the construction permit until such time that the bond is furnished to the District.

G. EXECUTION OF COVENANT

1. The General Manager may, as a prerequisite to the issuance of a construction permit, require the execution of covenants and/or easements running in form to the Fall Creek Regional Waste District and County of Madison by the owner or owners of such parcel. As a minimum in such cases, the General Manager shall require that the following covenant be executed by the owner or owners of such parcel which shall be included in a recorded plat:

   "It shall be the responsibility of the Owner of any lot or parcel of land within the area of this plat to comply at all times with the provisions of the sanitary sewer construction approved by the Fall Creek Regional Waste District and the requirements of all sanitary sewer construction permits for this plan issued by said District. Owner further covenants that no building, structure, tree, or other obstruction shall be erected, maintained, or allowed to continue on the portion of the owners' real estate in which the easement and right-of-way is granted without express written permission from the District. Such permission, when duly recorded, shall run with the real estate. The District, and its agents, shall have the right to ingress and egress, for temporary periods only, over the owners' real estate adjoining said easement and right-of-way, when necessary to construct, repair or maintain sanitary sewer facilities."

2. Any person who violates a covenant required under this section, and/or the owner of any parcel of land who permits such a violation, who is notified in writing by Fall Creek Regional Waste District that a violation exists shall be given a reasonable period of time, not to exceed thirty (30) days, in which to correct such violation. The notice shall specify the nature of the violation and shall stipulate a required correction date.

H. DEDICATION OF EASEMENT (SEE SECTION 4.05 FOR DETAIL)

Whenever possible, sanitary sewers shall be designed and constructed in the public right-of-way. When sewers are proposed to be constructed in easements and when unsewered or undeveloped property adjoins the applicant's property, the applicant may be required to extend the sewer and/or an easement dedicated to the District or its assignee, to the upstream property line. Such easements shall be accessible to vehicular traffic. Easements along public right-of-way shall be contiguous with such right-of-way.

I. DURATION OF CONSTRUCTION PERMIT AND CERTIFICATE OF COMPLIANCE

1. The sanitary sewer construction permit shall be valid for one (1) year from the date of issuance.

2. Within (14) days after satisfactory completion of tests on the sanitary sewer or lift station for which construction permit was obtained, the professional engineer contracted in accordance with Section 3.03 K shall execute and file with the

District a Certificate of Completion and Compliance in a form prescribed by the District.

J. SEWER SERVICE AGREEMENT AND PRIVATE SEWER CONSTRUCTION CONTRACT

1. Prior to the issuance of a Construction Permit, the Owner must have completed and submitted the following:

   a. Agreement for Construction of Sanitary Sewer Under Private Contract (See Appendix B) or Agreement for Construction of Sanitary Sewer Under Private Contract 15 Year Law - IND. CODE 36-9-22 each of which includes a sub-agreement providing for Construction Observation Services (Reference Section 3.03K) (See Appendix B), and

   b. Sewer Service Agreement (See Appendix B).

2. Construction of Sanitary Sewers Under Private Contract 15-Year Law

   a. Engineer shall prepare and clearly define the proposed 15-Year Law area on the cover sheet of the proposed Construction plans submitted to the District for review. Engineer shall further be responsible for preparing and clearly indicating the recoupment cost rate schedule on the cover sheet of the proposed plans submitted to the District for review. Allowable costs to be included in the rate schedule in general include those portions of the construction costs, engineering fees and legal fees incurred by OWNER which are over and above those costs necessary to serve OWNER'S lands only; and may include financing (interest) fees.

   b. The proposed 15-Year Law area and recoupment cost rate schedule will be reviewed by the District on a case-by-case basis and are subject to the District's approval.

K. OBSERVATION OF CONSTRUCTION OF SANITARY SEWERS

Section 9 provides a detailed discussion regarding the procedures for providing Observation Services and the scope of work to be performed.

1. Provisions for Construction Observation Services

   Prior to the issuance of a Construction permit and commencement of any construction activities pertaining to the installation of sanitary sewer systems, the Owner shall execute an Agreement with the District which will provide that:

   a. The District will contract for construction observation services to ensure that such construction meets the requirements of the approved construction plans.

   b. The contracted engineer will be responsible for submitting and certifying air pressure or infiltration test results for all pipe and deflection test results for all applicable flexible and semi-rigid pipe, under the observation of Fall Creek Regional Waste District.

c. The Owner will reimburse the District for the cost of such observation services which shall be determined at the time of execution of the Agreement, and verified by the Owner or his representative throughout construction.

d. Upon completion of construction, the contracted engineer shall execute and file with the District a Certificate of Completion and Compliance certifying to the District and the Owner as to the compliance of such construction with the requirements of the approved construction plans and approved change orders.

e. No action with regard to the acceptance of the construction and release of the improvement bond pursuant to this section shall be taken until the Owner has reimbursed the District in full for the observation services.

2. Observation of Construction

All construction of sanitary sewers intended for dedication to the District shall be observed and certified pursuant to the Agreement executed under Section 3.03 K.1.

The Owner shall furnish the District with five (5) copies of the approved construction plans at the time the Agreement is executed.

L. REQUIREMENTS FOR PROJECT ACCEPTANCE AND DEDICATION

Sanitary sewers and lift stations will not be accepted and building connection permits shall not be issued until all documents, as required by the District's Standards, are submitted to and approved by the District including the following:

1. One (1) year Maintenance Bond,

2. Recorded Covenant and easement documents,

3. Certificate of Completion and Compliance as required in Section 3.03K,

4. The completion of a final inspection which confirms that the sewer has been constructed and tested in accordance with the District's Standards, and;

5. As-built/as-constructed drawings on reproducible mylars, 24" x 36", Top profile = Scale 1" = 50', Side profile = Scale 1" = 10'. All drawings to be prepared and/or reviewed and stamped by a Licensed PE, State of Indiana.

M. DEDICATION AND REHABILITATION OF EXISTING SEWERS

The Owner of a sanitary sewer may apply to the District for dedication of the sewer providing that the application is made in writing.

Dedication of such sewer shall be subject to all applicable requirements outlined in Sections 3.03K and 3.03L and, further; at the discretion of the General Manager, may require the following:

1. Proof of legal ownership,

2. Flow monitoring results,

3. Internal television tapes and results, and/or

4. Any other requirements as may be deemed reasonable and necessary by the General Manager.

In addition, Owner may at his expense, be required to correct any deficiencies or remove any sources of clear water found as a result of any inspection, flow monitoring, television and/or other related testing.

N. GENERAL AUTHORITY FOR INVESTIGATIONS AND INSPECTION

1. The power to make investigations and inspection of sanitary sewer and/or lift station construction shall be vested in the General Manager and his/her authorized representatives.

2. Investigation and inspection of sanitary sewer and/or lift station construction may be made at any time by going upon, around or about the affected property.

3. Such investigation and inspection may be made either before, during or after the construction is completed and shall be made for the purpose of determining whether the construction has been accomplished in a manner consistent with the approved plans and specifications and the minimum requirements of the District enumerated in these Standards.

4. Persons working or having control of the construction shall cooperate fully with the inspectors/observers and shall have available a copy of the approved plans and specifications used to obtain the construction permit.

O. VARIANCE PROCEDURE

1. The General Manager, or in his/her absence, a representative of the District designated by the General Manager, shall have the power to modify or waive any minimum sanitary sewer design standard of these Standards or any regulations promulgated by the District. The General Manager or his/her designee may grant such a modification or waiver if an applicant for a construction permit submits the request in writing and makes a substantial showing:

   a. that a minimum sanitary sewer design standard or regulation is infeasible or unreasonably burdensome; and

   b. that an alternate plan submitted by the applicant will achieve the same objective and purpose as compliance with minimum sewer design standards and regulations of the District.

2. If the General Manager or his/her designee shall fail to respond to such request for variance within 20 days from such written request, it shall be deemed to be denied.

3. An applicant may appeal to the Board of Trustees the decision of the General Manager or his/her designee denying or partially approving a request variance.

The appeal of such a decision shall be filed with the Board within twenty (20) days of the decision. The Board shall hear the request for the variance de novo and in making a decision shall apply the standards set forth above.

P. STOP-WORK ORDER

The permit holder shall be responsible for all safety regulations and all obligations under Chapter XVII of Title 29, Code of Federal Regulations, Part 1926 otherwise known as Safety and Health Regulations for Construction. The District is empowered to issue an order requiring suspension of work ("Stop-Work-Order") whenever it determines that:

1. Construction is proceeding in an unsafe manner; or

2. Construction is occurring in violation of the District's Standards and requirements and in such a manner that if construction is allowed to proceed, there is a probability that it will be substantially difficult to correct the violation; or

3. Sewer construction for which a District Sewer Permit is required is proceeding without a permit and/or Developer's Agreement being in force. In such an instance the stop-work order shall indicate that the effect of the order terminates when the required permit is obtained. The stop-work order shall be in writing and shall state to what construction it is applicable and the reason for its issuance. One (1) copy of the stop-work order shall be posted on the property in a conspicuous place and one (1) copy shall be delivered to the permit applicant, to the person doing the construction and to the Owner of the property or his agent. The stop-work order shall state the conditions under which construction may be resumed.

Q. PENALTIES

Any person found guilty of violating any provision of these Standards and/or the District Ordinance shall be subject to the penalties in accordance with District Ordinances.

This penalty shall in no way limit the operation of special penalties for specific provisions of the Ordinance nor shall such special penalties in any way limit the operation of this general penalty.

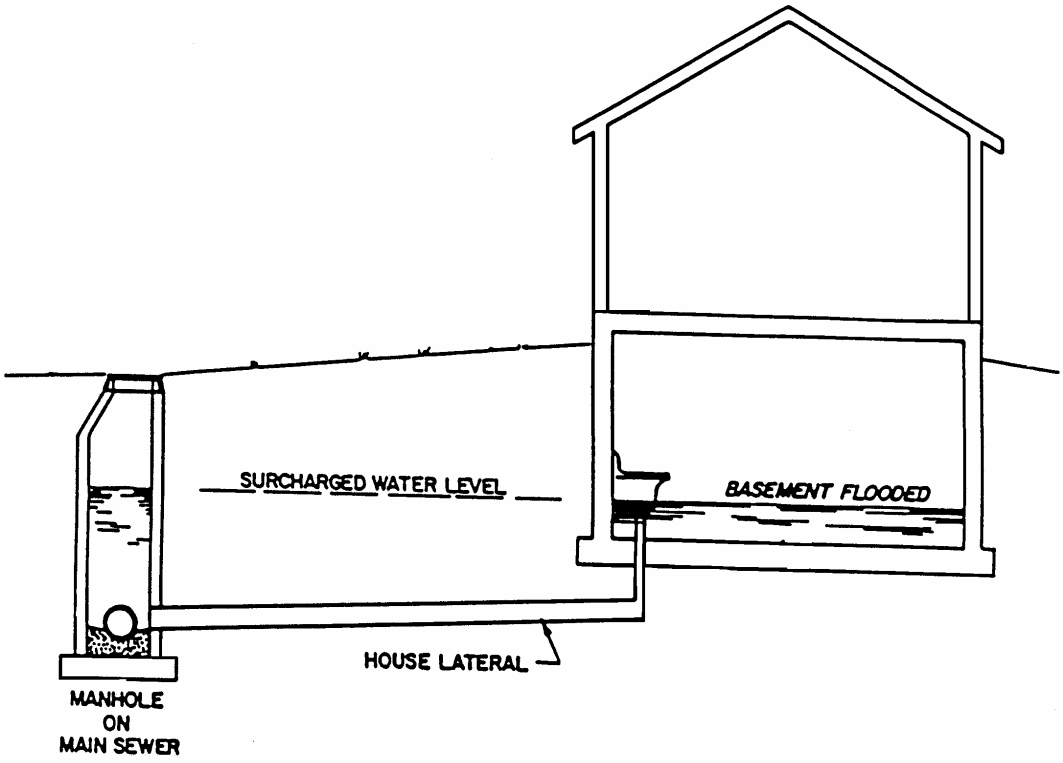
R. APPEALS

Any person affected by authority delegated by these sections to any official of the District and who objects to the decision made or the action taken by such official shall be entitled to a hearing before the Board of Trustees upon such objection. The person desiring such a hearing shall file a written statement of his objections with the General Manager who shall call the same to the attention of the Board. The appeal shall be scheduled before the Board within (30) days after such objections are filed with the General Manager. Notice shall be given to the objector identifying the time, place and date of the appeal at least ten (10) days prior to the scheduled date.

After hearing testimony of the objector and the official who made the decision, or took the action objected to, the Board may confirm, reverse or modify such decision or action.

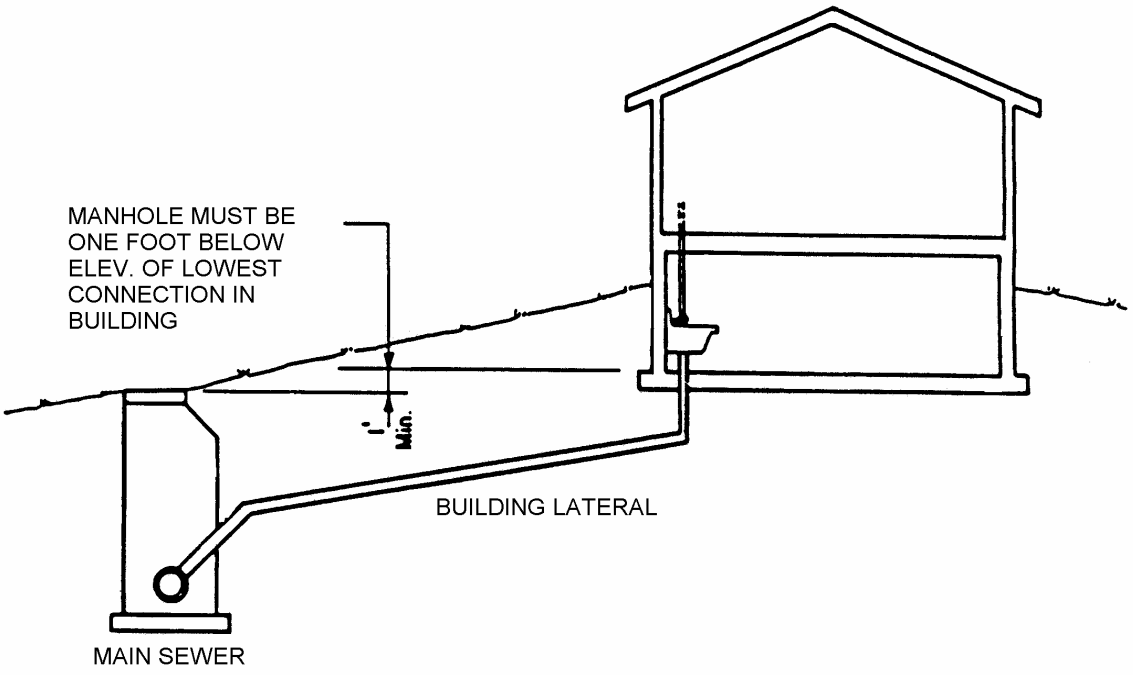
The order of the Board shall be final. Within ten (10) days of the Board's decision, a written notice shall be given to the objector confirming such decision.

END OF SECTION 3



SANITARY SEWER HOUSE CONNECTION CONSTRUCTED IN THIS SITUATION WILL NOT BE ACCEPTED. (SEE THE ACCEPTED SITUATION – FIGURE 3-2)

FIGURE 3-1



ACCEPTED DESIGN OF SANITARY SEWER HOUSE CONNECTION (SEE THE REJECTED DESIGN - FIGURE 3-1

FIGURE 3-2

SECTION 4 - GENERAL DESIGN STANDARDS

4.01 GENERAL

Developer's Agreement and/or Sewer Permits shall be obtained from the District for the installation of all sanitary sewer facilities discharging into the Fall Creek Regional Waste District in accordance with Ordinance 84-2, Sanitary sewer facilities shall be designed and installed in accordance with the Standards for Sanitary Sewer Design and Construction in the boundary of Fall Creek Regional Waste District and Ten States Standards for Sewage Works.

4.02 DESIGN CRITERIA

A. GENERAL

All sanitary sewers shall be designed to carry the estimated flow from the area ultimately contributing to the respective reach of the sanitary sewer. The required capacity shall either be established by the District or at the District's option, by means of a basin study developed by the Owner or his authorized representative engineer/designer. In no instance shall a gravity sewer, other than a building sewer, be less than eight (8) inches in diameter.

The following design standards for gravity sewers within or contributing to Fall Creek Regional Waste District have been established:

1. Population Density

Population density shall be an actual count or character of proposed development, whichever is greatest.

2. Average Family

For the purposes of design, the average family unit is considered to be 3.1 persons per single family home.

3. Design Flow

The design of all sanitary sewer facilities shall be based on future area population growth and land development characteristics and figures provided by the Fall Creek Regional Waste District including the servicing of existing developed areas not currently served by sanitary sewers.

The values of Average and Peak Flow and Design Population hereby shall be the values which include the future flows and population. The District reserves the right to review and determine the appropriateness/applicability of the estimated flow volumes provided.

The following shall be used as a guide:

a. Average Design Flows

(1) Single Family Residential: The average design flow for single family dwellings shall be one hundred (100) gallons per person per day.

(2) Commercial/Industrial/Institutional: The average daily design flow for these facilities shall be based on the flow rates established in the Indiana Administrative Code Title 327 Article 3, Rule 6, Section 11, Table 11-1 latest edition. A current copy is included at the end of this Section.

The flows established in IAC 327-3-6-11 shall be used as a general guideline in determining average flow volumes anticipated from a proposed development.

Based upon information either submitted by the Owner or developed by the District, these flow volume guidelines may be modified at the District's discretion.

b. Peak Design Flow

(1) Single Family Residential: The peak design flow for a single family development shall be calculated per Ten States Standards as

$$\frac{\text{Q Peak Hourly}}{\text{Q Design Ave}} = \frac{18 + (P)^{0.5}}{4 + (P)^{0.5}}$$

Where P is equal to the total Design Population in thousands.

(2) Commercial/Industrial/Institutional: The peak design flow from commercial, industrial or institutional developments shall be the average daily flow determined multiplied by 2.5.

4. Infiltration: Sanitary sewer design capacity must include an allowance to carry unavoidable amounts of groundwater infiltration or seepage in addition to the peak sanitary flows. Collector and trunk sewers shall be designed to include an allowance of two hundred (200) gallons per day per inch diameter mile of pipe.

5. Design Capacities: Collector and trunk sewers shall be designed on the following basis:

a. Collector Sewers Twelve (12) inches and Smaller. Peak design flow capacities shall be based on sewers flowing two-thirds (2/3) full.

b. Trunk Sewers Fifteen (15) Inches and Larger.
Peak design flow capacities for trunk or interceptor sewers shall be based on sewers flowing full, without head, using the design population density and appropriate land use determined by the Fall Creek Regional Waste District; and shall include an allowance for infiltration which will be reviewed on a case-by-case basis and is subject to the approval of the District.

4.03 MINIMUM PIPE SIZES AND STANDARDS

A. PIPE DIAMETER

The required diameter of gravity sewers shall be determined by Manning's formula using a roughness coefficient, "n", of 0.013 or the pipe manufacturer's recommendation, whichever is greater. The minimum pipe diameter for gravity sanitary sewers shall be eight (8) inches.

B. MINIMUM SLOPES AND VELOCITIES

All sanitary collector and trunk sewers shall be designed and constructed to provide a minimum velocity when flowing full of two (2) feet per second. The slope of the sewer pipe shall be such that these minimum velocity requirements are attained. The minimum acceptable slopes for the design and construction of sanitary sewers are as follows:

THESE ARE MINIMUM SLOPES REQUIRED OF THE DESIGN. AS CONSTRUCTED SANITARY SEWERS FOUND TO HAVE LESS THAN THIS MINIMUM SLOPE SHALL NOT BE ACCEPTED.

PIPE SIZE* (INCHES)	**MINIMUM SLOPE* (FEET PER 100 FEET, %)**
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21	0.10
24 AND GREATER	0.08

6" lines are allowed for building sewers only. For details see UPC (Uniform Plumbing Code), latest edition, Indiana Department of Fire Protection and Building Safety.

C. MINIMUM DEPTH

For the protection of the sanitary sewer lines from damage caused by utilities installed after the sanitary sewer has been constructed, the minimum depth of crown of all sanitary sewers shall be 5 feet.

D. BUILDING SEWERS

Building sewers shall conform to the latest edition of the Uniform Plumbing Code and to these Standards.

The Building sewer shall connect to the public sewer at a mainline fitting. Connections to manholes shall be core drilled with a rubber boot installed.

Building sewers within the right-of-way or easement shall be a minimum of six (6) inches in diameter. Building sewers shall have a tee cleanout located within three (3) feet of the

building's exterior wall and extended to grade. For laterals extending over 100', a clean out is required every 100'.

Cleanouts installed under concrete or asphalt paving shall be made accessible by yard boxes or extended flush with paving with approved materials and be adequately protected.

Building sewers installed for future connections shall be terminated at the right-of-way or easement and plugged to ensure 100 percent water tightness. A one-half (1/2) inch metal locator rod or a magnetic locator tape shall be installed at the end of the plugged line to within one (1) foot of the finished grade.

4.04 SEWER STRUCTURES

A. MANHOLES

1. General

Manholes shall be installed at the end of each line; at all changes in grade, size, materials or alignment; at all sewer intersections and at a maximum 400 foot interval between manholes.

The minimum inside diameter of manholes shall be as stated in Section 5.

Flow channels shall be shaped and formed in each manhole to provide a smooth transition of flow from all inlets to the outlet. The bench wall shall be formed to the crown of the inlet and outlet pipes to form a "U" as shown in the Standard Details (Figures 5-1, 5-2 and 5-8).

Manholes proposed to be installed in unpaved areas shall be designed and construction such that the top of the casting is a minimum of three (3) inches above the finished grade to prevent ponding of water over the casting. Positive drainage away from the manhole shall be provided.

2. Outside Drop Connections

Outside drop pipe connections shall be provided for all sanitary sewers entering a manhole at an elevation greater than twenty-four (24) inches above the invert of the manhole (see Figure 5-8).

In areas where future residential, commercial and/or industrial growth can occur, all new manholes 15 feet deep or deeper shall be equipped with up to two (2) precast outside drop connections of a size and at an elevation to be determined by the District at the time of design to allow for future connections at these points. The drops shall extend from the base to within 5 feet minimum of the final graded surface elevation.

NOTE: THIS SHOULD NOT BE CONSTRUED AS TO IMPLY THAT EVERY MANHOLE SHALL BE PROVIDED WITH 2 OUTSIDE DROP CONNECTIONS

B. LIFT STATIONS

A construction permit shall not be issued for a sanitary sewer lift station until an economic analysis identifies or proves to the satisfaction of the District that the lift station exhibits a lower 50-year life cycle cost than a gravity sewer.

The analysis shall be per latest standard practice for least cost (life cycle) as developed by ASTM and evaluate labor costs, maintenance costs (including parts replacements), operation costs and rehabilitation costs. The analysis shall take into consideration both interest and inflation rates.

4.05 EASEMENTS (SEE ALSO SECTION 3 FOR DEDICATION OF EASEMENT)

A. GENERAL

Whenever possible, sanitary sewers shall be constructed within the public right-of-way. Should the construction be outside the limits of the public right-of way, recorded sewer easements shall be acquired, dedicated and recorded solely for the benefit of the District. Easement boundaries shall be so shown on the plans and specifications as "Sanitary Sewer Easement" in lieu of "Utility Easement".

The minimum permanent easement widths to be dedicated to the District are as follows:

DEPTH OF SEWER FROM FINISHED GRADE	MINIMUM EASEMENT (FT.)
UP TO 15 FEET	20
> 15 FEET TO 25 FEET	25
GREATER THAN 25 FEET	30

All sanitary sewers shall be centered in the easement. For those sanitary sewers constructed in the public Right-of Way, the easement shall extend the distance outside the right-of-way necessary to provide the required easement width.

A minimum 30 foot easement shall be provided for all submersible lift stations with wet wells up to 30 feet deep.

Easements for lift stations with wet wells greater than 30 foot deep and/or wet well/dry pit lift stations shall be handled on a case by case basis.

The sewer easements shall be exclusively under the discretion and control of the District. Ingress and egress shall be available to the District's crew at all times.

No utility companies are allowed to use the sewer easements for installation of their utility line without the expressed written permission of the District. All plan sheets shall clearly identify the sanitary sewer easement and the location of all other proposed utilities. The horizontal and vertical plans shall identify all utilities proposed to cross the sanitary sewer easement.

The following are guidelines that are pertinent for the easement submittals to be approved.

B. RIGHT-OF-WAY PLAN SHEET

1. Geographic location map showing the extent of the project and including where applicable:

   a. Directional north arrow and scale;

   b. County;

   c. Civil township;

   d. Section, township and range identification;

   e. Subdivision names, recording information and lot numbers;

   f. Highway, road and street identification;

   g. Rivers, creeks and named ditches;

   h. Assigned parcel numbers arranged in ascending numerical order from the project beginning to end;

   i. List of apparent owners (last deed of record) by assigned parcel numbers.

2. In addition to the above, there should be sufficient information on the design drawings to properly correlate with the right-of-way plan sheet; i.e., property lines, subdivision information, parcel number or name, width of right-of-way, permanent or temporary and special conditions; for example, structures, trees, shrubs to be removed or replaced, sodding, riprap, etc.

C. LEGAL DESCRIPTION SHEETS

The following shall be provided:

1. Parcel number;

2. Project number;

3. Project name;

4. Identification as to permanent or temporary easement;

5. Separate descriptions on separate sheets are required where both permanent and temporary easements are to be taken;

6. Metes and bounds descriptions shall be clear, concise and complete with sufficient detail to positively establish from known and referenced points, monuments, lines, etc. Area of taking should be stated at end of description. Areas should be given in acres;

7. Descriptions of easements from platted subdivision lots, including strips off sides of lots should include name of subdivision and recording information for the subdivision as well as affected lot number(s). NOTE: These are usually small areas; therefore, area should be stated in square feet; and

8. Registered land surveyor's licensed in the State of Indiana, seal and signature.

D. PROPERTY PLATS

1. Parcel number;

2. Project number;

3. Project name;

4. County;

5. Civil township;

6. Section;

7. Township;

8. Range;

9. Owner;

10. Permanent or temporary legends;

11. Permanent or temporary easement areas;

12. Total area of property out of which easement is to be taken;

13. Drawn by;

14 Directional north arrow;

15. Scale;

16. Unplatted properties; complete boundaries of property description out of which easements are to be taken, including properly identified referenced corners, P.O.B.'s, monuments, roads, bearings, distances, etc.;

17. Platted subdivisions: dimensions of lot(s) as well as the lot number(s) and including the subdivision name and recording information;

18. Easement boundaries as described in Item A of this Subsection including referenced bearings, distances, etc. and identified as shown in legend; and

19. Registered land surveyor's licensed in the State of Indiana, seal and signature.

4.06 DRAFTING STANDARDS

A. GENERAL

These standards have been established for the purpose of ensuring uniformity in the design and drafting techniques of projects to be submitted for review and acceptance.

1. All projects submitted shall have a title sheet which will include:

   a. General overall area map;

   b. Vicinity location map;

   c. A site plan map detailing the project;

   d. Name/title of project including section number if applicable.

   e. Owner and Engineer's Name; and

   f. Professional engineer's seal and signature

2. All plan and profile sheets are to be certified and dated by a professional engineer of the state of Indiana.

3. All sheets are to be numbered, with total number of sheets included; i.e., sheet 4 of 12.

4. Include detail sheet(s)/specification sheet(s), as applicable.

5. Design drawings shall be 24-inch by 36-inch.

B. SCALES

The following scales for drawings are required:

1. Plan and profile: 1" = 50' horizontal,
   1" = 10' vertical.

2. Cross sections: 1" = 10' horizontal and vertical.

C. LETTERING

Minimum sizes for lettering shall be:

1. Titles: hand lettered, 1/4" or larger. Controlled (Leroy, etc): No. 200 or larger.

2. General: hand lettered, 1/8" or larger. Controlled: No. 100 or larger.

D. MATERIALS

Mylar type drafting film shall be used for all original and reproduction "originals" to be submitted as record drawings. They shall be of a quality suitable for blue printing and microfilming. Any drawing deemed not usable by the District will be rejected. Permanent drawing ink is preferred, and plastic and composite leads intended for use on drafting film are acceptable. Degree of hardness shall be "H" equivalent or softer.

E. ORIENTATION

Drawings shall be situated so that North is either toward the top or toward the left side of the sheet. The north sign shall be placed on the upper right of sheet.

F. SANITARY SEWER SITE PLAN DRAWINGS

1. All Construction Drawings must include an overall site plan identifying the entire sewer layout of the proposed development. The site plan should include the following information when applicable:

    a. A north arrow;

    b. Scale;

    c. Project name, sheet number, date drawn, date and nature of revisions;

    d. Right-of-way lines, property lines and easements;

    e. Locations of benchmarks and their descriptions;

    f. Locations of all existing and proposed utilities in the project area;

    g. Clear delineation of the different sections within the development;

    h. Sheet index including relevant sheets from other sections within the development. Example: If a gravity sewer ties into a manhole in a section that was previously submitted please identify that sheet.

G. PLAN AND PROFILE DRAWINGS

1. All plan sheets shall include the following information when applicable:

    a. A north arrow;

    b. The scales used;

    c. Project name and number, sheet number, date drawn, date and nature of revisions;

    d. All topography in the area affected by construction;

    e. Right-of-way lines, property lines and easements;

    f. Locations of benchmarks and their descriptions;

    g. Locations of all existing and proposed utilities in the project area; and

    h. Match lines shall be easily identifiable.

    i. Tap locations measured from center of down stream manhole.

' TAP LATERAL FROM MAIN LINE (FEET

DEPTH (FEET)

2. All profiles shall include the following:

   a. Existing and finished grade lines;

   b. Inverts at all manholes;

   c. Length and size of pipe between manholes;

   d. Slope of pipe in percent;

   e. Elevations to USGS datum;

   f. Top of casting elevations;

   g. Types of materials used;

   h. Profile of existing and proposed utilities; and

   i. Special construction required due to unfavorable soil conditions.

H. LIFT STATION DRAWINGS

1. Lift station plans shall, at a minimum, contain the following:

   a. At least two views of the station, plan view and cross section;

   b. Electrical panel detail;

   c. Pump and alarm control elevations;

   d. Inlet and outlet pipe elevations;

   e. Finished grade and foundation elevations;

   f. Special construction required due to unfavorable soil conditions;

   g. Design pump capacity, rated horsepower, total dynamic head, manufacturer and model number, serial number;

   h. Sump capacity and cycle time;

   i. Also, the Engineer shall submit a copy of the head discharge curve and the complete design calculations for the lift station and force main; and

   j. Fence and access drive detail;

   k. Emergency generator and detail.

I. RECORD DRAWINGS

Sanitary sewer plans submitted as record ("as-built") drawings shall have all laterals shown on the plan view with their locations properly scaled. Lateral measurements shall be indicated by their distance from the downstream manhole. Lateral end from main and depth at end of tap. Example: All sheets shall have the phrase "as-built" boldly printed on them with the date, and shall be stamped by a professional engineer registered in the State of Indiana.

J. USE OF STANDARD SYMBOLS AND NOTATIONS

Sanitary sewer plans shall be prepared using standard symbols and notations commonly used in the practice of civil engineering. If necessary, legends shall be provided to define the symbols used.

4.07 PROTECTION OF WATER SUPPLIES

There shall be no physical connections between a public or private water supply system and a sanitary sewer or appurtenances thereto which would permit the passage of any polluted water into the potable supply.

Sanitary sewers shall be laid at least ten (10) feet horizontally from any existing or proposed water line.

The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten (10) foot separation, the appropriate reviewing agency may allow deviation on a case-by-case basis if supported by data from the design engineer. Such deviation may allow installation of the sewer closer to a water main provided that the water main is in a separate trench or on an undisturbed earth shelf located to one side of the sewer, and at an elevation so the bottom of the water main is a least 18 inches above top of the sewer.

Sanitary sewers crossing water mains shall be laid to provide a minimum vertical separation distance of 18 inches between the outside of water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistance and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the sewer shall be designed and constructed equal to water pipe, and shall be pressure tested to assure water tightness prior to backfilling.

4.08 EXISTING UTILITY STRUCTURES AND FACILITIES

The plans shall show the location of overhead and underground utility lines and existing sewers according to the best information presented and available. Plans shall be submitted to the utilities and shall have indicated to the best of their records the locations of their facilities and the route of the proposed sewer.

4.09 UTILITY COORDINATION

It is the responsibility of the Owner or his authorized representative to coordinate with and get approval from the various UTILITIES. Further, it is the responsibility of the Owner to get authorization to encroach upon any other utilities easement(s) and secure such recorded encroachment as a requirement for dedication of the sanitary sewer system.

4.10 SANITARY SEWERS CROSSING DRAINAGE WAYS

Sanitary sewers shall be constructed of ductile iron pipe or shall be encased in a minimum of 6" of concrete wherever the sanitary sewer crosses under a naturally occurring drainage way (i.e. creeks, rivers, streams, etc.). Wherever applicable, the sanitary sewer crossing the drainage way shall be pressure tested to assure 100% water tightness prior to backfilling.

ATTACHMENT TO SECTION 4

INDIANA ADMINISTRATIVE CODE
TITLE 327 ARTICLE 3, RULE 6, SECTION 11, TABLE 11-1 LATEST EDITION

FLOW CALCULATION FACTORS

SERVICE CONNECTION DESCRIPTION	FLOW CALCULATION FACTORS (GALLONS PER DAY)
AGRICULTURAL LABOR CAMP	50 PER OCCUPANT
AIRPORT	3 PER PASSENGER PLUS 20 PER EMPLOYEE
ASSEMBLY HALL	3 PER SEAT
ATHLETIC FIELD (BASEBALL, SOCCER, FOOTBALL, ETC.)	1 PER PARTICIPANT AND SPECTATOR WITH ADDITIONS FOR CONCESSIONS
AUCTION AND FLEA MARKET: WITH FULL KITCHEN	5 PER CUSTOMER
AUCTION AND FLEA MARKET: WITH WARMING KITCHEN	4 PER CUSTOMER
AUCTION AND FLEA MARKET: WITHOUT FULL KITCHEN	3 PER CUSTOMER
AUTOMATIC SELF-CLEANING BATHROOM	20 PER CYCLE (3 PER DAY)
BANQUET CATERER	10 PER PERSON
BAR (WITHOUT FOOD)	10 PER SEAT
BEAUTY SALON: PERM OR COLOR CHANGES	35 PER CUSTOMER
BEAUTY SALON: CUT WITH WASH	10 PER CUSTOMER
BEAUTY SALON: CUT WITHOUT WASH	5 PER PERSON
BED AND BREAKFAST	150 PER BEDROOM
BOWLING ALLEY (WITH BAR AND/OR FOOD)	125 PER LANE
BOWLING ALLEY (WITHOUT FOOD)	75 PER LANE
BUS STATION	3 PER PASSENGER

CAMPGROUND (ORGANIZATIONAL) WITH FLUSH TOILETS, SHOWERS, CENTRAL KITCHEN	40 PER CAMPER
CAMPGROUND (ORGANIZATIONAL) WITHOUT FLUSH TOILETS, PRIVY USE, CENTRAL DINING HALL, NO SHOWERS, HANDWASHING	20 PER CAMPER
CAMPGROUND (RECREATIONAL) WITH INDIVIDUAL SEWER CONNECTION	100 PER CAMPSITE
CAMPGROUND (RECREATIONAL) WITHOUT INDIVIDUAL SEWER CONNECTION	50 PER CAMPSITE
CHURCH WITH FULL KITCHEN	5 PER SANCTUARY SEAT
CHURCH WITH WARMING KITCHEN	4 PER SANCTUARY SEAT
CHURCH WITHOUT FULL KITCHEN	3 PER SANCTUARY SEAT
CONDOMINIUM, MULTI-FAMILY DWELLING: ONE BEDROOM	200 PER UNIT
CONDOMINIUM, MULTI-FAMILY DWELLING: TWO BEDROOM	300 PER UNIT
CONDOMINIUM, MULTI-FAMILY DWELLING: THREE BEDROOM	350 PER UNIT
CONDOMINIUM, ONE AND TWO FAMILY DWELLING	150 PER BEDROOM
CONFERENCES	10 PER ATTENDEE
CORRECTIONAL FACILITIES	120 PER INMATE
DAY CARE CENTER	20 PER PERSON
DENTIST	200 PER CHAIR PLUS 75 PER EMPLOYEE
DOCTOR'S OFFICE	75 PER DOCTOR, PLUS 75 PER NURSE, PLUS 20 PER SUPPORT STAFF
FACTORY WITH SHOWERS	35 PER EMPLOYEE
FACTORY WITHOUT SHOWERS	20 PER EMPLOYEE
FIRE STATION: MANNED	75 PER FIREFIGHTER
FIRE STATION: UNMANNED	35 PER FIREFIGHTER

FOOD SERVICE OPERATIONS: COCKTAIL LOUNGE OR TAVERN	35 PER SEAT
FOOD SERVICE OPERATIONS: RESTAURANT (NOT OPEN 24 HOURS)	35 PER SEAT
FOOD SERVICE OPERATIONS: RESTAURANT (OPEN 24 HOURS)	50 PER SEAT
FOOD SERVICE OPERATIONS: RESTAURANT (NOT OPEN 24 HOURS BUT LOCATED ALONG AN INTERSTATE)	50 PER SEAT
FOOD SERVICE OPERATIONS: RESTAURANT (OPEN 24 HOURS BUT LOCATED ALONG AN INTERSTATE)	70 PER SEAT
FOOD SERVICE OPERATIONS: TAVERN	35 PER SEAT
FOOD SERVICE OPERATIONS: CURB SERVICE (DRIVE-IN)	50 PER CAR SPACE
GOLF COMFORT STATION	3 PER 50% OF MAXIMUM NUMBER OF GOLFERS
GOLF MAIN CLUBHOUSE	5 PER GOLFER WITH ADDITIONS FOR FOOD SERVICE AND SHOWERS
HOSPITAL, MEDICAL FACILITY	200 PER BED
HOTEL	100 PER ROOM
KENNELS AND VET CLINICS (SUM OF ALL OF THE FOLLOWING SERVICES AT A FACILITY):	
1) A. CAGES; B. INSIDE RUNS C. OUTSIDE RUNS; D. GROOMING; E. SURGERY; PLUS	5 PER CAGE 10 PER RUN 20 PER RUN 10 PER ANIMAL 50 PER SURGERY ROOM
2) STAFF	75 PER VETERINARY DOCTOR, PLUS 75 PER VETERINARY ASSISTANT, PLUS 20 PER SUPPORT STAFF
MENTAL HEALTH FACILITY	100 PER PATIENT
MOBILE HOME PARK	200 PER LOT
MOTEL	100 PER ROOM
NURSING HOME	100 PER BED

OFFICE BUILDING WITHOUT SHOWERS	20 PER EMPLOYEE
OFFICE BUILDING WITH SHOWERS	35 PER EMPLOYEE
OUTPATIENT SURGICAL CENTER	50 PER PATIENT
PICNIC AREA	5 PER VISITOR
RACE TRACKS	5 PER ATTENDEE, 20 PER STAFF
SCHOOL: ELEMENTARY	15 PER PUPIL
SCHOOL: SECONDARY	25 PER PUPIL
SCHOOL: WITH DORMITORY	100 PER BED
SERVICE STATION: CONVENIENCE STORE/SERVICE CENTER	1,000 WITH ADDITIONS FOR FOOD PREPARATION AND SEATING
SERVICE STATION: WITH ONLY TWO (2) RESTROOMS	400 PER RESTROOM
SERVICE STATION: WITH ONLY UNISEX RESTROOM	600 PER RESTROOM
SERVICE STATION: AUTOMATIC SELF-CLEANING BATHROOM	60 PER DAY
SHOPPING CENTER	.1 PER SQUARE FOOT OF FLOOR SPACE, PLUS 20 PER EMPLOYEE
SWIMMING POOL BATHHOUSE	10 PER SWIMMER
THEATER: DRIVE-IN	5 PER CAR SPACE
THEATER: INSIDE BUILDING	5 PER SEAT

For uses not mentioned in this table, flow estimates should be submitted for preliminary design review and possible approval prior to proceeding with final plans.

END OF SECTION 4

SECTION 5 - MATERIALS

5.01 INTRODUCTION

The following Section provides a description of materials acceptable for the construction of gravity sanitary sewers, force mains, manholes and their appurtenances within Fall Creek Regional Waste District. Use of other materials not specified herein will be allowed only with the written approval and authorization of the General Manager of Fall Creek Regional Waste District.

5.02 GRAVITY SANITARY SEWERS

A. GENERAL

The Fall Creek Regional Waste District currently allows the use of the following pipe materials meeting or exceeding the minimum requirements/specifications set forth herein for the construction of gravity sanitary sewers:

- Polyvinyl Chloride Pipe (PVC)
- Ductile Iron Pipe (DIP)
- Truss Pipe
- High Density Polyethylene Pipe (HDPE)

VITRIFIED CLAY PIPE (VCP) is not an approved material for the construction of sanitary sewers within Fall Creek Regional Waste District.

In general, all gravity sanitary sewer pipe shall be the bell and spigot type with elastomeric seal joints and smooth interior walls meeting or exceeding all requirements set forth in the latest ASTM Standard referenced herein.

THE DISTRICT DOES NOT ALLOW THE USE OF SOLVENT CEMENT JOINT FOR GRAVITY SANITARY SEWERS.

Each length of pipe shall be marked per the requirements of the respective ASTM Standard.

Upon request, the Contractor at his own expense shall furnish the District with copies of all material tests required by applicable ASTM Standards.

B. GRAVITY SANITARY SEWER MATERIALS

Each pipe material acceptable for gravity sanitary sewer construction is separated into its own subsection for ease of revision and/or updating as follows:

1. <u>POLYVINYL CHLORIDE PIPE</u>

a. Pipe: Polyvinyl chloride (PVC) gravity sanitary sewer pipe shall be the integral wall bell and spigot type with elasto-meric seal joints and smooth inner walls meeting or exceeding all of the requirements set forth in ASTM D-3034 for pipe diameters 15-inches or less and meeting or exceeding all of the requirements set forth in ASTM F-679 for pipe diameters greater than 15-inches.

For diameters 15-inches or less, the pipe shall have a minimum cell classification of 12454-B or 12454-C and for diameters greater than 15-inches, the pipe shall have a minimum cell classification of 12454-C; with all pipe having a minimum tensile strength of 34.50 MPA as defined in ASTM D-1784.

PVC sanitary sewer pipe shall have a minimum pipe stiffness of 46 psi for each diameter when measured at 5% vertical ring deflection and tested in accordance with ASTM D-2412.

b. Joints: Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a water tight seal. The assembly of joints shall be in accordance with the pipe manufacturer's recommendations and ASTM D-3212. The gaskets sealing the joint shall be made of rubber of special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five (5) years experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater, and which will endure permanently under the conditions likely to be imposed by this service.

The gasket shall conform to the requirements of ASTM F-477.

All field-cutting of pipe shall be done in a neat, trim manner using a hand or power saw, and the cut end shall be beveled using a file or wheel to produce a smooth bevel of approximately 15 degrees and be a minimum depth of one-third the pipe wall thickness. Field cut pipe will only be allowed to be installed at manholes, at prefabricated tees and wyes, and at the connection of new sanitary sewer to existing sanitary sewer.

<u>NO SOLVENT CEMENT JOINTS SHALL BE ALLOWED.</u>

NOTE: Only smooth exterior pipe shall be used at manhole connections.

c. Fittings: only manufactured fittings made of PVC plastic having a cell classification of 12545-B or 12545-C as defined in ASTM D-1784 shall be used.

SADDLE CONNECTIONS SHALL NOT BE ALLOWED FOR NEW CONSTRUCTION.

d. Design: The minimum wall thickness for PVC sewer pipe greater than 15-inches in diameter shall conform to T-1 as specified in ASTM F-679

e. Marking: The date of manufacture, class of pipe, specification designation, size of pipe, name or trademark of manufacturer, and identification of plant/location shall be legibly marked on the outside of each pipe section in accordance with the ASTM D-3034.

f. Certification: The Contractor shall upon request furnish the District with manufacturer's certification stating that the pipe supplied meets or exceed all requirements of the applicable ASTM standards and these Standards.

g. Any pipe and fittings installed deeper than 15 feet shall be SDR-26.

2. REINFORCED CONCRETE PIPE

REINFORCED CONCRETE PIPE (RCP) IS PERMITTED FOR THE CONSTRUCTION OF GRAVITY SANITARY SEWERS OF ALL SIZES.

a. Material: All reinforced concrete pipe shall be Class III, IV or V in accordance with ASTM C-76, latest edition; wall thickness "B" or "C" per site conditions and be manufactured from Portland Cement and aggregate as specified herein.

Reinforced Concrete Low-Head Pressure Pipe in accordance with ASTM C-361 shall be allowed for gravity sanitary sewer construction.

b. Portland Cement: Portland Cement for manufacture of concrete pipe and fittings shall be Type I or Type III and shall conform to ASTM C-150. Upon request by the District, the Contractor shall furnish manufacturer's certificate stating the type of cement used in the manufacturer of the pipe furnished.

c. Aggregate: The aggregate for manufacture of concrete pipe and fittings shall conform to ASTM C-33 except that the requirement for gradation shall not apply. Upon request by the District, the Contractor shall furnish manufacturer's certificate stating the type of aggregate used in the manufacture of the pipe furnished.

d. Steel Reinforcement: Steel reinforcement shall be in accordance with requirements of the applicable table in ASTM C-76. Reinforcement shall extend full into bell or spigot ends for pipes 36" and larger and shall extend full into the bell of rubber gasketed pipes 12" and larger. Elliptical reinforcement shall not be permitted. Longitudinal reinforcement shall be continuous and all reinforcement shall have a minimum concrete cover of 1 inch.

e. Lift Holes: Lift Holes shall not be permitted.

f. Joints: Concrete pipe shall be furnished with joints using either concrete bell and spigot or zinc coated steel bell and spigot rings or rubber seal and rings (Anderson Seal or an approved equal). All types of joints shall have a groove on the spigot for a rubber "O" ring gasket.

Pipe joints using concrete bell and spigot or zinc coated steel bell and spigot rings shall conform to ASTM C-361 except that the gaskets shall be as specified hereinafter. Pipe joints using rubber gaskets shall conform to ASTM C-443. The joint shall be sealed with a rubber gasket conforming to ASTM C-443 so that the joint will remain watertight under all conditions of service. The steel skirt (minimum 5 3/4 inches in

length and fabricated from 16 gage metal) shall be continuously welded in the inside face of the steel spigot ring and to the longitudinal reinforcement.

Profile gasket type joints using a self-lubricated gasket (Forsheda Style 138 or approved equal) on a single offset spigot and formed bell are acceptable. Joints shall be sealed with a profile rubber gasket conforming to ASTM C-443 so that the joint will remain watertight under all conditions of service.

Only one style of joint system will be permitted between a manhole run of pipe.

g. Absorption Limit: Absorption of the reinforced concrete pipe shall not exceed 6% of the dry weight.

h. Marking: The date of manufacture, class of pipe and specification designation, size of pipe, name or trademark of the manufacturer, and identification of plant shall be legibly marked on the outside of each section of pipe per the ASTM requirement.

i Specials: Specials shall conform to the specifications for straight pipe insofar as applicable. Special design or construction necessary for specials shall be subject to approval by the District on a case-by-case basis.

j. Gaskets: The gaskets sealing the joint shall be made of rubber of special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five (5) years experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater, and which will endure permanently under the conditions likely to be imposed by this service. The gasket shall conform to the requirements of ASTM C-443.

k. Sanitary Sewer Lateral Connections: Connections to the RCP sewer shall be subject to District approval. Where lateral connections must be made to the RCP sewer, a rubber connector with stainless steel clamp (KOR-N-SEAL) shall be used. The connector shall be the sole element relied on to assure a flexible watertight seal of the pipe.

The rubber for the connector shall comply with ASTM C-923 and shall be resistant to ozone, weather elements, chemicals including acids and alkalis, animal and vegetable fats, oils, and petroleum products from spills.

The stainless steel elements of the connector shall be totally non-magnetic Series 305 stainless steel. The stainless steel clamp shall be capable of sustaining applied torque in excess of eighty (80) inch-pounds. It shall be the responsibility of the Contractor to submit details of the proposed connection to the District for approval. Connections not

approved by the District shall be subject to removal and replacement with an approved adaptor.

l. Certification: The contractor shall upon request furnish to the District manufacturers' certification stating that all pipe materials and pipe appurtenances supplied meet or exceed the applicable requirements of the ASTM standards and these Standards.

3. DUCTILE IRON PIPE

a. Material: Ductile Iron Pipe in diameters from eight (8) inches through thirty-six (36) inches shall be centrifugally cast and shall conform to ANSI Specifications A21.51 and AWWA C-151, latest revision. Ductile Iron Pipe shall be Class 50, 51, 52 or 54 wall thickness dependent upon site conditions and provided in minimum laying lengths of eighteen (18) feet. Ductile Iron Pipe larger than thirty-six (36) inches in diameter shall be approved on a case-by-case basis by the District.

b. Fittings: Fittings shall be standardized for the type of pipe and joint specified and shall comply with ANSI A-21.10, AWWA C-110.

c. Joints: Mechanical joints, slip or flanged joints shall be provided.

Mechanical joints and accessories shall conform to AWWA Standard C-111, ANSI A-21.11. The bolts and nuts shall be corrosion resistant high strength alloy steel.

The o-ring gaskets sealing the slip joint shall be made of rubber of special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five (5) years experience in the manufacturer of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater; and which will endure permanently under the conditions likely to be imposed by this service. The gasket shall conform to the requirements of AWWA C-111 (ANSI A-2111).

Flanged joints shall be manufactured with laying dimensions, facing and flange detailed in accordance with AWWA Standard C-115 (ANSI A21.15) Class 125.

d. Weights and Marking: Weights of pipe fittings shall conform strictly to the requirements of ANSI Specifications. The class designations for the various classes of pipe and fittings shall be cast onto fittings in raised numbers, and cast or stamped on the outside of each joint of pipe. Weights shall be plainly and conspicuously painted in white on the outside of each joint of pipe and each fitting after the exterior coating has hardened.

e. Certification: The Contractor shall upon request furnish the District with certified reports stating that inspection and specified tests have been

made and that the results thereof comply with the applicable ANSI Specifications and these Standards for each.

4. HIGH DENSITY POLYETHYLENE PIPE

a. Pipe and fittings: HDPE pipe shall be the wall bell and spigot type with elastomeric seal joints and smooth interior walls. Pipe and fittings shall be made from high molecular weight high density polyethylene material meeting the requirements of ASTM D-3350 Cell Class PE 334433C. All material shall be virgin resin.

Only manufactured wyes, tees, adaptors of the bell and spigot type shall be used. NO SADDLE CONNECTORS SHALL BE USED.

b. Joints: Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the machined groove on the pipe spigot will be compressed radially in the pipe bell to form a watertight seal. Joints shall meet the requriements of ASTM D-3212.

c. Gaskets: The gaskets shall be made of a rubber of special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five (5) years experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater, and which will endure permanently under the conditions likely to be imposed by this service. The gasket shall conform to all requirements of ASTM F-477.

d. Nominal ring stiffness: ALL HDPE PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI WHEN MEASURED IN COMPLETE ACCORDANCE WITH ASTM D-2412. The Ring Stiffness Constant (RSC) classification value for the pipe between bell and spigot shall comply with the minimum value of 57 lb/ft.

Installation: The installation shall be in conformance with specifications for installation of flexible pipe as per all applicable ASTM requirements including F-412, D-2321, D-2412, D-3212, and D-3350

e. Certification: Upon request the contractor shall furnish a certificate of conformance to the required ASTM Standards, these Standards and other conformance certifications in the form of affidavits of conformance, test results and/or copies of test reports.

f. Markings: Each length of HDPE sanitary sewer shall be clearly marked with the Manufacturer's Name, Tradename or Trademark, Nominal pipe size, Pipe Stiffness, production Code/Extrusion Code Material Cell Class Designation and ASTM number.

5. COMPOSITE WALL/TRUSS PIPE

a. Material: PVC Truss Pipe shall be the wall bell and spigot type with elastomeric seal joints and smooth inner walls meeting or exceeding all

of the requirements set forth in ASTM D-2680 for pipe diameters eight (8) inches to fifteen (15) inches.

PVC Truss Pipe shall have a minimum pipe stiffness of 200 psi for each diameter when measured at 5% vertical ring deflection and tested in accordance with ASTM D-2412.

The fill material shall be Portland Cement, Perlite Concrete or other inert fill material exhibiting the same degree of performance.

b. Joints: Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a watertight seal. The gaskets sealing the joints shall be made of rubber of special composition having a texture to assure a watertight and permanent seal and shall be the product of a manufacturer having at least five (5) years experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater, and which will endure permanently under the conditions likely to be imposed by the requirements of ASTM F-477.

NO SOLVENT CEMENT JOINTS SHALL BE ALLOWED.

All field-cutting of pipe shall be done in a neat, trim manner using a hand saw per manufacturer's recommendations. Care shall be taken to protect the filler material. All field cuts shall be sealed according to manufacturer's recommendations.

c. Fittings: Only manufactured fittings shall be used.

d. Certification: Upon request the contractor shall furnish to the District a copy of the manufacturer's test report or a statement by the manufacturer that the material has been sampled, tested, and inspected in accordance with ASTM d-2680 and these Standards. Each certification shall be signed by an authorized agent of the manufacturer or seller.

e. Markings: The pipe barrel shall be marked at five (5) foot intervals per ASTM D-2680 with the following:

1. Manufacturer's name, tradename or trademark;

2. ASTM D-2680;

3. PVC Composite pipe;

4. Extrusion code, including date and location of manufacture; and

5. Nominal pipe size.

5.03 SANITARY SEWER FORCE MAINS

A. GENERAL

The Fall Creek Regional Waste District allows the use of the following pipe materials meeting or exceeding the minimum requirements set forth herein, for the construction of sanitary sewer force mains.

- Polyvinyl Chloride Pipe
- High Density Polyethylene Pipe (HDPE)

Each pipe segment shall be clearly marked per the requirement of the respective ASTM, AWWA and/or ANSI Standard.

B. ANCHORAGE

Force mains shall be anchored to resist thrusts that develop at bends, angles, tees, etc. in the force main pipe. The magnitude of the forces to be resisted shall be calculated and provided as part of the Engineer's design submittal. The required anchorage shall be attained by installing restrained pipe joints, concrete thrust blocks or anchor blocks based upon sound engineering practices. Anchorage design at force main fittings shall be based on pipeline pressures of at least 25 percent greater than the maximum pump design shut off head plus a water hammer allowance with an appropriate factor of safety.

C. AIR/VACUUM RELIEF VALVES

Sanitary sewer force mains shall be designed to avoid the need for air or vacuum release lines. If possible, force mains shall be designed without high points and with the top of the force main below the hydraulic grade line at the minimum pumping rate so that relief valves will not be needed.

If high points in the force main cannot be eliminated, an A.R.I. air release valve or approved equal shall be installed at each significant high point where air could become trapped. The air release valve shall be installed in a manhole structure in accordance with the requirements of section 5.04, and provisions shall be required for draining the structure. A high point shall be considered significant if it is 2 feet or more above the minimum hydraulic gradeline, or when pumping is intermittent above the static head line.

D. FORCE MAIN MATERIALS

Each pipe material acceptable for force main construction is described in the following individual subsections for ease of discussion and revisions:

1. <u>POLYVINYL CHLORIDE (PVC) FORCE MAIN</u>

a. PIPES:

PVC force main pipe shall conform to ASTM Specification D-2441, Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe (SDRPR). The material used shall conform to ASTM Specification D-1784, Standard Specification of Rigid Polyvinyl Chloride and Chlorinated Polyvinyl Chloride compounds, Class 12454-B (PVC 1120). The minimum pressure class/SDR rating acceptable shall be Class 200/SDR 21.

The pipe fittings shall be pressure rated in accordance with recommendations of the plastic pipe institute. Pressure class and standard dimension ratios (SDR) shall be as follows:

Class 200:	SDR 21
Class 250:	SDR 17
Class 315:	SDR 13.5

All plastic pipe and couplings shall bear identification markings in accordance with Sections 2.5.2 and 2.5.3 of AWWA C-900-75, which shall include the National Sanitation Foundation (NSF) seal of approval. In addition, the plain end of each pipe length shall have two (2) rings, one (1) inch apart, painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell or coupling.

b. JOINTS:

Joints shall be bell end or coupling push-on type. No glue allowed. The push-on joint and joint components shall meet the requirements for ASTM Specification D-3139, Joint for the Plastic Pressure Pipe, using Flexible Elastomeric Seals. The joint shall be designed so as to provide for the thermal expansion and contraction experienced with a total temperature change of seventy-five (75) degrees F in each joint of pipe. Details of the joint design and assembly shall be in accordance with joint manufacturer's standard practice.

The lubricant shall have no deteriorating effects on the gasket or the pipe. The lubricant containers shall be labeled with manufacturer's name.

Gaskets shall meet all applicable requirements of ANSI Standard A-21.11.

c. FITTINGS:

Fittings shall be of the same material and class as the pipe with joints and gaskets to properly fit the PVC pipe.

d. INSTALLATION:

The installation shall conform to the requirements of the manufacturer, the AWWA Standard and as indicated on the plans and specified herein.

e. MARKING AND CERTIFICATION:

Marking and certification requirements - see Section 5.02 b.1 e and f

2. <u>HIGH DENSITY POLYETHYLENE PIPE (HDPE) FORCE MAIN</u>

a. Pipe dimensions shall conform to the IPS dimensions associated with HDPE pipe unless otherwise noted.

b. Pipe and fittings: HPDE force main pipe shall conform to ASTM Specification D-3350, Standard Specification for Polyethylene (PVC) Plastic Pipe and fittings materials. All material shall be virgin resin. Pressure class and dimension ratios (DR) shall be as follows:

Class 100:	DR 17
Class 128	DR 13.5
Class 160:	DR 11
Class 200:	DR 9

Fittings for the polyethylene pipe line shall be molded or fabricated from the same material as specified for hereinbefore for the HDPE pipe. All run-of-the-pipe fittings shall be fusion welded into the pipeline. Wye branches shall be true wyes.

c. Joints: All HDPE is to be joined by leakproof, thermal, butt fusion joints. All fusion must be done by certified personnel. Threaded or solvent cement joints and connections are NOT permitted.

d. Nominal ring stiffness: ALL HDPE PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI WHEN MEASURED IN COMPLETE ACCORDANCE WITH ASTM D-2412. The Ring Stiffness Constant (RSC) classification value for the pipe between bell and spigot shall comply with the minimum value of 57 lb/ft.

Installation: The installation shall be in conformance with specifications for installation of flexible pipe as per all applicable ASTM requirements including F-412, D-2321, D-2412, D-3212, and D-3350

e. Certification: Upon request the contractor shall furnish a certificate of conformance to the required ASTM Standards, these Standards and other conformance certifications in the form of affidavits of conformance, test results and/or copies of test reports.

f. Markings: Each length of HDPE sanitary sewer shall be clearly marked with the Manufacturer's Name, Tradename or Trademark, Nominal pipe size, Pipe Stiffness, production Code/Extrusion Code Material Cell Class Designation and ASTM number.

5.04 SANITARY SEWER MANHOLES

A. GENERAL

Sanitary sewer manholes shall be installed at the end of each line segment; at all changes in grade, size, materials and/or alignment; at all intersections; and at distances not greater than 400 feet. Cleanouts shall not be substituted for manholes.

In unpaved/grassy areas manholes shall be designed and installed such that they extend a minimum of three (3) inches above finished grade to prevent water ponding. Positive drainage away from the manhole shall be provided. Manholes are not to be buried. All manholes are to be constructed a minimum of 1' above USGS 100 year flood plain.

B. TYPES OF MANHOLE CONSTRUCTION

The District will allow either Monolithic (Cast-in-Place) or Precast manholes conforming to the specifications herein.

C. MONOLITHIC (CAST-IN-PLACE) MANHOLES

Should a Contractor elect to build monolithic manholes, shop drawings showing at a minimum the concrete mix, steel reinforcement details, pipe connections and manhole dimensions shall be submitted to the District for approval of each structure to be built. The shop drawings shall have been reviewed and certified by a registered Professional Engineer prior to submittal to the District.

D. PRECAST MANHOLES (SEE FIGURES 5-1 THRU 5-3)

Precast reinforced concrete manholes including bases, risers/barrels, cones and flat slabs shall be constructed of either wet or dry cast Class A concrete meeting or exceeding the requirements of ASTM C-478, latest revision.

Precast reinforced concrete manholes shall be manufactured, tested and marked in accordance with ASTM C-478. Precast manholes shall be constructed with the base and the first riser section as one complete precast unit. Where used, precast manhole cones shall be the eccentric cone type.

"See Through" lift holes shall not be allowed on precast concrete manholes 48 inches in diameter or less. "See Through" lift holes are allowed on manholes greater than 48 inches in diameter. All lift holes shall be thoroughly wetted and completely filled with non-shrink mortar or epoxy grout; then smoothed and covered, both inside and out, with a trowelable grade butyl rubber base backplaster material to ensure water tightness. All joints between precast manhole elements shall be made with an approved rubber gasket in accordance with ASTM C-443, latest edition, and a 1/2-inch diameter non-asphaltic mastic (Kent Seal or equal as approved by F.C.R.W.D, conforming to AASHTO M-198 and Federal Specifications SS-521-A.

All manhole sections shall be steam or heat-and-water-mist cured and shall not be installed until at least five (5) days after having been cast. All cuts in manholes shall be core drilled.

E. MANHOLE BASES, INVERTS AND FLOW CHANNELS/BENCH WALLS

Monolithic or Precast manhole bases shall be of 6" minimum thickness for 4' diameter and 8" minimum thickness for larger diameters, and shall be constructed of Class A concrete having a minimum compressive strength of 4,000 psi. The bottom invert of all pipe entering a manhole shall be at least three (3) inches above the top of the base slab so that the finished sewer channel may be installed and shaped. The installation of the final sewer channel may be done at the point of fabrication of the precast base or cast-in-place.

The flow channels within manholes shall be an integral part of the precast base. The channels shall be shaped and formed for a clean transition with proper hydraulics to allow the smooth conveyance of flow through the manhole. The Bench wall shall be formed to the crown of the inlet and outlet pipes to form a "U" shaped channel as shown in Figures 5-1 and 5-2. The bench wall shall slope back from the crown at minimum 1/2-inch per

foot to the manhole wall. The outlet invert elevation of the manhole is to be 1/10th foot below the lowest inlet invert elevation(s). For connections to existing manholes, manholes shall be core drilled and flow channels shall be required and shaped as if it were a new manhole. Figure 5-6 provides generalized standards for the construction/layout of flow channels for manholes with numerous connections.

F. ADJUSTING RINGS

NO BRICK OR BLOCK SHALL BE USED IN THE CONSTRUCTION OF A MANHOLE OR TO ADJUST THE ELEVATION OF THE FRAME AND COVER.

Where one (1) solid riser or barrel section cannot be used, final adjustments in elevation of the frame and cover shall only be accomplished by the use of precast concrete adjusting rings per the detail as shown in Figure 5-4 or 5-4 B and conforming to ASTM C-478. Riser rings other than that shown in Figure 5-4 A or 5-4 B may be accepted based upon written approval of the District. PVC adjusting rings are acceptable upon review by the District.

Rings shall be of a nominal thickness of not less than two (2) inches and not more than twelve (12) inches total of adjusting rings shall be allowed for adjustment of the manhole frame and cover to required elevation.

A watertight seal shall be provided between the cone and riser ring, each adjoining riser ring, and riser ring and casting by the use of two (2) rows of 1/2-inch extrudable preformed gasket material. The extrudable gasket material shall be placed as shown in Figure 5-4 A or 5-4 B. As an alternative to adjusting rings, a cast-in-place section as detailed in Figure 5-5 may be used.

G. CASTING, FRAME AND COVER

The type of frame and cover to be used shall be Neenah R-1772 AVH with Type B concealed pickhole lid or East Jordan Model 1022-1AGSMD manufactured by East Jordan Iron Works, per the detail shown on Figure 5-7. All castings shall conform to the requirements of ASTM and the dimensions as shown on Figures 5-1 thru 5-4 A or 5-4 B, and the following:

1. Casting shall be of uniform quality, free from blow holes, porosity, hard spots, shrinkage, distortion or other defects. They shall be smooth and well-cleaned by shot blasting or other approved method.

2. All castings shall be manufactured true to pattern; component parts shall fit together in a satisfactory manner. Round frames and covers shall be of non-rocking design or shall have machined horizontal and vertical bearing surfaces to prevent rocking and rattling under traffic. All castings shall be fully interchangeable.

3. All weights shall not deviate from the tolerances permitted by ASTM Standards (i.e. ASTM A48-83 “Standard Specifications for Gray iron Castings”).

4. No open pick holes shall be allowed.

5. Sanitary sewer manhole covers shall have the words “sanitary sewer” cast in the cover in letters two (2) inches in height.

H. EXTRUDABLE PREFORMED GASKET MATERIAL

A nominal 1/2-inch size butyl rubber base gasket material, conforming to AASHTO M-198 and Federal specification SS-S-210A shall be used for adjusting ring grooves; between adjusting ring and cone; between adjusting ring and casting; and in joints of precast manhole sections. The gasket material shall be as manufactured by Hamilton Kent-Seal, RUB'R-NEK-L-T-M by K.T. Snyder Company or an approved equal. A compatible primer or solvent as recommended by manufacturer to butyl base material shall be used to prepare surfaces prior to application of butyl base material.

I. TROWELABLE BUTYL RUBBER BACKPLASTER

Per Figures 5-1 thru 5-3, the exterior of the manhole from two (2) inches below the bottom riser ring on the cone section to and covering the base of the casting, including the voids on the outside joints of the riser rings shall be sealed with a trowelable grade butyl rubber base exterior backplaster material, 1/4 inch minimum thickness when dry.

Installation shall be as detailed in the figures attached.

J. SPECIAL TYPES OF MANHOLES

1. Outside drop connection

No inside drop manhole connections shall be allowed for new sewer construction. Inside drop connections to existing manholes shall only be allowed upon written approval of the District. Where a sanitary sewer or sanitary sewer lateral enters a manhole 24 inches or more above the invert of the outgoing sewer, the incoming sewer shall be connected to the manhole by means of an outside drop connection per Figure 5-8. Outside drop connections may be either precast or monolithically poured.

Base for Manhole with outside Drop Connection - The footing for the portion of the manhole under the drop shall be monolithically poured at the same time as the rest of the manhole footing. A minimum of three (3) 1/2 inch diameter reinforcing rods shall be placed on dowels into the footing. these rods shall be tied to the reinforcements. The rods shall be tied to the reinforcement as specified in ACI Building Code Requirements. The rods shall be extended as the vertical part of the drop is constructed. In addition, the drop shall be tied into each joint to precast concrete manhole with a minimum 1/4 inch rod to prevent any separation of the drop from the precast manhole.

Detailed drawings shall be submitted for approval for all field fabricated drop connections.

2. Special flood protected manholes

In areas susceptible to flooding, the top of the manhole shall be above the 100 year flood elevation. The Engineer shall identify the flood elevation on the plans and design the manhole to preclude the submergence of the manhole. No alternatives may be used without approval of the District.

K. MANHOLE DIAMETERS

The following are minimum manhole diameters for sanitary sewers entering/exiting a manhole at the following range of angles:

MANHOLE DIAMETERS		
	PIPES ENTERING / LEAVING AT	PIPES ENTERING / LEAVING AT
PIPE SIZE	0 – 45 BEND	45 – 90 BEND
8" – 21"	48"	48"
24"	38"	60"
27" – 30"	60"	60"
33" – 36"	60"*	72"

Pipes greater than 36 inches and up to 48 inches in diameter shall be per Figure 5-2.

Pipes greater than 48 inches in diameter shall be per Figure 5-3.

L. STEPS

Manhole steps shall be furnished.

M. SEWER PIPE TO MANHOLE CONNECTIONS

To connect a sanitary sewer to a manhole, either a flexible boot KOR-N-SEAL 1 or 2, flexible connector, cast-in-place Dura-Seal gasket, "A"-lock gasket or an approved equal shall be used. Connections to an existing manhole shall be a flexible boot KOR-N-SEAL or approved equal.

If the flexible boot connection is used, it shall be placed in the reinforced concrete manhole base and secured to the pipe by a stainless steel clamp. Flexible connectors shall conform to ASTM C-923.

The cast-in-place inflatable gasket shall conform to ASTM C-923.

All connections shall provide for a watertight seal between the pipe and manhole. The connector shall be the sole element relied upon to assure a flexible watertight seal of the pipe to the manhole.

*NOTE: 72" if the "A"-lock connector is used.

The rubber for the connector shall comply with ASTM C-923 and shall be resistant to ozone, weather elements, chemicals, including acids and alkalis, animal and vegetable fats, oils and petroleum products.

The stainless steel elements of the connector shall be totally non-magnetic Series 305 stainless steel. The stainless steel clamp shall be capable of sustaining applied torque in excess of eighty (80) inch-pounds. It shall be the responsibility of the Contractor to submit details of the proposed connection to the District for approval. Connections not

approved by the District shall be subject to removal and replacement with an approved adaptor.

All pipe connections to manholes and pump station wetwells need to address "boot inversion" at the sewer pipe to manhole connection point due to the potential for excessive hydrostatic pressure on the boot. In these situations the pipe connection and boot shall be encased with a quick set grout on the inside and a No. 4 slump concrete mix on the outside to prevent the boot from inverting.

N. REJECTION OF PRECAST MANHOLE SECTION

Precast reinforced concrete manholes, risers and tops shall be subject to rejection for failure to conform to any of the following specification requirements:

1. Fractures or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint;

2. Defects that indicate imperfect proportioning, mixing and molding;

3. Surface defects indicating honeycombed or open texture;

4. Damaged ends, where such damage would prevent making a satisfactory joint;

5. Infiltration into manhole;

6. The internal diameter of the manhole section shall not vary more than one (1) percent from the nominal diameter;

7. Not installed in conformance with Section 7;

8. Not clearly marked date of manufacturer, trade name, size designation part number, and ASTM number;

9. Having a deviation more than 1/4" from the straight edge at any point across the top of manhole cone section or riser ring; and/or

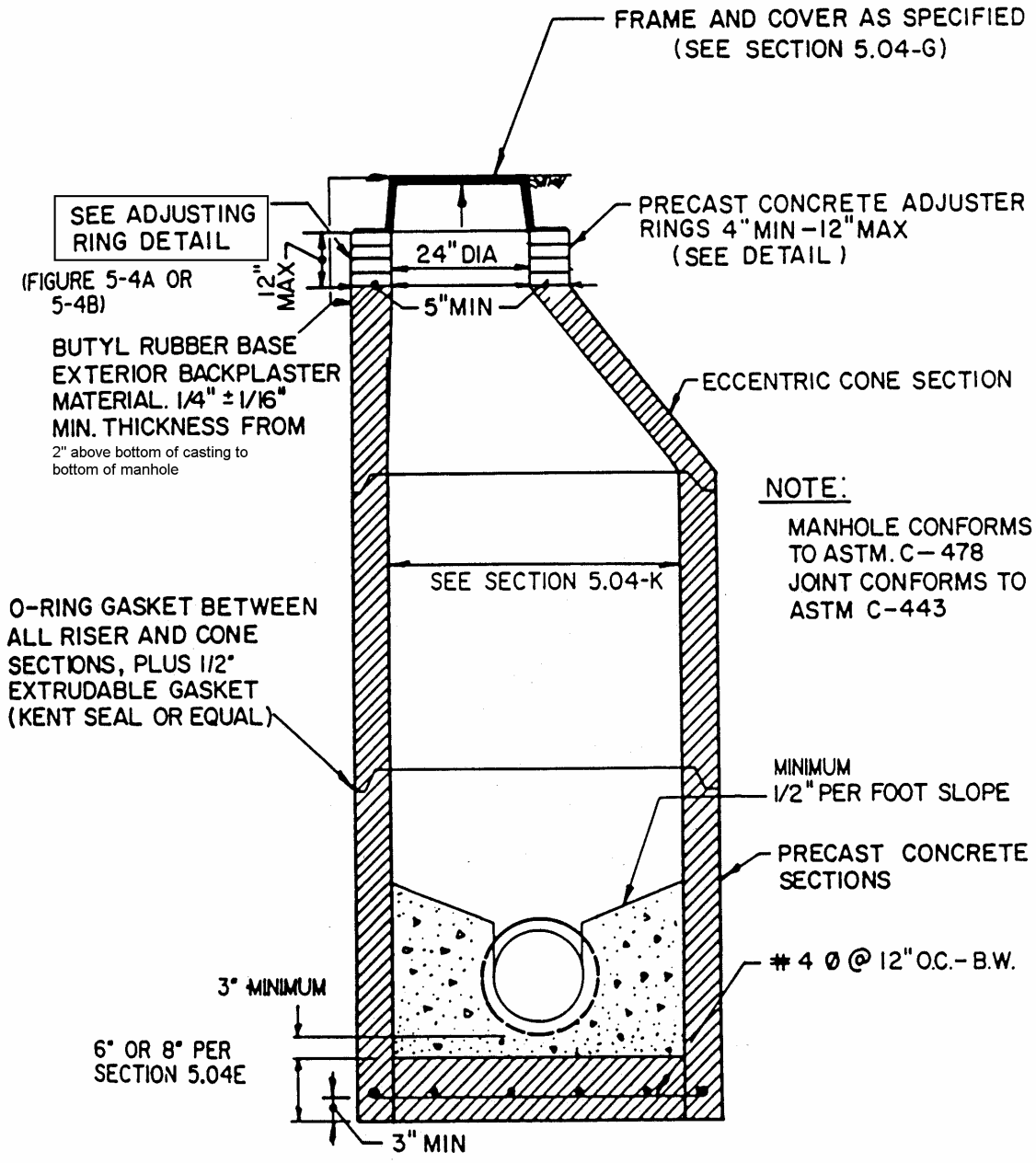
10. Having any visible steel bars along inside of outside surface of the manhole except for reinforcement stirrups or spacers used to position the cage during manufacture.

5.05 BUILDING SEWERS

Building sewers shall be either SDR 35, Schedule 80 or Schedule 40 PVC pipe conforming to ASTM D2241. Joints shall be flexible gasket push-on compression type.

VITRIFIED CLAY PIPE(VCP) SHALL NOT BE PERMITTED FOR BUILDING SEWER CONSTRUCTION.

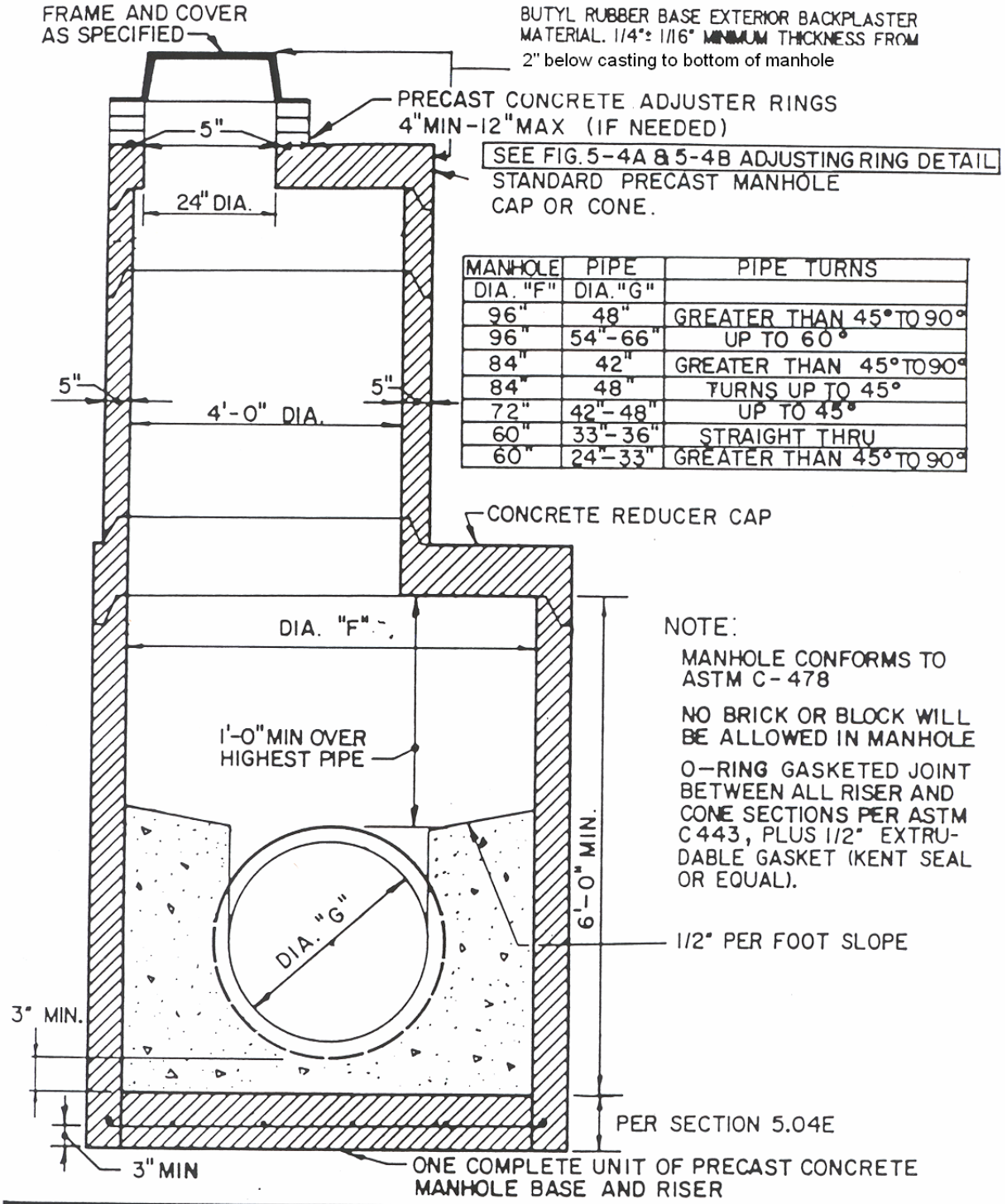
END OF SECTION 5



STANDARD MANHOLE FOR PIPE SIZES 8" thru 24" (Straight Thru)

FIGURE 5-I

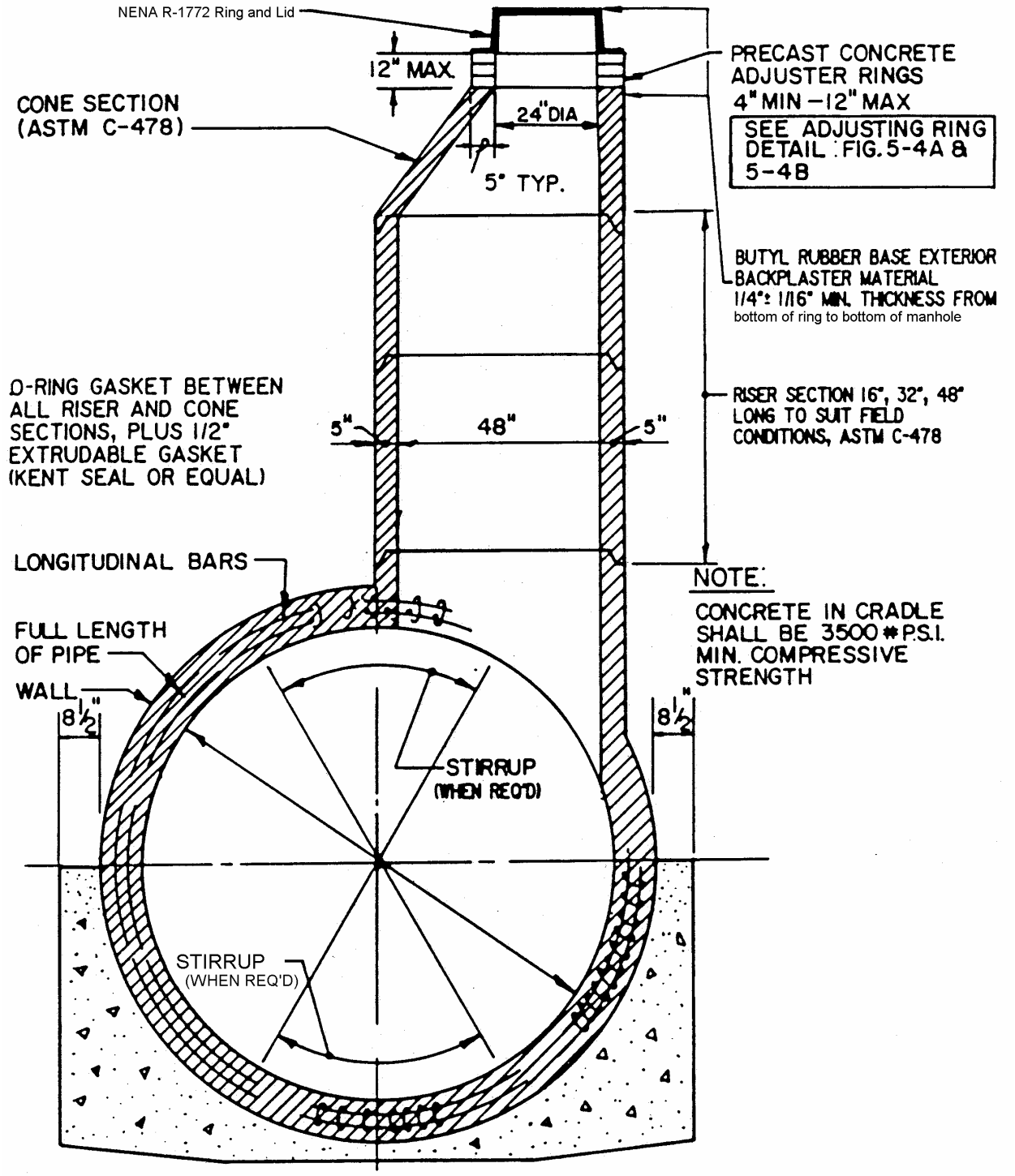
NENA R-1772



MANHOLE DIA. "F"	PIPE DIA. "G"	PIPE TURNS
96"	48"	GREATER THAN 45° TO 90°
96"	54"-66"	UP TO 60°
84"	42"	GREATER THAN 45° TO 90°
84"	48"	TURNS UP TO 45°
72"	42"-48"	UP TO 45°
60"	33"-36"	STRAIGHT THRU
60"	24"-33"	GREATER THAN 45° TO 90°

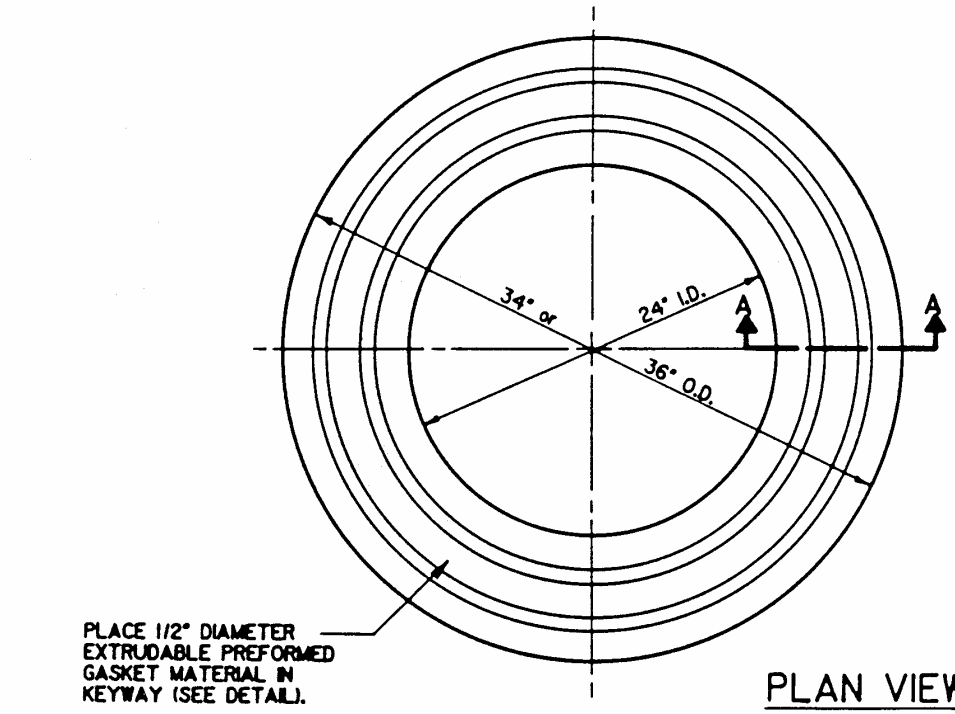
MANHOLE BASE, RISER AND REDUCER CAP FOR PIPES 24" THRU 48"

FIGURE 5-2

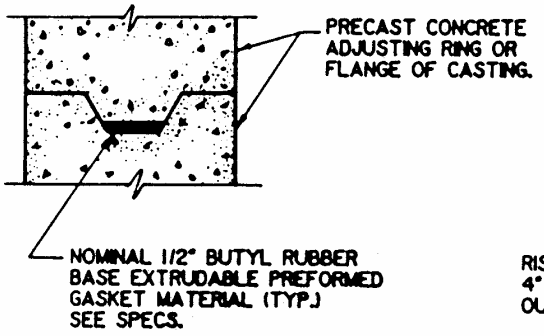


SPECIAL MANHOLE – 48" THRU 144" SEWERS
MEETING CLASS III, IV OR V A.S.T.M. SPEC.

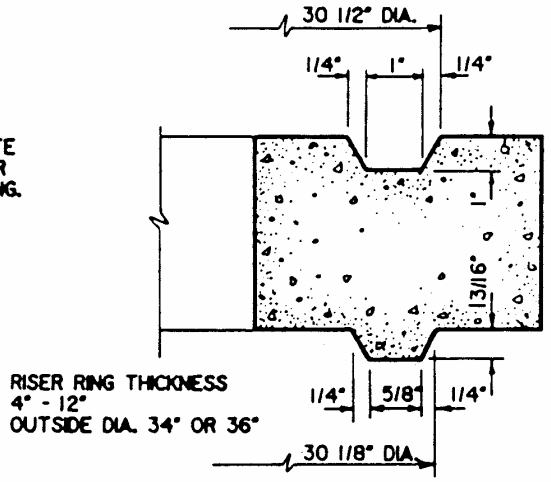
FIGURE 5-3



PLAN VIEW



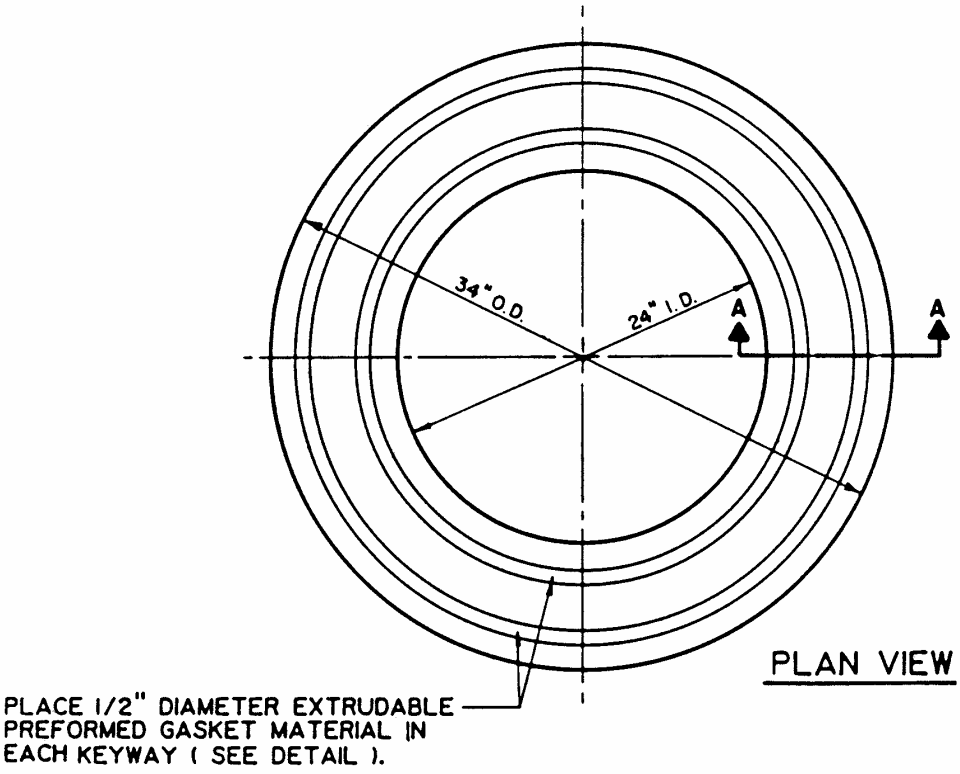
GASKET DETAIL

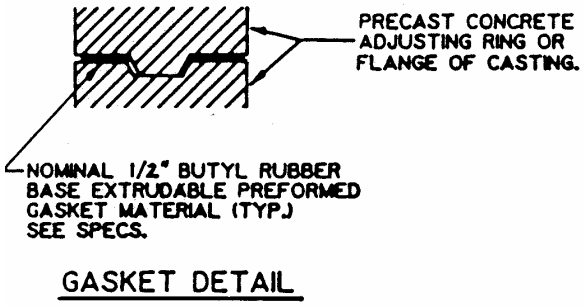


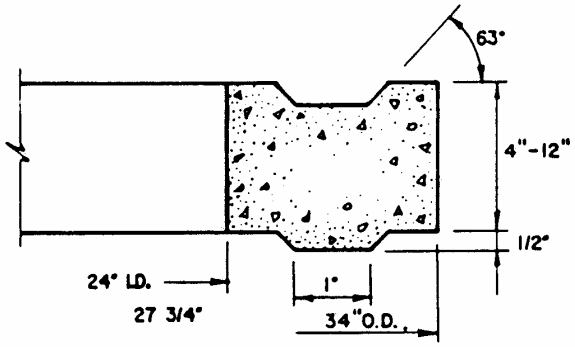
SECTION "A-A"

ADJUSTING RING

FIGURE 5-4A

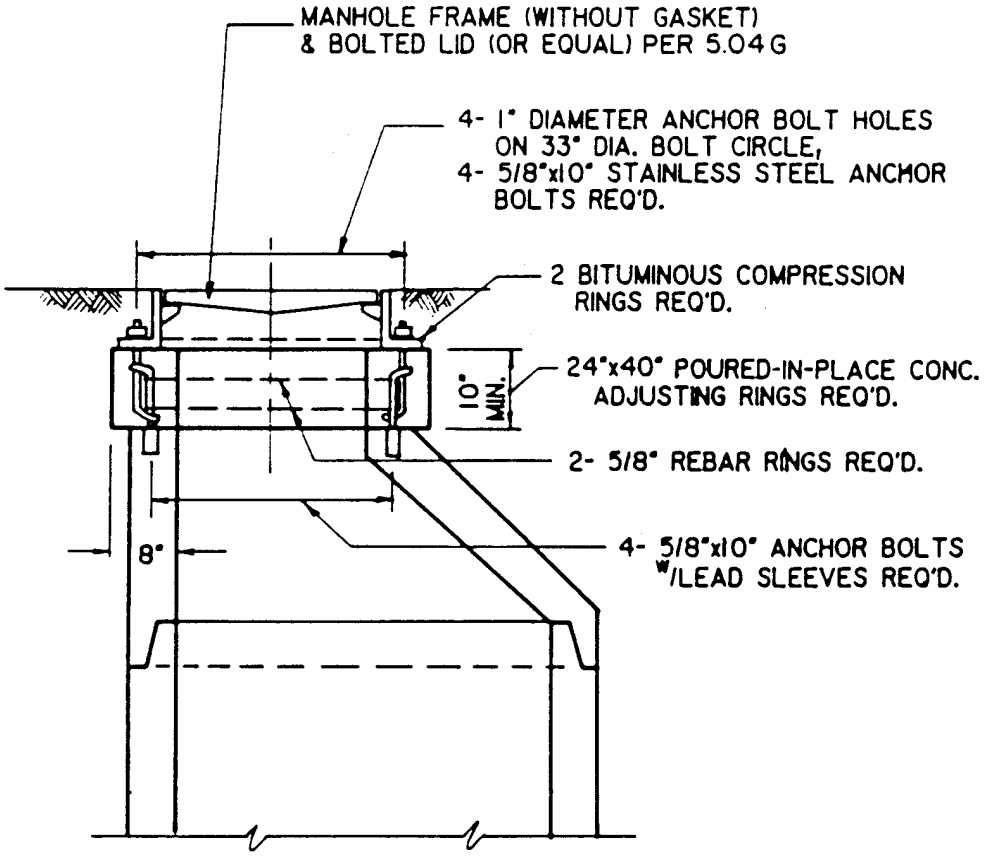






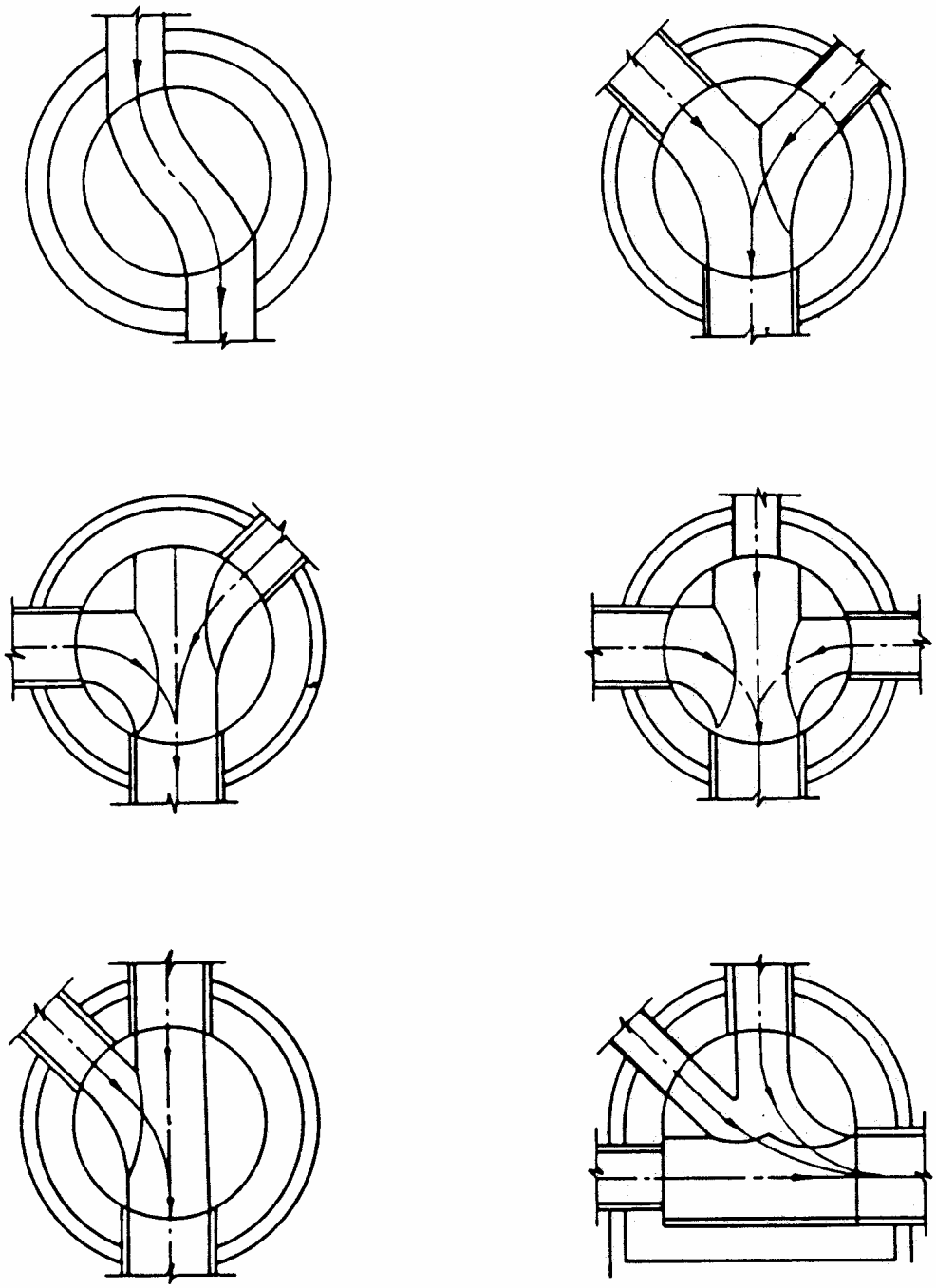
ADJUSTING RING

FIGURE 5-4B



CAST-IN-PLACE SECTION USED AS AN ALTERNATIVE TO ADJUSTING RINGS

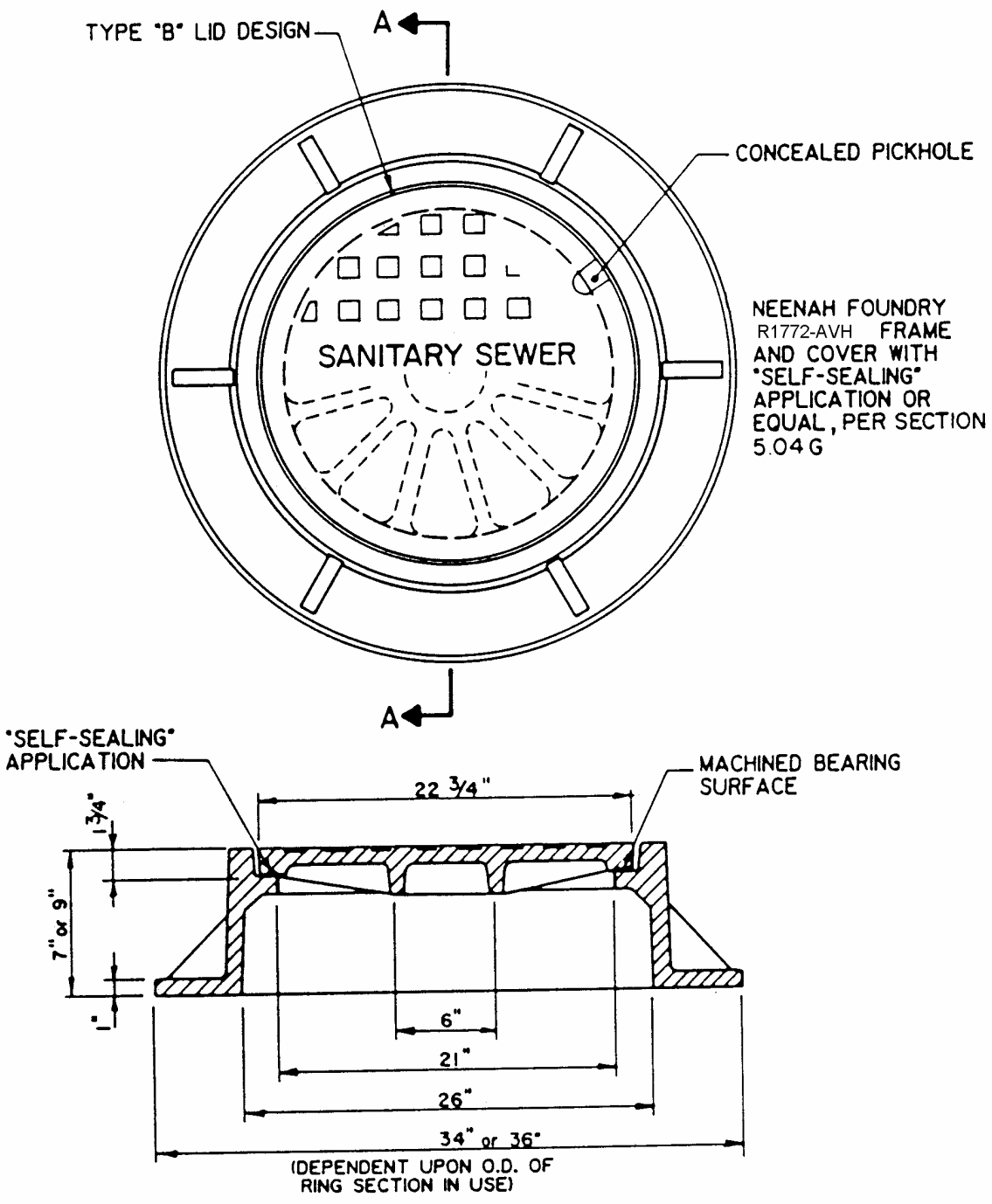
FIGURE 5-5



SANITARY SEWER
BENCH SLOPE= 1/2" PER FOOT

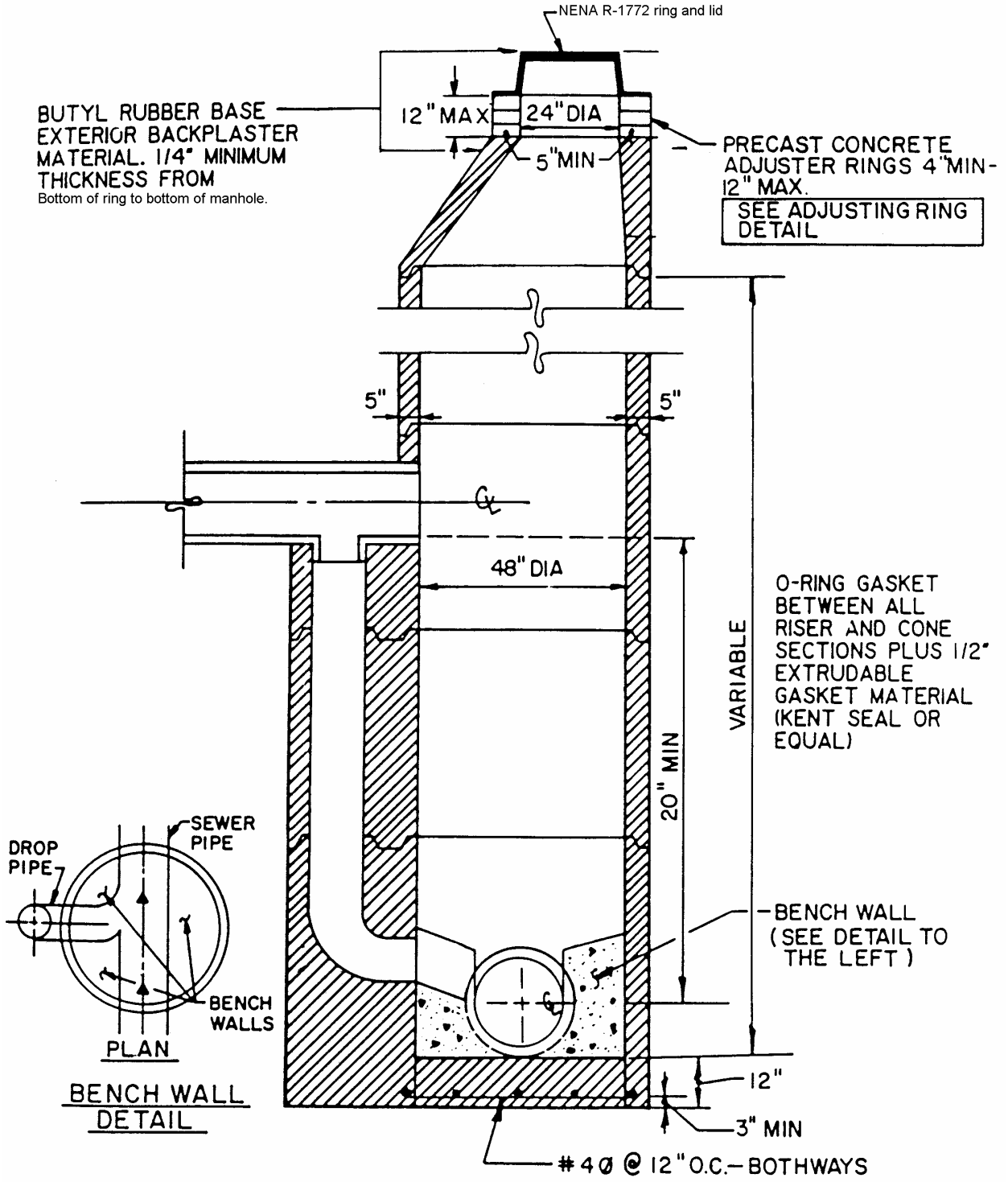
STANDARD MANHOLE BENCHES

FIGURE 5-6



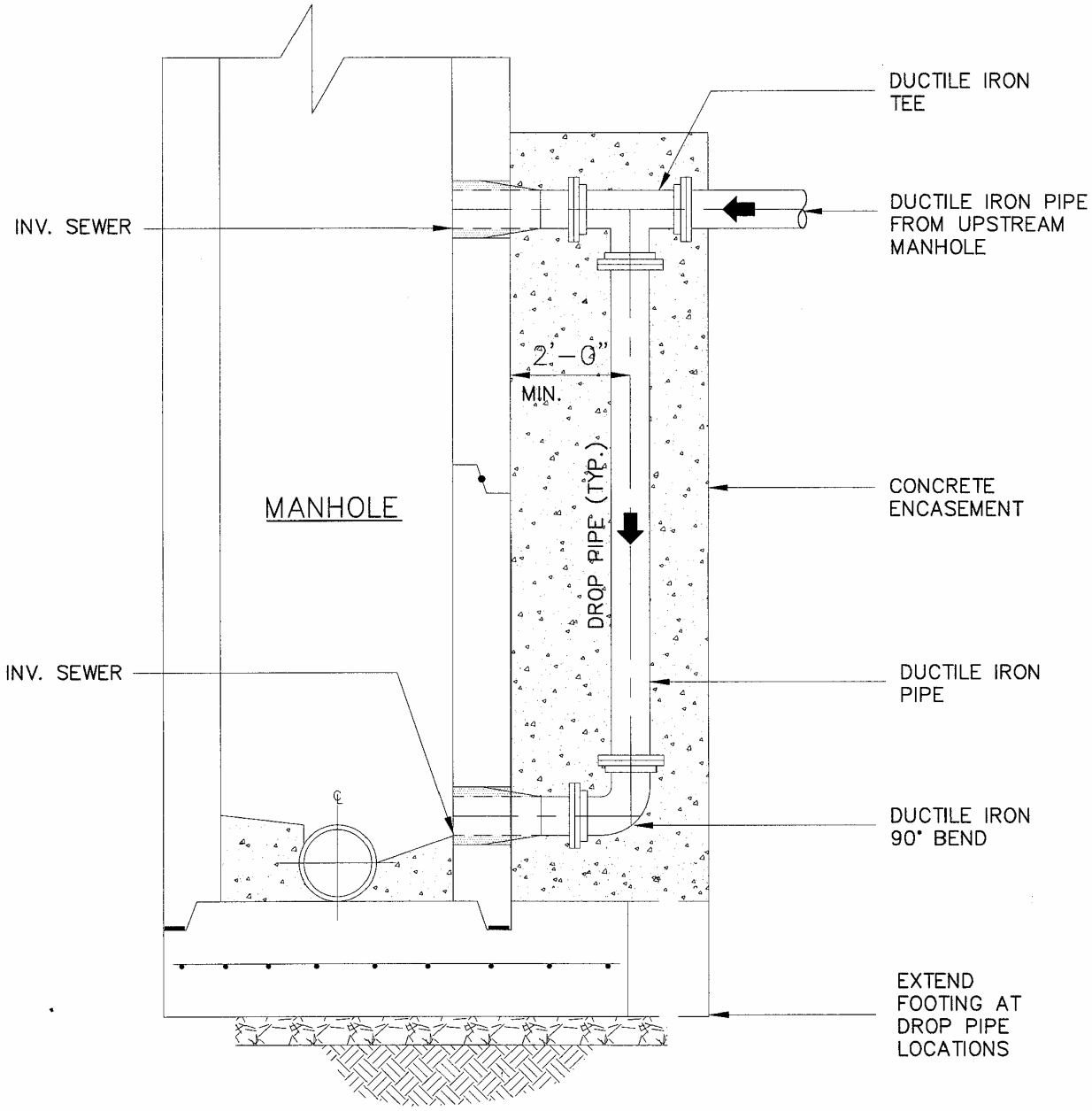
SANITARY SEWER MANHOLE
FRAME & COVER - STANDARD MANHOLE

FIGURE 5-7



PRECAST DROP MANHOLE

FIGURE 5-8



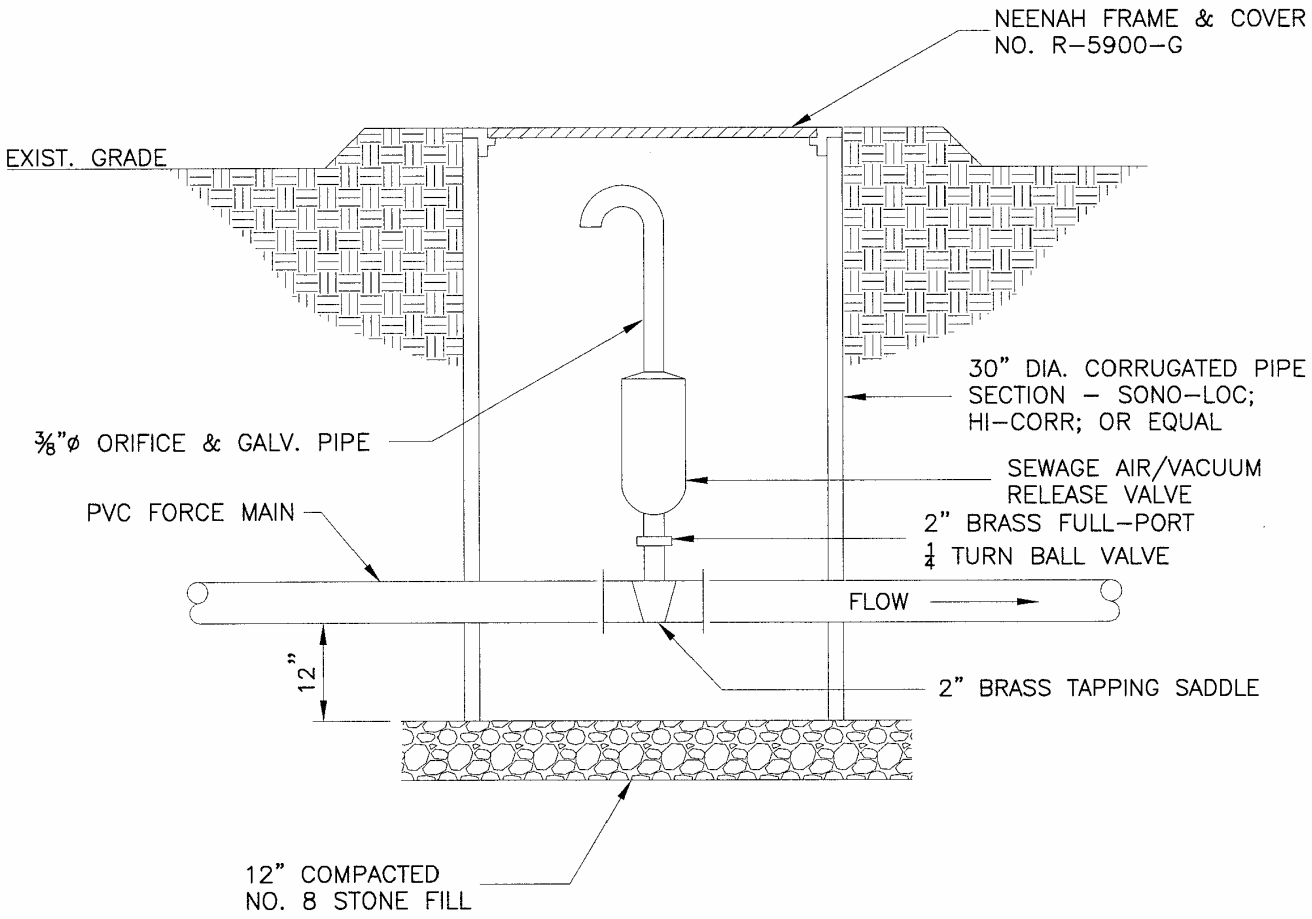
DETAIL - CAST-IN-PLACE DROP PIPE CONNECTION TO A MANHOLE

SCALE: N.T.S.

CONNECTION DETAIL NOTES:

1. DUCTILE IRON PIPE IS THE ONLY ACCEPTABLE PIPE FOR THE OUTSIDE DROP CONNECTION TO THE MANHOLE.
2. DUCTILE IRON PIPE MUST BE USED THE ENTIRE LENGTH FROM THE UPSTREAM MANHOLE TO THE DROP MANHOLE.
3. CONCRETE ENCASEMENT MUST BE A MINIMUM OF 3000 PSI STRENGTH CONCRETE.
4. ALL PIPE CONNECTIONS TO MANHOLE STRUCTURE MUST ADDRESS BOOT INVERSION. (SEE SECTION 5.04.M)

FIGURE 5–9



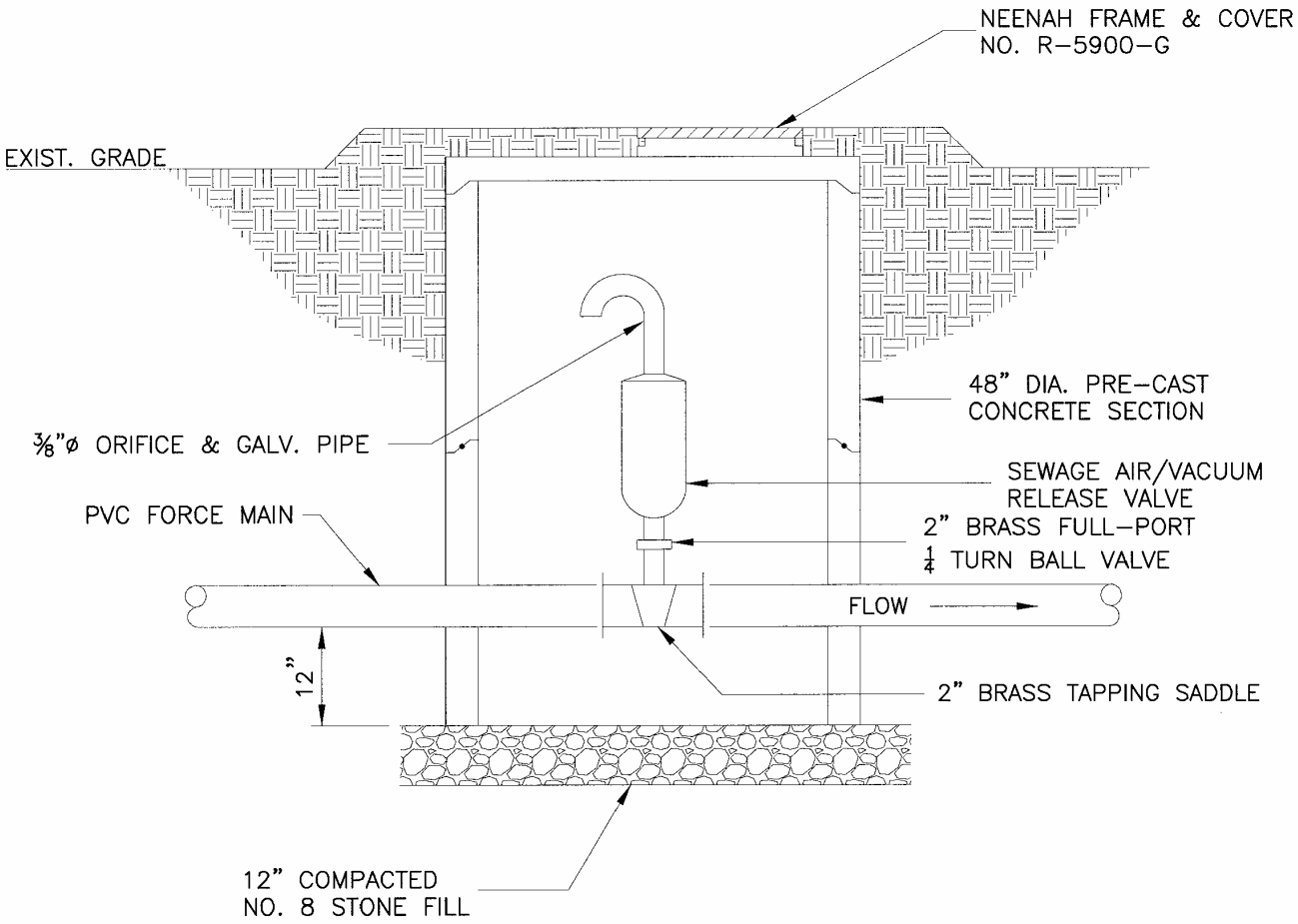
DETAIL - SEWAGE AIR RELEASE VALVE VAULT

SCALE: N.T.S.

AIR RELEASE VALVE VAULT NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING VALVE VAULT OVERALL HEIGHT (MIN. 5'-0" FROM TOP OF FORCEMAIN) WITH RESPECT TO FORCEMAIN CENTERLINE TO FACILITATE COMPLETE EQUIPMENT INSTALLATION.

FIGURE 5-10



DETAIL - SEWAGE AIR RELEASE WITH PRE-CAST VALVE VAULT

SCALE: N.T.S.

AIR RELEASE VALVE VAULT NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING VALVE VAULT OVERALL HEIGHT (MIN. 5'-0" FROM TOP OF FORCEMAIN) WITH RESPECT TO FORCEMAIN CENTERLINE TO FACILITATE COMPLETE EQUIPMENT INSTALLATION.

FIGURE 5-11

SECTION 6 - EXCAVATION, TRENCH SAFETY AND DUST CONTROL

6.01 GENERAL

This section provides for all surface removal, excavation and disposal of surplus materials within the public right-of-way, trench safety system and dust control.

Trench safety is a key and vital issue and owners should take the necessary steps to ensure that the contractor they use to construct the sanitary sewer has included trench safety construction techniques and safety systems in the cost proposal. It is recommended that the cost proposals submitted to the Owner and the ultimate contract for the construction/installation of the sanitary sewer constitute at least two (2) pay items. The first pay item should provide for all work specified in this and all other Sections with the exception of Trench Safety Systems. The second pay item would be for all work performed and materials furnished under Section 6.03 - "Trench Safety System" for all excavations four (4) feet in depth or greater per OSHA Part 1926 of the lump sum or per lineal foot of trench.

All trenches or excavations shall be backfilled to the original surface of the ground or such grades as shown on the design plans or as directed. In general, the backfilling shall be carried along as speedily as possible and as soon as the concrete, mortar, and/or other masonry work and pipe joints have sufficient strength to resist the imposed load without damage.

6.02 SURFACE REMOVAL (WITHIN PUBLIC RIGHT-OF-WAY)

For construction of the sanitary lines as indicated on the approved Plans within the Public Right-of-Way, the Contractor shall remove the surface materials only to such widths as will permit a trench to be safely excavated, affording sufficient room for proper efficiency and proper construction. Where sidewalks, driveways, pavements, curb and/or gutters are encountered, care should be taken to protect such against fracture or disturbance beyond reasonable working limits. All pavements shall be cut with an abrasive saw and concrete streets, driveways, walks, alleys, etc., cut to the nearest joint as required by the design plans and the District.

Excavated topsoil shall be stored in a designated location as approved by the District. The topsoil shall be protected in such a manner as to ensure the preservation of its quality. The topsoil shall be inspected by the District before being backfilled in the work.

6.03 TRENCH SAFETY SYSTEM

The contractor and the owner are responsible for ensuring that safe working conditions exist and safety procedures are being followed at the work site.

If, in the opinion of the inspector, an unsafe condition is noted, he will notify the contractor of this condition and report it to the District's General Manager. If the condition continues to exist the inspector shall notify the District's General Manager, document the unsafe condition in writing and/or through a photograph, and leave the job site.

The District's General Manager will contact IOSHA and request that they dispatch an inspector immediately. Further, the District's General Manager or an authorized representative of the District may inspect the site and may issue a Stop-Work-Order if, in his/her opinion, work is proceeding in an unsafe manner.

Regarding Trench Safety Systems, the Contractor shall design, install and maintain a "Trench Safety System" in strict compliance with OSHA (Occupational Safety and Health Administration) Part 1926 of the Code of Federal Regulations and all other applicable federal, state, and local regulations.

6.04 DUST CONTROL

The Contractor shall be responsible for maintaining the site and adjoining paved surfaces in a dust free condition per the requirements of the Indiana Air Pollution Control Division. Fugitive dust control is the sole responsibility of the Contractor.

END OF SECTION 6

SECTION 7 - INSTALLATION

7.01 GENERAL

The following Section addresses the minimum requirements for the installation of sanitary sewers within Fall Creek Regional Waste District.

7.02 WORKMANSHIP

A. LINE AND GRADE

The contractor and/or engineer (Owner's representative) shall furnish and set all line and grade stakes (HUB) and stakes for bench marks. The bench marks shall be set in strategic locations of the project in order to facilitate the Contractor's installation of the line and grade stakes (HUB) for each pipeline. Only the line laser method is approved by the District. The contractor shall constantly check line and grade of the laser beam and the pipe.

B. INSTALLATION OF SANITARY SEWERS

Suitable tools and equipment shall be used for the safe and convenient handling and laying of pipe. Great care shall be taken to prevent pipe coatings or wrappings from being damaged. Carefully examine all pipe for cracks and other defects. No pipe or fittings shall be laid which are known to be defective. If pipe or fittings are discovered to be cracked, broken or defective after being laid. they shall be removed and replaced with sound material. Thoroughly clean all pipe and fittings before installation. All pipe and appurtenances should be kept clean until accepted as completed work.

C. POINT OF COMMENCEMENT AND DIRECTION OF LAYING

The point of commencement for laying of sewer pipe shall be the lowest point in the proposed sewer line. Lay the pipe with the bell end of bell and spigot pipe or with the receiving groove end of tongue and groove pipe pointing upgrade. Any other procedure shall be followed only with permission of the District.

Lay each pipe on an even firm bed as specified so that no uneven strain will come to any part of the pipe. Particular care shall be exercised to prevent the pipes from bearing on the sockets. Dig all bell holes for bell and spigot pipe.

Completely shove home all pipe (to the assembly mark). On pipe of the tongue and groove type thirty (30) inches and larger in diameter, pressure must be applied to the center of each pipe as it is laid by a winch and cable or other mechanical means.

All connection fittings shall be sealed with a watertight plug or stopper.

The contractor shall extend the building wye lateral to the Right-of-Way and shall place a one (1) inch cast iron locator rod or magnetic locator tape above the end of the pipe to within one (1) foot of the ground surface. The purpose is to provide for ease of location of the wye stub.

D. CONSTRUCTION BULKHEADS

Before extending a sanitary sewer, the Contractor shall provide a watertight plug in the existing sewer immediately downstream of the point of connection. This plug shall be left in place until the new sanitary sewer has been cleaned of all accumulated water and debris and accepted by the District.

During all intermissions in construction of the sanitary sewer pipe, the open face of the last pipe laid shall be plugged so as to prevent sand, water, earth or other materials from entering the pipe.

Whenever pipe and special castings are required to be cut, the cutting shall be done by skilled workmen in such a manner as to leave a smooth end at right angles to the axis of the pipe without damage to the pipe casting or cement lining. CUTTING TORCHES SHALL NOT BE USED.

E. LAYING OF PIPE IN COLD WEATHER

The District reserves the right to order pipe installation discontinued whenever, in our opinion, there is danger of the quality of work being impaired because of cold weather. The Contractor shall be responsible for heating the pipe and jointing material so as to prevent freezing of joints. Do not lay any pipe on frozen ground. No flexible or semi-rigid pipe shall be laid when the air temperature is less than 32 F unless proper precautions per the manufacturer's recommendations are taken by the Contractor and the method is approved by the Engineer and District.

When pipes with rubber gaskets or resilient-type joints are to be laid in cold weather, sufficiently warm the gasket or joint material so as to facilitate making a proper joint.

F. ABANDONED SEWERS

Sewers and storm water drains which are to be abandoned shall be bulkheaded with mortar and an eight (8) inch thick brick wall. Sewers, storm water drains, and sewer structures which are to be abandoned in place shall be filled with sand or Cellular Concrete and plugged, unless otherwise indicated on the Plans. Service shall be maintained in such sewers and drains until the District shall order bulkheads placed. No timber bulkheads shall be allowed. All castings on such abandoned structures are the property of the District and shall be salvaged by the Contractor and delivered as directed.

Unless otherwise specified, all abandoned manholes, catch basins and inlets shall be removed to a depth of three (3) feet below the proposed or established grade or existing street grade, whichever is lower.

7.03 DEWATERING AND CONTROL OF SURFACE WATER

Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom before laying pipe. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, wellpoints, etc., necessary to depress and maintain the groundwater level below the base of the excavation. If the Contractor is unable to remove the standing water in the trench, the Contractor shall over-excavate the proposed bottom grade of the sewer bedding, and place not less than three (3) inches of Class No. 2 crushed stone (Indiana Department of Highway aggregate Classification) in the over-excavated area.

The Contractor and/or Developer shall be liable for all lawsuits which may arise as a result of the Contractor's dewatering efforts.

The Contractor shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps, and perform other work necessary to divert or remove rainfall and other accumulation of surface water from excavations. The diversion and removal of surface and/or groundwater shall be performed in a manner which will prevent the accumulation of water within the construction area.

UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR GROUNDWATER BE DISCHARGED TO, DISPOSED OF OR ALLOWED TO FLOW INTO THE DISTRICT'S SANITARY SEWER SYSTEM.

7.04 TRENCHING

The width of the trench at and below the top of the sanitary sewer shall be only as wide as is necessary for proper installation and backfilling, and consistent with safety requirements. The minimum width of trench for sanitary sewers, including force mains, 42-inches in diameter and less shall be 1.25 times the outside diameter (O.D.) plus 12-inches (See Figures 7-1, 7-2 and 7-3):

Minimum Trench Width (inches) - 1.25 (O.D.) + 12

The Minimum trench width for sanitary sewers larger than 42 inches in diameter shall be determined on a case-by-case basis by the Engineer and approved by the District.

The design plans and specifications submitted to the District for review, approval and issuance of a construction permit shall include a detailed trench drawing.

The design of the sewer pipe and structures is predicated upon the width of trench indicated above and, should these limits be exceeded, the Contractor shall be responsible for the provision and installation of such remedial measures as may be required by the Engineer and/or the District.

Bell holes shall be excavated for bell and spigot pipe and mechanical joint pipe, so that the entire barrel of the pipe shall rest on the bedding.

The pipe trench shall not be excavated more than one hundred (100) feet in advance of pipe laying.

Whenever pipe trenches are excavated below the designed bedding bottom, the Contractor shall fill the over-excavation with mechanically compacted No. 8 (1/4-inch to 3/4-inch) crushed stone or No. 8 fractured face aggregate.

All rock, boulders and stones 2-inches in diameter and larger encountered in trenches shall be removed. Boulders or rocks are not to be used for trench backfill.

In cases where material is deposited along open trenches, the material shall be placed so that no damage will result to the work or adjacent property as a result of rain or other surface wash.

If the bottom of the trench is of undesirable material, an additional six (6) inches of trench bottom shall be excavated and filled with Class 2 crushed stone and compacted using a hand held mechanical tamper. Where the distance to stable ground is excessive, the Engineer shall order in writing other types of foundation as he deems necessary subject to the approval of the District.

Remove any rock(s) encountered within six (6) inches below the barrel surface of the pipe, replace with No. 8 crushed stone or No. 8 fractured face aggregate and compact.

7.05 BEDDING AND BACKFILL - SANITARY SEWERS

The following Section provides the minimum requirements for the bedding of pipe and the backfilling of the trench.

Figures 7-1, 7-2 and 7-3 provides the bedding requirements for PVC, HDPE, and PVC Composite; Ductile Iron and Concrete, respectively.

Per Section 7.04 - Trenching, where the bottom of the trench is of undesirable material, an additional six (6) inches of trench bottom shall be excavated and a stable foundation shall be constructed using compacted No. 2 crushed stone.

All sanitary sewer pipe shall be laid to the lines and grade shown on the approved design plans unless otherwise approved by the District.

A. BEDDING - SANITARY SEWERS

Bedding material shall be compacted No. 8 crushed stone or No. 8 fractured face aggregate and shall be placed in the trench bottom such that after the pipe has been placed thereon, imbedded to grade and aligned, there remains a 4-inch minimum depth of material below the pipe barrel and a minimum of 3-inches below the bell.

The bell holes shall be excavated so that the entire pipe barrel rests on the bedding. The following presents the bedding requirements for each pipe classification:

1. Flexible pipe (Figure 7-1): PVC and HDPE Pipe

No. 8 crushed stone or No. 8 fractured face aggregate shall be placed around the sides of the pipe up to the springline (1/2 the Outside Diameter). This material shall be shovel sliced or otherwise carefully placed and “walked” or hand tamped in to ensure compaction of the haunch area and complete filling of all voids. From the springline to twelve (12) inches above the crown of the pipe, bedding shall be added in six (6) inch lifts “walked” in for compaction. Backfilling of the remainder of the trench shall be as specified in this Section.

2. Semi-Rigid Pipe (Figure 7-2): PVC Composite and Ductile Iron Pipe

No. 8 crushed stone or No. 8 fractured face aggregate shall be placed around the sides of the pipe up to the springline (1/2 the Outside Diameter). This material shall be shovel sliced or otherwise carefully placed and “walked” or hand tamped in to ensure compaction of the haunch area and complete filling of all voids.

From the springline to six (6) inches, or 1/2 the Outside Diameter above the top of the pipe, whichever is larger, bedding shall be added in six (6) inch lifts “walked” in for compaction. Backfilling of the remainder of the trench shall be as specified later in this Section.

3. Rigid Pipe (Figure 7-3): Concrete Pipe

No. 8 crushed stone or No. 8 fractured face aggregate shall be placed around the sides of the pipe up to the springline (1/2 the Outside Diameter). This material shall be shovel sliced or otherwise carefully placed and “walked” in or hand tamped to ensure compaction of the haunch area and complete filling of all voids.

From the springline, the trench shall be backfilled as specified in this Section.

B. BACKFILLING SANITARY SEWERS

1. Backfill Material The following materials shall be used to backfill the trenches in accordance with and in the manner indicated by the requirements specified herein:

Class I Angular, six (6) to forty (40) millimeters (1/4 to 1-1/2 inch) graded stone such as crushed stone.

Class II Course sands and gravels with maximum particle size forty (40) millimeters (1-1/2 inch), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.

Class III Fine sand and clay gravels, including fine sands, sand-clay mixtures and gravel-clay mixtures. Soil types GM GC, SM and SC are included in this class.

Class IV Silt, silty clays and clays, including organic clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML,CH and CL are included in this class. These materials are not recommended for bedding.

Backfill Around Pipe (Bedding): Bedding and backfill materials shall be agreed upon prior to construction by the Engineer and Contractor. Samples will be obtained and kept at the Engineer's office. No deviation from this material will be permitted for use without authorization by the Engineer and the District.

The term "Select Fill" shall mean the use of Class II or III backfill materials as described above.

The trench shall be backfilled per the following:

2. Areas Subject to Vehicular Traffic

In areas under proposed or existing paved roads or within five feet of pavement, sidewalks, curbs, gutters or similar structures, granular backfill material complying with the requirements of the Indiana Department of Highways Standard Specifications, 1988 Edition, shall be used.

The material shall be placed in uniform layers not exceeding six (6) inches, loose measurement. Within three (3) feet of the sanitary sewer pipe the backfill material shall be thoroughly and uniformly compacted with hand held mechanical tempers. The remaining backfill material shall be compacted with mechanical tampers. A minimum compaction of 95 percent Standard Proctor Density shall be achieved within the backfill material.

Jetting or flooding of the backfill or other alternative compaction methods and materials shall NOT be used without the approval of the District and other jurisdictional authority.

3. Areas NOT Subject to Vehicular Traffic

In areas five (5) feet or more from the paved surfaces provided in 7.05 B.1., the trench shall be carefully backfilled with clean fill material free of rocks larger than 2-inches in diameter, frozen lumps of soil, wood or other extraneous material.

7.06 TRENCH BOX PULLING AND SHEETING

When required by the Occupational Safety and Health Act (OSHA) to protect life, property, or the work, sheet and brace all open cut trenches in accordance with CFR 1926. Upon completion of the work, all temporary forms, shores, and bracing shall be removed. All vacancies or voids left by the sheeting, while being withdrawn, shall be carefully filled with bedding material.

The Contractor shall employ adequate safeguards to prevent movement of the pipe joint. If any movement should occur, the Contractor shall reinstall the pipe.

Any damage to pavement or other structures due to sheeting, shoring, or bracing shall be repaired by the Contractor at his own expense.

Sheeting and bracing which is to remain in place shall be cut off at the elevation of 1.5 feet above the top of the sewer pipe.

7.07 SANITARY SEWER MANHOLES INSTALLATION

Section 5.04 provides information regarding the design of manholes.

A. PREPARATION OF BASE

The bottom of the excavation/trench for the manhole shall be filled with a minimum of six (6) inches of No. 2 crushed stone mechanically compacted to form a stable base. Where poor or unstable soil conditions exist or over excavation has occurred, additional No. 2 crushed stone or Class B concrete shall be used to form a stable base.

B. PLACEMENT OF MANHOLE SECTIONS

Precast manhole sections shall be placed and aligned to provide vertical sides. The completed manhole shall be rigid, true to dimensions and watertight.

Per Section 5.04, the joints between manhole sections shall be made with an approved rubber o-ring in accordance with ASTM C-443 and a 1/2 inch diameter non-asphaltic mastic (Kent Seal or equal) conforming to AASHTO M-198 and Federal Specifications SS-521-A.

C. PIPE CONNECTIONS TO MANHOLES

Connections to new or existing manholes shall be per Section 5.04-M. Connections to existing manholes shall require the installation of flow channels and bench walls per Section 5.04-E.

Where the Contractor connects to an existing manhole, that manhole shall be rehabilitated to current standards of the District. This requirement shall include rehabilitating flow channel, as well as prescribed measures to eliminate infiltration and inflow to required levels.

D. BACKFILLING OF MANHOLES

Manhole backfilling and compaction shall comply with the requirements as specified for the adjacent sanitary sewer.

E. PLACEMENT OF ADJUSTING RINGS

Per Section 5.04-F, seal all joints; 1) between the casting and adjusting ring/chimney, 2) between adjusting rings with one (1) one half (1/2) inch diameter cord of extrudable preformed gasket material, and 3) between the adjusting rings and precast cone section with a minimum of two (2) one half (1/2) inch diameter cords of extrudable performed gasket material. Between adjusting rings, the extrudable gasket material shall be placed in the keyways and be of sufficient quantity to completely fill the joint cavity.

F. MANHOLE WATERPROOFING - EXTERIOR

Per Section 5.04-I, the exterior of the manhole from two (2) inches below the bottom of the adjusting rings on the cone to and covering the base of the casting, including the adjusting rings, shall be coated and the voids shall be filled with a trowelable grade butyl rubber base backplaster material.

G. CONNECTION FOR FUTURE SEWERS

All sewer structures shall be designed based on the future estimated growth (see Section 4). In areas where future residential or industrial growth can occur, manholes over fifteen (15) feet in depth shall be equipped with up to two (2) outside drop connections installed per Section 4. Future or unused connection pipes shall be plugged with a watertight stopper.

H. OUTSIDE DROP MANHOLES

See Section 5.04-J for details.

7.08 INSTALLATION OF BUILDING SEWERS (LATERALS)

A connection permit issued by the District shall be obtained prior to the installation of a building sewer.

Per Section 5, only PVC SDR 35. wall bell and spigot type pipe shall be used.

All building sewers shall have a cleanout located within three (3) feet of the exterior building wall and shall be installed per Figure 7-4 or 7-5. Also, if building sewer is more than 100’ in length, add a cleanout for ever 100’.

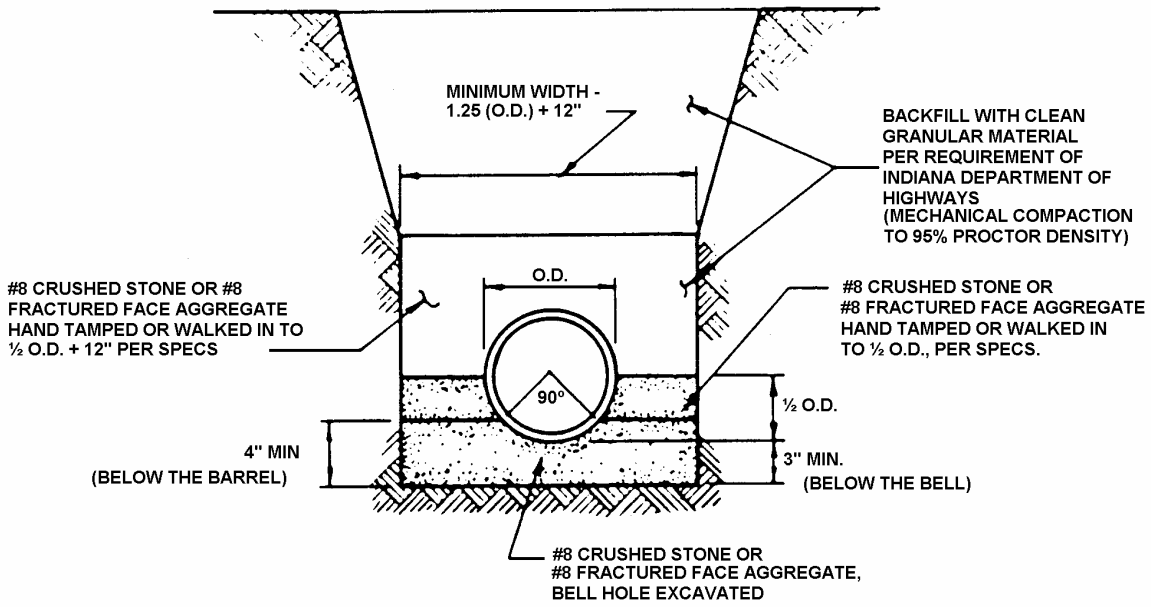
Connections to new sanitary sewers shall only be made at the manufactured fitting. No saddle connections shall be allowed if a manufactured fitting exists based upon approved as-built plans.

The point of commencement for laying of the building sewer pipe shall be at the connection to the main sewer and shall be laid with the bell end pointing upgrade.

Bedding per the specification of PVC flexible pipe shall be required.

Connections to sanitary manholes shall not be made without the written approval of the District. Building sewers shall connect to the manhole, when approved, at an elevation of not more than 24 inches above the base of the manhole. No inside drop connections shall be allowed without written approval of the District.

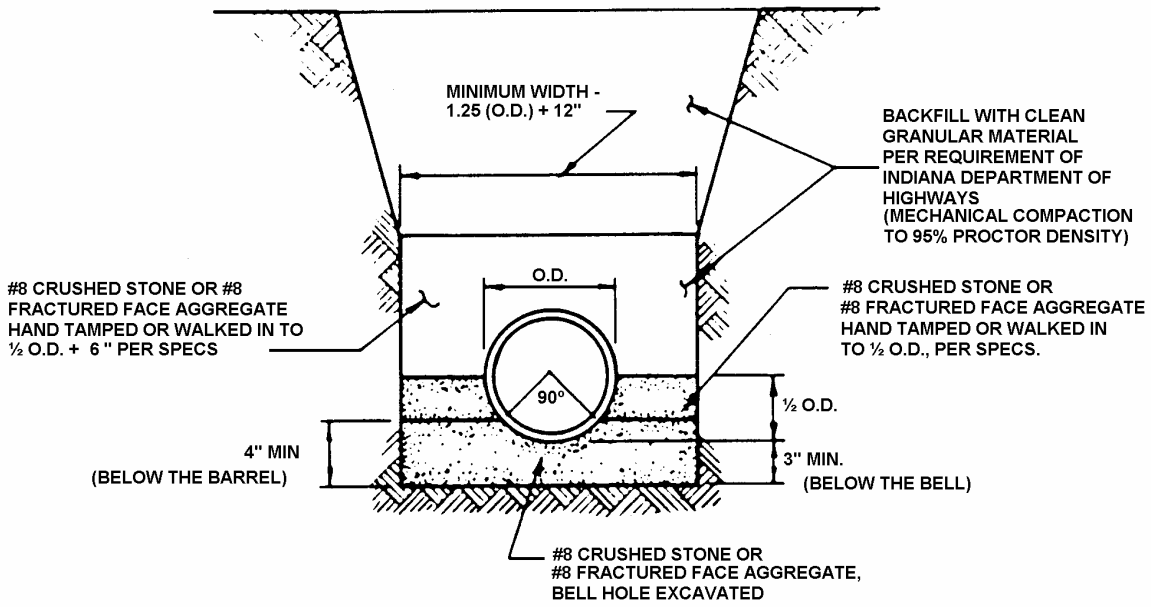
END OF SECTION 7



PIPE SIZE	8" TO 15"	18" & OVER
BEDDING BELOW THE PIPE BARREL	O.D. / 4 MIN. = 4"	O.D. / 4 MAX. = 8"

FLEXIBLE PIPE BEDDING DETAIL
PVC & HDPE Pipe

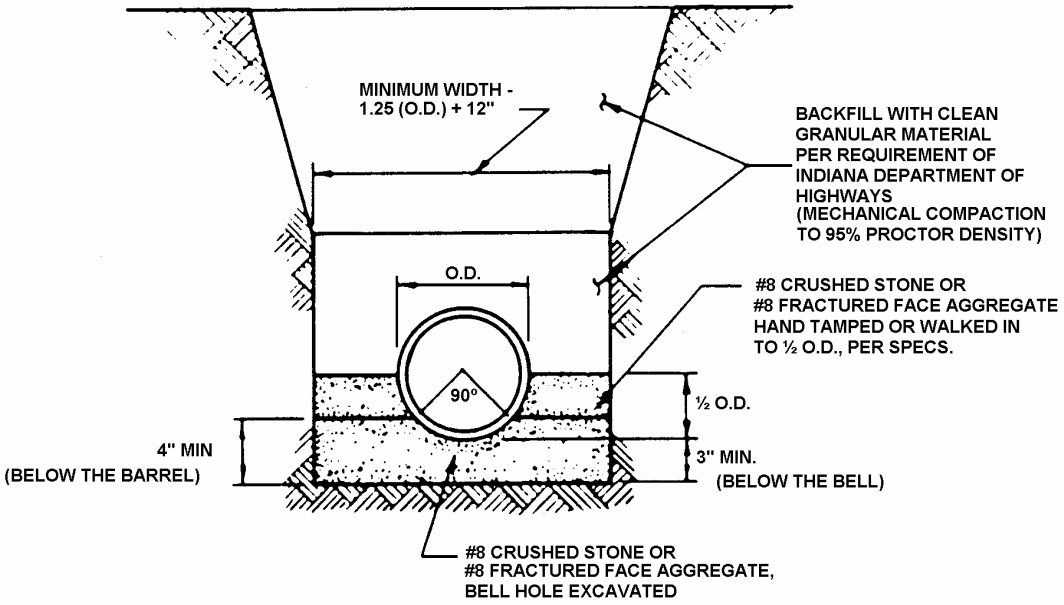
FIGURE 7-1



PIPE SIZE	8" TO 15"	18" & OVER
BEDDING BELOW THE PIPE BARREL	O.D. / 4 MIN. = 4"	O.D. / 4 MAX. = 8"

SEMI-RIGID PIPE BEDDING DETAIL
(PVC Composite Pipe & Ductile Iron Pipe)

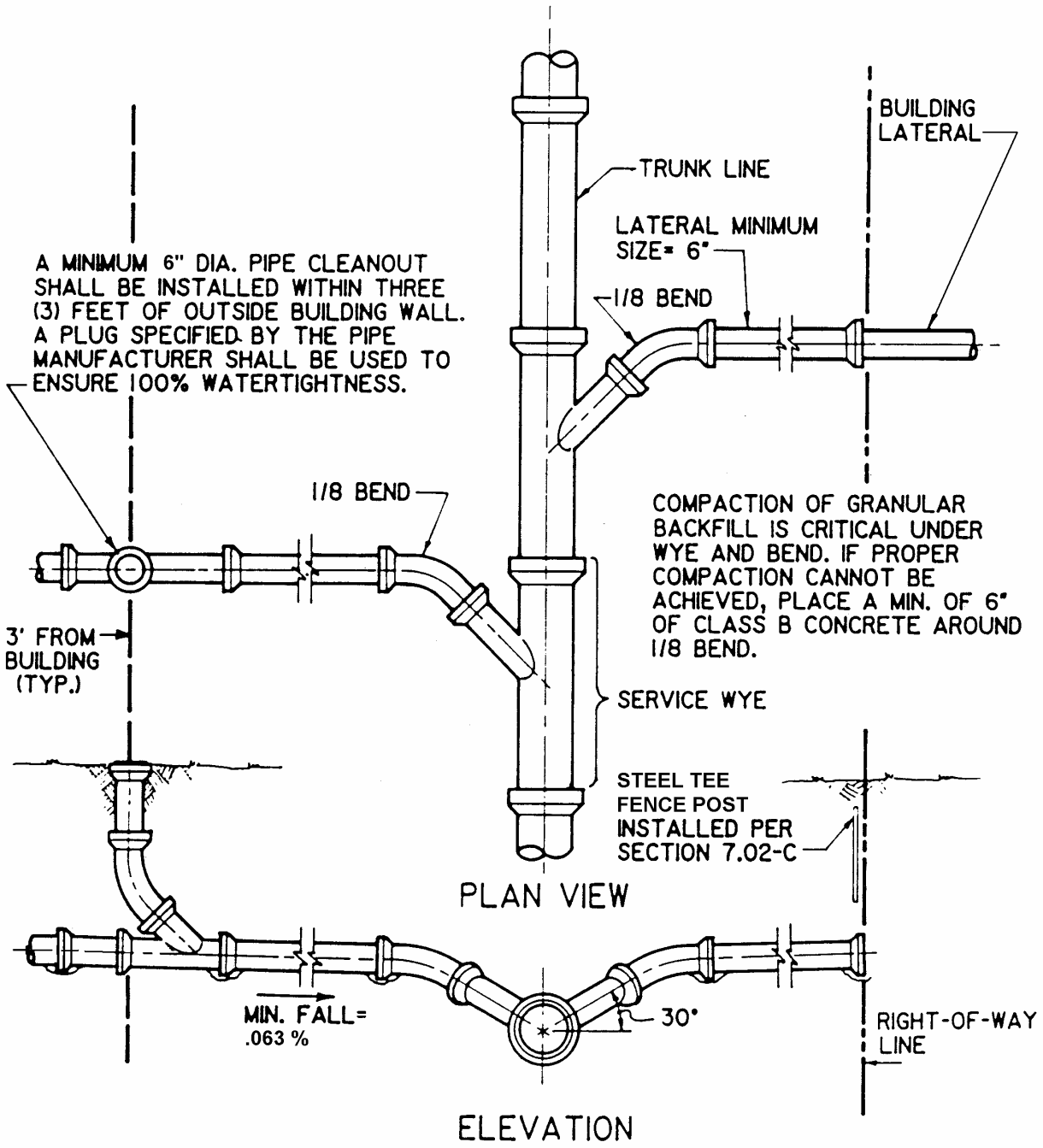
FIGURE 7-2



PIPE SIZE	8" TO 15"	18" & OVER
BEDDING BELOW THE PIPE BARREL	O.D. / 4 MIN. = 4"	O.D. / 4 MAX. = 8"

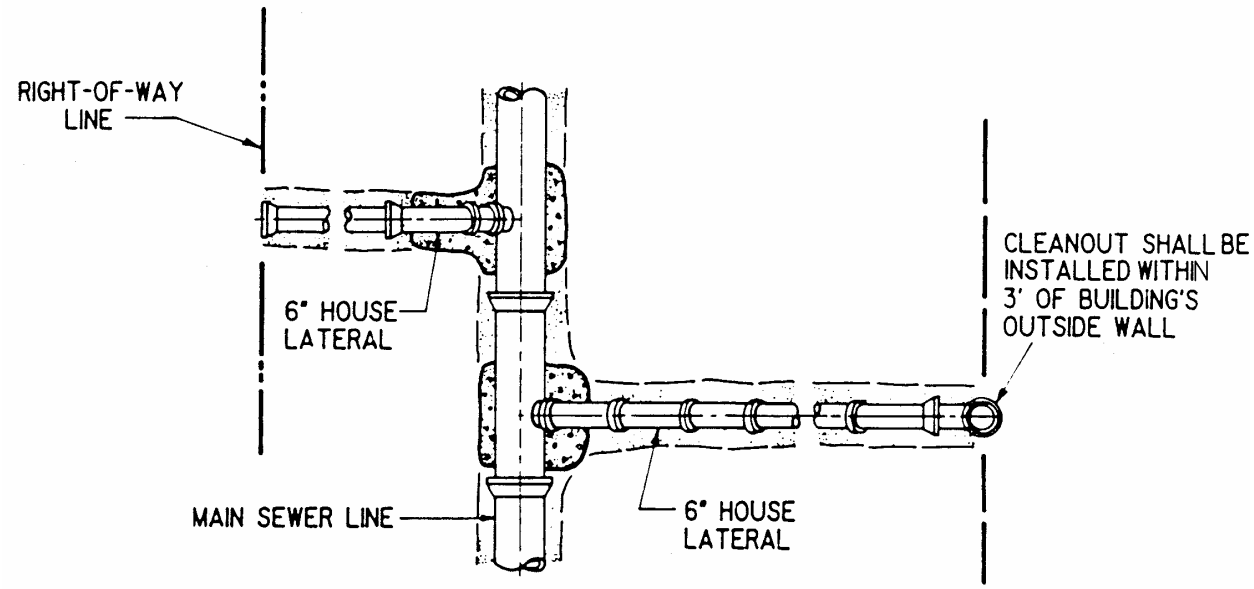
RIGID PIPE BEDDING DETAIL
(Concrete Pipe)

FIGURE 7-3

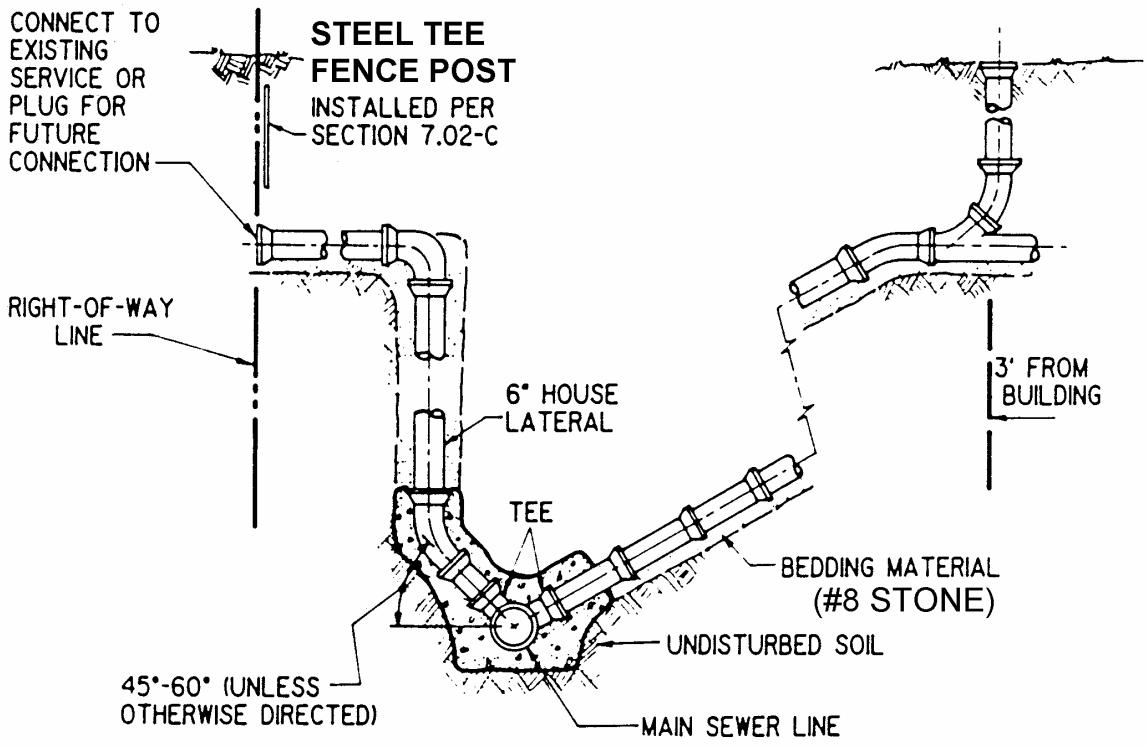


SERVICE CONNECTION FOR SHALLOW SEWERS
(LESS THAN 15' DEEP)

FIGURE 7-4



PLAN



ELEVATION

SERVICE CONNECTION FOR DEEP SEWERS (15' DEEP AND OVER)

FIGURE 7-5

SECTION 8 - SURFACE REPLACEMENT AND SITE RESTORATION

8.01 GENERAL

Section 8 pertaining to the restoration of areas within the public Right-of-Way, and/or acquired easements where an off-site sanitary sewer line is being constructed. Surface restoration within the site being developed is per the direction of the Owner.

When the sanitary sewer construction is complete, remove all surplus material and rubbish from the site or work. That portion of the surface disturbed by construction shall be rebuilt to as good condition as it was before the commencement of the work. The project site shall be promptly and regularly maintained. Contractor shall be responsible for repairs of unsatisfactory trench backfilling or other unsatisfactory contracted services.

8.02 PAVEMENT, CURB AND GUTTER REPLACEMENTS

In all streets, alleys or other areas that are to be paved, all backfilling shall be well compacted by hand held mechanical compaction machines per the requirements of the city, county, or Indiana Department of Highways. After the trench or excavation has been backfilled, the subgrade for the new paving, curb and/or curb and gutter shall be further compacted by rolling the backfill at subgrade elevation. After examination of the backfill and subgrade compaction by the District Representative, the pavement, curb and/or curb and gutter shall be replaced.

All pavements, curbs and/or gutters shall be replaced with the same materials as that removed in accordance with the latest revisions of Standards of the Indiana Department of Highways or the local governing body.

8.03 TRAFFIC CONTROL

The Contractor shall maintain vehicular and pedestrian traffic during all paving operations as required per the permit issued by the city, county or Indiana Department of Highways.

The Contractor shall provide flagmen, barricades and warning signs for the safe and expedient movement of traffic through construction zones within the right-of-way. This shall be in accordance with the principals and standards in the Department of Highways, Standard Specifications, latest revision. Figure 8-1 shows typical signing and flagging procedures for control of traffic.

8.04 LAWN AND GRASS AREA REPLACEMENT

All lawn and grass areas disturbed or damaged during construction shall be restored to original or better condition. Backfills, fills and embankments shall be brought to a subgrade level six (6) inches below finished grade. When subgrades have settled, deposit and spread topsoil to a finished depth of at least six (6) inches; fine raked, ready for seeding.

If the backfill, fill or embankment material is sand, an eight (8) inch layer of clay furnished by the Contractor at his expense shall be spread over the subgrade and thoroughly mixed into the sand subgrade. Mix the clay into the sand subgrade, then level and smooth. Deposit and spread topsoil to a finished depth of at least two (2) inches, and fine rake.

Commercial fertilizer 6-12-12 or equal shall be uniformly spread over the topsoil by a mechanical spreader and mixed into the soil for a depth of two (2) inches on areas to be seeded. This shall be done at least forty-eight (48) hours before the sowing of any seed at the rate of thirty-five (35) pounds per thousand square feet. The area shall then be lightly raked or harrowed until the surface of the finished grade is smooth, loose and pulverized.

Then, the grass seed shall be sown by a mechanical seeder, and lightly raked into the surface or sown with a standard agricultural drill. The seeded areas shall be thoroughly watered with a fine spray in such a manner as not to wash out the seed. The Contractor shall use care in raking in order to avoid disturbance of the finished grade and seed distribution.

Seeding shall be done only within the seasons extending from August 15 to October 15, and from April 1 to June 1, unless otherwise permitted by the District.

Contractor must submit a seed mixture certificate to the Engineer before using. Grass seed shall be sown at the rate of not less than three (3) pounds per thousand square feet and shall be the following analysis:

35 parts Kentucky Bluegrass

30 parts Perennial Rye

30 parts Kentucky 31 Fescue

5 parts inert matter

Hydro seeding shall be done in accordance with the Indiana Department of highways Specifications, latest revision.

8.05 MULCHING

Adequate mulching material following seeding and fertilizing shall be applied, followed by cultipacking.

Mulch shall consist of:

1. Dry straw or hay of good quality and at the rate of two and one-half (2-1/2) tons per acre; or

2. Wood cellulose or cane fiber mulch at a rate of one thousand (1,000) pounds per acre; or

3. A combination of good quality dry straw or hay free of seeds of competing plants at a rate of two and one-half (2-1/2) tons per acre and wood cellulose or cane fiber mulch at a rate of five hundred (500) pounds per acre; or

4. Manufacturered mulch materials such as soil retention blankets, erosion control netting, or others that may be required on special areas of high water concentration or unstable soils. When these materials are used, follow the manufacturer's recommendation for installation.

The seeded area shall be watered, maintained and patched as directed by District until the Contractor's work is completed and accepted.

8.06 STAND OF GRASS

The Contractor shall be required to establish a satisfactory stand of grass at least one (1) inch in height . Satisfactory stand of grass to be full coverage without bare spots. This is not required for areas subject to agricultural activities.

Within three (3) months after work completion, the Contractor shall be required to correct any defective work, such as bare spots in grass coverage, erosion, gullies, etc.

8.07 SODDING

The areas to be sodded shall be as shown on the plans and as specified in these Standards.

The use of sod shall be in accordance with the Indiana Department of Highway Specifications, latest revision. As a minimum, sod shall be fibrous, well rooted bluegrass, or other approved sod, with the grass cut to a height of not more than three (3) inches. Edges of sod shall be cleanly cut, either by hand or machine, to a uniform thickness of not less than one and one-half (1-1/2) inches, to a uniform width of not less than sixteen (16) inches, and in strips of not less than three (3) feet in length.

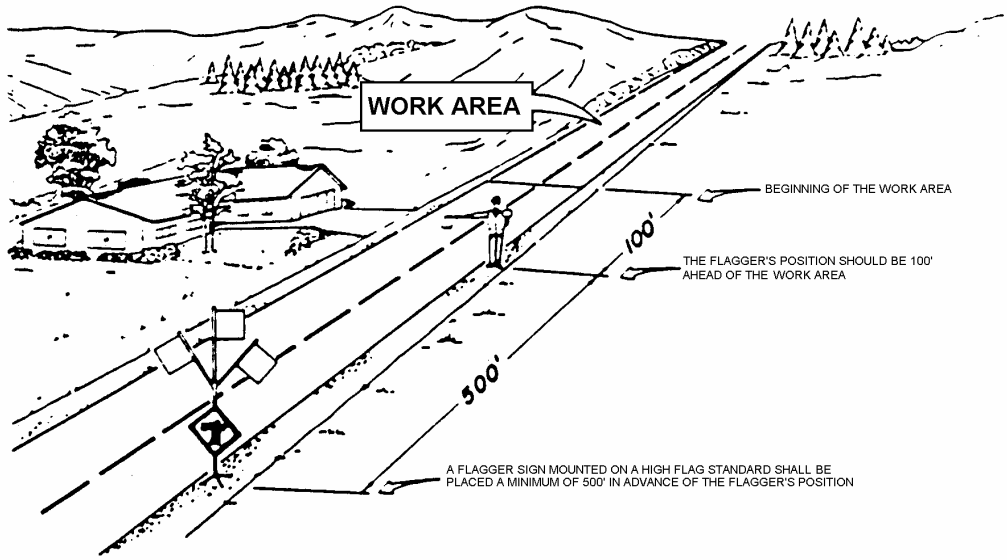
Sod shall be free from all primary noxious weeds as defined by the Indiana State Seed Law.

END OF SECTION 8

SIGNING AND FLAGGING FOR CONTROL OF TRAFFIC

DRAWINGS TO ILLUSTRATE PROVISIONS OF SECTION 8.03

FLAGGER CONTROL OF TRAFFIC



TYPICAL SIGNING FOR EXCAVATIONS IN EXISTING STREETS

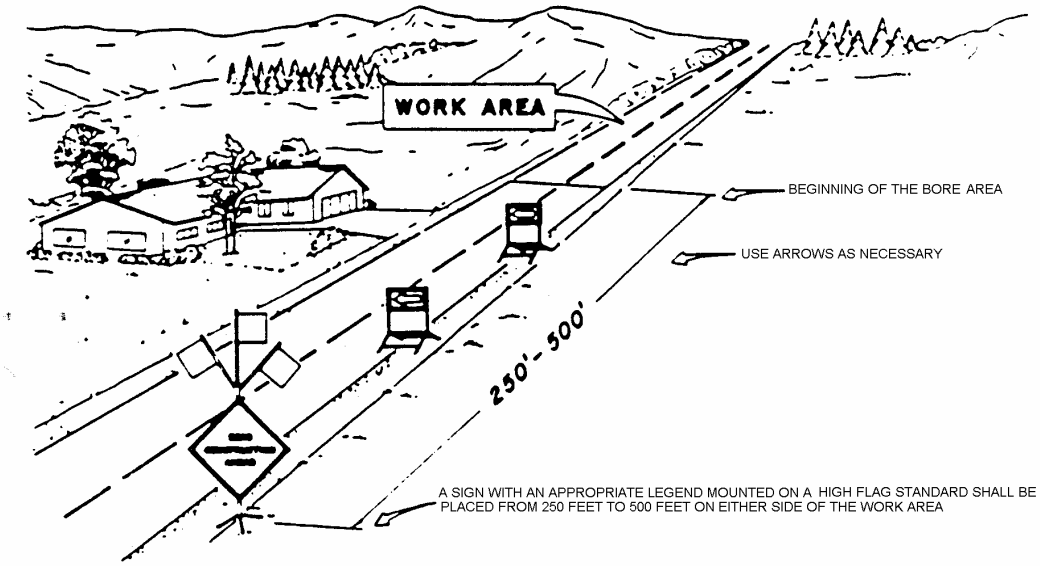


FIGURE 8-1

SECTION 9 - INSPECTION, TESTING AND ACCEPTANCE

9.01 GENERAL

The following section describes the minimum requirements and general procedures for the inspection and testing of sanitary sewer systems to be dedicated to the District.

The sanitary sewer system shall not be accepted nor will connection permits be issued until all requirements for inspection and testing, including filing of affidavits and any other paperwork are completed.

Any section of sanitary sewer not passing the tests prescribed herein shall be repaired to the satisfaction and approval of the District, retested and reinspected via closed circuit televising.

9.02 INSPECTION

Inspection of the sanitary sewer system shall occur throughout the construction of the collector sewer system and upon the installation but prior to the backfilling of the building sewer (lateral) as part of the Sanitary Sewer Construction Permit and Connection Permit programs, respectively.

A. SANITARY SEWER CONSTRUCTION INSPECTION

1. General

As previously discussed, prior to the issuance of a Construction Permit and the commencement of construction of a sanitary sewer system, the Owner shall make arrangements with the District for Construction Observation Services to be provided.

2. Estimated Cost

Where a lift station is involved, additional time for the inspection during construction and final checkout of the inspection during construction and final checkout of the lift station shall be added. Estimates for inspection costs can be obtained by contacting the District.

The above is a pre-construction estimate only. The actual Observation time will vary from project to project and may exceed or be less than this estimate based upon actual project duration. Observation time at the site is verified by the Contractor and/or a representative of the Owner.

3. General Requirements

a. Contractor and/or Owner shall provide notice to the District of the planned commencement of construction forty-eight (48) hours prior to such commencement.

b. Once the construction starts, the Contractor shall be responsible for informing and/or notifying the Observer assigned of the following:

(1) Daily work schedule including any changes in schedule,

(2) Prior notification if work is to be performed on weekends and/or holidays,
(3) Date air and mandrel tests are to be performed, and
(4) Date as-built verification is to be performed.

c. The District, upon request of the contractor and/or Owner, will schedule the Final Inspection. All testing required shall be performed under the observation of the District observer. It shall be the Contractor's responsibility to schedule the testing with the Observer and/or District. Test results obtained in the absence of the presence of the District's Observer will not be accepted.

B. CONNECTION PERMIT - BUILDING SEWER INSPECTION

As discussed in Section 3, a sewer Connection Permit shall be obtained for any repair, modification or connection of a building sewer to a public sewer. Connection permits shall not be issued for connection to sanitary sewers not yet dedicated to and accepted by the District.

Following the installation/repair/modification and prior to the backfilling of the Building Sewer, the Contractor/Plumber shall notify the District that the Building Sewer is ready to be inspected. The District shall then have four (4) hours to make the inspection after which the Contractor/Plumber may backfill the trench. The notification of the District shall adhere to the requirements of Fall Creek Regional Waste District.
If notification is not provided and the building sewer is backfilled prior to inspection, at the District's request the Contractor/Plumber shall be required to re-excavate the trench so that an inspection can be made.

9.03 TESTING (GRAVITY SANITARY SEWERS)

Once constructed, all sanitary sewers and manholes shall be watertight and free from leakage. The Contractor shall be required to repair all visible leaks to the satisfaction of the District. Any leakage found during the infiltration test shall be corrected by the Contractor at his expense.

The method of repair shall be per the approval of the District; however, grouting of the joint or crack to repair the leakage shall not be permitted. If the defective portion of the sanitary sewer cannot be located, the Contractor will remove and reconstruct as much of the work as is necessary to obtain a system that passes infiltration requirements.

All gravity sanitary sewers constructed of flexible pipe (PVC and HPDE) and Truss pipe shall be mandrel tested no sooner than thirty (30) days after installation per the requirements herein.

The Contractor shall bear the complete cost and supply all equipment necessary to perform the tests required.

All tests shall be conducted under the observation of the District's Inspector. It shall be the Contractor's responsibility to schedule testing with the Inspector.

A. LOW PRESSURE AIR TEST (GRAVITY SEWERS)

All gravity sanitary sewers shall be tested for infiltration by means of a low pressure air test as generally described herein. Any other infiltration test procedure will only be

allowed following the submittal of the procedure to the District for review and upon written approval by the District.

1. Equipment

The Contractor shall be responsible for providing all equipment and supplies necessary for the performance of a Low Pressure Air Test including but not limited to the following:

a. Mechanical or pneumatic plugs;

b. Air control panel;

c. Shut-off valve, pressure regulative valve, pressure relief valve and input pressure gauge. The pressure regulator or relief valve set shall be set no higher than 10 psig to avoid over pressurization; and

d. Continuous monitoring pressure gauge having a range of 0 to at least 10 psi. The gauge shall be no less than 4 inches in diameter with minimum divisions of 0.10 psi and an accuracy of +/- .04 psi.

To reduce the potential for sewer line over-pressurization, two (2) separate hoses shall be used to: (1) connect the control panel to the sealed line for introducing low pressure air, and (2) a separate hose connection for constant monitoring of air pressure buildup in the line.

If pneumatic plugs are utilized, a separate hose shall be required to inflate the pneumatic plugs.

2. Ground Water Elevation and Air Pressure Adjustment

a. General

Per Section 5.04; a few key manholes shall have a one-half inch diameter threaded pipe nipple installed through the manhole wall directly on top of one of the sanitary sewers entering the manholes as shown in Figure 9-1. Every manhole need not have a pipe nipple installed. The design Engineer shall designate the manholes to be used for gauging the ground water level. The pipe nipples shall be sealed with a threaded one-half inch cap.

Immediately before air testing, the ground water level shall be determined by removing the threaded cap(s) from the nipple(s) nearest the section to be tested blowing air through the pipe nipple(s) to remove any obstructions, and then connecting clear plastic tube(s) to the pipe nipple(s). Each plastic tube shall be held vertically to allow groundwater to rise in it. After the water level in the tube has stopped rising, a measurement of the height in feet of water over the invert of the sewer pipe shall be taken per Figure 9-1. If the section to be tested is not immediately adjacent to an installed pipe nipple, the groundwater height shall be estimated based upon nearby height readings and the pipe's invert elevation. Alternate ground water monitoring methods shall require the prior written approval of the District.

b. Air Pressure Adjustment

The air pressure correction, which must be added to the 3.5 psig normal test starting pressure, shall be calculated by dividing the average vertical height, in feet of groundwater above the invert of the sewer pipe to be tested, by 2.31. The result gives the air pressure correction in pounds per square inch to be added. (for example, if the average vertical height of groundwater above the pipe invert is 2.8 feet, the additional air pressure required would equal 2.8 divided by 2.31 or 1.2 psig. This would require a minimum starting pressure of 3.5 plus 1.2 or 4.7 psig.)

c. Maximum Test pressure

In no case should the starting test pressure exceed 9.0 psig. If the average vertical height of groundwater above the pipe invert is more than 12.7 feet, the section so submerged may be tested using 9.0 psig as the starting test pressure. The 9 psig limit is intended to further ensure workman safety and falls within the range of the pressure monitoring gauges normally used.

3. Test Procedure

Following are general procedures to be employed in the performance of the test. Figure 9.2 is a recommended Air Test Data Sheet for use in recording the test. Other test data sheets may be allowed based upon approval by the District. These test data sheets shall be submitted to the District.

a. Plug Installation and Testing

After a segment of pipe has been backfilled to final grade, prepared for testing, and the specified waiting period has elapsed, the plugs shall be securely placed in the line at the ends of each segment to be tested.

It is advisable to plug the upstream end of the line first to prevent any upstream water from collecting in the test line. This is particularly important in high groundwater situations.

When plugs are being placed, the pipe adjacent to the manhole shall be visually inspected to detect any evidence of shear in the pipe due to differential settlement between the pipe and the manhole. A probable point of leakage is at the junction of the manhole and the pipe. This fault may be covered by the pipe plug, and thus not revealed by the air test.

b. Line Pressurization

Low pressure air shall be slowly introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater above the pipe, but not greater than 9.0 psig. If groundwater is present, refer to Section 9.03 A.2. Ground Water Elevation and Air Pressure Adjustment to determine the internal pressure to be applied.

c. Pressure Stabilization

After a constant pressure of 4.0 psig (greater than the average groundwater back pressure) is reached, the air supply shall be throttled to maintain) that internal pressure for at least 2 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.

d. Timing Pressure Test

When temperatures have been equalized and the pressure stabilized at 4.0 psig (greater than the average groundwater back pressure), the air hose from the control panel to the air supply shall be shut off or disconnected.

The continuous monitoring pressure gauge shall then be observed while the pressure is decreased to no less than 3.5 psig (greater than the average back pressure of any groundwater over the pipe). At a reading of 3.5 psig, or any convenient observed pressure reading between 3.5 psig and 4.0 psig (greater than the average groundwater back pressure), timing shall commence with a stop watch or other timing device that is at least 99.8% accurate.

e. Determination of Line Acceptance

If no pressure drop is observed, the section undergoing test shall have passed and shall be presumed to be free of air leaks. The test may be discontinued once the prescribed time has elapsed.

f. Determination of Line failure

If the pressure drops before the appropriate time has elapsed, the air loss rate shall be considered excessive and the section of pipe shall be determined to have failed the test.

4. Test Times

a. Testing Main Sewers with Building Sewers

In general, the District will only approve the construction of the main line sewer and wye connections with the lateral stubbed-off to the property line. Building sewers will be allowed to be installed during the construction of the main line sewer only upon the written request to and written approval of the District. This shall be clearly delineated on the design plans and specifications submitted for approval by the District.

If building sewers are approved for construction by the District as part of the mainline sewer they shall be included in the test.

b. Specified Time Tables

The Contractor is responsible for the repair of any section of pipe which fails the air test. Repaired sections of pipe must be retested and pass the air test prior to being accepted by the District. No grout repair will be allowed.

B. MANDREL TEST FOR SELECT PIPE

A five (5) percent "GO-NO-GO" Mandrel Detection Test shall be performed on all PVC, HDPE and PVC Composite gravity sanitary sewer pipe.

These pipes shall be mandrel with a rigid device sized to pass five percent (5%) or less deflection (or deformation) of the base inside diameter of the pipe.

The mandrel test shall be conducted no earlier than thirty (30) days after reaching final trench backfill grade, provided that in the opinion of the District sufficient water densification or rainfall has occurred to thoroughly settle the soil throughout the entire trench depth. If densification, in the opinion of the District, has not been achieved within the thirty (30) day time frame, the mandrel size shall be increased to measure a deflection limit of three percent (3%).

The mandrel (GO-NO-GO) device shall be cylindrical in shape and constructed with nine (9) or ten (10) evenly spaced arms or prongs. Mandrels with less arms shall not be allowed due to being insufficiently accurate. The mandrel diameter dimension "D" shall be equal to the inside diameter of the sanitary sewer.

Allowances for pipe wall thickness tolerances or validity (from heat, shipping, poor production, etc.) shall <u>not</u> be deducted from the "D" dimension but shall be counted as part of the 5% or lesser deflection allowance. As an example, the dimensions for the mandrel shown in Figure 9.3 for ASTM D-3034 PVC pipe shall be as listed in Table 9.2. Each pipe material/type required to be Mandrel tested shall be tested with a mandrel approved by the pipe manufacturer and meeting the requirements of this Section. The "D" mandrel dimension shall carry a tolerance of +/- 0.01 inches.

The mandrel shall be hand pulled through all sewer lines and any section of sewer not passing the mandrel shall be uncovered, replaced or repaired to the District's satisfaction and retested.

The contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than as shown in Table 9.2.

The Contractor shall provide proving rings to check the mandrel. Drawings of mandrels with complete dimensions shall be furnished by the Contractor to the District upon request for each diameter and specification of pipe.

C. MANHOLE TESTING

Each manhole shall be visually inspected after assembly and backfilling by the District's Inspector for leakage or evidence thereof.

If the manhole shows leakage or signs thereof, the manhole shall be repaired to the satisfaction of the District and reinspected, and vacuum tested.

All manholes are to be checked by the District Inspector 30 days after installation and again before the one (1) year warranty period ends. If they show signs of leakage, they shall be vacuum tested by an approved company and repaired at the <u>Contractor's or Developer's</u> expense. By no means will any leakage be allowed.

D. VACUUM TEST PROCEDURES

Standard Test Method for Concrete Sewer Manholes by the Negative Air pressure (Vacuum) Test.

This standard is issued under the fixed designation C 1244; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number of parentheses indicates the year of last reapproval. A superscript epsilon (e) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers procedures for testing precast concrete manhole sections when using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures. This test method is used for testing concrete manhole sections utilizing mortar, mastic, or gasketed joints.

1.2 This test method is intended to be used as a preliminary test to enable the installer to demonstrate the condition of the concrete manholes prior to backfill. it may also be used to test manholes after backfilling; however, testing should be correlated with the connector supplier.

1.3 This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.4 This test method is the companion to metric Test Method C 1244M; therefore, no SI equivalents are shown in this test method.

NOTE 1 - Vacuum test criteria presented in this test method are similar to those in general use. The test and criteria have been widely and successfully used in testing manholes.

NOTE 2 - It should be understood that no correlation has been found between vacuum (air) and hydrostatic tests.

2. Reference Documents

2.1 ASTM Standards:

C822 Terminology Relating to Concrete Pipe and Related Products/2

C924 Practice for Testing Concrete Pipe Sewer Lines by Low-pressure Air Test Method/2

C969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines/2

3. Terminology

3.1 For definitions of terms relating to manholes, see Terminology C822.

(1) This practice is under the jurisdiction of ASTM C-13 on Concrete Pipe and is the direct responsibility of Subcommittee

C13.06 on Manholes and Specials. Current edition approved Aug. 15, 1993. Published October 1993.

(2) Annual Book of ASTM Standards Vol. 04.05.

4. Summary of Practice

4.1 All lift holes and any pipes entering the manhole are to be plugged. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.

5. Significance and Use

5.1 This is not a routine test. The values recorded are applicable only to the manhole being tested and at the time of testing.

6. Preparation of the Manhole

6.1 All lift holes shall be plugged.

6.2 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 manhole.

7. Procedure

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

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

7.3 The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in Table 9.1.

7.4 If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.

7.5 Use or failure of this vacuum test shall not preclude acceptance by appropriate water infiltration or exfiltration testing, (see practice C9690, or other means).

8. Precision and Bias

8.2 No justifiable statement can be made either on the precision or bias of this procedure, since the test result merely states whether there is conformance to the criteria for the success specified.

9. Keywords

9.1 Acceptance criteria: Concrete; manhole sections; test method; vacuum test.

TABLE 9-1
Minimum Test Times for Various Manhole Diameters
(seconds)

	Diameter (Inches)									
Depth (feet)		30	33	36	42	48	54	60	66	72
	8	11	12	14	17	20	23	26	29	33
	10	14	15	18	21	25	29	33	36	41
	12	17	18	21	25	30	35	39	43	49
	14	20	21	25	30	35	41	46	51	57
	16	22	24	39	34	40	46	52	58	67
	18	25	27	32	38	45	52	59	65	73
	20	28	30	35	42	50	53	65	72	81
	22	31	33	39	46	55	64	72	79	89
	24	33	36	42	51	59	64	78	87	97
	26	36	39	46	55	64	75	85	94	105
	28	39	42	49	59	69	81	91	101	113
	30	42	45	53	63	74	87	98	108	121

9.04 LIFT STATION AND FORCE MAIN TESTING

The following section describes the testing that shall be performed on the lift station pumps, piping and force main for acceptance and dedication to the District.

NOTE: The Contractor shall be responsible for providing sufficient notice of all lift station and force main testing to the District, 48 hours minimum, to ensure that the following personnel shall be present at the time of testing: (1) District engineering representative, (2) private inspector, (3) contractor's representative, (4) developer's representative, (5) Fall Creek Regional Waste District Lift Station Maintenance representative.

A. FORCE MAIN TESTING

1. General

Under the observation of the District's Inspector, force mains shall be tested for leakage after installation and prior to final acceptance. The Contractor shall be responsible for providing all equipment and tools necessary to perform an air pressure test or hydrostatic pressure test conducted in accordance with AWWA standards for testing pressure pipe.

*These standards are material specific and generally reference manufacturer's guidelines. The standards apply to method of conducting air pressure tests only. Established pass/fail criteria are contained in the following sub-sections.

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 1916 Race St., Philadelphia, PA 19103.

2. Air Pressure Testing

Force mains shall not be tested using air pressure test methods.

3. Hydrostatic Pressure Testing

Hydrostatic pressure testing of force mains is the only method of force main testing approved by the District.

The Contractor shall be responsible for providing all of the equipment and tools necessary to conduct the hydrostatic test including, but not limited to, the following:

a. Hydrostatic test pump (jockey pump).

b. Four and one half (4 1/2" inch diameter calibrated pressure test gauge of range 0-150 psi graduated in 1 psi increments. The manufacturer's calibration papers and test date information shall be made available at the request of the District.

c. All pipe plugs and/or caps required to perform the hydrostatic test.

d. Calibrated/graduated container to measure quantity of water required to be added during hydrostatic pressure test to maintain specified test pressure.

The hydrostatic pressure test shall be conducted in accordance with the applicable AWWA standard based on force main material and in accordance with ASTM E103 - "Standard Method for Hydrostatic leak Testing." in conjunction with and in addition to the aforementioned standards, the hydrostatic pressure test shall proceed as follows:

e. The force main shall be completely backfilled prior to testing.

f. The influent line and effluent discharge shall be appropriately plugged/bulkheaded. The plugs/bulkheads shall be equipped with a minimum of two (2) openings for filling/draining the pipeline and for bleeding air from the line. Thrust blocking restraints are required at each bulkhead and shall be furnished in accordance with the bulkhead manufacturer's requirements.

g. The test line shall be filled with water at a slow rate to prevent air entrapment. In the case where concrete force main materials are being tested, the line shall be left at low pressure for 24 hours prior to pressure testing in order to minimize the apparent leakage due to water absorption by the pipe walls.

h. Trapped air shall be expelled through high point bleed off valves as the line is being filled.

i. The test line shall be pressurized to 1.5 times the pump shut-off head as determined from the pump manufacturer's performance curves or to 100 psi whichever is greater.

j. Water shall be added to the test segment to maintain the test pressure for a period of no less than 2 hours and no more than 8 hours. The District's inspector must be present for at least the first 2 hours of testing.

k. If the force main or any portion thereof fails the hydrostatic pressure test, the Contractor shall remove and replace or otherwise repair the force main to the satisfaction of the District and the force main shall be retested.

B. WET WELL LEAKAGE TESTING

Leakage tests shall be made and observed by the District's Inspector in the wet well. The test shall be the exfiltration test made as described below:

After the wet well has been assembled in place, all lifting holes shall be filled with an approved non-shrinking mortar. The test shall be made prior to placing any fill material. If the ground water table has been allowed to rise above the bottom of the wet well, it shall be lowered for the duration of the test. All pipes and other openings into the wet well shall be suitably plugged and the plugs braced to prevent blow out.

The wet well shall then be filled with water to the top. If the excavation has not been backfilled, and observation indicates no visible leakage after 1 hour; the wet well may be considered to be satisfactorily water-tight. If the test described above is unsatisfactory or if the wet well excavation has been backfilled, the test shall be continued for a period of 24 hours to allow for absorption. At the end of this period, the wet well shall be refilled to the top, if necessary; and the measuring time of at least 8 hours begun. At the end of the test period, the wet well shall be refilled to the top, measuring the volume of water added. This amount shall be extrapolated to a 24-hour rate and the leakage determined on the basis of depth. The leakage for each wet well shall not exceed 1 gallon per vertical foot for a 24-hour period. if the test fails this requirement, but the leakage does not exceed 2 gallons per vertical foot per day, repairs by approved methods may be made as directed by the District to bring the leakage within the allowable rate of 1 gallon per foot per day. Leakage due to a defective section or joint or exceeding the 2 gallon per vertical foot per day maximum shall be cause for the rejection of the wet well. It shall be the Contractor's responsibility to uncover the wet well as necessary and to disassemble, reconstruct, or replace it as directed by the District. The wet well shall then be retested.

No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorptions, etc.; i.e., it will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the District's Inspector that the water table is below the bottom of the wet well throughout the test.

C. LIFT STATION PUMP TESTING

Lift Station pump test will be performed by the Contractor during the lift station's final inspection. The Contractor shall be responsible for providing the clean water to run the pumps and perform the test(s).

1. Manufacturer's Start-up

Prior to the District's final inspection of the lift station equipment, the Contractor shall be responsible for coordinating start-up activities with the pump manufacturer's representative in accordance with the manufacturer's requirements. The District's Inspector must be present at the time of manufacturer's start-up.

The manufacturer's representative shall complete the appropriate one of the two lift station check lists attached at the end of this Section. The checklist shall be witnessed to in writing by the District's Inspector. Any deficiencies in equipment and/or workmanship noted during the manufacturer's start-up shall be remedied by the Contractor prior to final inspection.

Upon successful completion of the manufacturer's start-up, the manufacturer shall deliver to the Contractor:

a. Three-(3) copies of the completed, witnessed checklist with cover letter certifying that all pumping and electrical equipment has been installed and is operating in accordance with manufacturer's requirements;

b. Five (5) sets of Operation and Maintenance Manuals as specified in Section 10 of these Standards; and

c. One (1) complete set of Spare Parts as specified in Section 10 of these Standards.

2. Final Inspection

Contractor shall deliver two (2) copies of the manufacturer's start-up checklist at the time of final inspection. In addition, the Contractor shall provide the following pump test equipment and materials:

a. Water to conduct test,

b. Amp/volt meter,

c. Stop watch,

d. Tape level rod to measure settings,

e. Calibrated test gauge to measure operating head. The gauge shall be calibrated in feet of water from 0 to 100 feet in one foot increments, and

f. Manufacturer's pump performance curves.

The District's representative attending the final inspection shall review the manufacturer's checklist and re-check any deficiencies. The District's representatives shall then complete a cursory final inspection checklist and perform pump draw down tests which shall include the following:

a. Manual check of all on-off operations, alarm and run lights;

b. Determination of inflow rate (if any);

c. Determination of pump capacity for each pump individually and both/all pumps simultaneously;

d. Determination of pump capacity with force main full. Verification of full force main shall be determined by pressure gauge provided by Contractor. Force main shall be considered full when the line pressure stabilizes; and

e. Plot performance of each pump or pump curves provided by Contractor.

Contractor shall provide all water necessary to conduct the pumping tests, and shall provide a connection for the test gauge on the blind flanged tee in the valve vault. The stem connection shall be equipped with a plug valve to close the connection after testing is complete. The connection shall be left in place and shall be suitable for use as an air bleed off.

The pumping test results must meet or exceed the design pumping criteria approved by the District to successfully pass the final inspection. Any deficiencies noted during the final inspection shall be repaired/replaced by the Contractor to the satisfaction of the District and reinspected/retested prior to final acceptance.

9.05 CLOSED CIRCUIT TELEVISION INSPECTION

When Mandrel Test shows areas of deflection failure along the pipe or when air testing fails, the Contractor shall be required to perform a closed circuit television inspection of the sanitary sewer between manholes as follows:

A. A camera equipped with a rotating lens and remote control devices to adjust the light intensity and one thousand (1,000) lineal feet of sewer cable shall be provided. The camera should be able to transmit a continuous image to the television monitor as it is being pulled through the pipe. The image shall be clear enough to enable the District representative and others viewing the monitor to easily evaluate the interior condition of the pipe. The camera shall have a digital display for lineal footage and project number and an audio voice-over shall be made during the inspection identifying any problems.

B. The pipe shall be thoroughly cleaned before the camera is installed and televising is commenced.

C. The VHS tape of the entire sewer line and reproduction map indicating the pipe segment numbers of all the pipe that has been televised shall be submitted to the District for their records.

If any pipe and/or joint is found to be leaking, the Contractor shall be required to repair that portion of the pipe to the satisfaction and approval of the District.

D. FCRWD will perform a closed circuit television inspection of all new sanitary sewer lines prior to final acceptance by the District. Any deficiencies noted must be repaired and re-televised by the Contractor before final acceptance by the District.

Table 9-2
(9-Arm Mandrel)
Dimensions for ASTM D3034 SDR 35 PVC Pipe

Nominal Diameter	Length	Deflection	
		3%	5%
8	8	7.71	7.56
10	10	9.63	9.45
12	12	11.46	11.26
15	12	14.03	13.78

(10-Arm Mandrel)
Dimensions for ASTM D3034 SDR 35 PVC Pipe

Nominal Diameter	Length	Deflection	
		3%	5%
8	8	7.72	7.58
10	10	9.65	9.48
12	12	11.48	11.29
15	12	14.06	13.82

EXAMPLE LOW PRESSURE AIR TESTS

A. GENERAL

The purpose of this Section is to illustrate the proper application of this recommended practice with regard to appropriate test time selection. The examples that follow include a variety of conditions which may be encountered in the field.

1. EXAMPLE A

A manhole to manhole reach of nominal 12-inch pipe is 350 feet long. No lateral connections exist in the reach. What is the required test time for a 0.5 psig pressure drop?

Solution: The required test time can be read directly from Table 9.1B. For 350 feet of 12-inch pipe, the required test time is 9:58 (9 minutes and 58 Seconds).

2. EXAMPLE B

A 350 foot section of nominal 12-inch pipe is ready for testing. A total of 128 feet of 4-inch lateral sewer pipe is connected to the 350 foot section and will be included in the test. What will be the required test time for a 0.5 psig pressure drop?

Solution: Lateral sewers may be disregarded when selecting test times. Therefore, the required test time will be the same as for Example A, i.e. 9 minutes and 58 seconds.

Note: If lateral sewers had not been disregarded, the required test time would be 10 minutes and 22 seconds, i.e. only 24 seconds longer.

3. EXAMPLE C

What should the required test time be for a 1.0 psig pressure drop in 327 feet of nominal 8-inch diameter pipe between two manholes?

Solution: The exact test time is easily calculated by using Table 9.1A. Table 9.1A is used because a 1.0 psig pressure drop is specified. Since 327 feet exceeds the minimum test time for an 8-inch pipeline, the fourth column in Table 9.1A shall be used to quickly calculate the required test time as follows:

T = 1.520 L= 1.52 X 327 = 497 seconds

Therefore, the required test time for a 1.0 psig pressure drop is 497 seconds, or 8 minutes and 17 seconds.

4. EXAMPLE D

A manhole to manhole reach of nominal 24-inch pipe is 82 feet long. What is the required test time for a 0.5 psig pressure drop?

Solution: Table 9.1B must be used because a 0.5 psig pressure drop is specified. Since 82 feet is less than the 99 foot length associated with the minimum test for a 24-inch pipeline, the minimum test time shall apply. Thus, the required test time for a 0.5 psig pressure drop must be 11:20 (11 minutes and 20 seconds).

5. EXAMPLE E

A 412 foot section of nominal 15-inch sewer pipe has been readied for air testing. A total of 375 feet of nominal 6-inch lateral piping and 148 feet of nominal 4-inch lateral piping branch off of the 15-inch sewer line. All laterals have been capped and/or plugged and will be tested together with the 15=inch main line. The specified pressure drop which will be timed is 0.5 psig. What is the appropriate test time for this pipe network?

Solution: All lateral sewer sizes and lengths may be disregarded since their influence is generally not significant enough to warrant computation. Table 9.1B must be used for a

0.5 psig pressure drop. The fourth column in the Table provides the appropriate formula for calculating the required test time because 412 feet is longer than the third column value of 159 feet.

T = 2.671 L = 2.671 X 412 - 1, 100 seconds

The required test time is 1,100 seconds or 18 minutes and 20 seconds.

FINAL INSPECTION

SUBMERSIBLE LIFT STATION CHECK LIST

JOB NO:_____

ADDRESS:_____

CONTRACTOR:_____

ENGINEER:_____

PUMP SUPPLIER:_____

KW METER NO:_____

DATE:_____

I. ELECTRIC

A. Is the power system 3 phase or 1 phase?_____

B. If 3 phase, is grounded neutral provided? Yes ( ) No ( )

C. If above answer is "no", is transformer installed? Yes ( ) No ( )

D. Voltage Readings

1. Between phases : L1, L2_____ L1, L3 _____ L2, L3 _____

2. High phase to ground _____

3. Other Legs to ground _____

E. High Leg (L) is connected to motor only and not to any auxiliary circuits? Yes ( ) No ( )

F. Do Latches on control panel work smoothly? Yes ( ) No ( )

Remarks_____

_____

_____

_____

II. PUMP AND MOTOR CONTROLS

A. Breaker switches operate properly.

1. **No. 1 pump** **Yes ( ) No ( )**
2. **No. 2 pump** **Yes ( ) No ( )**
3. **No. 3 pump** **Yes ( ) No ( )**
4. **No. 4 pump** **Yes ( ) No ( )**
5. **Control Circuit** **Yes ( ) No ( )**
6. **Remote Monitor Circuit** **Yes ( ) No ( )**

B. Hand-off-automatic switches.

1. **No. 1 pump hand position operates.** **Yes ( ) No ( )**
2. **No. 2 pump hand position operates.** **Yes ( ) No ( )**
3. **No. 3 pump hand position operates.** **Yes ( ) No ( )**
4. **No. 4 pump hand position operates.** **Yes ( ) No ( )**

C. Amperage

1. **Name plate rating (amps) No. 1 motor_____**
2. **Amps pulled by No. 1 motor_____**
3. **Name plate rating (amps) No. 2 motor_____**
4. **Amps pulled by No. 2 motor_____**
5. **Name plate rating (amps) No. 3 motor_____**
6. **Amps pulled by No. 3 motor_____**
7. **Name plate rating (amps) No. 4 motor_____**
8. **Amps pulled by No. 4 motor_____**

D. Automatic Operation

1. **No. 1 pump Automatic Position operates** **Yes ( ) No ( )**

2. No. 2 pump Automatic Position operates Yes ( ) No ( )

3. No. 3 pump Automatic Position operates Yes ( ) No ( )

4. No. 4 pump Automatic Position operates Yes ( ) No ( )

5. Do the pumps sequence properly with relation to lead pump, lag pump on, and alternation? Yes ( ) No ( )

E. Seal Failure/Heat Sensor

1. Seal failure wires connect properly to seal failure circuit? Yes ( ) No ( )

2. Test seal failure circuit OK? Yes ( ) No ( )

3. Heat sensor wires connected properly to heat sensor circuit? Yes ( ) No ( )

4. Test heat sensor circuit OK? Yes ( ) No ( )

F. Control Components

1. Verify all electrical components are of U.S. manufacture and locally available. Yes ( ) No ( )

G. Alarm Light/Horn

1. High water alarm light and horn activate with test button. Yes ( ) No ( )

2. Horn silence with silence button? Yes ( ) No ( )

3. High water alarm light and horn activate? Yes ( ) No ( )

H. Level Setting

1. Lead pump kicks on at EL _____ (_____'_____") from wet well bottom.

2. Lead pump kicks off at EL_____ (_____'_____") from wet well bottom.

3. Lag pump kicks on at EL_____ (_____'_____") from wet well bottom.

4. Lag pump kicks off at EL_____ (_____'_____") from wet well bottom.

5. Standby pump 1 kicks on at EL_____(_____,_____")from wet well bottom.

6. Standby pump 1 kicks off at EL____(_____,_____") from wet well bottom.

7. Standby pump 2 kicks on at EL_____(_____,_____") from wet well bottom.

8. Standby pump 2 kicks off at EL_____(_____,_____") from wet well bottom.

9. Height of influent sewer above floor of wet well_____'_____".

10. Height of high water alarm above floor of wet well_____'_____".

11. Top of basin EL_____.

12. Total basin depth_____'_____".

I. Pump Rotation

1. No. 1 Pump correct? Yes ( ) No ( )

2. No. 2 Pump correct? Yes ( ) No ( )

3. No. 3 Pump correct? Yes ( ) No ( )

4. No. 4 Pump correct? Yes ( ) No ( )

Remarks:_____
_____
_____
_____
_____

III. PUMPS AND MOTORS

A. Operation

1. Are pumps running quietly?

a. No. 1 Yes ( ) No ( )

b. No. 2 Yes ( ) No ( )

c. No. 3 Yes ( ) No ( )

d. No. 4 Yes ( ) No ( )

2. Are motors running quietly?

a. No. 1 Yes ( ) No ( )

b. No. 2 Yes ( ) No ( )

c. No. 3 **Yes ( ) No ( )**

d. No. 4 **Yes ( ) No ( )**

3. Is excessive vibration noticed?

a. No. 1 **Yes ( ) No ( )**

b. No. 2 **Yes ( ) No ( )**

c. No. 3 **Yes ( ) No ( )**

d. No. 4 **Yes ( ) No ( )**

Remarks:_____
_____
_____
_____
_____

IV. REMOTE MONITOR PANEL

A. Verify start-up procedure completed properly and put "On Line" with Sewer Maintenance division by remote monitor panel supplier. Yes ( ) No ( )

V. VALVES

A. Check Values

1. Do clappers swing freely? **Yes ( ) No ( )**

2. Does packing leak? **Yes ( ) No ( )**

3. Are counter weights adjusted properly? **Yes ( ) No ( )**

B. Plug Valves

1. Do valves open and close freely? **Yes ( ) No ( )**

2. Does packing leak? **Yes ( ) No ( )**

3. During operation, are all gates completely open? **Yes ( ) No ( )**

VI. PUMP DRAW DOWN TEST

A. Diameter of wet well_____'_____".

(Re: 5'0" = 150 Gallon/Ft., 6'0" = 212 Gallon/Ft.,

7'0" = 288 Gallon/Ft., 8'0" = 376 Gallon/Ft).

		LEVEL			**TIME**	
ITEM	**LEVEL**	**DIFFERENCE**	**GAL.**	**TIME**	**DIFFERENCE**	**GPM**
PUMP # ON	________	____________	________	________	_______________	________
PUMP # OFF	________	____________	________	________	_______________	________
PUMP # ON	________	____________	________	________	_______________	________
PUMP # OFF	________	____________	________	________	_______________	________
PUMP # ON	________	____________	________	________	_______________	________
PUMP # OFF	________	____________	________	________	_______________	________
PUMP # ON	________	____________	________	________	_______________	________
PUMP # OFF	________	____________	________	________	_______________	________
PUMP # ON	________	____________	________	________	_______________	________
PUMP # OFF	________	____________	________	________	_______________	________

PUMP # __________ **AVERAGE GPM __________**

PUMP # __________ **AVERAGE GPM __________**

PUMP # __________ **AVERAGE GPM __________**

PUMP # __________ **AVERAGE GPM __________**

VII. COVERT ALARM SYSTEM

A. Do latches on control panel work smoothly? **Yes ( ) No ( )**

B. Code Indication - Functioning

1. Pump overload trip **Yes ( ) No ( )**

2. Wet well high water **Yes ( ) No ( )**

3. Dry Pit high water of submersible seal failure **Yes ( ) No ( )**

4. Power failure **Yes ( ) No ( )**

5.	**Open**	**Yes ( ) No ( )**
6.	**Restore to Normal**	**Yes ( ) No ( )**
7.	**Low Battery**	**Yes ( ) No ( )**

Remarks:_____
_____
_____
_____
_____

VIII. EQUIPMENT

	MANUFACTURER	**MODEL**	**SIZE**	**SERIAL NO.**
A. PUMPS	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
B. MOTORS	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
C. PUMP CIRCUIT BREAKER	_____	_____	_____	_____
D. STARTERS	_____	_____	_____	_____
E. HEATERS	_____	_____	_____	_____
F. CONTROL CIRCUIT BREAKER	_____	_____	_____	_____
G. REMOTE MONITOR CIRCUIT BREAKER	_____	_____	_____	_____
H. ALTERNATOR	_____	_____	_____	_____

I. HOA SWITCHES	_____	_____	_____	_____
J. PLUG VALVES	_____	_____	_____	_____
K. CHECK VALVES	_____	_____	_____	_____
L. OTHER	_____	_____	_____	_____
1._____	_____	_____	_____	_____
2._____	_____	_____	_____	_____

Remarks:_____

_____

_____

_____

END OF SECTION 9

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q= 0.0015

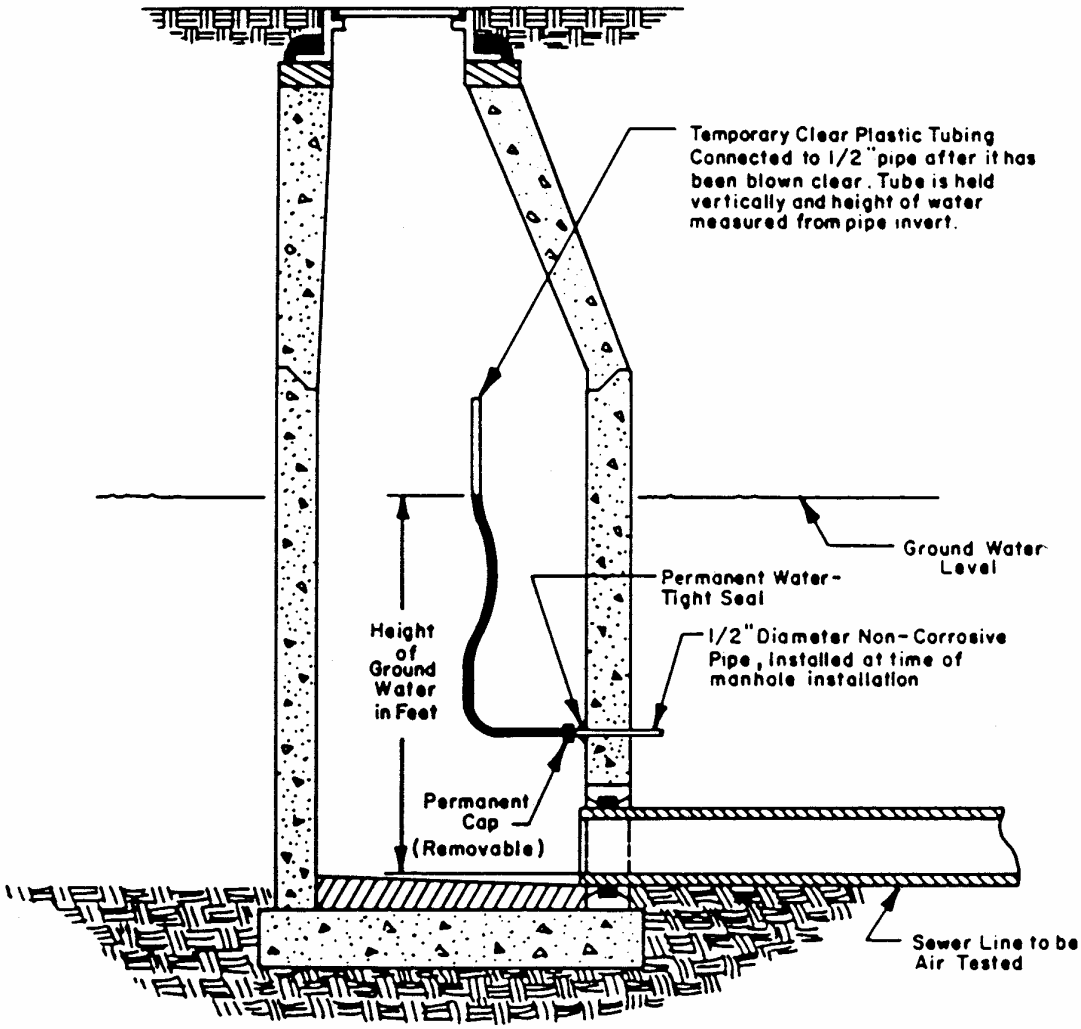
1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.036 L	28:51	43:16	57:41	72:07	86:32	100:47	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table 9.1A

SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q= 0.0015

1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

Table 9.1B



MANHOLE FOR DETERMINING GROUND WATER HEIGHT

FIGURE 9-1

AIR TEST DATA SHEET

Owner (Name of city, District, etc.) _____ Test No. _____

Identification of Pipe installation (Job name, location, contract number, etc.)

_____

Field Test Data: (To be filled in by the inspector)

Date: _____ Specified Maximum Pressure Drop: _____ psig.

Identification of Pipe Material Installed _____

Pipe Under Test					Field Test Operations Data					
Upstream MH sta #	Downstream MH sta #	Dia. D (in)	Length L (ft)	Specification Time (min:sec)	Pressure initially Raised to (psig)	Time Allowed for Pressure to stabilize (min)	Start Test Pressure (psig)	Stop Test Pressure (psig)	Elapsed Time (min:sec)	Pass or Fail (P or F)

Inspector's Name and Title: _____

Signature of Inspector: _____

If a section fails, the following items should be completed:

Identify section(s) that failed: _____

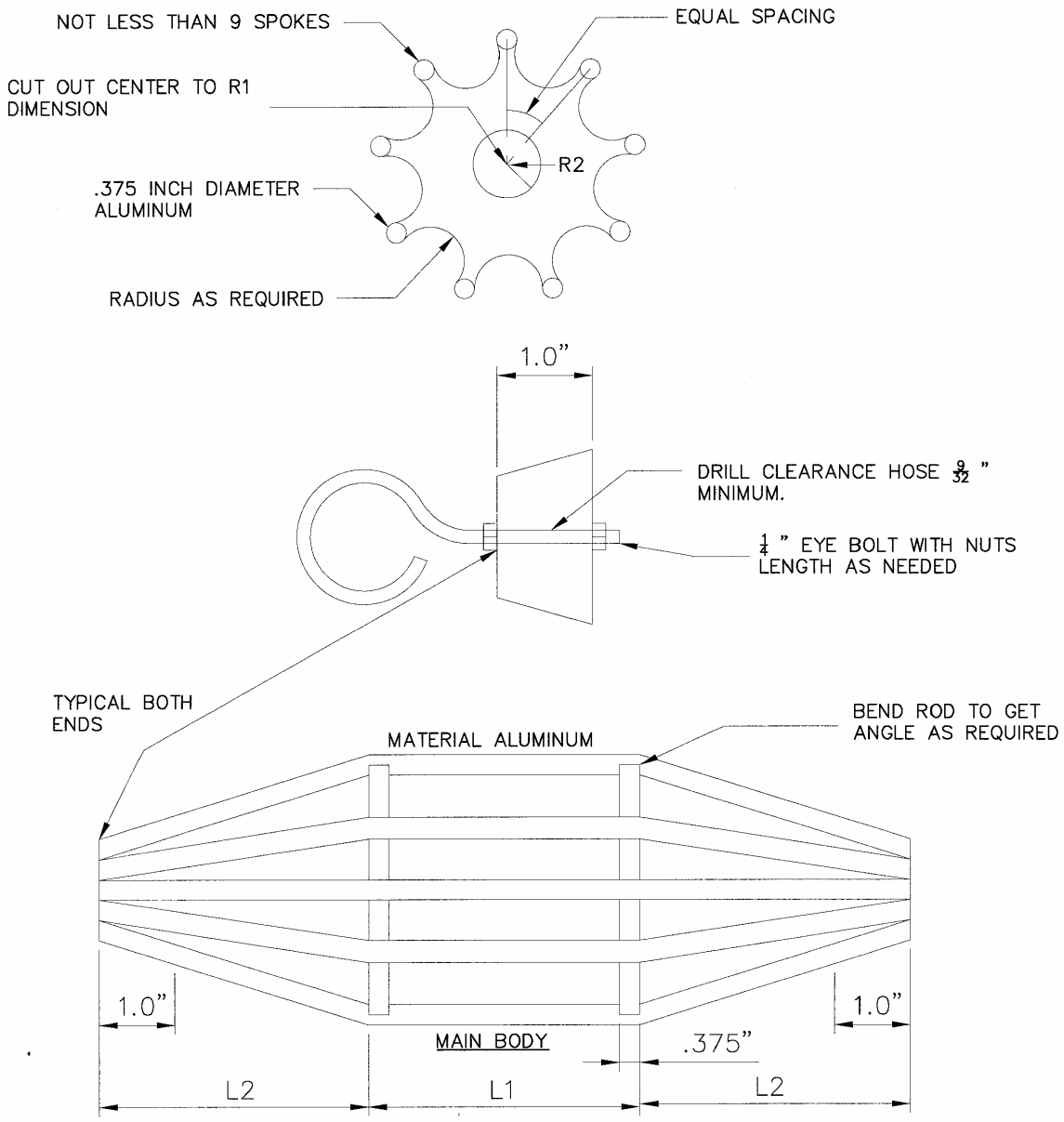
Leak (was) (was not) located. Method used: _____

Description of leakage found: _____

Description of corrective action taken: _____

For test results after repair refer to Test No. _____, Inspector _____

Figure 9-2



5% NO GO DEFLECTION GAUGE

PIPE SIZE	L1	L2	PVC R1	ABS TRUSS R1	R2
8″	6″	6″	3.69″	3.10″	1.25″
10″	8″	8″	4.60″	4.66″	1.50″
12″	8″	8″	5.49″	5.61″	1.75″
15″	9″	9″	6.72″	7.18″	2.00″

FIGURE 9–3

SECTION 10 - LIFT STATIONS

10.01 GENERAL

This Section pertains to the requirements for the design and construction of submersible type lift stations, which are the primary type constructed as part of private development. Wet well/dry pit stations are acceptable, and their design and approval will be handled on a case-by-case basis.

Lift stations meeting or exceeding the requirements set herein will be approved. Any proposed alteration of the lift station dimensions, equipment, controls, etc. from the standards set forth herein will be approved only upon the submittal of plans and specifications of the proposed changes to the District, and upon the District's written approval.

Lift Stations, in general, shall be submersible type including a minimum of two (2) pumps and motors of minimum pumping capacity of 100 gpm under site operating conditions, wet basin, separate valve pit, valves, piping, hatches, guide rails, pump removal components, control center, float switches, remote monitor package, interconnecting electrical wiring, incoming power and radio supply, and all other features regularly and normally required as a part of a complete and functional facility. All work shall be in accordance with site requirements, details in the Plans, these Standards and the manufacturer's recommendations.

All Lift Stations shall be designed for and operate on three (3) phase power. No deviation from this requirement shall be permitted without the express prior written approval of the District.

10.02 GENERAL REQUIREMENTS

A. All of the mechanical and electrical equipment shall be an integral package supplied by the pump manufacturer with local representation so as to provide undivided responsibility. The package shall be equal in construction and performance to Hydromatic Pump equipment and other specific requirements set forth herein and in the approved plans.

B. The Contractor shall submit to the District for review and approval three (3) sets of shop drawings, detailed specifications, pump warranty and performance characteristics for all of the equipment and fixtures to be furnished and installed.

The Shop Drawings and equipment data shall be submitted with a cover letter or Contractor's stamp of approval, indicating that he has reviewed, checked and approved the data submitted. The District will review the submittal and render a decision in writing as to the acceptability of the equipment. Without prior written District approval, the item of work may not be accepted.

C. Any exceptions to this Standard or associated approved Plans shall be submitted in writing and clearly stated. The exceptions must be approved by the Engineer and the District prior to proceeding with the work.

D. All components of the lift station that are exposed to weather shall be constructed of material that is resistant to corrosion and will not require surface protection throughout the expected life of the lift station. In general, these materials are stainless steel, aluminum, Fiberglas reinforced polyester (FRP) and ultraviolet stabilized PVC. All control panels disconnect enclosures, and fittings must be constructed of stainless steel.

E. The lift station wetwell and valve vault structures must include external waterproofing and internal corrosion resistant lining. See section 10.05 for more details.

F. All valves and piping less than 4" diameter, coming in contact with sewage or installed in the pump or valve chambers shall be stainless steel or brass. All valves and piping of 4' diameter or greater coming into contact with sewage or installed in the pump or valve chambers shall be coated with 14 mil coal tar epoxy. Stainless steel or brass fasteners shall be used in all cases.

G. All lift station control panels and antenna must be connected to an adequately sized and installed grounding rod to provide lightening protection. A separate grounding rod is to be used for each component which is to be protected from lightning.

*See Section 9 for information regarding Testing of Lift Stations and 4.04B for economic Analysis of Lift Station.

10.03 OPERATING CONDITIONS

The characteristics and operating conditions of the lift station and pumps shall be provided in detail as part of the ENGINEER'S design and submitted for approval to the District.

Prior to installation the Contractor shall submit the following information for each pump to the District for review and approval:

A. Pump capacity in gallons per minute;

B. Total dynamic head (TDH) and operating RPM;

C. Motor horsepower;

D. Motor rpm;

E. Motor voltage, phase and cycle;

F. Make and model number; and

G. Pump curves for the pumps to be provided.

10.04 PUMPING EQUIPMENT

A. Pumps shall be of the submersible type for handling raw unscreened sewage. Pump volute, motor and seal housing are to be high quality gray cast iron. Impeller shall be either cast iron or cast bronze of a non-clog design capable of handling minimum three (3) inch sphere solids, fibrous material, heavy sludge, and other matter found in normal sewage applications. Impeller shall have pump out vanes on the back shroud of the impeller to keep pumped material away from the seal area and increase operating life. Impeller shall be either slip fit or taper fit with key to securely lock the impeller to the driving shaft. The pump volute shall be fit with a replaceable bronze wear ring to minimize wear on the impeller and help achieve longer balanced operating life. All fasteners shall be of stainless steel.

B. All mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber o-rings. Sealing shall be accomplished when metal-to-metal contact is made, resulting in controlled compression of the rubber o-rings without requirements of a specific torque limit.

C. The pump shall be provided with a mechanical rotating shaft seal system running in an oil reservoir having separate, constantly lubricated lapped seal faces. The lower seal unit between the pump and oil chamber shall consist of one (1) stationary seat and one (1) rotating ring held in place by its own spring. The lower seal shall be removable without disassembling the seal chamber. The upper seal between the motor and the seal chamber shall be of the same design with its own separate spring system. The seals shall require neither maintenance nor adjustment, but shall be easily inspected and replaceable.

Shaft seals with conventional double seal utilizing a single spring between the two (2) seals and requiring a pressure differential to offset external pressure shall not be considered acceptable nor equal to the dual independent seal system specified. The shaft sealing system shall be capable of operating submerged to pressures equivalent to two hundred (200) feet. No seal damage shall result from operating the pump unit out of its liquid environment. The seal system shall not rely upon the pumped media for lubrication.

The seal chamber shall also be equipped with a seal failure sensor probe which will sense water intrusion through the lower seal. This sensor is to be connected to an alarm in the control panel to indicate lower seal failure.

D. The stator winding, rotor and bearings are to be mounted in a sealed submersible type housing. Insulation utilized in the stator windings shall be Class F with maximum temperature capability of $155\ ^{0}$ C. Motor housing shall be filled with a high dielectric oil to give superior heat transfer and allow the bearing to run in a clean, well lubricated environment; or the housing shall be air filled with grease lubricated bearings.

The pump and motor are to be specifically designed so that they may be operated partially or completely submerged in the liquid being pumped. The pump should not require cooling water jackets. Stator shall be securely held in place with a removable end ring and threaded fasteners so that it may be easily removed in the field without use of heat or press.

Shaft shall be of stainless steel and supported by ball bearings. Motor shall be provided with heat sensing units attached to the motor windings which shall be connected to the control panel to shut down pump if overheating occurs.

E. Pump motor cable and heat sensor/seal failure sensor cable shall be suitable for submersible pump applications and this shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC specifications for pump motors and shall be of adequate size to allow motor voltage conversion without replacing the cable. Cable of the proper length shall be provided to eliminate need for splices or junction boxes between pump and the "control center." The cable shall enter the motor through a cord cap assembly which is double sealed allowing disassembly and disconnect of the wires and the motor and still not damage the sealed characteristics of the motor housing. Each individual conductor shall be color coded in accordance with generally accepted industry standards. The color coding shall designate the application of the conductor.

F. The pump mounting base shall include adjustable guide rail supports and a discharge connection with a one hundred twenty-five (125) pound standard flange. The base and the discharge piping shall be permanently mounted in place. The anchors with stainless steel studs and nuts as manufactured by HILTI Fasteners, Inc. or equal.

G. A rail system shall be provided for easy removal of the pump and motor assembly for inspection and service. The system shall not require a man to enter the wet well to remove the pump and motor assembly. Two (2) rails of two (2) inch stainless steel pipe or one rail of Fiberglas reinforced plastic (FRP) I-Beam shall be provided for each pump. The guide rails shall be positioned and supported by the pump mounting base. The guide rails shall be aligned vertically and supported at the top by attachment to the access hatch frame. One (1) intermediate guide rail support is required for each fifteen (15) feet of guide rail length for stainless steel pipe and one for each nine (9) feet of guide rail length for FRP I-Beam rail.

H. The pumps shall be equipped with sliding brackets or rail guides. To ensure easy removal of the pumps, the rail guides attached to each pump shall not encircle the rails. A stainless steel lifting chain or manufacturer's pump removal system (similar to the Flygt Lift) of adequate length for the basin depth shall be provided for each pump. Each pump shall be equipped with a permanent, stationary lifting handle with a minimum clearance of 12" between the top of pump and bottom of handle.

I. The rails and the rail guides shall function to allow the complete weight of the pumping unit to be lifted on dead center without binding and stressing the pump housing. The rail system shall function to automatically align the pumping unit to the discharge connection by a simple downward movement of the pump. No twisting or angle approach will be considered acceptable. The actual sealing of the discharge interface may be of the hydraulically sealing diaphragm type assembly with removable Buna-N diaphragm as supplied by Hydromatic Pump.

J. Pump warranty shall be provided by the pump manufacturer and shall warrant the units being supplied to the Owner against defects in workmanship and materials for a period of five (5) years under normal use, operation and service. The warranty shall be in printed form and apply to all similar units. A copy of the warranty statement shall be submitted with the approval drawings.

10.05 BASIN, VALVE PIT AND ACCESSORIES

A. The basin and valve pit are to be constructed of precast concrete meeting the requirements of ASTM C-478. Cast-in-place monolithic structures may be substituted with the prior written approval of the District. Minimum valve vault and wet well diameter shall be 6' - 0". The actual arrangement of the structures is to be as shown in the approved Plans. The wet well basin top shall be provided with a four(4) inch PVC vent having a downward pointing inlet and screen over the inlet opening and a 4" PVC by-pass pipe to be within one (1) foot of bottom of wet well and to have an adapter on top of wet well. Adapter to meet District by-pass pump connection.

B. The basin, valve pit, flat tops and base slabs are to be constructed of precast reinforced concrete manhole sections conforming to ASTM C-478. All joints between precast sections shall be made with an approved rubber o-Ring in accordance with ASTM C-443 and a 1/2 inch diameter non-asphalt mastic conforming to AASHTO M-198 and federal Specification SS-521-A. The inside of the wetwell is to be coated with an internal corrosion resistant liner which should consist of either a primer coat of Aquatapoxy A-10

followed with two coats of Raven 405 liner, SPECTRASHIELD multi-component stress skin panel wetwell liner system or equal epoxy coating system. In addition, the outside wall below grade is to be coated with bituminous waterproofing material. The top and bottom of the chambers shall be precast or may be poured in place concrete if approved by the Engineer and the District.

C. The wet well pump basin and the valve pit chamber shall be enclosed at grade level with a reinforced concrete pad rectangular in shape and extending a minimum 1' - 0" from the chambers outside diameter.

D. The Lift Station shall be provided with an access drive to the nearest public right-of-way conforming to the latest DOT Standards for Design of Driveways. The District will determine final surface materials.

E. The pump supplier shall provide an aluminum two (2) door access hatch frame and door assembly to be installed in the concrete basin top. This door assembly shall provide access for removal of the pumps and shall support the guide rails. The doors shall be provided with lifting handle, safety latch to hold door in the open position and a hasp suitable for padlock. The doors shall have a nonskid finish and be designed for light, medium or heavy duty, depending on the location of the pumping station. Minimum opening for the wet well entry shall be thirty-six (36) inches by thirty-six (36) inches.

F. An aluminum single door access hatch frame and door assembly similar to the one described above shall be provided for use as entry to the valve pit. Minimum opening for the valve box entry shall be thirty-six (36) inch by thirty-six (36) inch.

G. A swing flex check valve and an eccentric plug valve shall be installed in the valve pit in each pump's discharge piping. A minimum clearance of twelve (12) inches shall be allowed from the bottom of the valves to invert of the pit. A drain pipe and check valve or gate valve shall be installed to drain the valve pit back to the wet basin but not allow the wet basin liquid to enter the valve pit. In addition, a tee or cross with bleedable blind flange shall be provided in the valve vault.

H. All padlocks are to be keyed to District specifications.

10.06 DISCONNECT SWITCH

A. A single main fusible or breaker disconnect switch of adequate size to provide power for the "control center" and its related components shall be provided by the Contractor.

B. The disconnect switch shall be housed in a NEMA 4X stainless steel enclosure with an external operation handle capable of being locked in the ON and OFF position.

10.07 CONTROL CENTER

A. The control center shall be built in a NEMA 4X stainless steel enclosure and shall be suitable for the specified horsepower and voltage for the pumping equipment. The outer door of the panel shall be hinged dead front with provisions for locking with a padlock. Inside shall be a separate hinged panel to protect all electrical components. H-O-A switches, run lights, circuit breakers, etc. shall be mounted such that only the faces protrude through the inside swing panel and no wiring is connected to the back side of the inside swing panel.

B. A circuit breaker and magnetic starter with three (3) leg overload protection and manual reset shall be provided for each pump. Starters shall have auxiliary contacts to operate both pumps on override condition. A separate circuit breaker shall be supplied for power to the control circuit. The control center shall include an extra circuit breaker of adequate size to provide 115 volt, single (1) phase power for the remote monitor panel. The control center shall include a control voltage transformer to reduce supply voltage to 115 volt, single (1) phase to be used for all control functions except the float circuit and associated relays which shall be provided with 24 volt control voltage. An alternating relay shall be provided to alternate pumps on each successive cycle of operation. A green run light and H-O-A switch shall be provided for each pump. A terminal strip shall be provided to make field connections of pump power leads, float switches, seal sensor leads, heat sensor leads, and remote monitor panel interconnections.

C. A time delay relay shall be provided to delay start of second pump should power outage occur.

D. The control center shall incorporate connections for heat sensors which are installed in the pumps. The connection shall disconnect the starter upon high temperature signal and will automatically reconnect when condition has been corrected.

E. The control center shall incorporate connections for seal failure sensors which are installed in the pumps. The panel will have a seal failure alarm light for each pump. This alarm indicates failure of the lower mechanical seal in the pump. This will be an alarm light only and will not shut down the pump.

F. The control center shall include an hour meter for each pump to register the elapsed operating time of each pump.

G. The control center shall have a high water alarm built into the main enclosure. The high water alarm shall consist of a flashing alarm light with red Lexan plastic cover or red glass globe with metal guard mounted on top of the enclosure. A push to test horn and light button as well as a push to silence horn button shall be provided and mounted on the side of the enclosure.

H. The control center shall include a condensate heater to protect against condensation inside the enclosure. The heater shall be placed so as not to damage any other component or wiring in the control center.

I. The control center shall include lightning protection and a phase monitor relay to shut down the control circuit and protect the equipment due to loss of phase or phase reversal. The three phase sequence voltage relay shall be of the 8-pin connector type.

J. The control center shall incorporate an alternator selector switch to allow selection of automatic alternation or manual selection of the lead pump.

K. The control center shall include a GFI convenience outlet with 20 amp breaker and suitable transformer or power supply to provide 110 volt single (1) phase power to the convenience outlet.

L. The control center shall be suitable for connection to a remote monitor package as described in the section titled “Remote Monitor Package.” The main control must include the following interconnection capability:

1. Circuit breaker to power remote monitor panel as described above.

2. Relay contact to signal high water alarm.

3. Relay contact to signal tripping of the overload of any of the pumps.

4. Relay contact to transmit signal of seal failure or heat sensor trip of any of the pumps.

5. Relay contact for pump run and pump call.

6. Relay contact for power failure.

M. A minimum four (4) inch PVC Schedule 40 wall conduit shall be provided from the wet well basin to the control center which will allow the pump power cables, transducer cable or probe cables to be pulled through without difficulty and allow the use of one (1) piece cables from the pumps and level control switches to the control center. The conduit shall be sealed at the control center to avoid entrance of sewer gases into the control panel.

JUNCTION BOXES SHALL NOT BE USED.

N. The control center and associated components shall be mounted on a non-maintenance type pedestal or mounting stand constructed of aluminum. The control center shall be located so as to provide safe access to the panel while wet well hatch doors are open, and shall be positioned so as not to be between the access drive and the wet well.

O. All components of the control Center shall be American made and available from local sources. In particular, items such as circuit breakers, overload protection, relays, etc. shall be available and in stock by local sources.

P. In order to maintain unit responsibility and warranty on the pumping equipment and control center, the control center must be accepted in writing by the pump manufacturer as suitable for operation with the pumping equipment.

Q. The contractor shall furnish an emergency power disconnect with double throw capabilities.

10.08 LEVEL CONTROL

A. ELECTRONIC LEVEL CONTROL SWITCHES

1. Transducers

2. Probe

10.09 SYSTEM OPERATIONS

A. On sump level rise, the first level switch shall energize the pump call relay. The second level switch shall start the lead pump, with the lead pump operating thelevel shall drop to the first level switch and shut off the lead pump. The alternating relay in the control center shall index on the stopping of the pump so that the lag pump will start on the next operation. If the level continues to rise with the lead pump operating the override switch shall energize and start the lag pump.

Both lead and lag pump shall operate together until the lower level switch turns off both pumps. If the level continues to rise with both pumps running the alarm level switch shall energize and signal the alarm. If one pump should fail for any reason, the second pump shall operate on the override switch. All level switches shall be adjustable from the surface.

10.10 REMOTE MONITOR PACKAGE

A. The station shall be equipped with a remote monitor capable of monitoring the status of the lift station and communicating with the District's existing alarm system house at the Main Office, FCRWD. The monitor shall include an eight (8) channel digital communicator with a gel battery, a terminal strip for connection to lift station control center circuits, a thermostatically controlled heater and connections to AC power and a radio. The monitor package is to be built in a NEMA 4X stainless steel enclosure. The District's central receiver is an Aquatrol 1300 and the remote test central console is a Pro Soft 2000. To assure compatibility with the existing system, the remote monitor shall be an Aquatrol with 1300 remote.

B. The Remote Monitor shall monitor:

1. High water alarm,
2. Power failure,
3. Pump fail,
4. Signal of seal failure or heat sensor trip of any of the pumps,
5. Pump run,
6. Pump call,
7. Station identification, and
8. One open channel.

The Remote Monitor shall provide for phase monitor protection in that it shall continuously check for undervoltage (less than 90% of the normal setting) or loss on one of the three phases or improper phase sequence. Upon detecting one of the above conditions, the unit will generate a code (power failure) alarm.

Each circuit shall use two relays. Each relay shall be wired to an individual pump to remove the shock hazard. Bypass switches shall be installed for each relay so that when a pump is removed for service, the circuit can be bypassed to allow monitoring the status of the remaining pump. Switches will be labeled PUMP 1 ALARM BYPASS and PUMP 2 ALARM BYPASS. A relay and control switch shall be provided to the Pump Running signal to implement pump on/off cycle studies.

Turning the switch on at a station will cause the station to signal the computer as the pumps cycle on and off so that the computer may log the time on and off for later analysis.

C. The Contractor shall install the monitor and coordinate testing with Sewer Maintenance Control Center to assure that the remote monitor reports the proper outputs prior to final acceptance of lift station.

10.11 ON-SITE EMERGENCY POWER GENERATOR

A. Provisions for emergency standby power shall be provided at each lift station site unless otherwise indicated by the District. The station shall be equipped with an onsite permanent generator that meets the following requirements:

1. Emergency Generator shall be totally automatic and shall include all automatic transfer switches and other components necessary for automatic operation.

2. Housing for the emergency generator shall be a heated and insulated weatherproof enclosure.

3. Automatic transfer switch must be enclosed in a NEMA 4x rated enclosure.

4. A residential type silencer must be provided to minimize noise from the emergency generator. Noise levels shall no exceed 80 decibels.

5. Emergency generator shall be diesel fueled and be equipped with a 24-hour fuel tank.

6. Generator shall be sized to run all pumps at the pump station simultaneously

7. Acceptable emergency generator manufacturers: Cummins, Caterpillar, Kohler, or approved equal.

8. Supplier must have a complete service and parts facility within a 60 mile radius and provide 24 hour service.

9. A two (2) year warranty must be provided to guarantee against defective parts or workmanship. The warranty shall cover 100% of all parts and labor.

10. The generator, diesel engine, and radiator shall be painted the engine manufacturer’s standard color.

10.12 OPERATION AND MAINTENANCE MANUALS

A. Four (4) operation and maintenance manuals shall be submitted to the District.

B. Manuals shall include at a minimum:

1. Operation instructions;

2. Maintenance instructions;

3. Recommended spare parts list;

4. Lubrication schedules;

5. Structural diagrams;

6. As-built wiring diagrams; and

7. Bill of materials.

10.13 SPARE PARTS

A. The Contractor shall supply one set of spare parts for each station, including at a minimum the following:

1. Impeller;

2. Upper seal assembly;

3. Lower seal assembly;

4. Upper bearing assembly;

5. Lower bearing assembly;

6. Wear rings; and

7. O-Rings and gaskets (two (2) sets).

10.14 NOTES TO DESIGN ENGINEER

A. SIZING OF WET BASIN

1. The wet well storage below the lowest inlet shall be a minimum of 5’0”and shall also meet the following criteria;

a. Pump Level to be set at the pump manufacturer’s recommended level but no less than 1’0” from the bottom of the wet well.

b. The distance between the pump off level and the lead pump on level shall be set to provide storage capacity equal to:

$$\frac{15 \times \text{RATED PUMP GPM}}{4 \text{ (I.E. 15 MINUTE CYCLE MINIMUM}}$$

c. The lag pump on level shall be set a minimum of 6” above the lead pump on level and a minimum of 6” below the lowest inlet invert.

d. The high water alarm level shall be set a minimum of 6” above the lag pump on level and a minimum of 6” below the lowest inlet invert.

e. All levels shall be set below the lowest inlet invert.

B. STATION WARRANTY

Station warranty shall be three (3) years from the date of acceptance per District maintenance bond requirements.

10.15 SMALL DIAMETER PRESSURE SEWER SYSTEMS

A. GENERAL

1. Small diameter pressure sewer systems incorporating the use of individual home grinder pump units will be allowed on a case-by-case basis subject to the written approval of the District and the Indiana Department of Environmental Management. In general, these systems shall only be considered in areas where the surrounding areas are currently served by sanitary sewers and the site can not be sewered by gravity.

2. The maintenance of the grinder pump station and building force main to the point of connection with the collector force main shall be the responsibility of the homeowner. The District shall only be responsible for the maintenance of the collector force main.

3. The redundant check valves for use as a curb stop shall be a brass McDonald swing check valve model 3101. The curb stop shall be located in the right-of-way. The vault for the curb stop (See Figure 10.2) shall be a 30-inch diameter Sono-Loc, Hi Corr or approved equal corrugated pipe section with an East Jordan Inc. Type 2800, Neenah R-5900-G, or approved equal cover and frame that reads "SEWER"

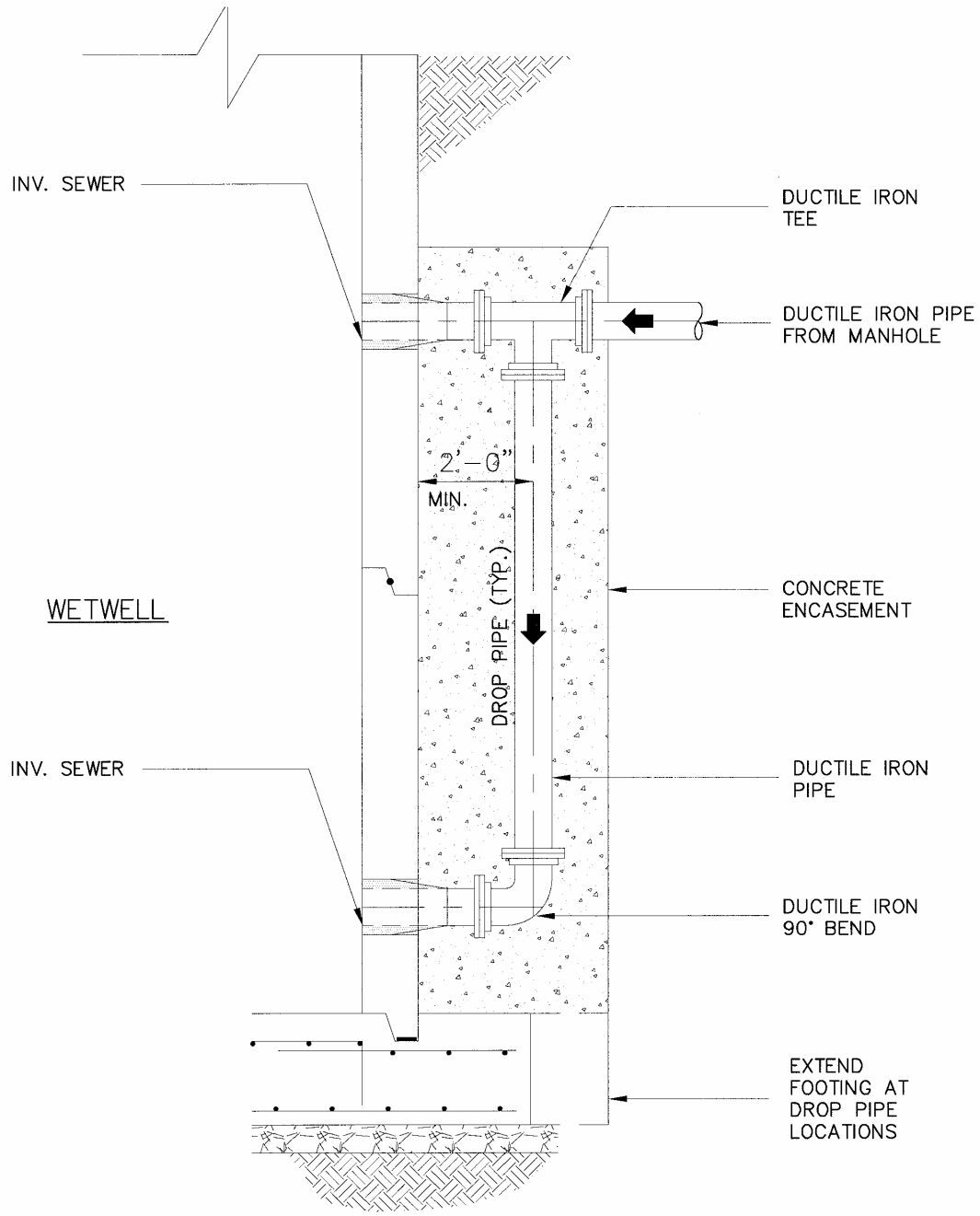
4. All of the mechanical and electrical equipment shall be an integral package supplied by the grinder pump manufacturer with local representation so as to provide undivided responsibility. The package shall be equal in construction and performance to F.E. Myers WG20 Grinder Pump Model and other specific requirements set forth herein and in the approved plans.

5. The Contractor shall submit to the District for review and approval three (3) sets of shop drawings, detailed specifications, pump warranty performance characteristics, and design calculations for all of the equipment and fixtures to be furnished and installed.

6. The Shop Drawings and equipment data shall be submitted with a cover letter or Contractor's stamp of approval, indicating that he has reviewed, checked and approved the data submitted. The District will review the submittal and render a decision in writing as to the acceptability of the equipment.

7. Any exceptions to this Standard or associated approved Plans shall be submitted in writing and clearly stated. The exceptions must be approved by the Engineer and the District prior to proceeding with the work.

END OF SECTION 10



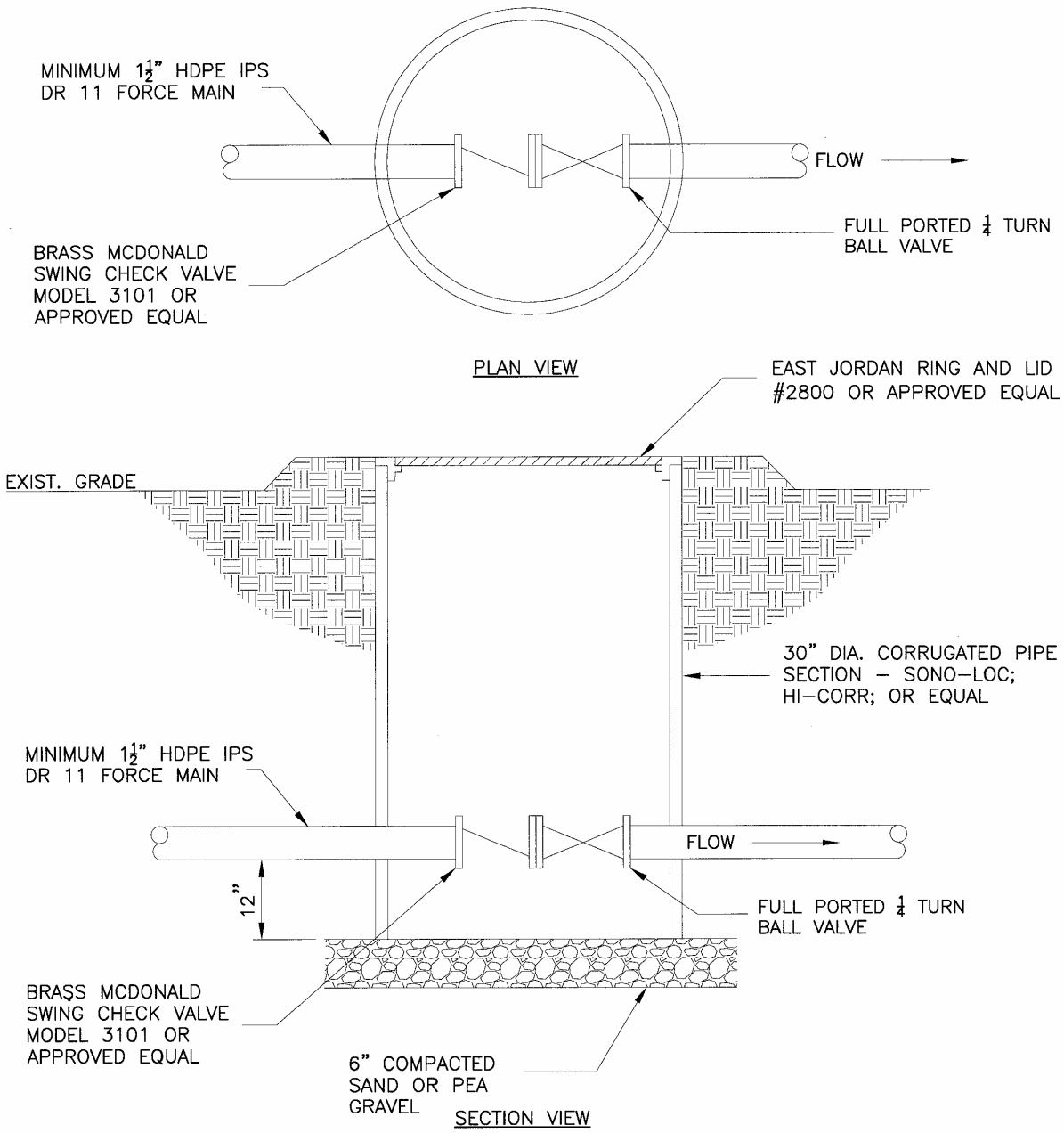
DETAIL - PIPE CONNECTIONS TO THE WETWELL STRUCTURE

SCALE: N.T.S.

CONNECTION DETAIL NOTES:

1. DUCTILE IRON PIPE IS THE ONLY ACCEPTABLE PIPE FOR THE OUTSIDE DROP CONNECTION TO THE WETWELL.
2. DUCTILE IRON PIPE MUST BE USED THE ENTIRE LENGTH FROM THE UPSTREAM MANHOLE TO THE WETWELL.
3. CONCRETE ENCASEMENT MUST BE A MINIMUM OF 3000 PSI STRENGTH CONCRETE.
4. ALL PIPE CONNECTIONS TO WETWELL STRUCTURE MUST ADDRESS BOOT INVERSION. (SEE SECTION 5.04.M)

FIGURE 10–1



DETAIL - STANDARD SERVICE CONNECTION VALVE VAULT

SCALE: N.T.S.

STANDARD SERVICE CONNECTION VALVE VAULT NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING VALVE VAULT OVERALL HEIGHT (MIN. 5'–0" FROM TOP OF FORCEMAIN) WITH RESPECT TO FORCEMAIN CENTERLINE TO FACILITATE COMPLETE EQUIPMENT INSTALLATION.

FIGURE 10–2

SECTION 11 - BORING AND JACKING

11.01 GENERAL BORING

A. The work covered by this section includes furnishing all labor, equipment and materials required for the boring and jacking of carrier pipe under highways and/or other locations. Figure 11/1 shows details for Railroad and Highway Boring.

B. Ductile iron pipe (AWWA C151, latest revision), cast iron pipe (AWWA C106, latest revision) or RCP (ASTM C76) shall be used as a carrier pipe. Casing pipes shall be per ASTM A139 Grade B.

11.02 GENERAL EXECUTION:

A. The Owner or Contractor shall make arrangements with all governmental and other parties affected by the work in sufficient time for each to take appropriate action to ensure successful and timely completion of boring and jacking operations. The Owner or Contractor shall pay all costs involved.

NOTE: The District is not responsible nor will it make arrangements to obtain permits from other governmental agencies.

B. The Contractor shall accomplish the boring and jacking operations in accordance with all applicable requirements of owners of roads, railroads, utilities and private property encountered in the work.

C. Use of materials and detailed method of installation shall be per these Standards or the project technical specifications and drawings approved by an Indiana Registered Professional Engineer.

D. Contractor shall submit to the District for review details giving locations and size of the shaft, pit or approach tunnel and the method and equipment to be used. Location of shaft, pit or approach tunnel shall not interfere with traffic or adjacent property.

11.03 INSTALLATION

A. General Requirements. An approach trench shall be dug at the forward end of the proposed pipe to a depth sufficient to from a vertical face at least one foot higher than the top of the pipe and large enough to provide ample working room. The size and height of this vertical face may be varied, but in all cases the roadbed and shoulders shall be adequately protected.

After the pipe is installed, the excavated area not occupied by the pipe shall be backfilled with suitable material and thoroughly compacted into place.

Sheeting and bracing of work pits shall be provided if the nature and conditions of the soil or height of exposed faces is such as to endanger either the traveling public or the integrity of the road surfacing (See Section 6.03). Pit construction is to comply with all provisions, requirements and latest revisions of Federal Occupational Safety & health Act of 1970.

When ground water is know or anticipated, a dewatering system of sufficient capacity to handle the flow shall be maintained at the site until their operation can be safely halted. The dewatering system shall be equipped with screens or filter media sufficient to prevent the displacement of fines.

Jacked pipe shall be so constructed as to prevent leakage of any substance from the pipe throughout its length. Installation by open-trench methods will be permitted only at locations indicated and shall comply with the applicable specifications for that type of installation. Jacked pipe shall be installed by the following methods:

1. Jacking. This method shall consist of pushing welded steel pipe as the carrier pipe into the embankment.

   All pipe shall be handled, unloaded and stacked so as to prevent any damage to the joints of the pipe.

   Excavation shall be undertaken within a steel cutting edge or shield attached to the front section of pipe to form and to cut the required opening for the pipe. Excavation shall be undertaken within the shield and shall not be carried ahead of the pipe far enough to cause loss of soil. When jacking in loose, granular, or running soils, the shield shall have means for inserting steel baffle plates and shelves for the purpose of preventing voids.

   The Contractor's superintendent and/or engineer experienced in pipe-jacking techniques shall be present at all times while work is proceeding and shall be responsible for checking the line and grade.

   The thrust wall shall be adequate for installation of the jacked pipe. It shall be constructed normal to the proposed line of thrust.

   The Contractor shall use jacking equipment which is designed to provide the forces necessary for installation of the pipe. The thrust load shall be imparted to the pipe through a suitable thrust ring which shall be sufficiently rigid to ensure distribution of the load without creating point loading.

   When necessary to prevent loss of soil at the heading, the face of the excavation shall be adequately bulkheaded when work is shut down at the end of the working day.

   All jacking pipe shall have accompanying design data of diameter, wall thickness, joint design, circumferential reinforcement and additional joint reinforcement and steel placement. Shop drawings showing this information shall be submitted to the Engineers for their approval, before any materials are shipped to the site.

2. Boring. This method shall consist of pushing the pipe into the fill with a boring auger rotating within the pipe to remove the spoil. Advancement of the cutting head ahead of the pipe will not be permitted except for that distance to permit the cutting head teeth to cut clearance for the pipe. In the event granular, loose or unstable soil is encountered during the boring operation, the cutting heads shall be retracted into the casing a distance that permits a balance between pushing pressure and the ratio of pipe advancement to quantity of spoil to assure no voiding is taking place. The excavation by the cutting head shall not exceed the

outside diameter of the pipe by more than 1/2 inch. The face of the cutting head shall be arranged to provide reasonable obstruction to the free flow of soft or porous material.

The use of water or liquids to soften or wash the face will not be permitted. Water may be used in sticky clays to facilitate spoil removal providing water is introduced behind the cutting head. Lubricating agents, such as bentonite, may be used to lubricate the casing and reduce friction between casing and embankment.

Bored or jacked installations shall have a bored hole essentially the same as the outside diameter of the pipe. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe by more than approximately one inch, grouting or other approved methods shall be employed to fill such voids.

B. If an obstruction that stops progress of pipe is encountered during installation, the cause of stoppage shall be determined, and when the cause is identified, the installation method shall be modified to best suit the conditions encountered, except that line and grade may not be changed. Before proceeding, the Contractor shall notify the Engineer in writing of the difficulty, diagnosis and proposed procedural modification. If the Contractor proposes abandonment of in-place piping and initiation of a new attempt at an alternate location, such a proposal will be considered only under condition that:

1. The Contractor assures the District, in writing, that he will perform all proposed work in compliance with applicable laws, regulations and ISHD and AREA or other industry or trade standards (he shall cite standards) that govern the activities he proposes.

2. In-place pipe will be left in place, filled with grout; stymied pipe shall not be withdrawn and reused in a subsequent attempt.

3. The site of abandonment will be restored to a condition equal to that prior to start of work.

4. All shifts in alignment necessary to accommodate the proposed relocation shall be included and no deviation from designated grade shall be made.

5. The Contractor submits to the District, prior to commencement of work, sufficient drawings, calculations and other supporting data, bearing the seal of a Professional Engineer registered in the State of Indiana, to enable the District to judge the acceptability of the proposed work.

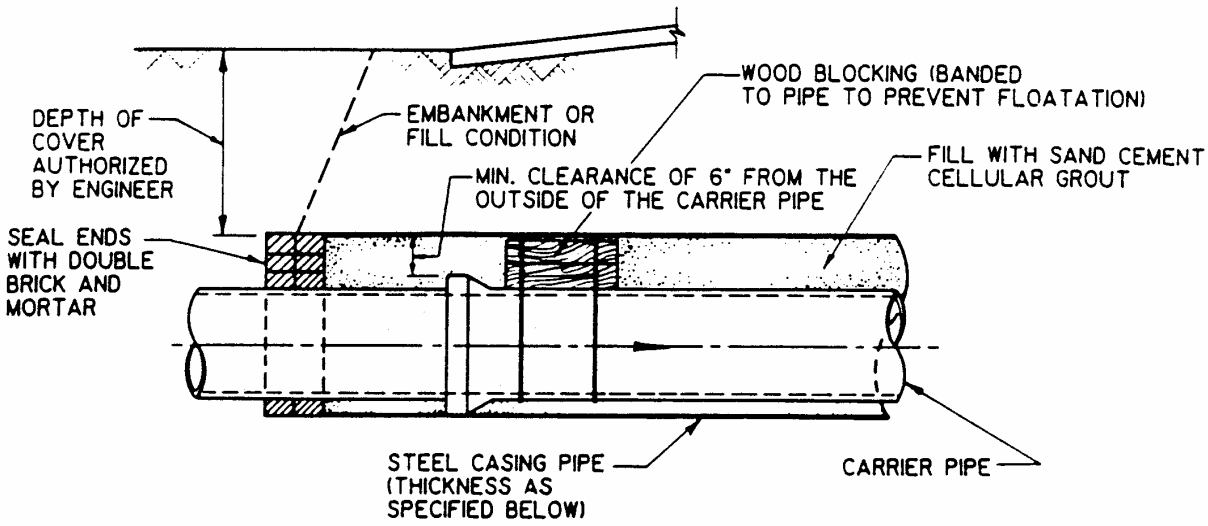
C. Pressure grouting of the soils, or freezing of the soils before jacking or boring may be appropriate to stabilize the soils, control water, prevent loss of material, and prevent settlement or displacement of embankment. Grout shall be cement chemical, or other special injection material selected to accomplish the necessary stabilization. All materials and methods for injection shall be as developed by a Registered Professional Soils Engineer and by an experienced and qualified company specializing in this type of work. If injection will be used in the work, the Contractor shall submit the proposed plan to the Engineer before start of work, along with evidence of the qualifications of the preparer of the proposed plan.

D. The Contractor shall employ only personnel skilled and experienced for all specialized activities and operation of specialized equipment involved in the work of this section.

11.04 CLEAN UP

Remove and dispose of all debris, including temporary earthwork. Regrade site to ensure adequate drainage characteristics and former appearance.

END OF SECTION 11



NOMINAL WALL THICKNESS

		RAILROAD CROSSINGS		HIGHWAY CROSSINGS	
Nominal Size	Actual O.D.	Bare	Protective Coated	Bare	Protective Coated
8"	8 5/8"	.250	.188	.250	.188
10"	10 3/4	.250	.188	.250	.188
12"	12 3/4"	.250	.188	.250	.188
14"	14"	.281	.219	.250	.219
16"	16"	.281	.219	.250	.219
18"	18"	.312	.250	.250	.250
20"	20"	.344	.281	.312	.250
24"	24"	.406	.344	.312	.250
30"	30"	.469	.406	.375	.375
36"	36"	.532	.469	.500	.438
42"	42"	.563	.500	.500	.500
48"	48"	.625	.563	.625	.563
54"	54"	.688	.625	.625	.625
60"	60"	.750	.688	.625	.625
66"	66"	.813	.750	.625	.625
72"	72"	.875	.813	.750	.750

BORING DETAIL

FIGURE II-I

SECTION 12 - SLOPE PROTECTION

12.01 GENERAL

The Contractor shall accomplish temporary and permanent erosion protection related to grubbing, grading, excavation, paving and other work as directed by the District and as shown on the approved plans.

12.02 TEMPORARY EROSION CONTROL

The Contractor shall construct temporary beams, dikes, dams, ditching or sediment basins and maintain such control features until permanent erosion control features are placed all in accordance with the Indiana Department of Highway "Erosion Control Standards."

12.03 PERMANENT EROSION CONTROL

The Contractor shall incorporate permanent erosion control features into the project at the earliest practicable time as the construction progresses all in accordance with the Indiana Department of Transportation "Erosion Control Standards" and the following:

A. EROSION CONTROL FABRIC

1. The fabrics shall act to block the force of rain and act as mulch.

2. The mat shall be clean and weed free using biodegradable materials that will not leave a residue.

3. The application of the specified seed, lime and fertilizer shall be applied immediately before laying the fabric.

4. The fabric shall be laid according to the manufacturer's recommendations and as approved by the District.

B. RIPRAP

1. Riprap shall be placed where indicated on the approved plans and in accordance with the State of Indiana Highway Standards Section 616.

2. The type of riprap required shall be indicated on the approved plans and as directed and approved by the District.

C. SEED/SOD

1. Seed mixtures and mulched seeding shall be placed as early as practicable to keep the area of bare soil exposed at any time by construction operations to a minimum

2. Sod shall be placed as shown on the approved Plans and as directed by the District.

3. Seed and sod shall be placed according to the State of Indiana Highway Standards Section 621.

D. GABIONS (STONE FILLED)

1. Gabion materials shall be non-corrosive, high strength polyethylene or galvanized stainless steel.

2. Stone fill material shall be placed in the gabion by hand. The stone shall be a hard durable rock not less than three (3) inches.

3. The gabion shall be constructed, installed and filled as recommended by the manufacturer and as directed by the District.

12.04 APPROVED ALTERNATIVES

The Contractor may use alternate permanent erosion control protection methods only with written authorization from the District.

END OF SECTION 12

SECTION 13 - BUILDING SEWERS (LATERALS)

13.01 GENERAL

This Section of these Standards provides the general rules and policies set forth for the construction of building sewer services within Fall Creek Regional Waste District. Many of the items discussed in this Section are set out verbatim in other sections of these Standards. It is the intent of this Section to provide those parties solely interested in the construction of building sewers with a concise statement of the policies governing the building sewer permit, construction and acceptance processes.

13.02 BUILDING SEWERS

A. BUILDING SEWER CONNECTION PERMIT

1. Connection Permits

The Fall Creek Regional Waste District requires Connection permits to be issued by the District for all repairs, and/or modifications to or connection of a building sewer to a public sewer or another building within Fall Creek Regional Waste District. Permits shall not be granted for connections to sanitary sewers not dedicated and accepted in accordance with Section 3.03L and 3.03M of the Standards. This shall in no way limit the issuance of building permits subject to the approval of a sanitary sewer connection permit application by Fall Creek Regional Waste District.

2. Minimum Elevations for Gravity Connection

A sanitary sewer connection permit shall not be granted to homes or buildings where the lowest elevation to have gravity sanitary services is less than one (1) foot above the top of the manhole casting elevation of either the first upstream or downstream manhole on the public sewer to which the connection is to be made. If the first upstream or downstream manhole is at a higher elevation due to the natural topography of the area, an alternate manhole will be selected for the purpose of determining this measurement. (See Figures 13-1 and 13-2).

3. Permit Fee

A fee shall be charged for a sanitary sewer connection permit. This fee shall cover the costs of mandatory inspection and any reinspection that may be necessary because of remedial construction. A current fee schedule may be obtained by contacting Fall Creek R.W.D. at (765) 778-7544.

4. Application for Connection Permit

An application for a connection permit shall be made on a form available from Fall Creek Regional Waste District.

An application shall require at a minimum the following information:

a. Name and address of the Owner;

b. Name, address and telephone number of the Contractor;

c. Address and Legal description, if required of the premises for which the connection permit is being requested;

d. Plans for the building sewer and connection, which at a minimum shall consist of the following;

(1) Drawing(s) of the building;
(2) Plot Plan including parcel boundaries;
(3) Connection details including location of connection and routing of the building sewer;
(4) Material of construction for the building sewer;
(5) Installation method; and
(6) Elevation of lower floor and building drain specifically the elevation of the lowest gravity, sanitary service. All elevation shall be tied to USGS datum.

5. Who May Apply

An application for a sewer connection permit shall only be made by the following:

a. A Plumbing Contractor licensed by the State.

b. A Contractor who has met the surety bond and insurance requirement of the Fall Creek Regional Waste District. Surety bond requirements are met if the building sewer contractor has filed and maintains with the District a surety bond. Insurance requirements are met if the Contractor has secured and maintains a public liability and property damage policy.

c. The District may deny permits to any applicant who is currently in violation of this chapter or any other applicable regulations.

d. Application by persons other than those listed above may be accepted at the discretion of the General Manager.

All sewer work and other construction actually performed on or associated with the building sewer and its connection to the public sewer shall be in accordance with the rules and regulations of the Indiana Fire Prevention and Building Safety Commission and the Standards of the Fall Creek Regional Waste District.

6. Expiration of Permit

The connection permit shall expire if work is not initiated within ninety (90) days from the date of issuance. Upon expiration, a new connection permit, including payment of the connection permit fee, shall be required.

The General Manager may for good cause extend the duration of the permit for a reasonable period. Requests for extension of the permit period shall be submitted in writing to the District in advance of the expiration and shall state the reason for the request. Requests for extension shall be forwarded to:

Fall Creek Regional Waste District

P.O. Box 59
Pendleton, IN 46064

B. PROHIBITION AGAINST CLEAR WATER DISCHARGES

1. Except as provided in Item 2 below, it shall be unlawful to cause or allow the connection of a building sewer to a public sewer or other building sewer when such building sewer has any of the following sources of clear water connected to it:

   a. Foundation/footing drains;

   b. Sump pumps with foundation drains connected;

   c. Roof drains;

   d. Heat pump discharge;

   e. Garage floor drain;

   f. Basement floor drain;

   g. Cooling water; and/or

   h. Any other sources of clear/unpolluted water.

   Any person found violating any provision listed above shall be required to correct such connection at his expense. (Ordinance 84-2 and amendments)

2. In the event an industrial or commercial entity finds it necessary to discharge clear water consisting of cooling water and/or steam condensate into the public sewer; and the sewer has capacity to receive such clear water without affecting existing or future users, the District may enter into an Agreement for such discharge that will define a metering system and any other requirements deemed necessary to measure the flow.

C. EXEMPTION FOR CERTAIN GOVERNMENTAL UNITS

Connection permits shall be obtained for building sewer construction accomplished by or for a governmental unit, and inspections as specified shall be required. Fees shall be required as specified except for the following:

1. Building sewer construction for which a fee cannot be charged by the municipality because of federal or state law, or

2. Building sewer construction accomplished by an employee or contractor on behalf of the District.

D. STOP-WORK ORDER

The permit holder shall be responsible for all safety regulations and all obligations under Chapter XVII of Title 29, Code of Federal Regulations, Part 1926 otherwise known as

Safety and Health Regulations for Construction. The District is empowered to issue an order requiring suspension of work ("Stop-Work Order") whenever it determines that:

1. Construction is proceeding in an unsafe manner; or

2. Construction is occurring in violation of the District's Standards and requirements and in such a manner that if construction is allowed to proceed, there is a probability that it well be substantially difficult to correct the violation; or

3. Sewer construction for which a connection permit is required is proceeding without a connection permit being in force. In such an instance the stop-work order shall indicate that the effect of the order terminates when the required permit is obtained. The stop-work order shall be in writing and shall state to what construction it is applicable and the reason for its issuance. One (1) copy of the stop-work order shall be posted on the property in a conspicuous place and one (1) copy shall be delivered to the permit applicant, to the person doing the construction and to the owner of the property or his agent. The stop-work order shall state the conditions under which construction may be resumed.

E. MANDATORY INSPECTION OF BUILDING CONNECTIONS

1. Notification

It shall be the duty of the holder of a connection permit to notify the District in the manner described on the sanitary sewer connection permit that the sewer work is available for inspection. The District will conduct inspections on building sewer connections from 7:30 a.m. to 3:30 p.m. local time, Monday through Friday, except for observed District holidays. The building sewer, in its entirety from the foundation to the connection with the public sewer or existing lateral, must be exposed for inspection and be properly bedded in accordance with the District's Standards to one half (1/2) the diameter of the building sewer. The responsibility for safety measures rests solely with the permit holder: all excavations shall adequately guard the public by barricades, fences, lights, and other such means as necessary. The permit holder may backfill the building sewer trench if the District has not made an inspection within a four (4) hour period after notice has been given to the District. In the event the building sewer is not completed and ready for inspection upon the inspector's arrival or if the notification is made after 1:00 p.m. local time, Monday through Friday, the permit holder shall make the building sewer and connection available for a four (4) hour period on the following District work day. An inspection may be waived with or without conditions with the approval of the General Manager.

2. The District shall have the right of entry to, upon or through and premises for purposes of inspection of sewer work and any other construction activity performed on or associated with the connection of the building sewer to the District sewer including inspection for clear water discharges into the sewer.

F. BUILDING SEWER CONSTRUCTION

1. Materials

Building sewers shall be SDR35 or Schedule 40 PVC pipe conforming to ASTM 3034. Joints shall be flexible gasket push-on compression type assembled in accordance with the manufacturer's recommendations.

2. Installation of Building Sewers

a. Permit

A connection permit must be issued by the District prior to the installation of a building sewer.

b. Minimum Size and Access

Size and grade requirements shall conform to the latest edition of the Uniform Plumbing Code and to these Standards.

Building sewers within the right-of-way or easement shall be a minimum of six (6) inches in diameter. Building sewers shall have a tee cleanout located within three (3) feet of the building's exterior wall and shall be extended to grade and properly capped. Cleanouts shall be installed per Figure 13-3 or 13-4. Cleanouts installed under concrete or asphalt paving shall be made accessible by yard boxes or extended flush with paving with approved materials and be adequately protected.

c. Connection to Public Sewer

The building sewer shall connect to the public sanitary sewer only at manufactured fittings (except as otherwise permitted by the Standards). No saddle connections shall be allowed if a manufactured fitting exists based upon approved as-built drawings. Connections to manholes shall not be made without the written approval of the District, and then only at terminating manholes. Building sewers shall connect to the manhole, when approved, at an elevation of not more than 24 inches above the base of the manhole. Inside drop connections to manholes are not permitted.

d. Building Sewer Stubs

Building sewers installed for future connections shall be terminated at the right-of-way or easement and plugged to ensure 100% water tightness. A one-half (1/2) inch metal locator rod or a magnetic tape locator shall be installed at the end of the plugged line within one (1) foot of the finished grade.

e. Laying Building Sewers

The point of commencement for laying of the building sewer pipe shall be at the connection to the main sewer and shall be laid with the bell pointing upgrade.

f. Bedding and Backfill

Bedding and backfill requirements shall meet all standards set in Section 7 of these Standards, applicable standards for bedding and backfill of PVC flexible pipe and the manufacturer's recommendations.

G. BUILDING SEWER MAXIMUM LENGTH

Except for building sewers serving single or double family residences, or single owner industrial facilities, connection permits will not be issued for building sewers exceeding 300 feet in length as measured from the outside of the building to the center of the public sewer unless the sewer is constructed in a dedicated easement or right-of-way in accordance with Section 3.03H. No more than 100 feet of a building sewer shall exist within a public right-of-way.

H. MAXIMUM NUMBER OF BUILDING CONNECTIONS

No more than one (1) building will be permitted to connect to a building sewer. Sewers with more than one (1) connection must be constructed as a public sewer in a dedicated easement in accordance with Section 3.03H, unless the District determines that an exception is justified.

I. BUILDING SEWER RESPONSIBILITY

It shall be the responsibility of the property owner(s) whose property is benefited to provide for, install and make private connections for the use of their premises to an existing public or building sewer. Further, it shall be the responsibility of the owner to make all necessary repairs, extensions, relocations, changes or replacements there of, and of any accessories thereto. These requirements may be altered, modified or waived at the discretion of the General Manager when it is shown that compliance is not possible due to extenuating circumstances.

J. EXISTING FOUNDATION DRAINS, ROOF DRAINS, DEFECTIVE BUILDING SEWERS AND PUMPS

In the event the District determines that a violation of Section 13.02B exists, the District shall notify the violator, by certified mail, that such violation exists. The notice shall describe the nature of the violation and the corrective action(s) that must be taken. Such corrective action shall be taken within 30 days of receipt of such notice.

K. PROTECTION OF WATER SUPPLIES

There shall be no physical connections between a building sewer and the water supply system, or appurtenances thereto which would permit the passage of any polluted water into the potable supply. Building sewers shall be laid at least ten (10) feet horizontally from any existing or proposed water line. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten (10) foot separation, the appropriate reviewing agency may allow deviation on a case-by-case basis. Such deviation may allow installation of the sewer closer to a water line, provided that the water line is in a separate trench or on an undisturbed earth shelf located to one side of the sewer, and at an elevation so the bottom of the water line is at least 18 inches above the top of the sewer.

Building sewers crossing water mains shall be laid to provide a minimum vertical separation distance of 18 inches between the outside of water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as

possible from the water line joints. Where a water line crosses under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water line. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the building sewer shall be designed and constructed equal to water pipe, and shall be pressure tested to assure water tightness prior to backfilling.

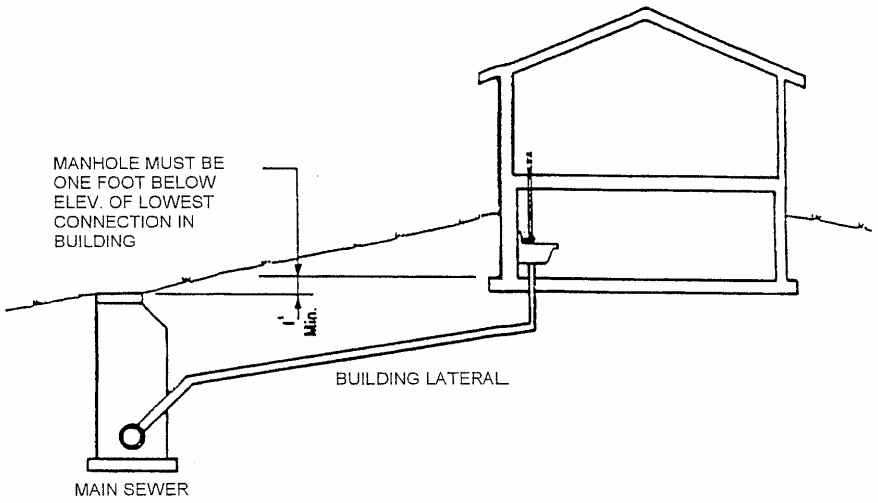
L. PENALTIES

Any person violating any provisions of Section 13.02 shall be subject to the penalties of this chapter in accordance with applicable District Ordinances and General Manager shall be required to correct such violation at his expense.

M. APPEALS

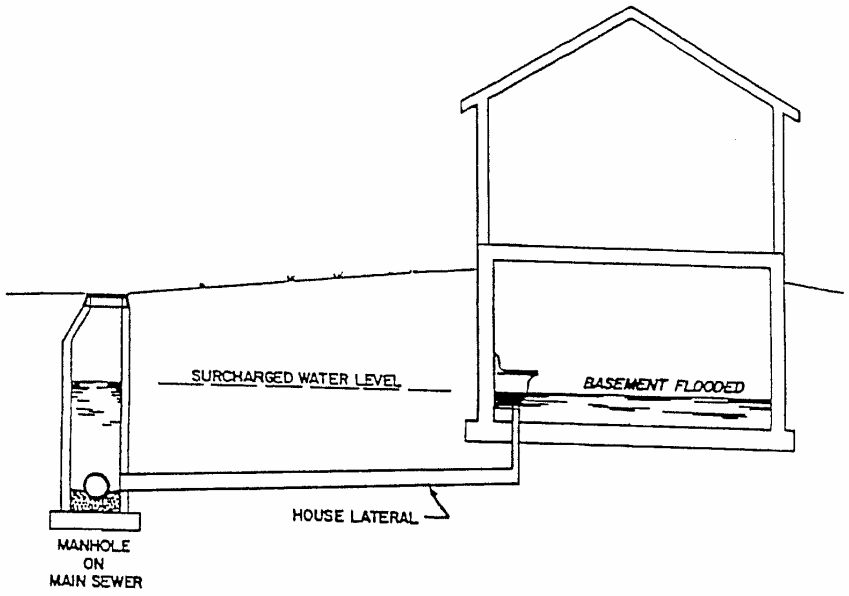
Any person affected by the exercise of any discretionary authority delegated by Section 13 to any official of the District and who objects to the decision made or action taken by such official shall be entitled to a hearing before the District Board of Director's upon such objection. The person desiring such hearing before the Board shall file a written request for a hearing, including a statement of his objections, with the General Manager who shall call the same scheduled before the Board within thirty (30) days after such request is filed. Notice shall be given to the appellant identifying the time, place and date of the appeal at least ten (10) days prior to the scheduled date. The Board may hear any evidence it deems relevant. After the hearing, the Board may confirm, reverse or modify the decision or action. The order of the Board shall be final. Such order shall be made within ten (10) days after the hearing and shall be in writing and sent to the appellant.

END OF SECTION 13



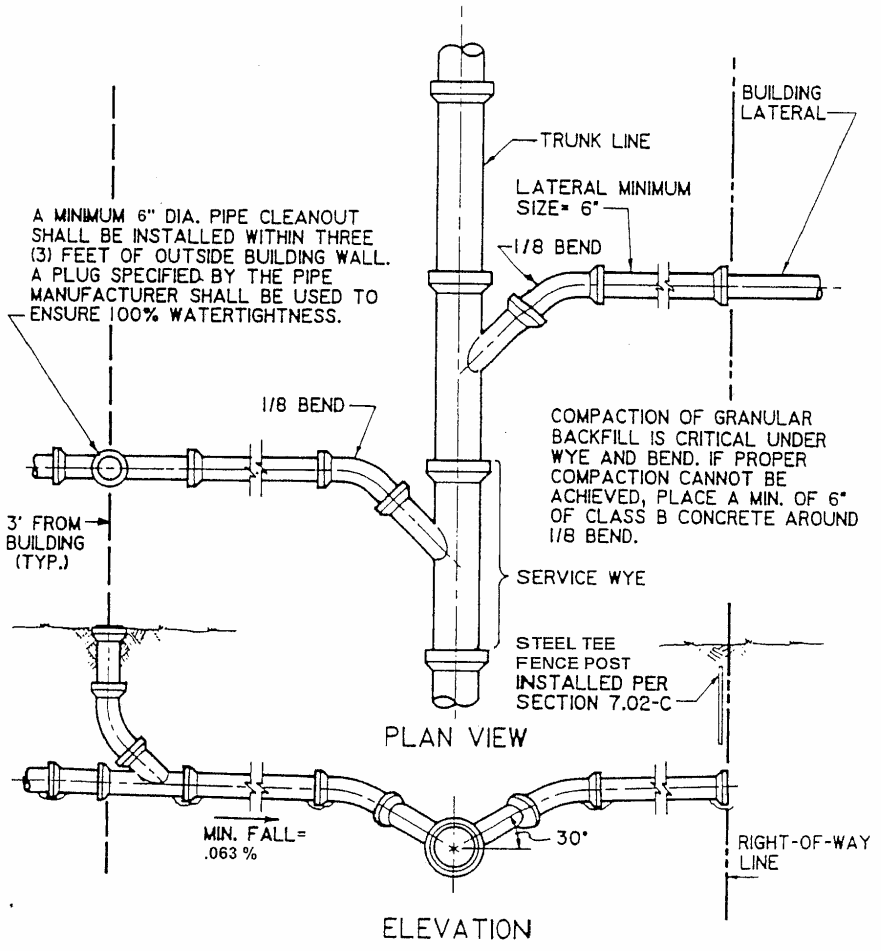
ACCEPTED DESIGN OF SANITARY SEWER HOUSE CONNECTION (SEE THE REJECTED DESIGN - FIGURE 3-1

FIGURE 13.1



SANITARY SEWER HOUSE CONNECTION CONSTRUCTED IN THIS SITUATION WILL NOT BE ACCEPTED. (SEE THE ACCEPTED SITUATION – FIGURE 3-2)

FIGURE 13.2



SERVICE CONNECTION FOR SHALLOW SEWERS
(LESS THAN 15' DEEP)

FIGURE 13.3

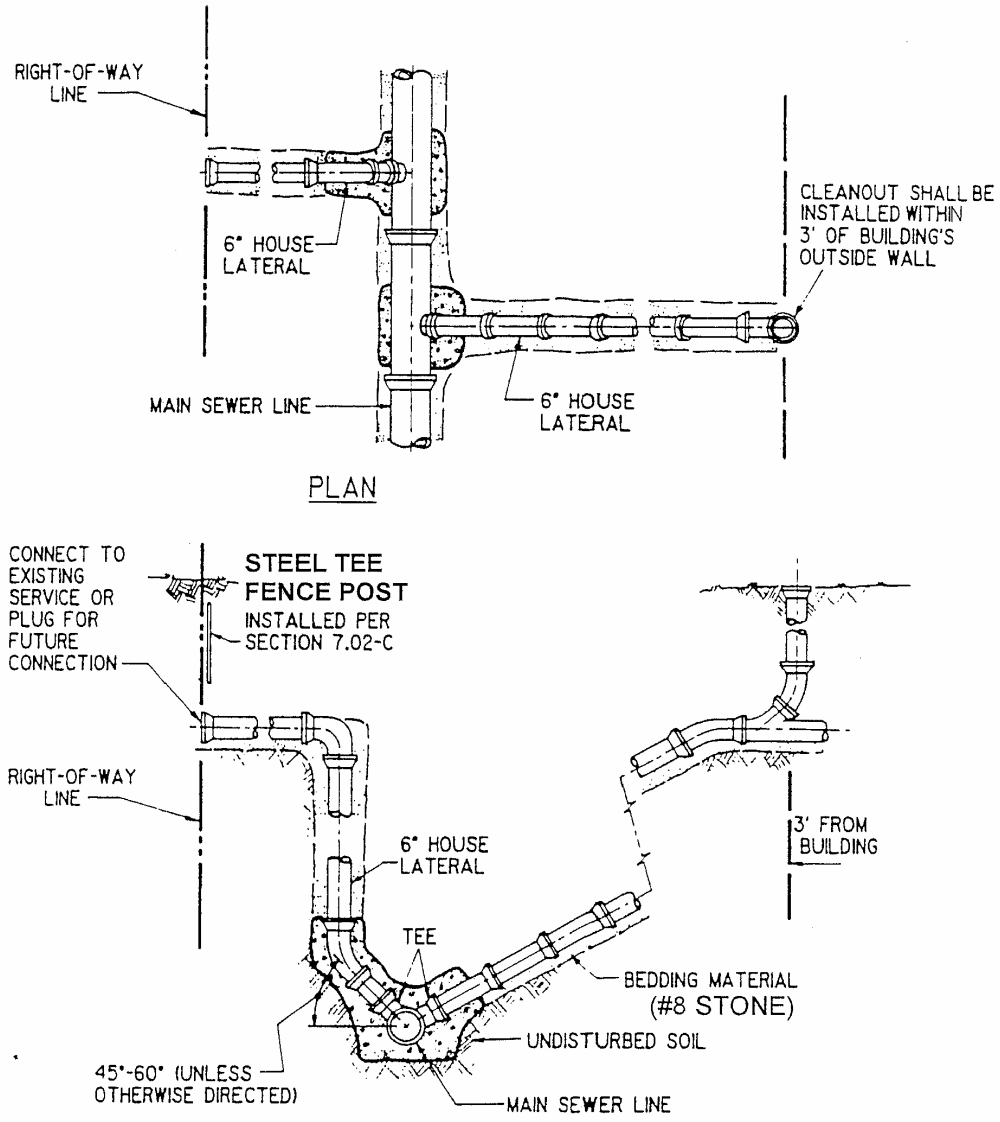

RIGHT-OF-WAY LINE
6" HOUSE LATERAL
CLEANOUT SHALL BE INSTALLED WITHIN 3' OF BUILDING'S OUTSIDE WALL
MAIN SEWER LINE
6" HOUSE LATERAL
PLAN
CONNECT TO EXISTING SERVICE OR PLUG FOR FUTURE CONNECTION
STEEL TEE FENCE POST
INSTALLED PER SECTION 7.02-C
RIGHT-OF-WAY LINE
6" HOUSE LATERAL
3' FROM BUILDING
TEE
BEDDING MATERIAL (#8 STONE)
UNDISTURBED SOIL
45°-60° (UNLESS OTHERWISE DIRECTED)
MAIN SEWER LINE
ELEVATION
SERVICE CONNECTION FOR DEEP SEWERS
(15' DEEP AND OVER)

FIGURE 13.4

SECTION 14 - REGULATIONS GOVERNING THE CONNECTION TO AND USE OF THE FALL CREEK REGIONAL WASTE DISTRICT WASTEWATER SYSTEM

14.01 GRAVITY SYSTEM

A. Tap-on Fee: There is a tap-on fee to the District for each hook-up, except industrial. The industrial tap-on fee shall be determined on a case-by-case basis.

B. Capacity Fee: The application for sewer permit requires that a capacity fee be paid to the District prior to issuance of the permission to connect.

C. Materials: Building laterals connecting to the District lines shall be at least six (6) inches in diameter made from the following material:

1. Pipe:

   Polyvinyl Chloride pipe (SDR-35 O-Ring Pipe)

2. Joint:

   All joints to be rubber "O" ring type - glue joints are prohibited

3. Fittings:

   T's, Y's, 45's, etc. shall be the same material as pipe used (Double 45's shall be used in lieu of 90 Ells)

4. Adapters:

   Connections at the end of the lateral where the size or type of materials differs shall be made with adapters. The adapters shall be rubber body couplings with stainless steel bands around the ends for sealing.

D. Slope: A minimum slope of 1/8 inch per foot for 6" pipe is required.

E. Lateral Trench: Trenches shall be excavated only wide enough for adequate working space. The bottom of the trench shall be free from rocks, roots, foreign materials or water. The lateral pipe shall be carefully placed on a firm, uniform base. A wet (or soft) trench may require a bedding of stone to provide a firm base for laying pipe. Backfill material shall be #8 crushed stone free of large rocks, lumps, wood, or foreign materials. It shall be carefully placed and compacted around the lateral pipe. (See Item #7)

F. Connection to District Sewer: Care must be taken when excavating lateral stub for connection to District Sewer. Any damage done to lateral pipes will be repaired by the owner at no coast to the District. Prior to removing the cap from the lateral stub, all water, mud, rocks, g8ravel, etc. must be removed from lateral trench. Entrance of these materials into the District Sewer will be the responsibility of the owner. Any costs to the District for cleaning or removing these materials will be paid for by the owner.

G. Backfilling Lateral Trench: The Trench is not to be backfilled nor any pipe, fittings or connections covered until inspected by a representative of the Fall Creek Regional Waste District. Approval must be received by the District prior to backfill. Any covered items must be re-excavated and replaced at the owner's expense.

H. Cleanout: It is required that a 6" cleanout be installed within three (3) feet of the building by the owner for ease in cleaning their lateral. One cleanout should be installed for every 100 feet of line.

I. Septic Tank Abandonment: The owner is responsible for the disposition of the septic tank. The tank shall be emptied of its contents, filled with a granular material and disconnected from further use. Abandonment of the septic system shall be done in accordance with the County Health Department regulations. No septage from the tank shall be emptied into the District System.

J. Storm Water: Indiana Law and District Ordinance 84-2 prohibit connection of any storm water or ground water into District sewers. No person shall make connection of roof downspouts, exterior footing drains, surface runoff, or any ground water connection into the District System.

K. Inspection Notification: When the owner has the lateral line laid and is ready to make connection into the District Sewer, they shall notify the District inspector. If the District cannot respond within four (4) hours of notice from customer, the customer may backfill. District hours are 7:30 A.M. - 3:30 P.M. Monday through Friday. If work is done after hours, weekends or holidays, there will be a fifty ($50) dollar inspection fee. The permit application and inspector are available at (765) 778-7544, District Office, 9378 S. 650 West, Pendleton, Indiana. Mailing address, Fall Creek Regional Waste District, P.O. Box 59, Pendleton, Indiana 46064.

14.02 PRESSURE SYSTEM

A. Tap-on Fee: There is a tap-on fee to the District for each hook-up, except industrial. The industrial tap-on fee shall be determined on a case-by-case basis.

B. Capacity Fee: The application for sewer permit requires that a capacity fee be paid to the District prior to issuance of the permit to connect.

C. Materials: Low pressure laterals connecting to the District lines shall be made from the following materials:

1. Building laterals from the building to the pump pit shall be 4" SDR 35 Gasketed Joint Pipe (no glue joints) including a clean-out within 3 feet of the building.

2. The pump pit should be manufactured for the purpose of a grinder pump pit (if other type of tank is used it should be authorized by the District prior to use).

3. The outlet pipe from pit to District main shall be 1 1/2" HDPE IPS DR 11-160 PSI with brass compression fittings.

D. Lateral Trench: Trenches shall be excavated only wide enough for adequate working space. The bottom of the trench shall be free from rocks, roots, foreign materials or water. The lateral pipe shall be carefully placed on a firm, uniform base of pea gravel or sand carefully placed above the haunches of the pipe, leaving the top of the pipe exposed for inspection. Backfill material shall also be free of large rocks, lumps, wood or foreign materials. The 1 1/2" minimum discharge pipe from the pump pit to the main shall be buried with a #10 solid copper trace wire. Sand or pea gravel bedding is required unless backfill unless backfill material is free of rocks, roots, gravel, etc. The grinder pit shall be bedded with pea gravel or sand up to the electrical discharge of the pit.

E. Backfilling Lateral Trench: The Trench is not to be backfilled nor any pipe, fittings or connections covered until inspected by a representative of the Fall Creek Regional Waste District. Approval must be received from the District prior to backfill. Any covered items must be re-excavated and replaced at the contractor's expense.

F. Connection to District Sewer Main: Care must be taken when excavating lateral stub or the force main for connection to District sewer main. Any damage done to lateral pipes will be repaired by the contractor or the person doing the work at no cost to the District. Prior to making the connection to the District main, all water, mud, rocks, gravel, etc. must be removed from lateral trench. Entrance of these materials into the District Sewer will be the responsibility of the contractor or the person doing the work. Any costs to the District for cleaning or removing these materials will be paid by the contractor or person (s) doing the work. The grinder unit and all connections shall be water tight.

G. Septic Tank Abandonment: The owner is responsible for the disposition of the septic tank. The tank shall be the emptied of its contents, filled with a granular material and disconnected from further use. No septage from the tank shall be emptied into the District sewer.

H. Floor Drains - Residential: Floor drains in residential structures are not to be connected to the customer's service lateral or to the customer's wastewater grinder unit.

I. Storm Water: Indiana Law and District Ordinance 84-2 prohibit connection of any storm water or ground water into District sewers. No person shall make connection of roof downspouts, exterior footing drains, surface runoff, or any ground water connection into the District System.

J. Inspection Notification: When the force main is laid and is hooked up to the District sewer main they shall notify the District inspector. If the District cannot respond within four (4) District regular working hours of notice for final inspection, the customer may backfill. The permit application and inspectors are available at the following number: (765) 778-7544, District Office, 9378 S. 650 West, Pendleton, Indiana. Mailing address: Fall Creek Regional Waste District, P.O. Box 59, Pendleton, Indiana 46064. District inspection hours are 7:30 A.M. - 3:30 P.M. Monday through Friday.

END OF SECTION 14

SECTION 15 - GREASE TRAPS

15.01 GENERAL POLICY

All waste discharge sewers from industrial and commercial kitchens and food services that will contain high amounts of grease, fats, or oils such as restaurants, cafes, lunch counters, cafeterias, bars, clubs, hotels, hospitals, sanitariums, factories, school kitchens or other establishments where grease may be introduced into the drainage or sewer system in quantities that can affect line stoppage or hinder sewage treatment shall be connected to a Grease Trap before discharging into the sanitary sewer.

15.02 GREASE TRAP SPECIFICATIONS

A. Tank design shall conform with specifications provided by the Indiana Department of Environmental Management.

B. The recommended grease trap size may be calculated as follows:

Tank Size (in gallons)	=	Meals Served During Peak Hour	*X*	Waste Flow Rate Factor	*X*	Retention Time Factor	*X*	Storage Factor

Waste Flow Rate Factor

a.	Commercial kitchen with dishwashing machine	6
b.	Commercial kitchen without dishwashing machine	5
c.	Single service kitchen	2
d.	Food waste disposal only	1

Retention Time

a.	Commercial kitchen waste	2.4
b.	Single service kitchen	1.5

Storage Factor

a. Fully equipped commercial kitchen having

8-hour operation	1
16-hour operation	2
24-hour operation	3

b.	Single service kitchen	1.5

15.03 CATEGORIES

A. COMMERCIAL

1. Restaurants

2. Schools

B. INDUSTRIAL

1. Prison Facilities

2. Hospitals

15.04 DATE OF COMPLIANCE

A. Property owners of existing facilities shall be given notice of compliance by certified mail or personal delivery and the owner shall comply with the policy within 24 months of notice. Failure to comply shall be a violation.

B. Property owners of newly constructed facilities shall comply with this policy prior to connection to the sanitary sewer collection system. Failure to comply shall be a violation.

15.05 MAINTENANCE OF GREASE TRAPS

A. Grease traps shall be pumped empty and cleaned by a commercial sewer cleaning service on a quarterly basis.

B. Property owners may apply for a waiver from the District to extend the period between cleanings.

C. The District may require cleaning more often as it warrants.

15.06 REPORTING

A. Property owners shall submit a report to the District each time their grease trap is cleaned.

B. A copy of a receipt from the commercial cleaning service shall be attached to the report which shows:

1. Name of the commercial cleaning service which cleaned the grease trap.

2. Date the grease trap was cleaned.

3. The point of disposal of the grease.

C. The property owner shall also obtain a disposal receipt from the commercial cleaning service and attach a copy to the report.

15.07 INSPECTION

A. The district will inspect the grease trap for proper construction upon installation.

B. The district may inspect the grease traps at any time and advise the owner of the condition of the trap.

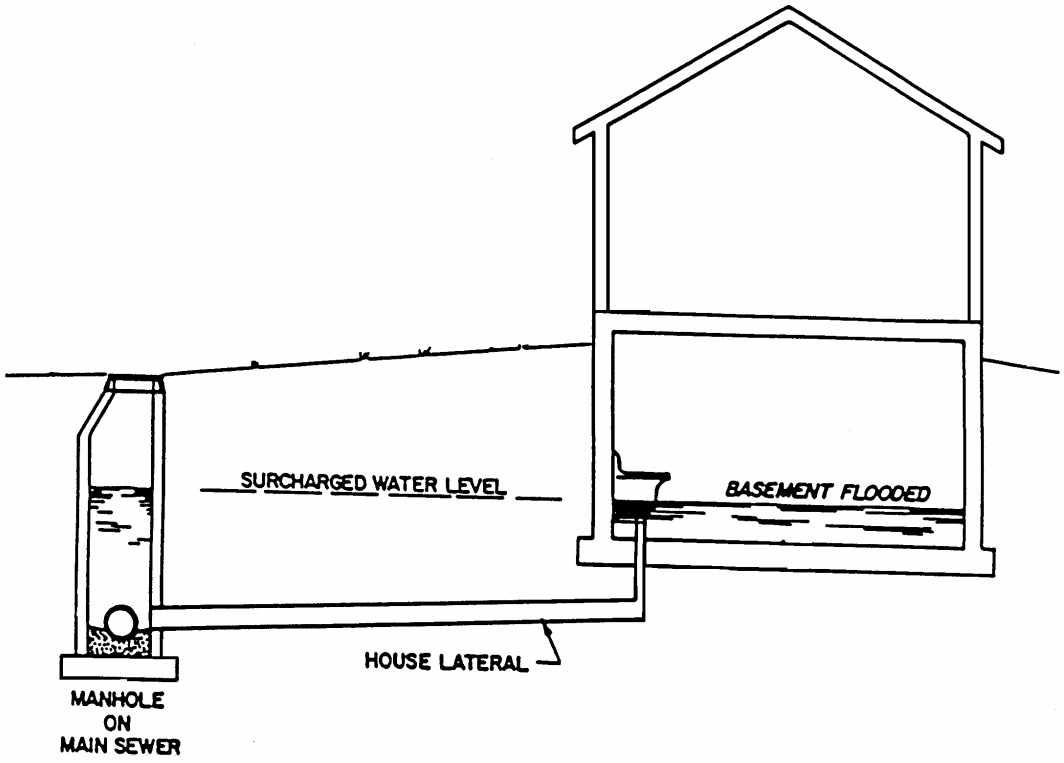
C. Failure to submit a report when the grease trap is cleaned will prompt the district to visit the facility for an inspection.

D. A follow-up inspection will be conducted within 30 days to insure the owner has complied by the inspection.

15.08 PENALTIES

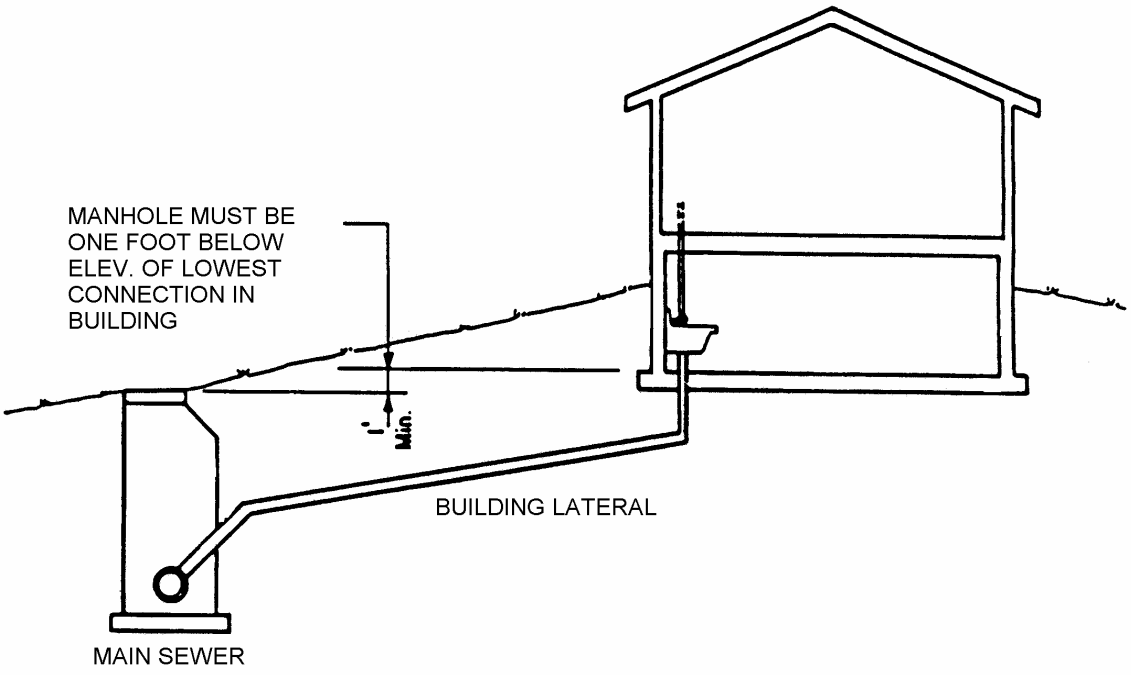
Any user found to be operating in violation of this Grease Trap Program and discharging into the District's sanitary sewer system prohibited substances as defined by F.C.R.W.D. Ordinance 84-2 shall be subject to the penalty provisions of that ordinance.

END OF SECTION 15



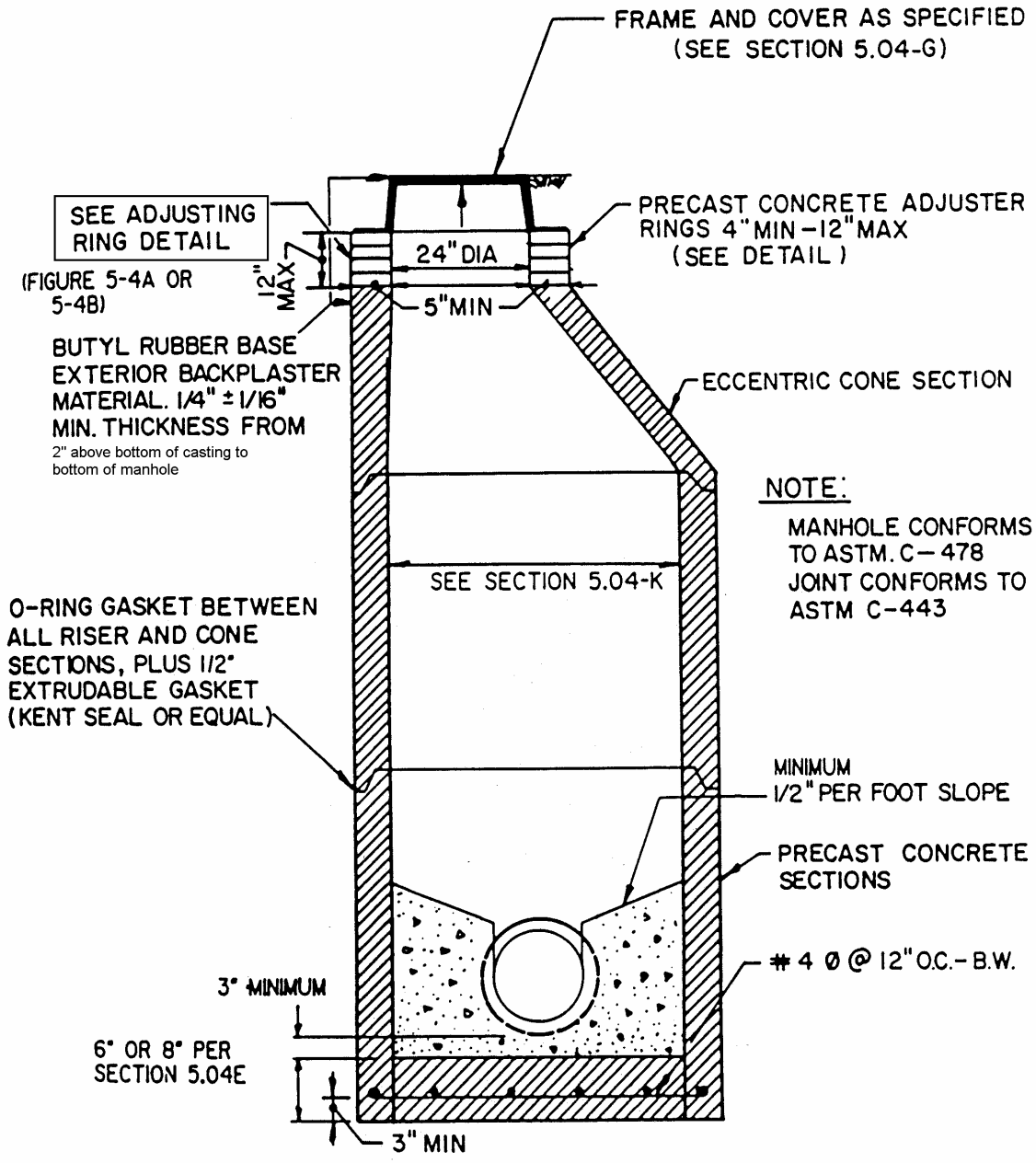
SANITARY SEWER HOUSE CONNECTION CONSTRUCTED IN THIS SITUATION WILL NOT BE ACCEPTED. (SEE THE ACCEPTED SITUATION – FIGURE 3-2)

FIGURE 3-1



ACCEPTED DESIGN OF SANITARY SEWER HOUSE CONNECTION (SEE THE REJECTED DESIGN - FIGURE 3-1

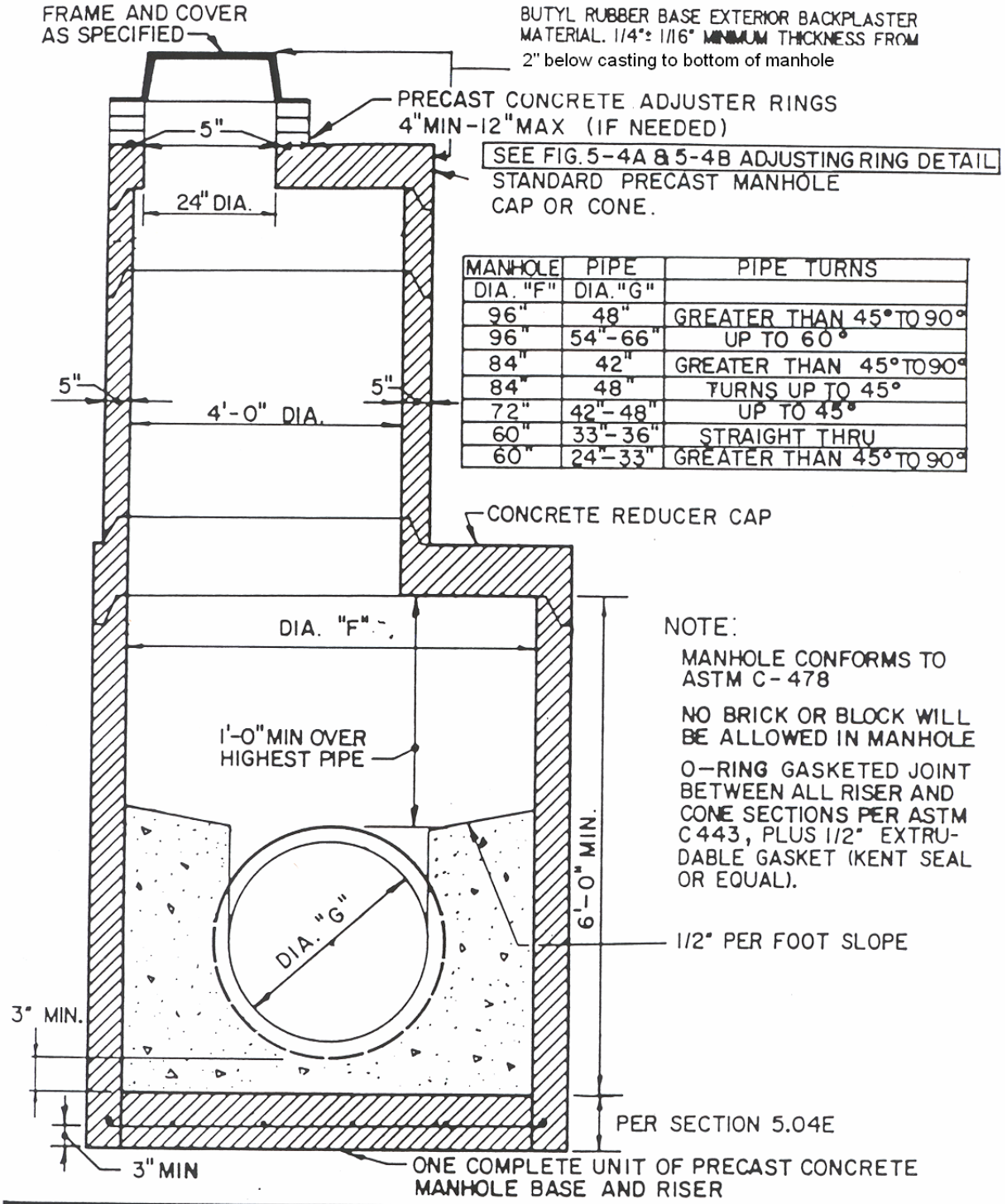
FIGURE 3-2



STANDARD MANHOLE FOR PIPE SIZES 8" thru 24" (Straight Thru)

FIGURE 5-I

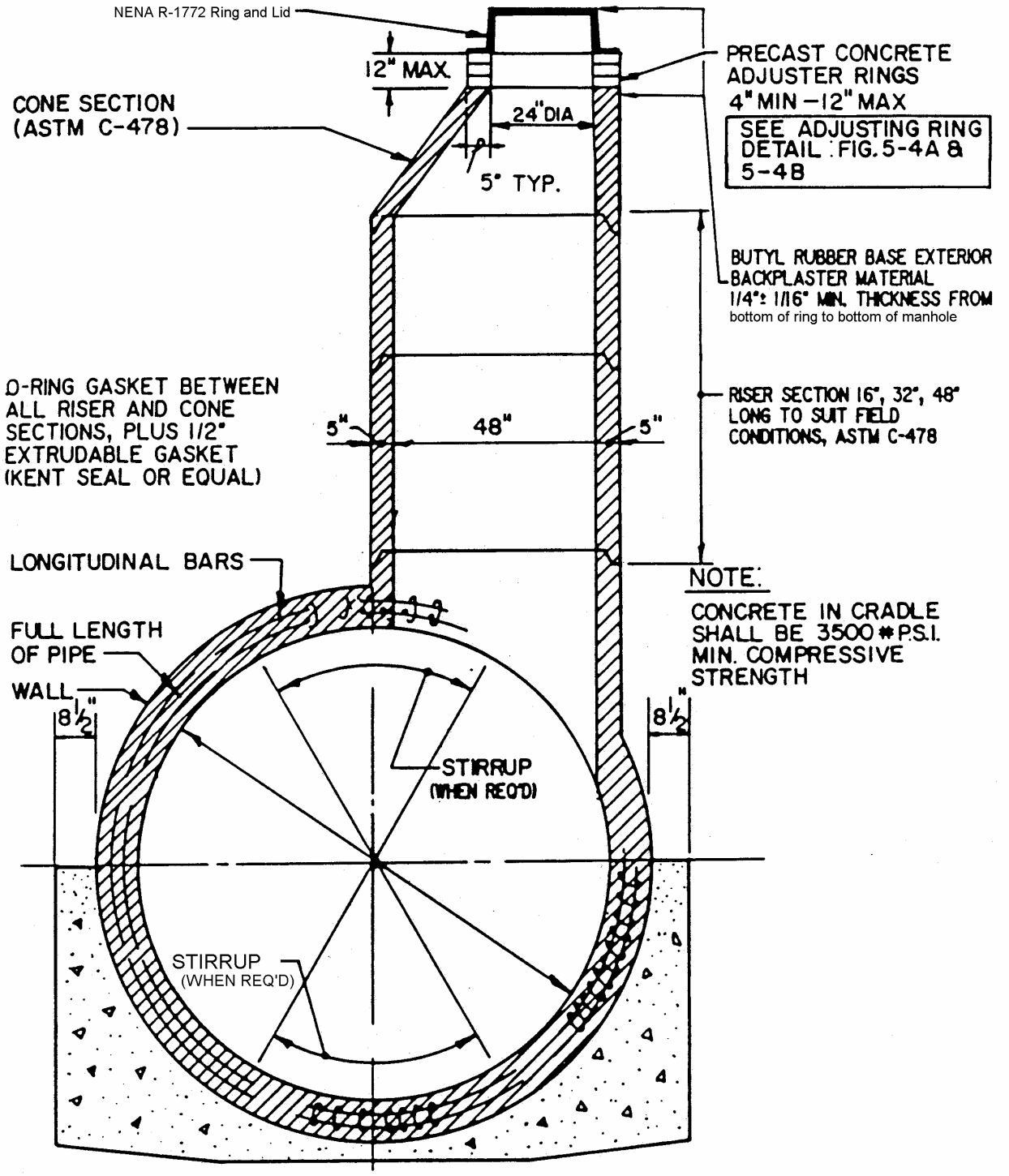
NENA R-1772



MANHOLE DIA. "F"	PIPE DIA. "G"	PIPE TURNS
96"	48"	GREATER THAN 45° TO 90°
96"	54"-66"	UP TO 60°
84"	42"	GREATER THAN 45° TO 90°
84"	48"	TURNS UP TO 45°
72"	42"-48"	UP TO 45°
60"	33"-36"	STRAIGHT THRU
60"	24"-33"	GREATER THAN 45° TO 90°

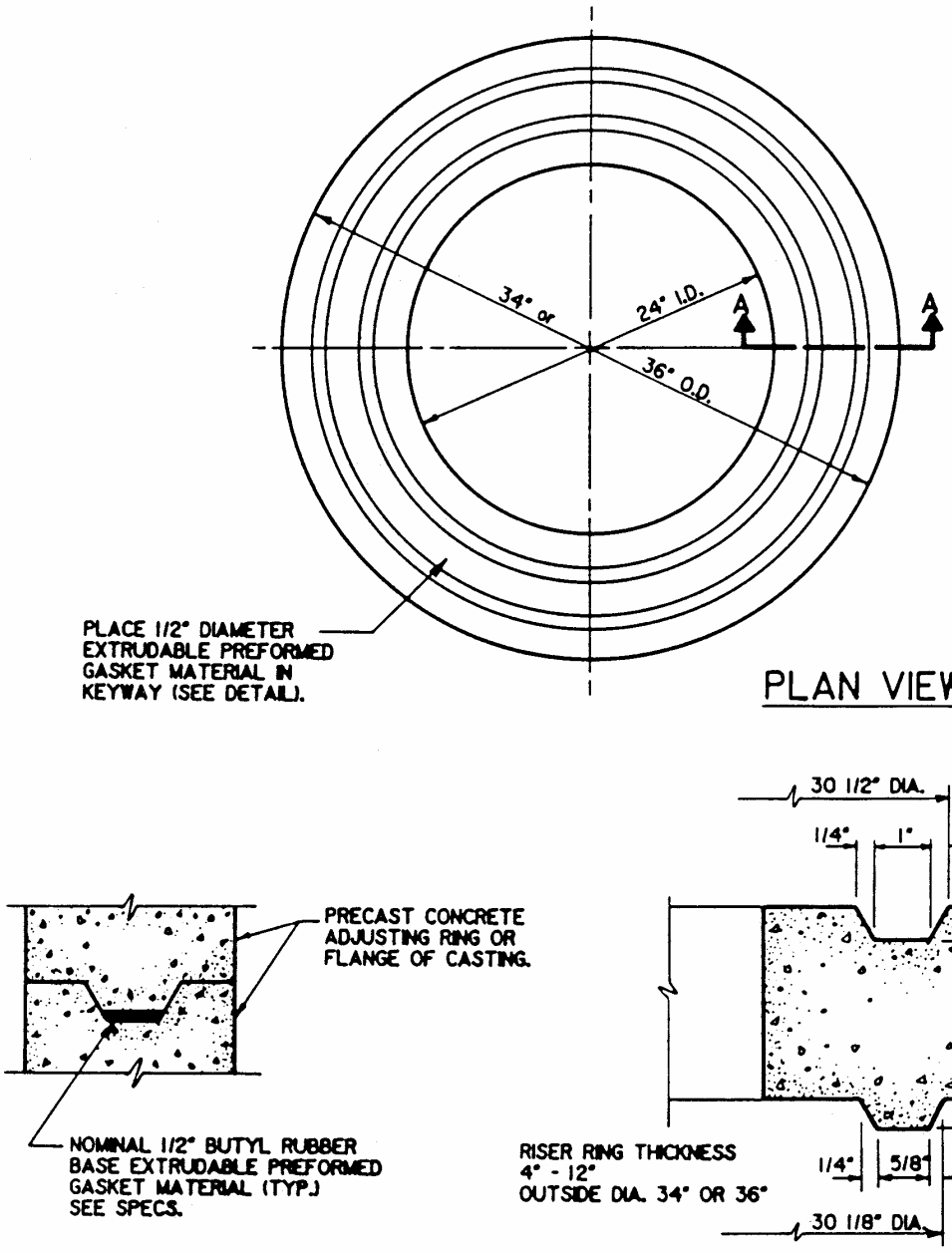
MANHOLE BASE, RISER AND REDUCER CAP FOR PIPES 24" THRU 48"

FIGURE 5-2



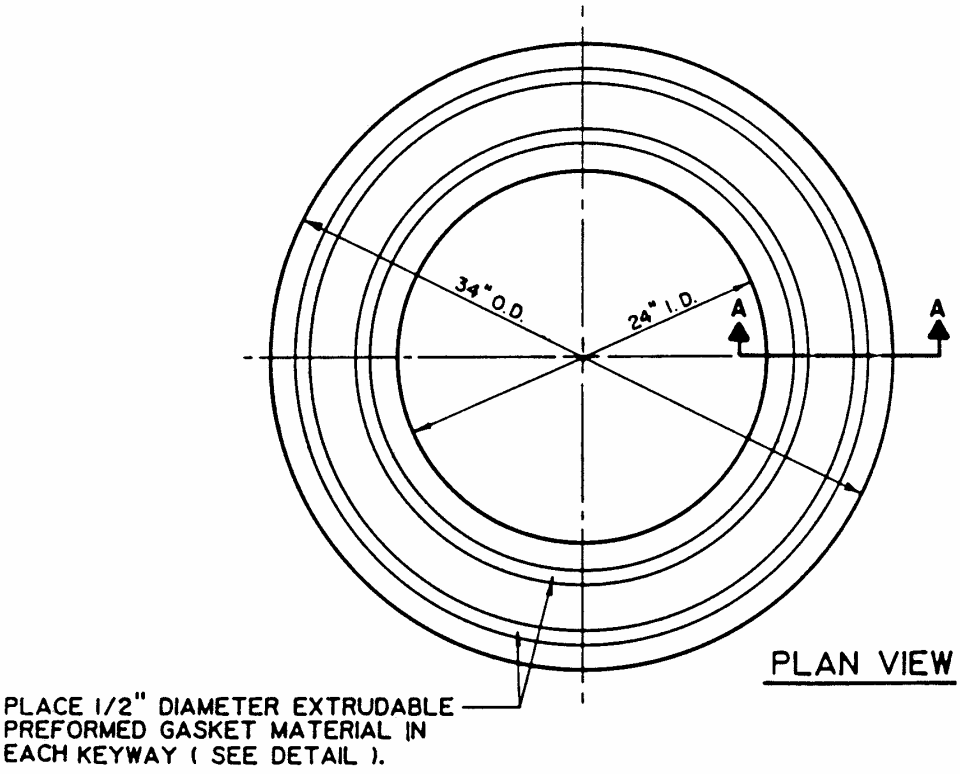
SPECIAL MANHOLE – 48" THRU 144" SEWERS
MEETING CLASS III, IV OR V A.S.T.M. SPEC.

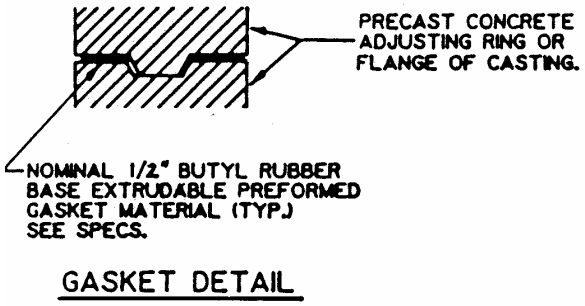
FIGURE 5-3

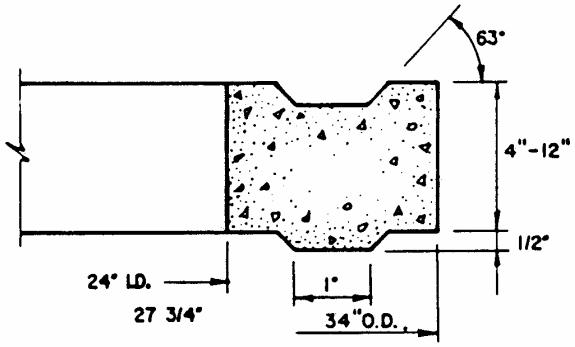


ADJUSTING RING

FIGURE 5-4A

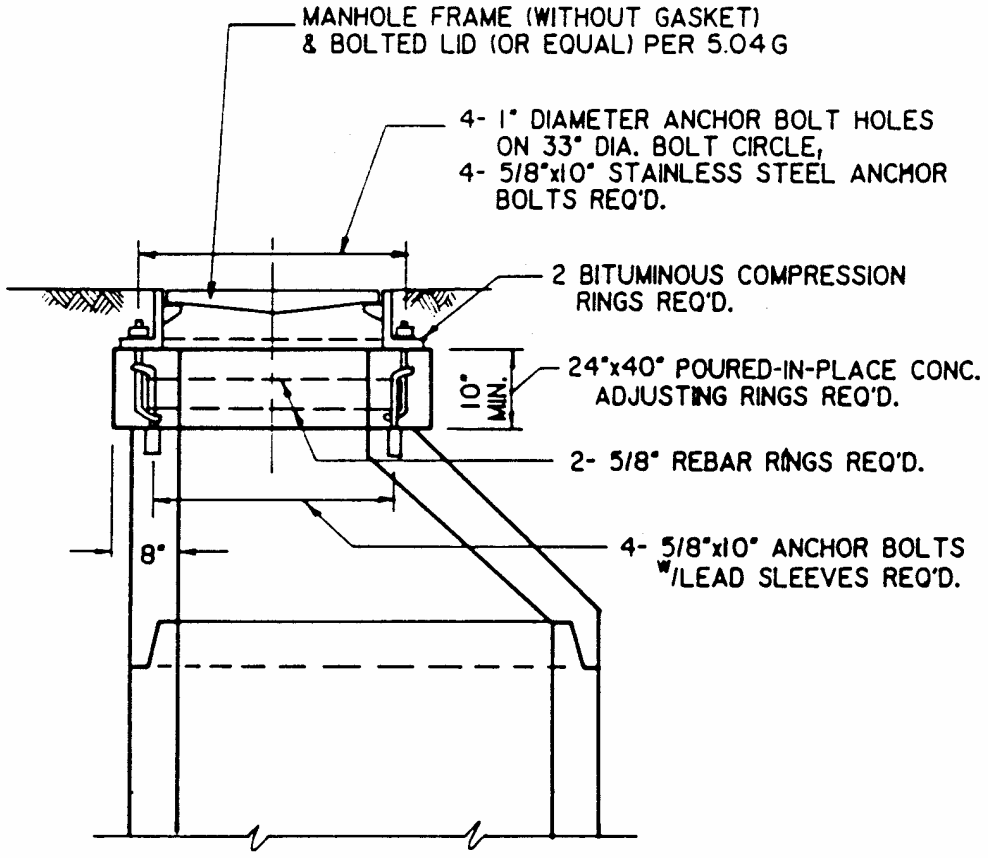






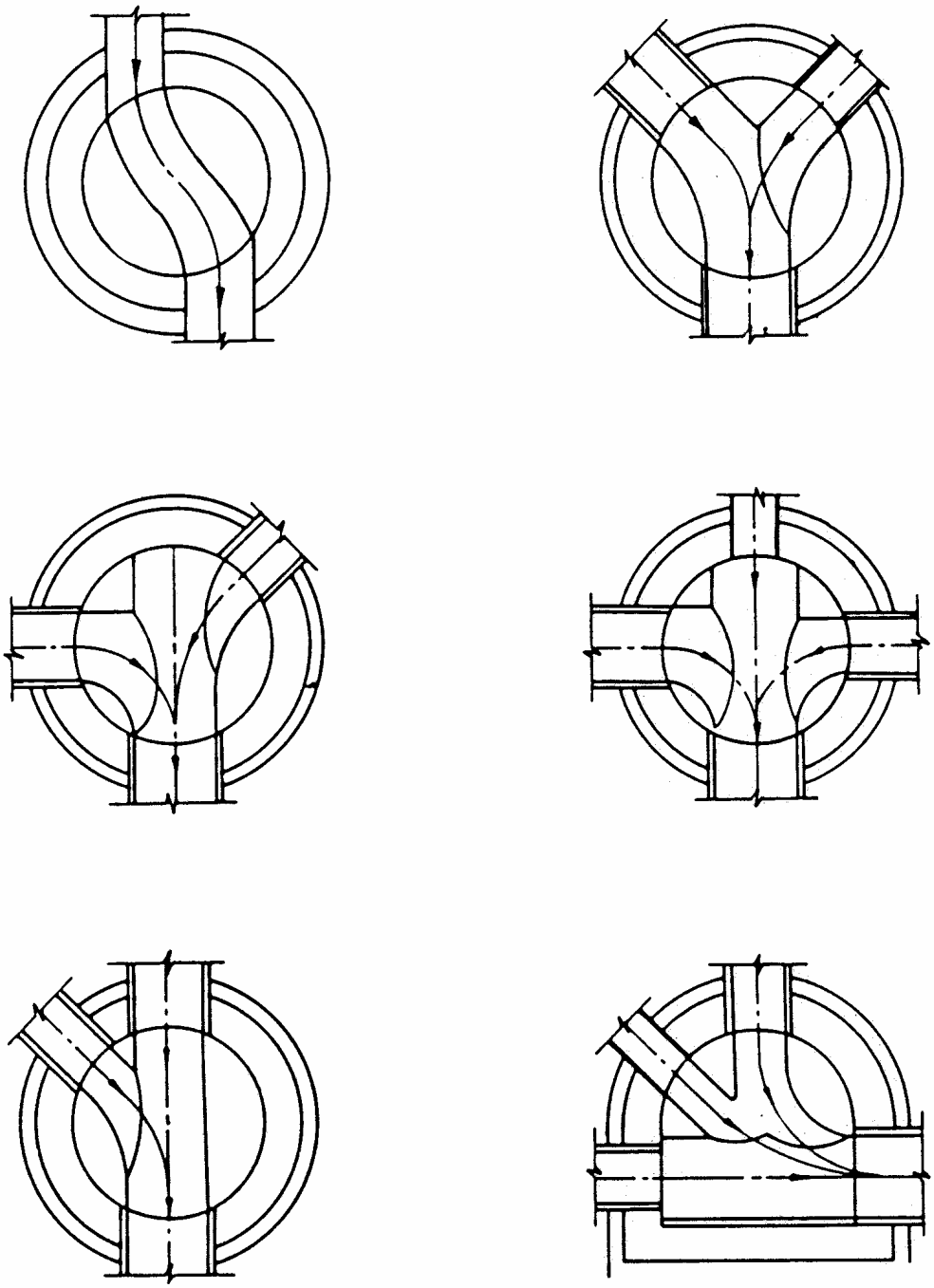
ADJUSTING RING

FIGURE 5-4B



CAST-IN-PLACE SECTION USED AS AN ALTERNATIVE TO ADJUSTING RINGS

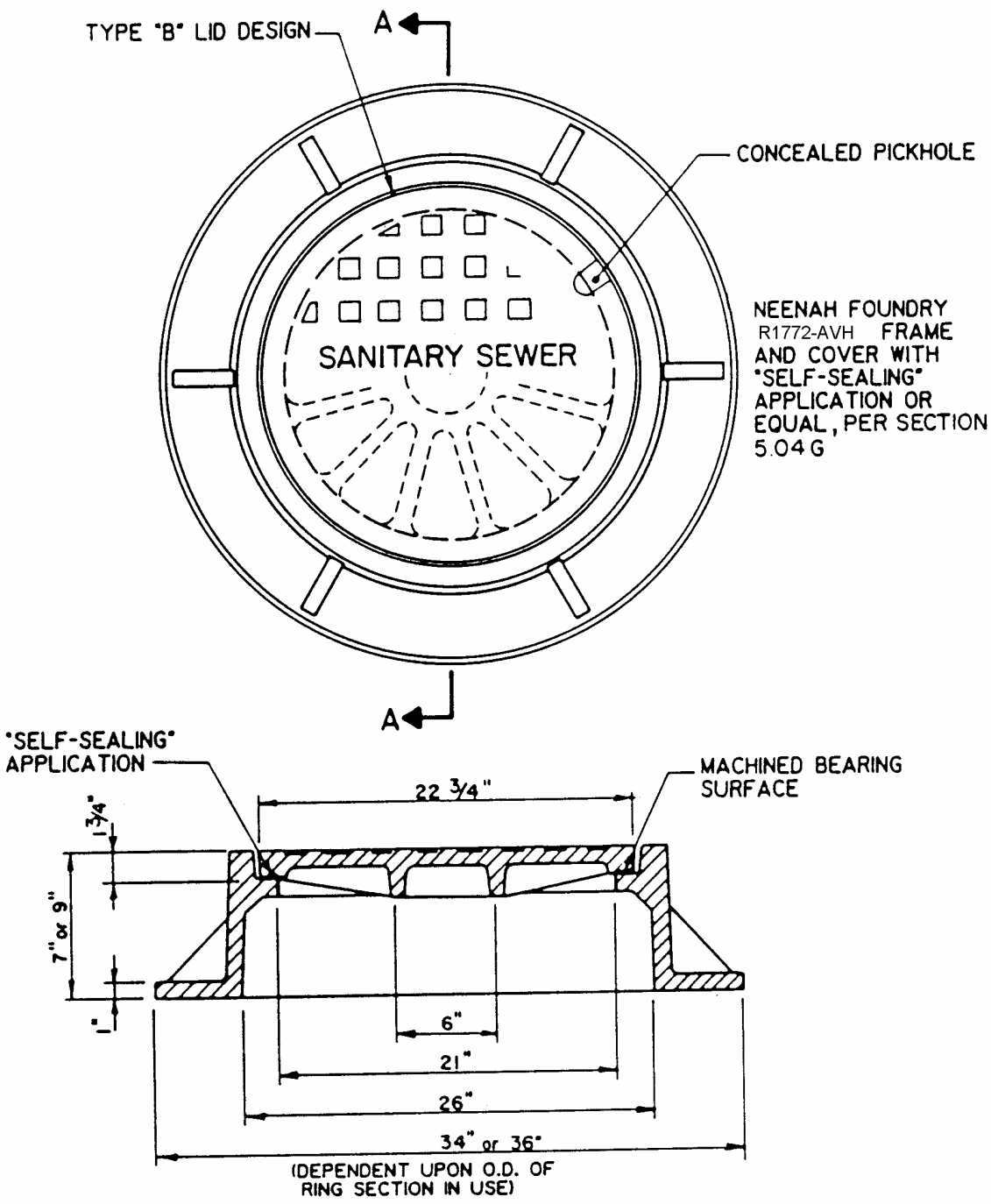
FIGURE 5-5



SANITARY SEWER
BENCH SLOPE= 1/2" PER FOOT

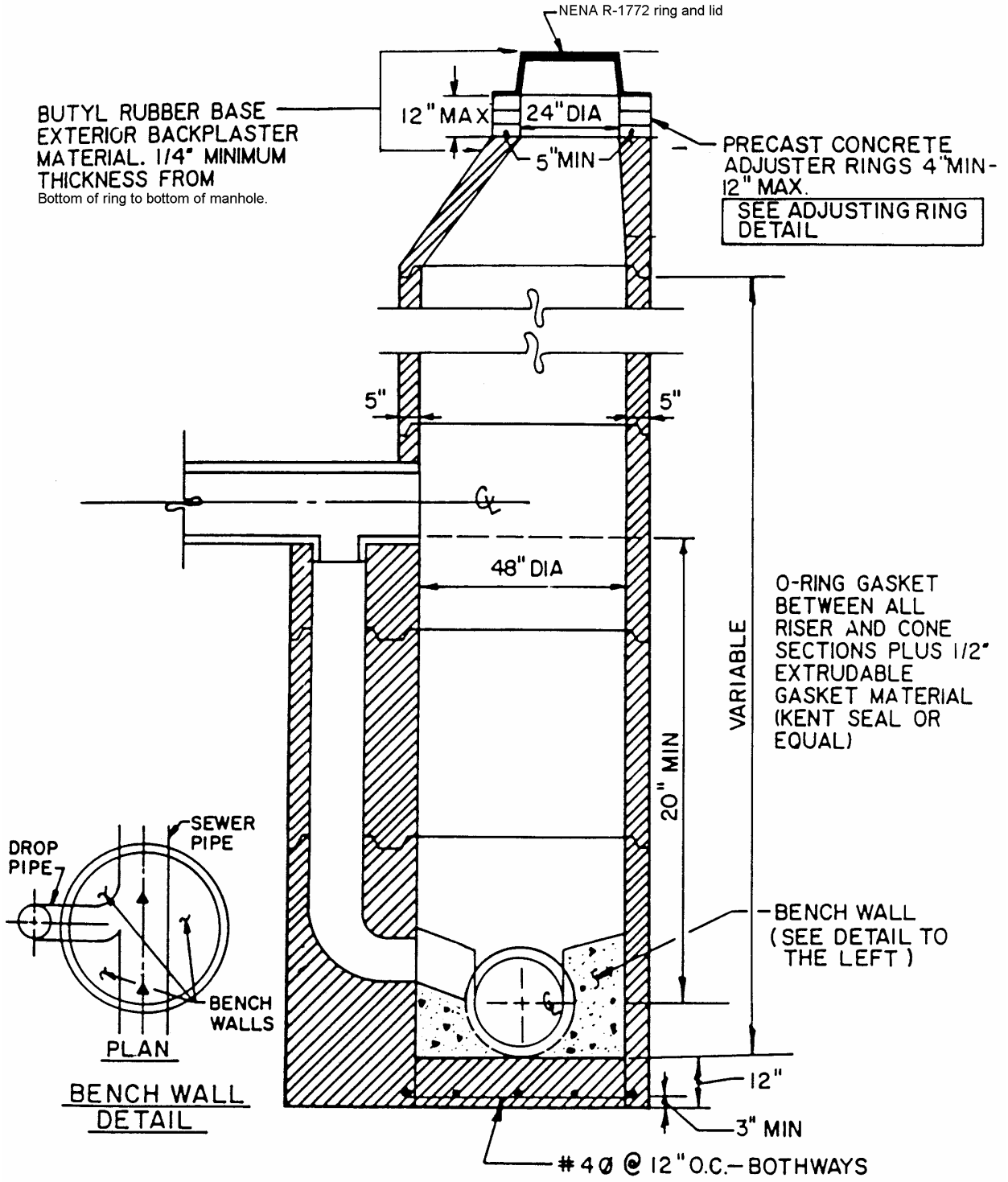
STANDARD MANHOLE BENCHES

FIGURE 5-6



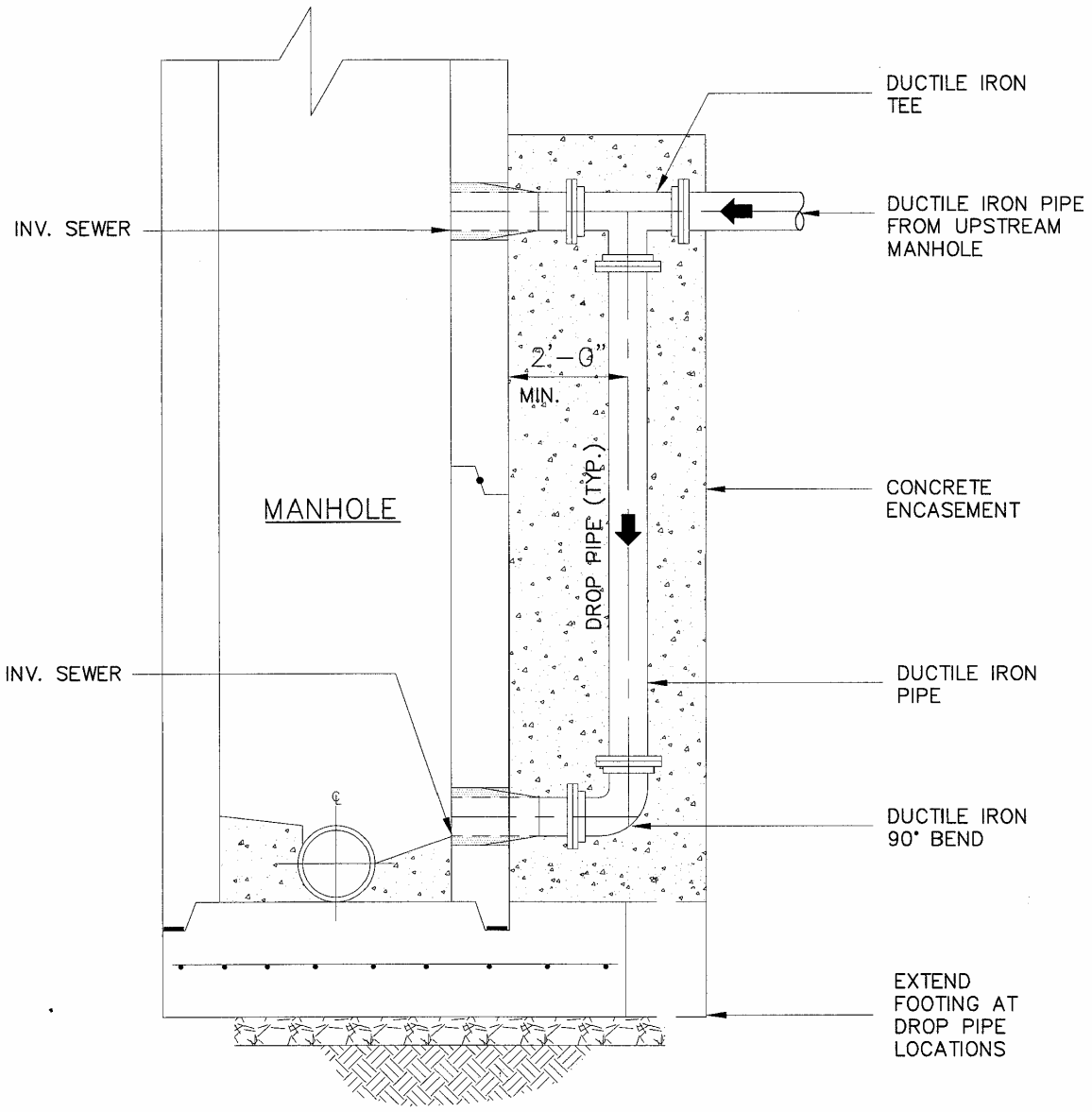
SANITARY SEWER MANHOLE
FRAME & COVER - STANDARD MANHOLE

FIGURE 5-7



PRECAST DROP MANHOLE

FIGURE 5-8



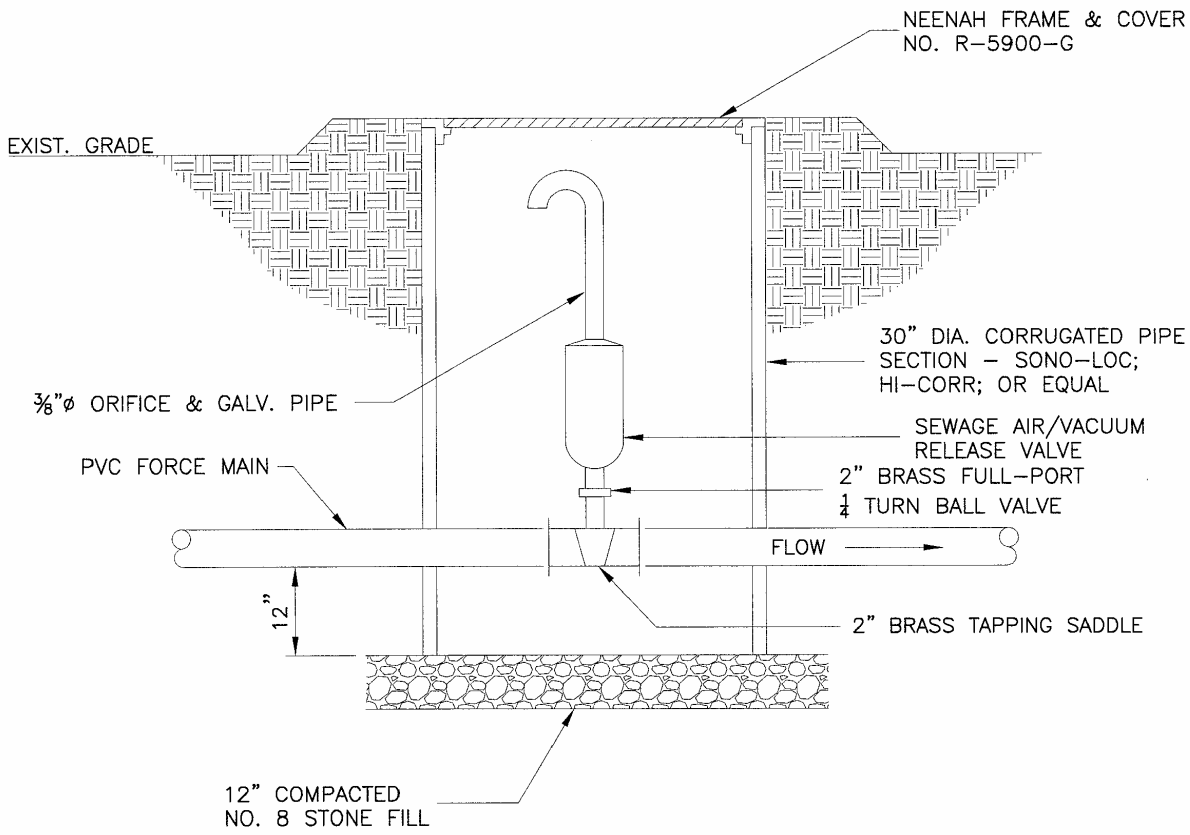
DETAIL - CAST-IN-PLACE DROP PIPE CONNECTION TO A MANHOLE

SCALE: N.T.S.

CONNECTION DETAIL NOTES:

1. DUCTILE IRON PIPE IS THE ONLY ACCEPTABLE PIPE FOR THE OUTSIDE DROP CONNECTION TO THE MANHOLE.
2. DUCTILE IRON PIPE MUST BE USED THE ENTIRE LENGTH FROM THE UPSTREAM MANHOLE TO THE DROP MANHOLE.
3. CONCRETE ENCASEMENT MUST BE A MINIMUM OF 3000 PSI STRENGTH CONCRETE.
4. ALL PIPE CONNECTIONS TO MANHOLE STRUCTURE MUST ADDRESS BOOT INVERSION. (SEE SECTION 5.04.M)

FIGURE 5–9



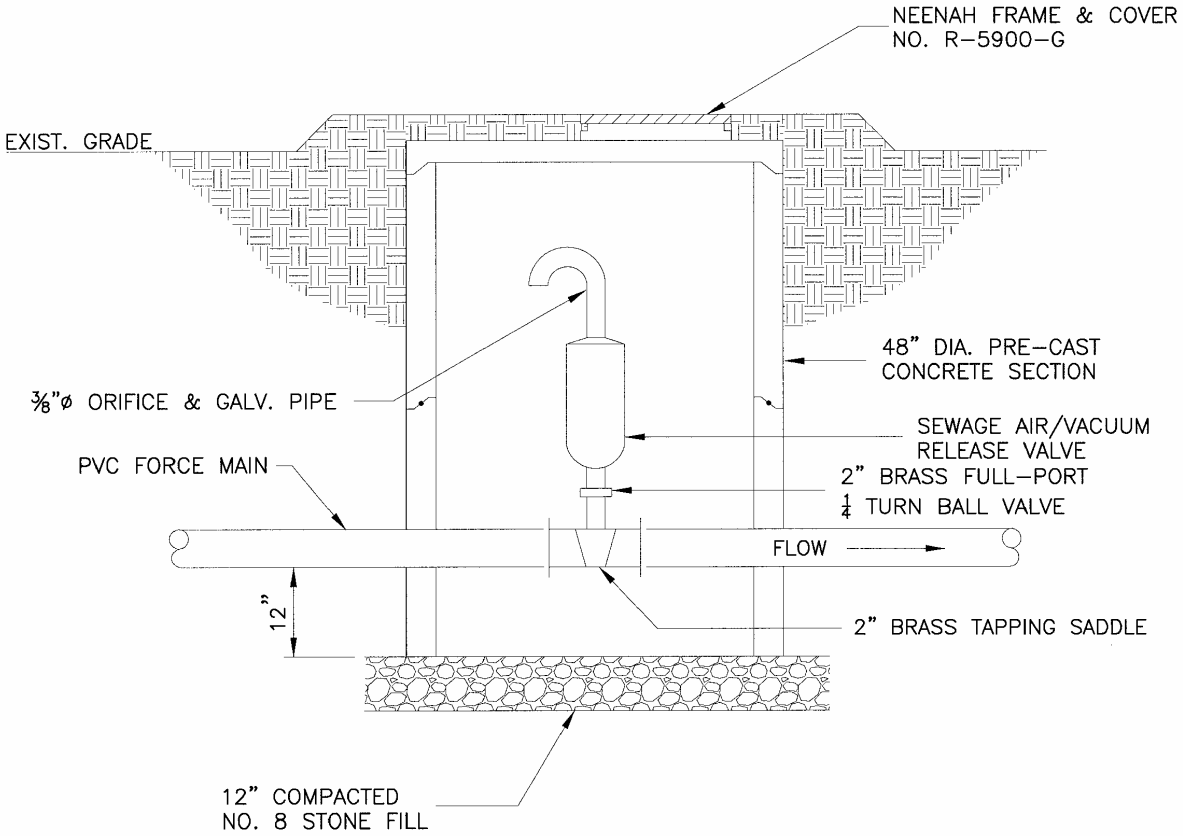
DETAIL - SEWAGE AIR RELEASE VALVE VAULT

SCALE: N.T.S.

AIR RELEASE VALVE VAULT NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING VALVE VAULT OVERALL HEIGHT (MIN. 5'-0" FROM TOP OF FORCEMAIN) WITH RESPECT TO FORCEMAIN CENTERLINE TO FACILITATE COMPLETE EQUIPMENT INSTALLATION.

FIGURE 5-10



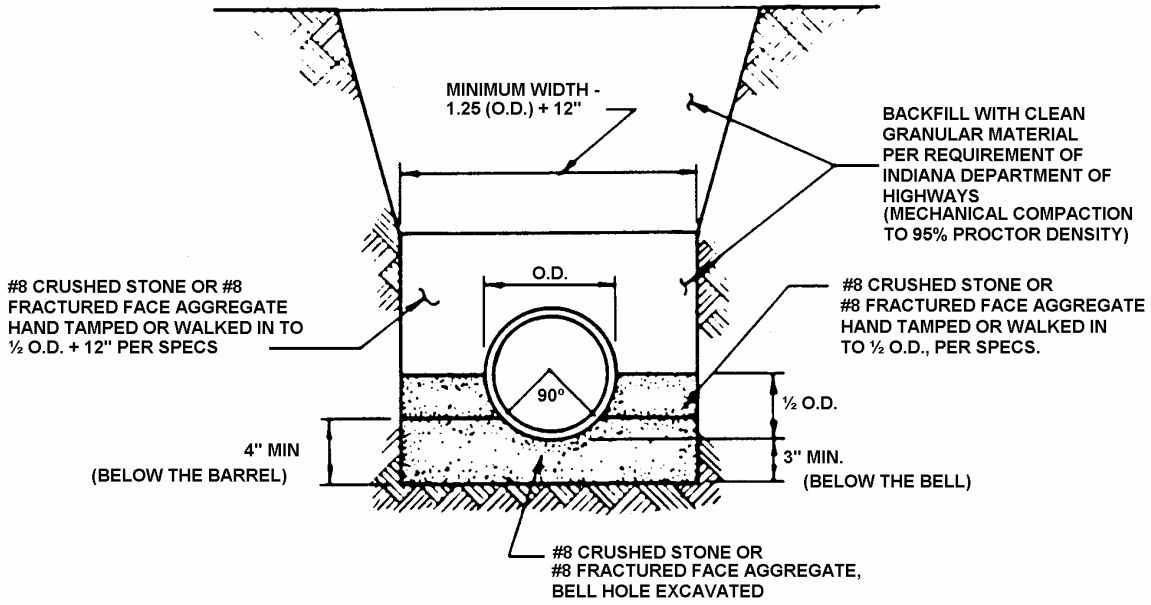
DETAIL - SEWAGE AIR RELEASE WITH PRE-CAST VALVE VAULT

SCALE: N.T.S.

AIR RELEASE VALVE VAULT NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING VALVE VAULT OVERALL HEIGHT (MIN. 5'-0" FROM TOP OF FORCEMAIN) WITH RESPECT TO FORCEMAIN CENTERLINE TO FACILITATE COMPLETE EQUIPMENT INSTALLATION.

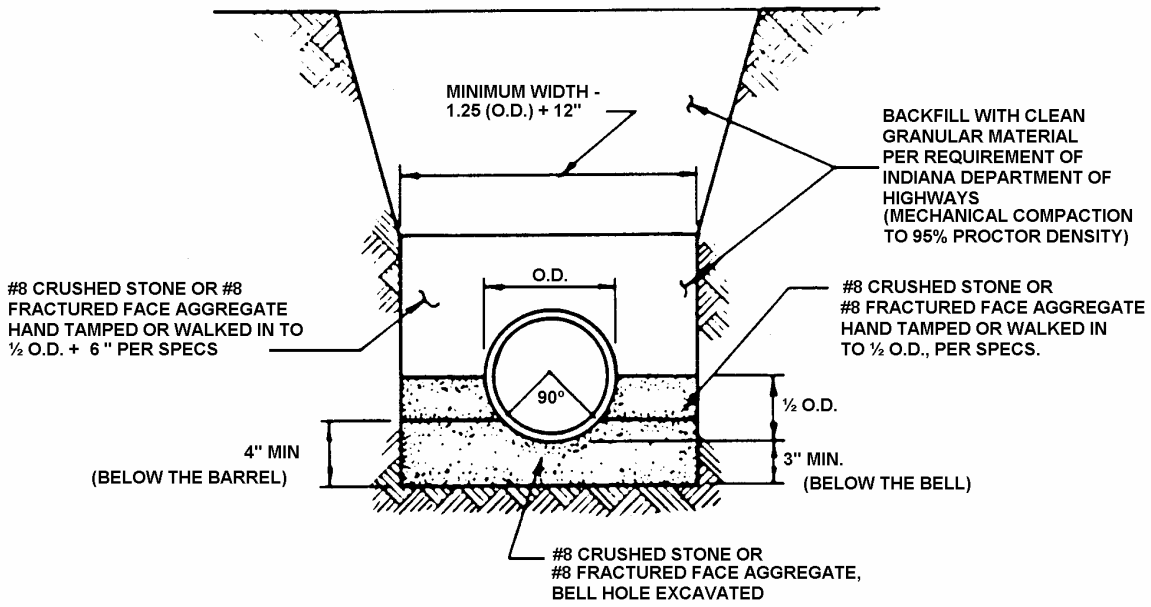
FIGURE 5-11



PIPE SIZE	8" TO 15"	18" & OVER
BEDDING BELOW THE PIPE BARREL	O.D. / 4 MIN. = 4"	O.D. / 4 MAX. = 8"

FLEXIBLE PIPE BEDDING DETAIL
PVC & HDPE Pipe

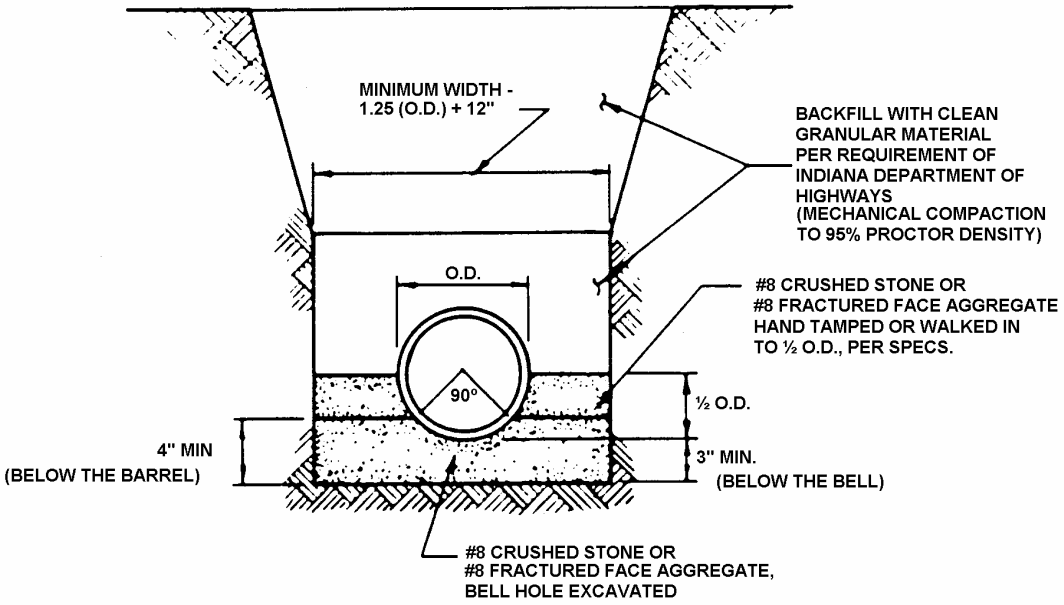
FIGURE 7-1



PIPE SIZE	8" TO 15"	18" & OVER
BEDDING BELOW THE PIPE BARREL	O.D. / 4 MIN. = 4"	O.D. / 4 MAX. = 8"

SEMI-RIGID PIPE BEDDING DETAIL
(PVC Composite Pipe & Ductile Iron Pipe)

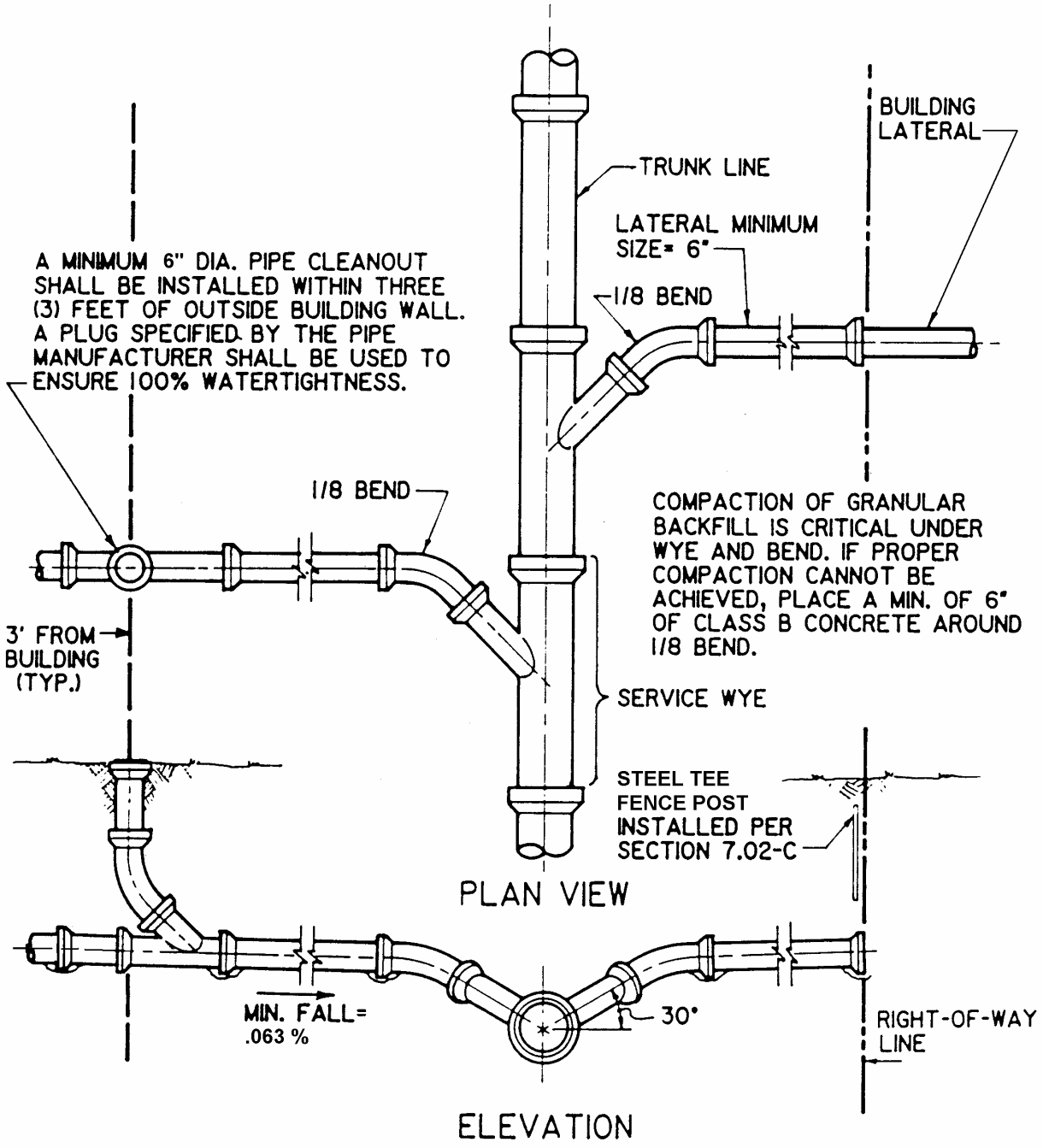
FIGURE 7-2



PIPE SIZE	8" TO 15"	18" & OVER
BEDDING BELOW THE PIPE BARREL	O.D. / 4 MIN. = 4"	O.D. / 4 MAX. = 8"

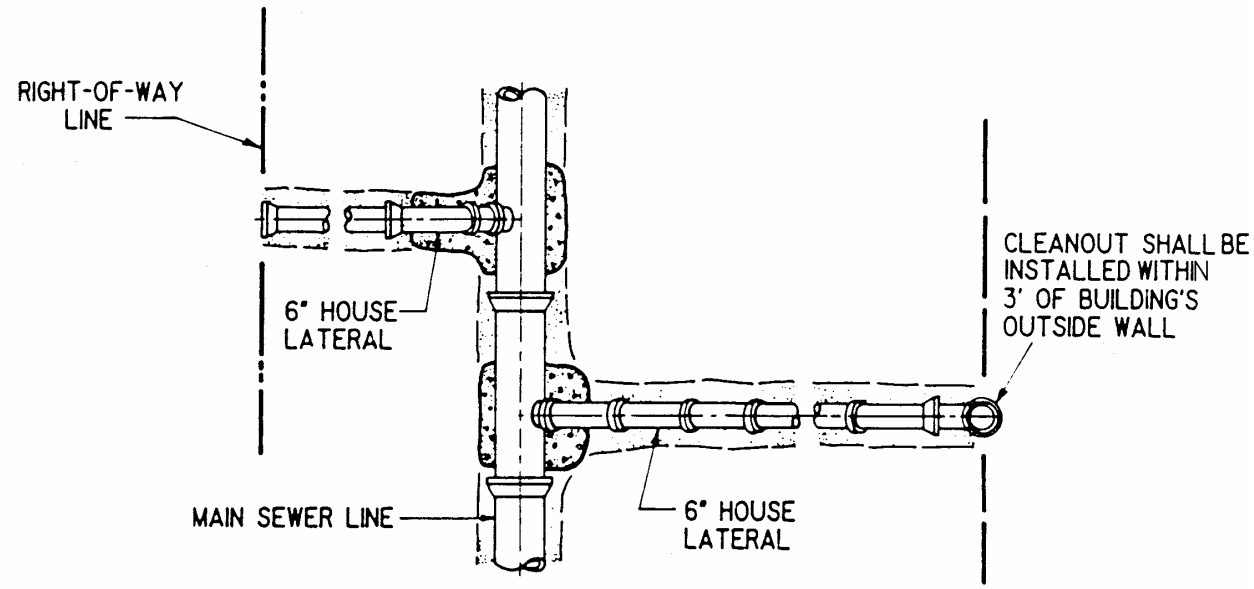
RIGID PIPE BEDDING DETAIL
(Concrete Pipe)

FIGURE 7-3

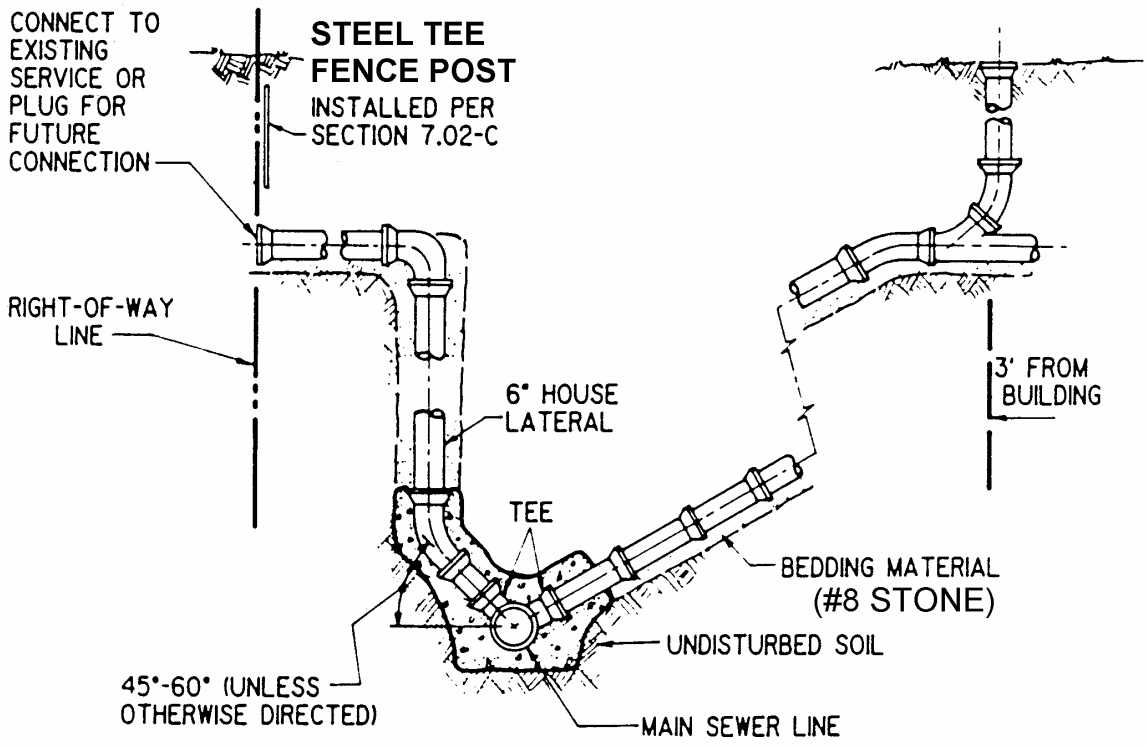


SERVICE CONNECTION FOR SHALLOW SEWERS
(LESS THAN 15' DEEP)

FIGURE 7-4



PLAN



ELEVATION

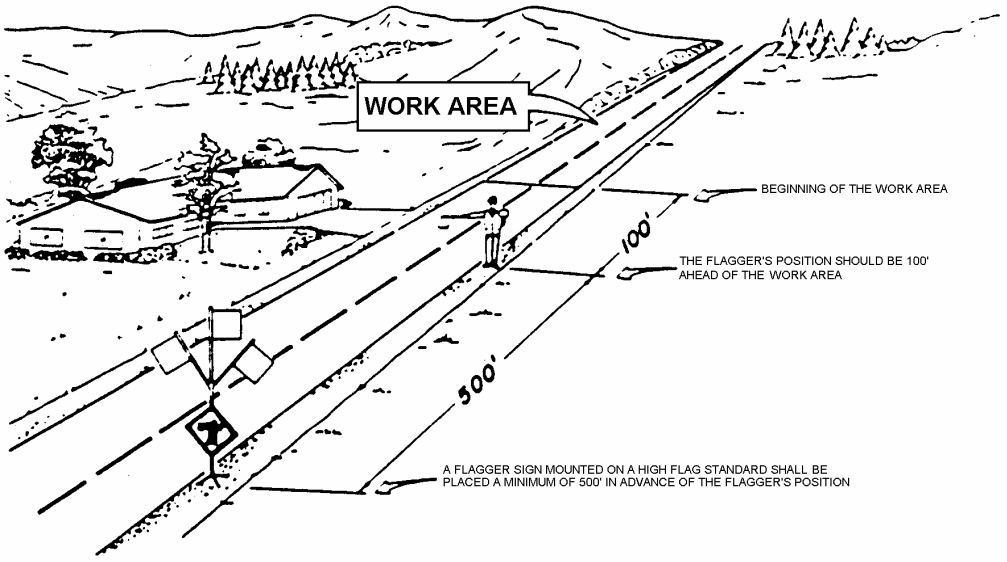
SERVICE CONNECTION FOR DEEP SEWERS (15' DEEP AND OVER)

FIGURE 7-5

SIGNING AND FLAGGING FOR CONTROL OF TRAFFIC

DRAWINGS TO ILLUSTRATE PROVISIONS OF SECTION 8.03

FLAGGER CONTROL OF TRAFFIC



TYPICAL SIGNING FOR EXCAVATIONS IN EXISTING STREETS

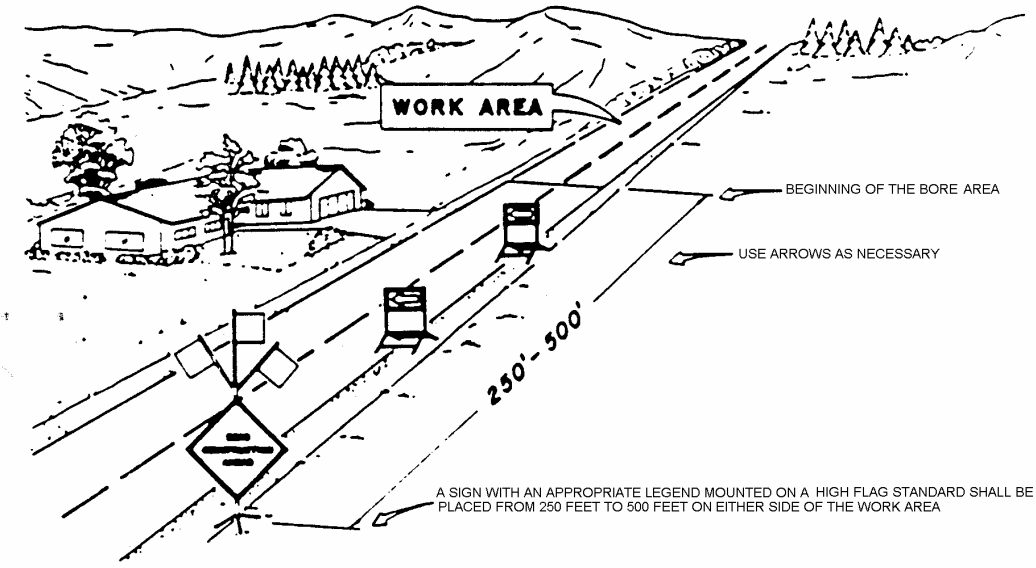


FIGURE 8-1

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q= 0.0015

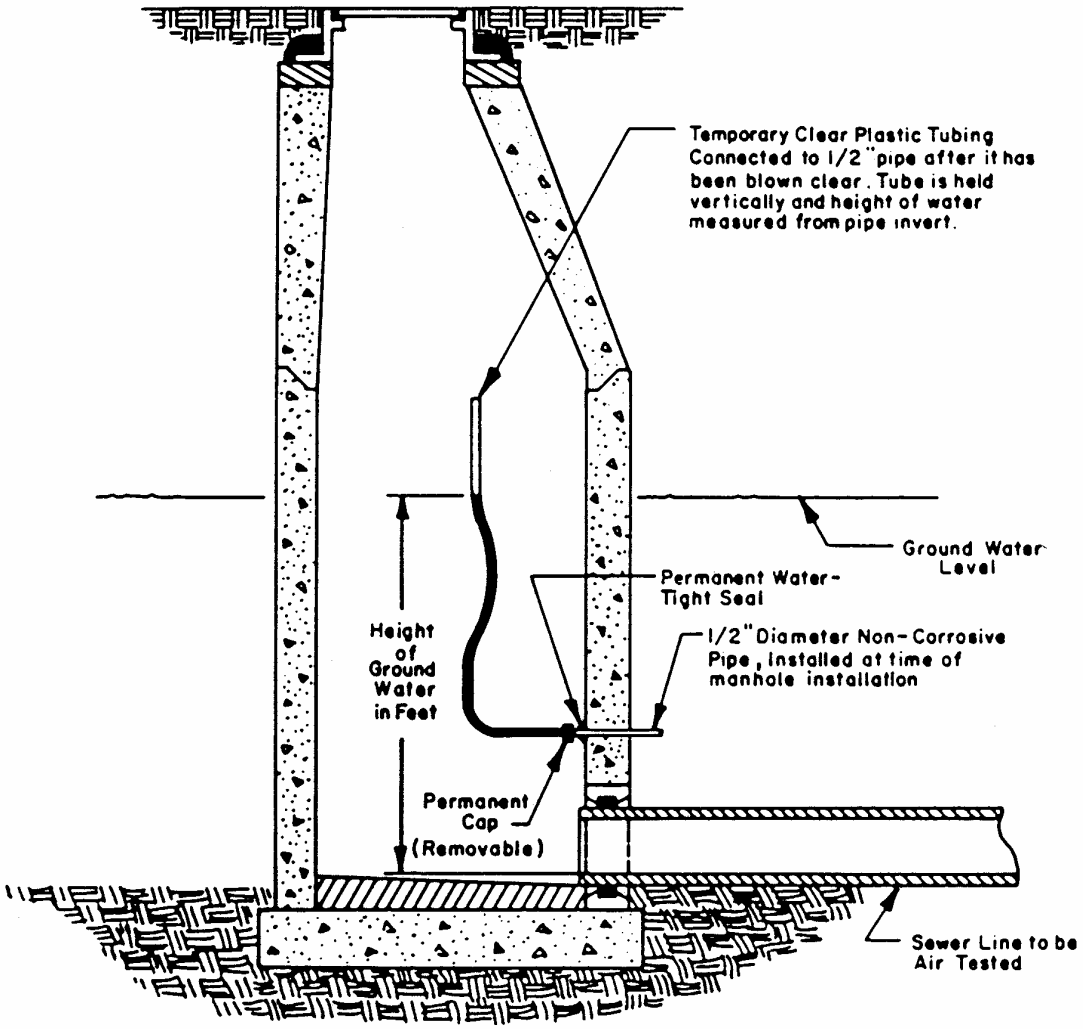
1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.036 L	28:51	43:16	57:41	72:07	86:32	100:47	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

Table 9.1A

SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q= 0.0015

1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

Table 9.1B



MANHOLE FOR DETERMINING GROUND WATER HEIGHT

FIGURE 9-1

AIR TEST DATA SHEET

Owner (Name of city, District, etc.) _____ Test No. _____

Identification of Pipe installation (Job name, location, contract number, etc.)

Field Test Data: (To be filled in by the inspector)

Date: _____ Specified Maximum Pressure Drop: _____ psig.

Identification of Pipe Material Installed _____

Pipe Under Test					Field Test Operations Data					
Upstream MH sta #	Downstream MH sta #	Dia. D (in)	Length L (ft)	Specification Time (min:sec)	Pressure initially Raised to (psig)	Time Allowed for Pressure to stabilize (min)	Start Test Pressure (psig)	Stop Test Pressure (psig)	Elapsed Time (min:sec)	Pass or Fail (P or F)

Inspector's Name and Title: _____

Signature of Inspector: _____

If a section fails, the following items should be completed:

Identify section(s) that failed: _____

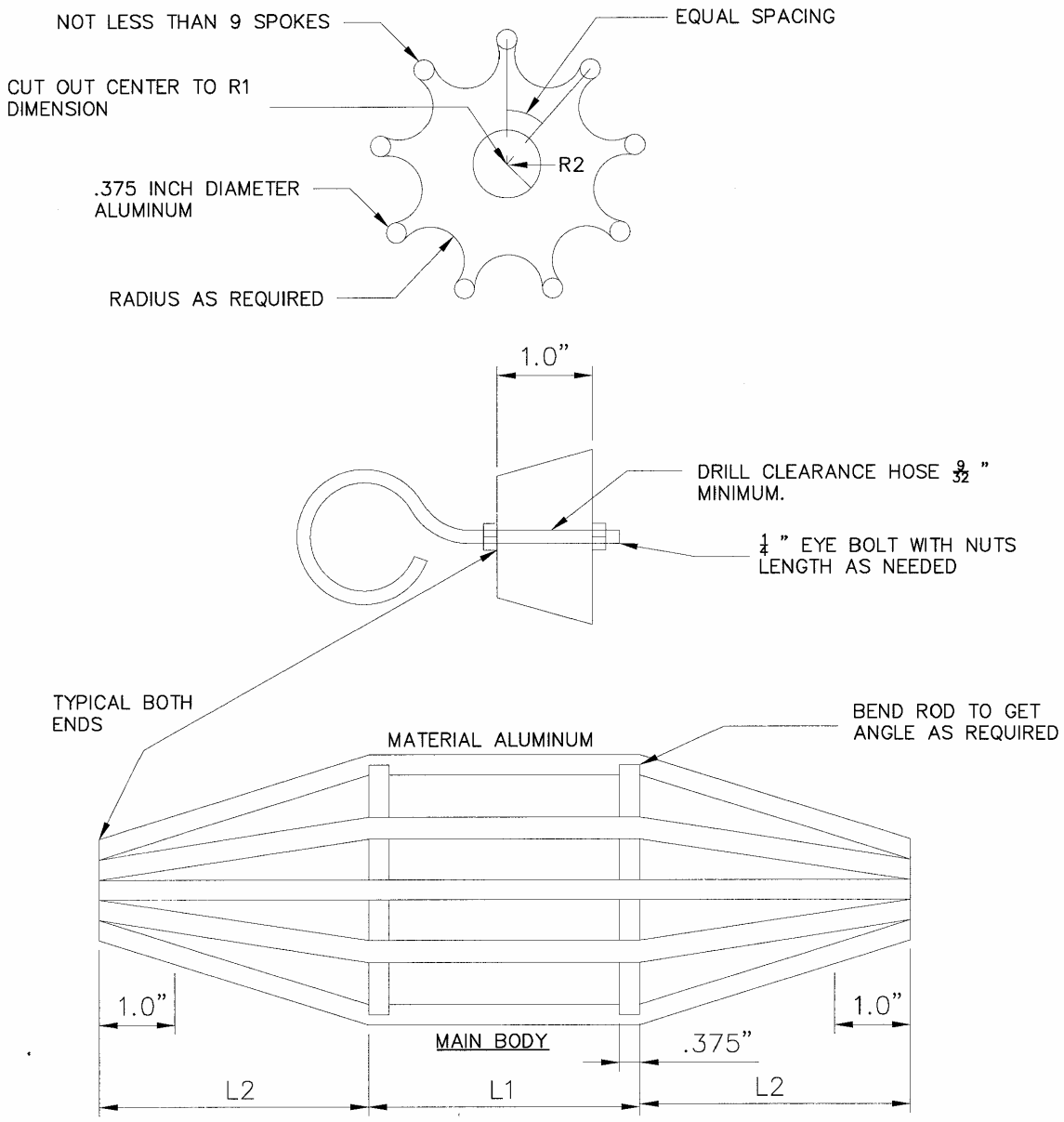
Leak (was) (was not) located. Method used: _____

Description of leakage found: _____

Description of corrective action taken: _____

For test results after repair refer to Test No. _____, Inspector _____

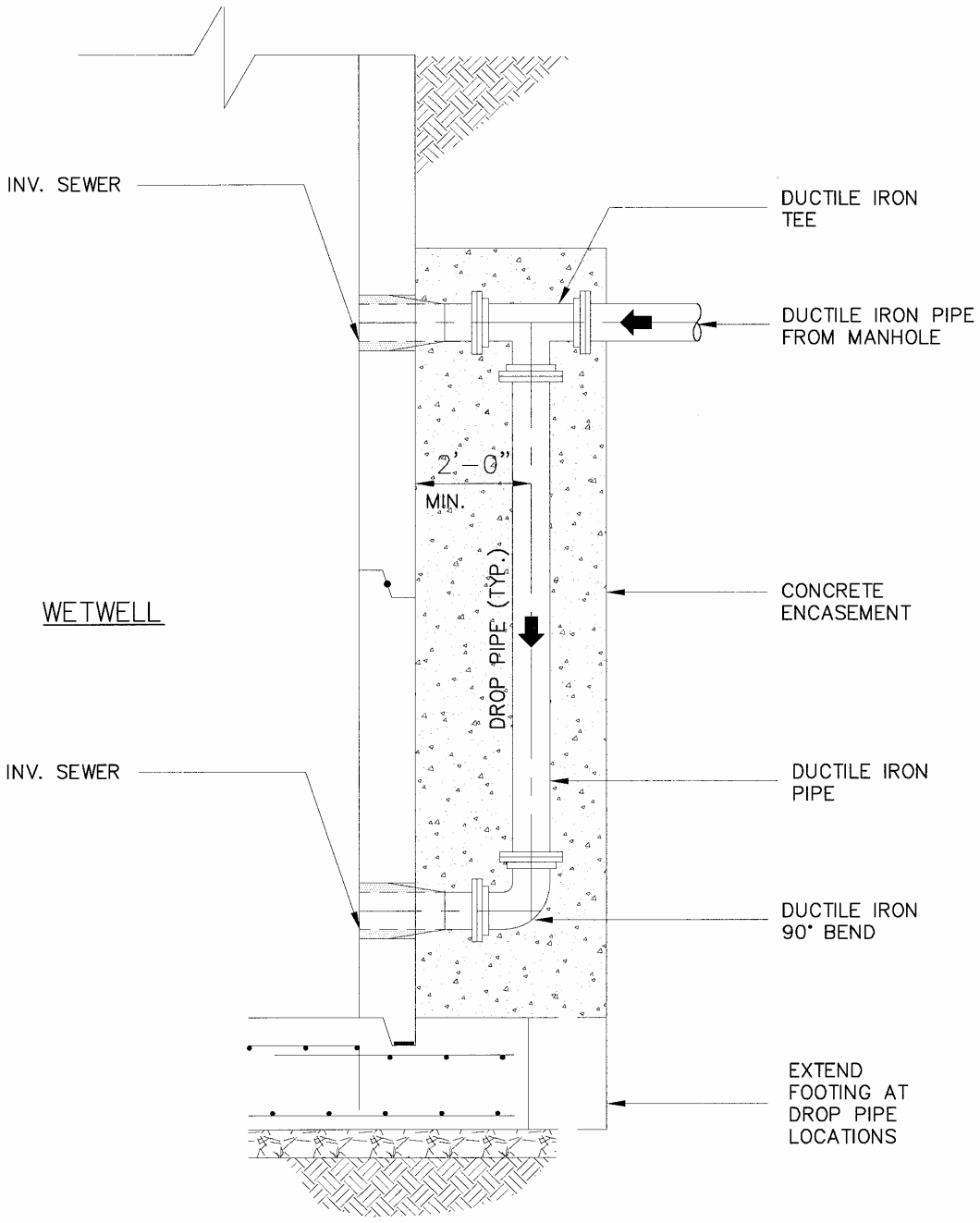
Figure 9-2



5% NO GO DEFLECTION GAUGE

PIPE SIZE	L1	L2	PVC R1	ABS TRUSS R1	R2
8″	6″	6″	3.69″	3.10″	1.25″
10″	8″	8″	4.60″	4.66″	1.50″
12″	8″	8″	5.49″	5.61″	1.75″
15″	9″	9″	6.72″	7.18″	2.00″

FIGURE 9–3



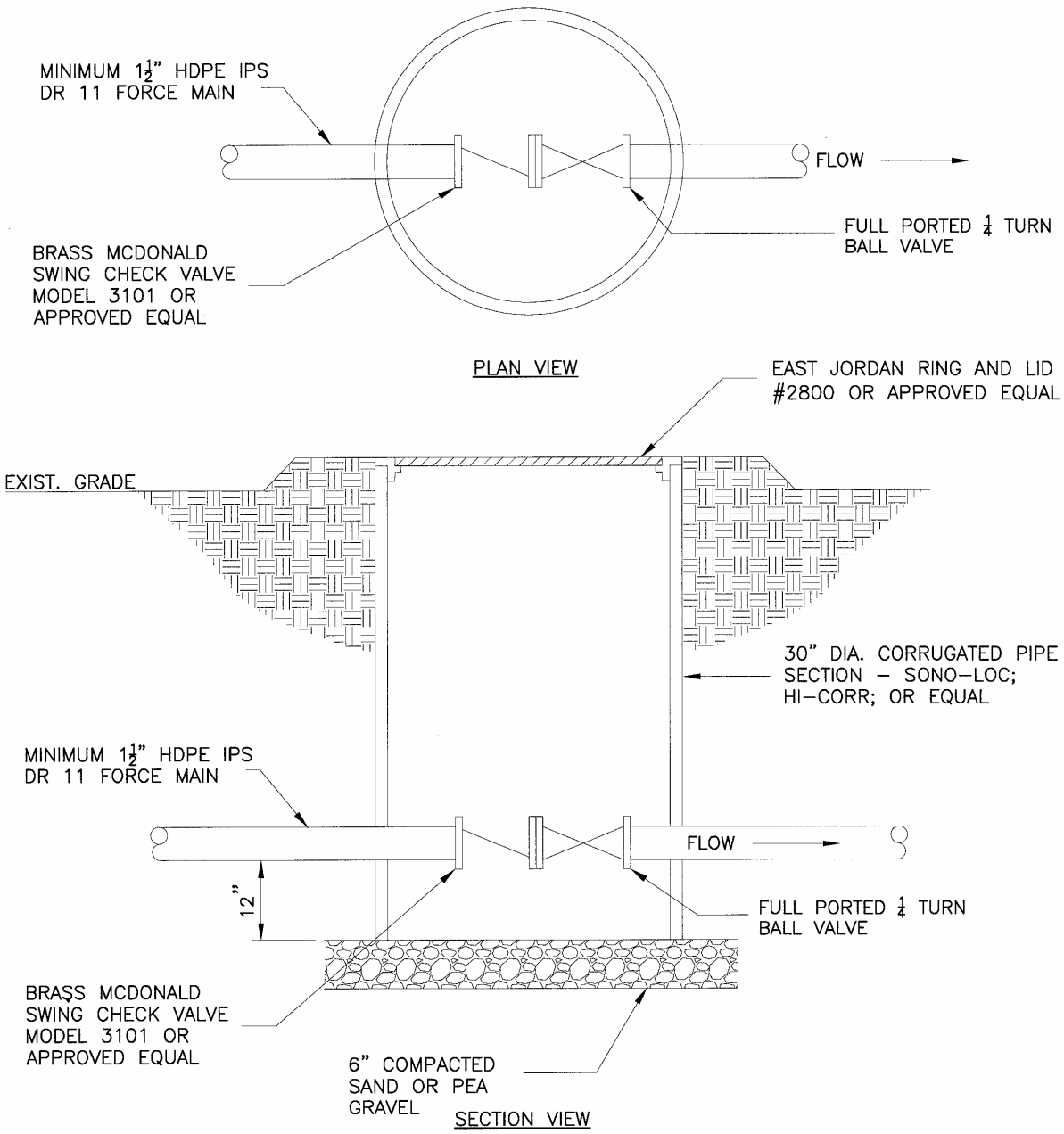
DETAIL - PIPE CONNECTIONS TO THE WETWELL STRUCTURE

SCALE: N.T.S.

CONNECTION DETAIL NOTES:

1. DUCTILE IRON PIPE IS THE ONLY ACCEPTABLE PIPE FOR THE OUTSIDE DROP CONNECTION TO THE WETWELL.
2. DUCTILE IRON PIPE MUST BE USED THE ENTIRE LENGTH FROM THE UPSTREAM MANHOLE TO THE WETWELL.
3. CONCRETE ENCASEMENT MUST BE A MINIMUM OF 3000 PSI STRENGTH CONCRETE.
4. ALL PIPE CONNECTIONS TO WETWELL STRUCTURE MUST ADDRESS BOOT INVERSION. (SEE SECTION 5.04.M)

FIGURE 10–1



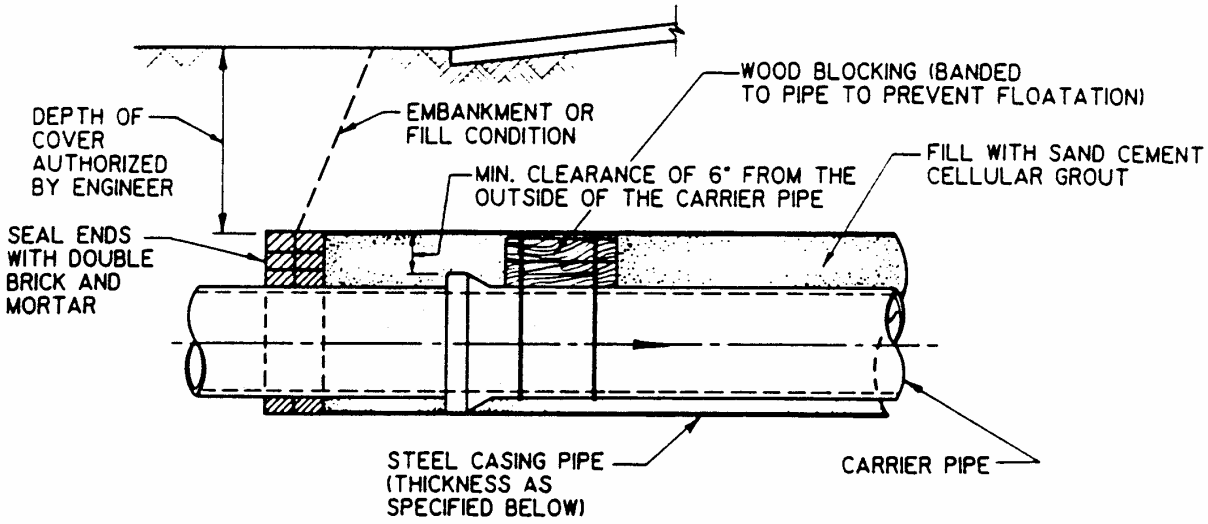
DETAIL - STANDARD SERVICE CONNECTION VALVE VAULT

SCALE: N.T.S.

STANDARD SERVICE CONNECTION VALVE VAULT NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING VALVE VAULT OVERALL HEIGHT (MIN. 5'–0" FROM TOP OF FORCEMAIN) WITH RESPECT TO FORCEMAIN CENTERLINE TO FACILITATE COMPLETE EQUIPMENT INSTALLATION.

FIGURE 10–2

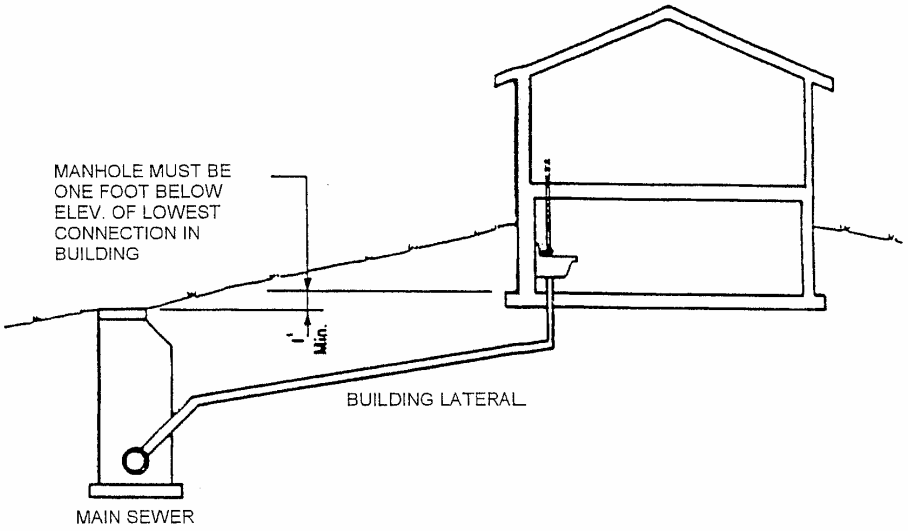


NOMINAL WALL THICKNESS

		RAILROAD CROSSINGS		HIGHWAY CROSSINGS	
Nominal Size	Actual O.D.	Bare	Protective Coated	Bare	Protective Coated
8"	8 5/8"	.250	.188	.250	.188
10"	10 3/4	.250	.188	.250	.188
12"	12 3/4"	.250	.188	.250	.188
14"	14"	.281	.219	.250	.219
16"	16"	.281	.219	.250	.219
18"	18"	.312	.250	.250	.250
20"	20"	.344	.281	.312	.250
24"	24"	.406	.344	.312	.250
30"	30"	.469	.406	.375	.375
36"	36"	.532	.469	.500	.438
42"	42"	.563	.500	.500	.500
48"	48"	.625	.563	.625	.563
54"	54"	.688	.625	.625	.625
60"	60"	.750	.688	.625	.625
66"	66"	.813	.750	.625	.625
72"	72"	.875	.813	.750	.750

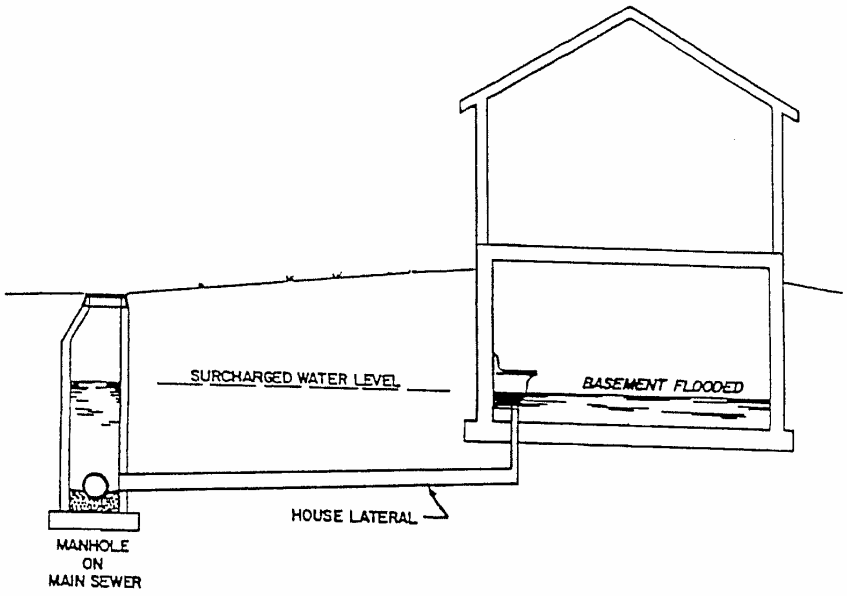
BORING DETAIL

FIGURE II-I



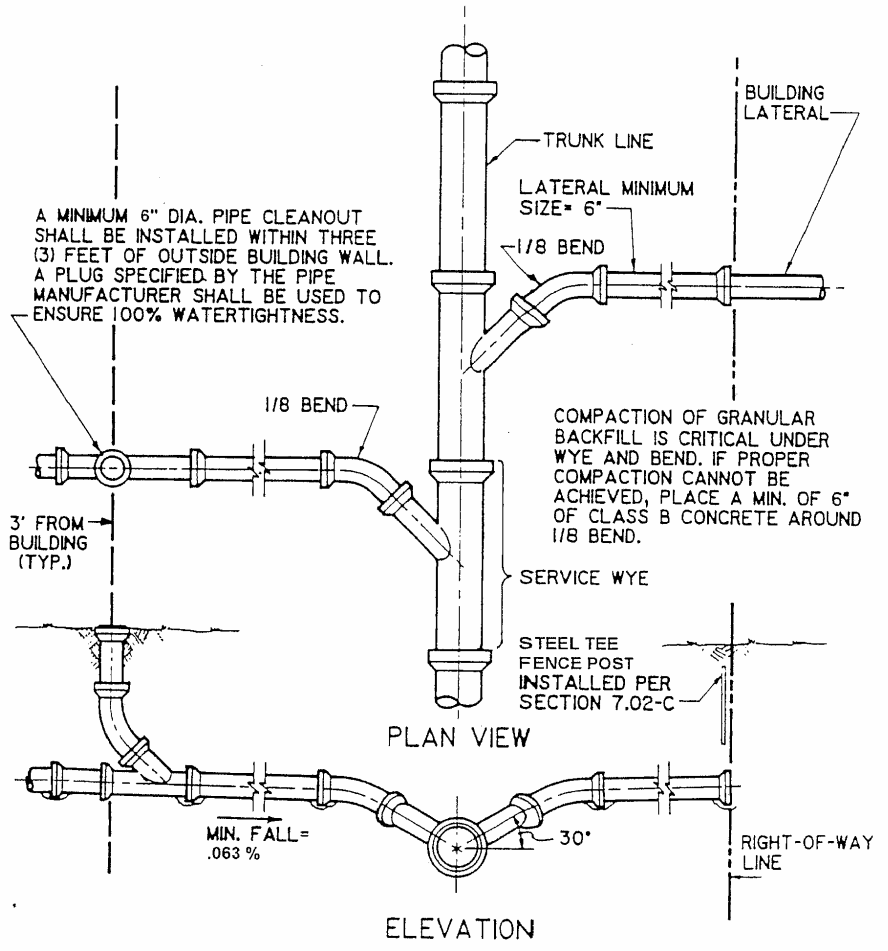
ACCEPTED DESIGN OF SANITARY SEWER HOUSE CONNECTION (SEE THE REJECTED DESIGN - FIGURE 3-1

FIGURE 13.1



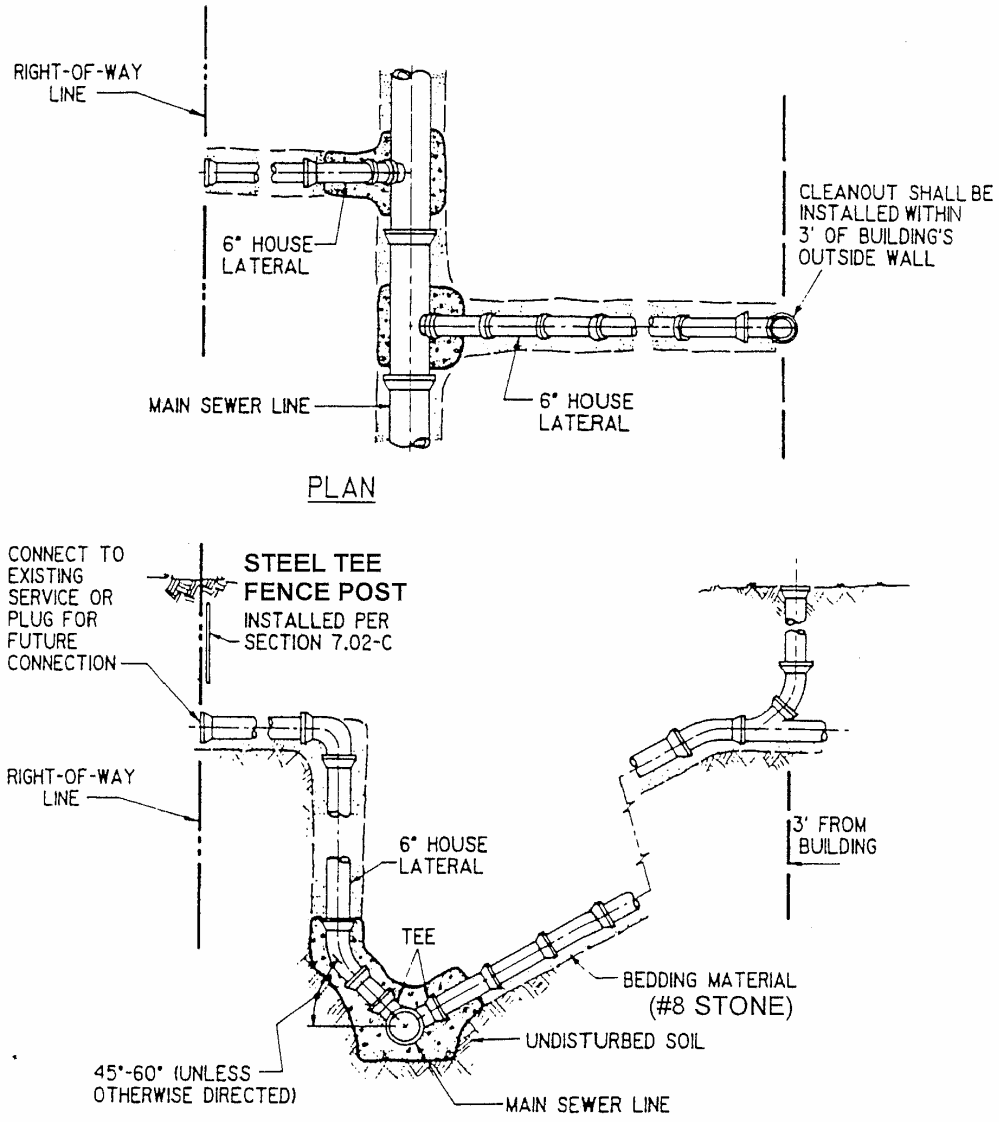
SANITARY SEWER HOUSE CONNECTION CONSTRUCTED IN THIS SITUATION WILL NOT BE ACCEPTED. (SEE THE ACCEPTED SITUATION – FIGURE 3-2)

FIGURE 13.2



SERVICE CONNECTION FOR SHALLOW SEWERS
(LESS THAN 15' DEEP)

FIGURE 13.3



SERVICE CONNECTION FOR DEEP SEWERS
(15' DEEP AND OVER)

FIGURE 13.4

APPENDIX A

REGULATIONS GOVERNING THE
CONNECTION TO AND USE OF THE
FALL CREEK REGIONAL WASTE DISTRICT
WASTEWATER SYSTEM
(GRAVITY SYSTEM)

1. TAP-ON FEE: There is a tap-on fee of _____ to the District for each hook-up, except industrial. The industrial tap-on fee shall be determined on a case-by-case basis.

2. CAPACITY FEE: The application for sewer permit requires that a capacity fee of _____ be paid to the District prior to issuance of the permission to connect.

3. MATERIALS: Building laterals connecting to the District lines shall be at least six (6) inches in diameter made from the following material:

   A. PIPE:

      Polyvinyl Chloride pipe (SDR35 O-Ring Pipe or SDR26 Class 160 O-Ring Pipe). Call FCRWD to verify which pipe is required.

   B. JOINT:

      All joints to be rubber "O" ring type – glue joints are prohibited.

   C. FITTINGS:

      T's, Y's, 45's, etc. shall be the same material as pipe used. (Double 45's shall be used in lieu of 90° Ells).

   D. ADAPTERS:

      Connections at the end of the lateral where the size or type of materials differs shall be made with adapters. The adapters shall be rubber body couplings with stainless steel bands around the ends for sealing.

4. SLOPE: A minimum slope for 6" is 0.63% per 100' or ¾" per 13' joint.

5. LATERAL TRENCH: Trenches shall be excavated only wide enough for adequate working space. The bottom of the trench shall be free from rocks, roots, foreign materials or water. The lateral pipe shall be carefully placed on a firm, uniform base of #8 stone with stone carefully placed above the haunches of the pipe, leaving the top of the pipe exposed for inspection. Backfill material shall also be free of large rocks, lumps, wood or foreign materials.

6. CONNECTION TO DISTRICT SEWER: Care must be taken when excavating lateral stub for connection to District Sewer. Any damage done to lateral pipes

will be repaired by the owner at no cost to the District. Prior to removing the cap from the lateral stub, all water, mud, rocks, gravel, etc. must be removed from lateral trench. Entrance of these materials into the District Sewer will be the responsibility of the owner. Any costs to the District for cleaning or removing these materials will be paid for by the owner.

7. BACKFILLING LATERAL TRENCH: The Trench is not to be backfilled nor any pipe, fittings or connections covered until inspected by a representative of the Fall Creek Regional Waste District. Approval must be received by the District prior to backfill. Any covered items must be re-excavated and replaced at the owners expense.

1. CLEANOUT: It is required that a 6" cleanout be installed within three (3) feet of the building by the owner for ease in cleaning their lateral. One cleanout should be installed for every 100 feet of line.

2. FLOOR DRAINS – RESIDENTIAL: Floor drains in residential structures are not to be connected to the customer's service lateral or to the customer's wastewater grinder unit.

3. SEPTIC TANK ABANDONMENT: The owner is responsible for the disposition of the septic tank. The tank shall be emptied of its contents, filled with a granular material and disconnected from further use. No septage from the tank shall be emptied into the District System.

4. STORM WATER: Indiana Law and District Ordinance 84-2 prohibit connection of any storm water or ground water into District sewers. No person shall make connection of roof downspouts, exterior footing drains, surface runoff, or any ground water connection into the District System.

5. INSPECTION NOTIFICATION: When the owner has the lateral line laid and is ready to make connection into the District Sewer, they shall notify the District inspector. If District cannot respond within four (4) hours of notice from customer, the customer may backfill. District hours are 7:30 A.M. – 3:30 P.M. Monday through Friday. If work is done after hours, weekends or holidays, there will be a fifty ($50) dollar inspection fee. The permit application and inspector are available at 778-7544, District Office, 9378 S 650 West, Pendleton, Indiana. Mailing address: Fall Creek Regional Waste District, P.O. Box 59, Pendleton, Indiana 46064.

REGULATIONS GOVERNING THE
CONNECTION TO AND USE OF THE
FALL CREEK REGIONAL WASTE DISTRICT
WASTEWATER SYSTEM
(PRESSURE SYSTEM)

1. TAP-ON FEE: There is a tap-on fee of _____ to the District for each hook-up, except industrial. The industrial tap-on fee shall be determined on a case-by-case basis.

2. CAPACITY FEE: The application for sewer permit requires that a capacity fee of _____ be paid to the District prior to issuance of the permission to connect.

3. MATERIALS: Building laterals from the building to the pump pit shall be 4" SDR 35 Gasketed Joint Pipe (no glue joints) including a clean-out within 3 feet of the building. The pump pit should be manufactured for the purpose of a grinder pump pit (if other type of tank is used it should be authorized by the District prior to use). The outlet pipe from pit to District main shall be 1 ½" minimum well plastic 160 PSI with brass well adapters and secured with (2) two stainless steel clamps per fitting.

4. LATERAL TRENCH: Trenches shall be excavated only wide enough for adequate working space. The bottom of the trench shall be free from rocks, roots, foreign materials or water. The lateral pipe shall be carefully placed on a firm, uniform base of pea gravel or sand with pea gravel or sand carefully placed above the haunches of the pipe, leaving the top of the pipe exposed for inspection. Backfill material shall also be free or large rocks, lumps, wood or foreign materials. The 1 ½"minimum discharge pipe from the pump pit to the main shall be buried with a #10 solid copper trace wire. Sand or pea gravel bedding is required unless backfill material is free of rocks, roots, gravel, etc. The grinder pit shall be bedded with pea gravel or sand up to the electrical discharge of the pit.

5. BACKFILLING LATERAL TRENCH: The Trench is not to be backfilled nor any pipe, fittings or connections covered until inspected by a representative of the Fall Creek Regional Waste District. Approval must be received from the District prior to backfill. Any covered items must be re-excavated and replaced at the contractors expense.

6. CONNECTION TO DISTRICT SEWER MAIN: Care must be taken when excavating lateral stub or the force main for connection to District sewer main.
Any damage done to lateral pipes will be repaired by the contractor or the person doing the work at no cost to the District. Prior to making the connection to the District main, all water, mud, rocks, gravel, etc. must be removed from lateral trench. Entrance of these materials into the District Sewer will be the
responsibility of the contractor or the person doing the work. Any costs to the District for cleaning or removing these materials will be paid by the contractor or person(s) doing the work. The grinder unit and all connections shall be water tight.

7. SEPTIC TANK ABANDONMENT: The owner is responsible for the disposition of the septic tank. The tank shall be emptied of its contents, filled with a granular material and disconnected from further use. No septage from the tank shall be emptied into the District System. Homeowner and/or contractor shall call FCRWD for inspection only after septic tank has been pumped and filled.

8. FLOOR DRAINS – RESIDENTIAL: Floor drains in residential structures are not to be connected to the customer's service lateral or to the customer's wastewater grinder unit.

9. STORM WATER: Indiana Law and District Ordinance 84-2 prohibit connection of any storm water or ground water into District sewers. No person shall make connection of roof downspouts, exterior footing drains, surface runoff, or any ground water connection into the District System.

10. INSPECTION NOTIFICATION: When the force main is laid and is hooked up to the District sewer main, they shall notify the District inspector. If the District cannot respond within four (4) District regular working hours of notice for final inspection, the customer may backfill. The permit application and inspectors are available at 778-7544, District office, 9378 S 650 West, Pendleton, Indiana. Mailing address: Fall Creek Regional Waste District, P.O. Box 59, Pendleton, Indiana 46064. District inspection hours are 7:30 A.M. – 3:30 P.M. Monday through Friday.

SANITARY SEWER SERVICE AGREEMENT

Madison County, Indiana

This Sanitary Sewer Service Agreement ("Agreement"), made and entered into this ____ day of , 20 , is between the FALL CREEK REGIONAL WASTE DISTRICT ("District") and ("Developer"), and is regarding the provision of sewer service to a new bank building that will be located at ("Property").

RECITALS:

A. The District is able to provide adequate capacity in the District's collection, interceptor, and treatment facilities to serve the Property.

B. The Developer desires to obtain a specific assignment of capacity within the District's sewer facilities and assurance of connection to the District's other facilities.

NOW, THEREFORE, in consideration of the mutual agreement and covenants set forth below, and other good and valuable consideration, the receipt and sufficiency of which are hereby mutually acknowledged, the parties agree as follows:

RIGHTS AND RESPONSIBILITIES OF THE DISTRICT

Section 1.1. Specifications for Sewage Facilities. Prior to the beginning of construction, the District will provide the Developer with: (i) the location, at the District's sole discretion, for the connection of the Property to the District's facilities; and (ii) a copy of the District's construction specifications for the construction of all necessary sewage facilities to be constructed on the Property ("Sewage Facilities").

Section 1.2. Approval of Plans for and Construction of Sewage Facilities. The District will be responsible for reviewing and approving or rejecting the plans for the Sewage Facilities.

Section 1.3. Compliance with District's Specifications. The District shall have the authority during all phases of construction and inspection of the Sewage Facilities to notify the Developer of any failure of materials or workmanship to meet the District's specifications and halt construction if the District's specifications are not being met. The District, in its sole discretion, may also direct the Developer to submit change orders to the contractor to cure any defects in material or workmanship revealed by the District's inspection. The District shall not be obligated to accept waste from or provide service to the Property until the Sewage Facilities are completed and any defects cured in accordance with the District's construction specifications.

Section 1.4. Provision of Service. The District agrees to accept up to three hundred ten (310) gallons per day of wastewater from the Property, subject to the timely and full payment by the Developer of all applicable rates and charges and compliance by the Developer with all provisions of this Agreement. The District will serve the Property following connection and payment of all applicable capacity fees and tap fees.

The Property's use of the District's service must be in conformance with all applicable ordinances and this Agreement.

Section 1.5. Rates and Charges. The District will impose all of the District's prevailing rates and charges, including, but not limited to, the following:

a. Capacity fees;

b. Tap fees; and

c. Monthly user rates.

Section 1.6. Right to Impose Additional Capacity Fees. The District reserves the right to impose additional capacity fees in the event the Developer and/or any future owner/tenant changes its anticipated use, expands the Property, and/or hires additional employees which will result in wastewater flows in an amount in excess of the amount of flows anticipated herein. The amount of the additional capacity fee shall be based on the increased flows anticipated to be generated by the new use, expansion, and/or addition of new employees.

Section 1.7. Right to Enter the Property. The District shall have the right to enter onto the Property at all reasonable times to inspect, repair, and/or replace any equipment used in connection with, or which has an impact on, the District's sewer service. However, the District does not, in any way, have or assume any obligation to maintain any facilities on the Property or not owned by the District.

Section 1.8. District's Liability. Absent negligence, the District will not be liable for any damage resulting from the use of the District's sewer service in and around the Property, including, without limitation, damage caused by events of force majeure. For purposes of this Agreement, an event of force majeure means a strike, vandalism, power failure, pipe failure or breakage, lockout, labor dispute, embargo, flood, earthquake, storm, dust storm, lightning, fire, epidemic, act of God or nature, war, national emergency, civil disturbance, riot, act of sabotage or terrorism, restraint by court order or order of another governmental authority, or any other unanticipated events. The District shall further not be responsible for any consequential damages.

Section 1.9. Recovery of Attorneys' Fees. The District is entitled to recover its costs including, but not limited to, reasonable attorneys' fees and court costs in any action brought to enforce the terms of this Agreement.

RIGHTS AND RESPONSIBILITIES OF THE DEVELOPER

Cost of Installation and Grease Trap. The Developer shall be responsible for paying the cost of installing any and all facilities on the Property that are necessary for the provision of sewer service. The Developer shall further take any other measures necessary to prevent excessive strength effluent from entering into the District's wastewater collection system, including installing a grease trap should the Developer or any future user prepare foods on the Property.

Payment of Rates and Charges. The Developer shall be responsible for the timely payment of the District's rates and charges. The Developer shall pay to the District the prevailing tap and capacity fees for the Property, which are currently Four Hundred Seventy-Five Dollars ($475) and Two Thousand One Hundred Sixty Dollars ($2,160) (per equivalent dwelling unit ("EDU")), respectively. For purposes of this Agreement, the District understands, based upon the Developer's representations, that the anticipated EDUs for the Property will be one (1). Based upon the Property's prior use, however, the Developer will receive a credit for the previously allocated capacity that will offset the capacity fees that would be owed under this section (i.e. 1 EDU), and a credit for one tap fee. The Developer will pay additional tap and capacity fees if the Developer and/or any future owner/tenant adds additional taps and/or modifies, expands, or changes its use of the Property so as to discharge more sewage into the District's system, or the District otherwise determines that the Developer is utilizing more capacity than was anticipated for purposes of this Agreement. (See also Section 1.6).

Plans and Specifications for Sewage Facilities. Prior to initiating any construction, the Developer must provide the District with plans and specifications of any Sewage Facilities for review and approval or rejection. Once the District approves the plans for the proposed Sewage Facilities, the Developer shall install the Sewage Facilities in accordance with the District's construction specifications and pay the cost of any modifications or revisions that are required to any existing District facilities. The Developer shall pay the District's cost of reviewing the Developer's plans for the Sewage Facilities, inspecting the installation of the Sewage Facilities, and any expenses associated with the requisite testing (as required in Section 2.4 below). The Developer will also be responsible for obtaining all easements, permits, approvals, and consents required for the construction of the Sewage Facilities and/or any future sewage disposal facilities required by the Property.

Testing and As-Built Drawings. The Developer will test the Sewage Facilities as required by the District's standards and remedy any deficiencies as required by the District. Upon completion of the testing (and remediation of all deficiencies), the Developer will provide the District with two (2) copies of as built drawings at a scale of 1" = 50' showing the location of all structures and taps.

Dedication of Sewage Facilities and Easements. To the extent that the Developer is required to construct off-site facilities, the Developer agrees to dedicate such facilities (including adequate easements and rights-of-way), exclusive of any service laterals, to the District after final inspection by the District and interconnection of such facilities to the District's facilities.

Release and Waiver as to District's Rates and Charges. The Developer hereby releases any right it may have to refuse or remonstrate against future customers and waives any opposition to the District's current rates or charges.

Use of the District's System. The Developer agrees to obtain sanitary sewer service only from the District; however, the Developer will refrain from discharging or using the District's system in any way which inhibits the District from providing service or causes damage to the District's facilities. In using the District's system, the Developer agrees to abide by the District's current "Sewer Use Policy" or as the same

may be revised. The Developer is prohibited from working on or altering the District's facilities and the Developer will not permit or allow the unauthorized connection or extension of its service line or any part of the District's system.

Additional Easements. The Developer (and its grantees, successors, and assigns) agrees to provide additional sewer easements (in, over, and across the Property), without additional compensation, to facilitate the provision of sewer service to future users in and around the Property. The exact location of the easements will be determined at a future date by the parties.

MISCELLANEOUS

Legal Description for Property. The legal description attached hereto as Exhibit A and incorporated herein by reference is a true and accurate legal description of the Property.

Binding on Successors and Assigns. The parties agree that the District's service touches and concerns the land and this Agreement shall be binding upon and inure to the benefit of the parties hereto, as well as their grantees, successors, and assigns.

Entire Agreement. This Agreement sets forth the entire agreement between the parties hereto, and fully supersedes any prior agreements or understandings between the parties pertaining to the subject matter hereof.

Amendment and Waiver. Neither this Agreement, nor any term hereof may be changed, modified, altered, waived, discharged, or terminated, except by written instrument. Failure to insist upon strict adherence to any term of this Agreement shall not be considered a waiver or deprive that party of the right thereafter to insist upon strict adherence to that term or any other term of this Agreement.

Counterparts. This Agreement may be executed in counterparts, including facsimile or photocopy counterparts, each of which shall be deemed an original, but all of which taken together shall constitute a single document.

Recordation. The District may record this Agreement at the District's cost.

Authority of Parties. Each party and signatory hereto has the authority to enter into this Agreement and at all times has full authority to perform this Agreement. No further approval or consent by any other person or authority is required.

Captions. The captions to this Agreement are for convenience of reference only and shall not be given any effect in the interpretation of this Agreement.

Notices. All notices, consents and other communications (collectively, "Notices") shall be given to the District or the Developer in writing to the addresses set forth below:

The District:	Fall Creek Regional Waste District 9378 South 650 West Pendleton, IN 46064 Attn: Joseph F. Rowlett
With Copy To:	Bose McKinney & Evans LLP 2700 First Indiana Plaza 135 N. Pennsylvania Street Indianapolis, IN 46204 Attn: J. Christopher Janak
Developer:	

Either party may change its address for Notices by giving written notice to the other party in accordance with this provision.

Severability. If any provision of this Agreement is found by a court of competent jurisdiction to be illegal, invalid, or unenforceable, the remaining terms hereof will not be affected, and in lieu of each provision that is found to be illegal, invalid, or unenforceable, a provision will be added as part of this Agreement that is as similar to the illegal, invalid, or unenforceable provision as may be possible and be legal, valid, and enforceable.

Governing Law. This Agreement shall be governed by and construed under the laws of the State of Indiana.

(Remainder of this Page Left Intentionally Blank)

FALL CREEK REGIONAL WASTE
DISTRICT BOARD OF TRUSTEES

_____
Mark A. Jablonski, President

STATE OF INDIANA)
)SS:
COUNTY OF _____)

Before me, a Notary Public in and for said County and State, personally appeared Mark A. Jablonski, by me known and by me known to be the President of the Fall Creek Regional Waste District Board of Trustees, who acknowledged the execution of the foregoing "Sanitary Sewer Service Agreement" on behalf of the Fall Creek Regional Waste District Board of Trustees.

WITNESS my hand and Notarial Seal this ____ day of _____, 2007.

_____
Notary Public

_____
(Printed Signature)

My Commission Expires: _____

My County of Residence: _____

_____

Authorized Agent

STATE OF INDIANA)
)SS:
COUNTY OF _____)

Before me, a Notary Public in and for said County and State, personally appeared Steve Bill, by me known and by me known to be the Senior Vice President and Authorized Agent of Madison Community Bank, N.A., who acknowledged the execution of the foregoing "Sanitary Sewer Service Agreement" on behalf of said entity.

WITNESS my hand and Notarial Seal this _____ day of _____, 2007.

_____
Notary Public

_____
(Printed Signature)

My Commission Expires: _____

My County of Residence: _____

This instrument prepared by Stephen C. Unger, Attorney at Law, Bose McKinney & Evans LLP, 135 N. Pennsylvania Street, Suite 2700, Indianapolis, Indiana 46204

FALL CREEK REGIONAL WASTE DISTRICT

№ 6159

9378 S 650 WEST, P.O. BOX 59, PENDLETON, IN 46064
765-778-7544

AGREEMENT FOR SANITARY SEWER SERVICE

This Agreement made and entered into this _____ day of _____, 200 ___, between FALL CREEK REGIONAL WASTE DISTRICT ("District") and _____ ("Applicant") regarding the provision of sanitary sewer service, and the assignment of capacity in, and connection to, the District's facilities for the premises located at _____ .

NOW THEREFORE, the parties, in consideration of the mutual promises set out in this Agreement, the receipt and sufficiency of which is hereby acknowledged, agree as follows:

1. The Applicant agrees that all workmanship and materials shall conform to all District ordinances and the District's construction standards. District must accept and approve all work and materials before backfilling and final connection is made to the sewer mains. Any violation of this provision will cause all lines and appurtenances in violation to be removed and replaced at the Applicant's expense.

2. The District shall have the right to enter upon the Applicant's premises at all reasonable times to inspect, repair, or replace any equipment used in connection with the District's service or which has an impact on said service.

3. The Applicant shall be responsible for all monthly user rates, capacity charges, and tap fees. The failure to pay any rate charge or fee may result in a lien against the property and/or the termination of service to the property, the cost of which will be borne by Applicant, including, but not limited to, all attorney's fees and collection costs.

4. The District shall not be responsible for any damages as a result of any failure to supply service unless said damages are due to default, neglect or culpability on the part of the District.

5. If there is an available sanitary sewer within three hundred (300) feet of the property line, the property owner shall be required to connect to the District's sanitary sewer system.

6. The Applicant and District agree that the provision of sanitary sewer service touches and concerns the property and the terms of this Agreement bind the District and Applicant and their heirs, executors, administrators, personal representatives, successors, agents, attorneys, assigns, designees, and transferees.

The parties hereto have read and fully understand the above provisions and agree to comply with said provisions.

FALL CREEK REGIONAL WASTE DISTRICT

_____
Signature

APPLICANT

_____
Signature

STATE OF INDIANA)
) SS:
COUNTY OF MADISON)

SUBSCRIBED and sworn to before me this _____ day of _____, 200 ___.

My Commission Expires:

_____

Signature _____

Printed _____
Notary Public
Resident of Madison County

****

INSPECTOR_____ DATE INSPECTED_____ APPROVED_____ REJECTED_____

REASON FOR REJECTION_____

DATE REINSPECTED_____ APPROVED_____ REJECTED_____

NOTES:
SIZE PIPE_____ TYPE PIPE_____

BASEMENT YES NO

SUMP PUMP YES NO

DOWNSPOUT TO GROUND YES NO

SEPTIC TANK PUMPED & FILLED YES NO

CONTRACTOR_____

SPECIAL CONDITIONS_____

EXISTING HOME_____

NEW CONSTRUCTION_____