

CHAPTER 1

GENERAL PROVISIONS

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CHAPTER 1

GENERAL PROVISIONS

1.1 SHORT TITLE

These Regulations together with all future amendments shall be known as the "Town of Bennett's Sanitary Sewer and Water System Design & Construction Standards" (hereinafter called Utility Standards). All prior Utility Standards are hereby repealed and replaced with these Utility Standards.

1.2 JURISDICTION

These Utility Standards shall apply to all land within the incorporated areas of the Town and to the areas within the designated urban growth boundaries.

1.3 PURPOSE

Presented in these Utility Standards are the minimum design and technical criteria for the analysis and design of water and sewer facilities, including associated infrastructures. All subdivisions, resubdivisions, planned developments, or any other proposed construction submitted for approval under the provisions of the Town of Bennett Subdivision Regulations (hereinafter called Regulations) shall include adequate water and sewer system analysis and appropriate water and sewer system design. Such analysis and design shall conform to the criteria set for the herein. Options to the provisions of these Utility Standards; may be suggested by the applicant. It shall be the responsibility of the applicant to demonstrate that the options meet or exceed the minimum criteria contained herein.

1.4 AMENDMENT AND REVISIONS

The standards and criteria may be amended as new technology is developed and/or experience gained in the use of these Utility Standards, indicate a need for revision. The Town Board of Representatives (hereinafter called The Board), following the recommendations of the Town Engineer or Director of Public Works, may consider revisions and/or amendments to these Utility Standards. The revisions will be adopted by resolution following public hearing thereon. The Town Engineer and Director of Public Works, shall monitor the performance and effectiveness

of these Utility Standards and will recommend changes, amendments and revisions.

1.5 ENFORCEMENT RESPONSIBILITY

It shall be the duty of the Board, acting through the Town Engineer or Director of Public Works, to enforce the provisions of these Utility Standards.

1.6 REVIEW AND APPROVAL

The Town will review all submittals for general compliance with these Utility Standards. An approval by the Town does not relieve the owner, engineer, or designer from responsibility of insuring that the calculations, plans, specifications, construction and as-built drawings are in compliance with the Utility Standards as stated in the Owner's/Engineer's Certification.

1.7 INTERPRETATION

In the interpretation and application of the provisions of the Utility Standards, the following shall govern:

- 1.7.1 In its interpretation and application, the requirements for the protection of the public health, safety, comfort, morals, convenience, prosperity and welfare of the residents of the Town. These Utility Standards shall therefore be regarded as remedial and shall be liberally construed to further its underlying purposes.
- 1.7.2 Whenever a provision of these Design Standards or any provision in any law, ordinance, resolution, rule or regulation of any restrictions covering any of the same subject matter, whichever standards are more restrictive or impose higher standards or requirements shall govern.
- 1.7.3 These Sanitary Sewer and Water System Design and Construction Standards shall not modify or alter any Utility Construction Plans which have been filed with and accepted by the Town Engineer prior to the effective date of this resolution. This exception shall be subject to the conditions and limitations under which said, plans were accepted by the Town Engineer.

1.8 RELATIONSHIP TO OTHER STANDARDS

Since the Town is the approval authority for land use changes, these Utility Standards, which stipulate certain minimum conditions for land use changes, shall apply. If special districts impose more stringent standards, this difference is not considered a conflict. The more stringent standard shall apply. If State or Federal Government imposes more stringent standards, criteria, or requirements, these shall be incorporated into this document after the due process and public hearing(s) required to modify the Utility Standards.

1.9 VARIANCES

Variations from these Utility Standards will be considered on a case-by-case basis in accordance with procedures in these Standards. See specific details on variance procedures in Section 3.2.

1.10 ABBREVIATIONS

As used in these Utility Standards, the following abbreviations shall apply:

| | |
|--------|--|
| ASTM | American Society of Testing Materials |
| TBTTB | The Town Board of Trustees for the Town of Bennett |
| CDOH | Colorado Department of Highways |
| ROW | Right-of-way |
| BSDDTC | Bennett/Storm Drainage Design and Tech. Criteria |
| UDFCD | Urban Drainage and Flood Control District |
| USDCM | Urban Storm Drainage Criteria Manual |
| USGS | United States Geological Survey |
| ANSI | American National Standards Institute |
| ASTM | American society for Testing and Materials |
| AWWA | American Water Works Association |
| NFPA | National Fire Protection Association |

| | |
|--------|--|
| COSHA | Colorado Occupational Safety and Health Administration |
| OSHA | Occupational Safety and Health Administration |
| UBC | Uniform Building Code, International conference of Building Officials, latest edition. |
| UPC | Uniform Plumbing Code, International Association of Plumbing and Mechanical Officials, latest edition. |
| AASHTO | American Association of State Highway and Transportation Officials |
| ACI | American Concrete Institute |
| AISC | American Institute of Steel Construction, Inc. |
| ASA | American Standards Association |
| ISO | Insurance Services Offices |
| AWS | American Welding Society |

Whenever the following words or phrases appear in these specifications, they shall have the following meanings:

- A) Town shall mean the Town of Bennett, Colorado.
- B) Town Ordinances shall mean the official adopted Town Ordinances of Bennett, Colorado.
- C) Engineer shall mean the Town Engineer, Town of Bennett, Colorado or their authorized representatives acting on behalf of the Town. The Town Engineer shall have the authority to ascertain that all design and construction of facilities is equal to or better than the minimum requirements set forth in these specifications.
- D) Director shall mean the Director of Public Works, Town of Bennett, Colorado, or his authorized representatives acting on behalf of the Town. The Director of Public Works shall have the authority to ascertain that all design and construction of

facilities is equal to or better than the minimum requirements set forth in these specifications.

- E) Inspector shall mean an authorized representative of the Engineer and/or Director assigned to make detailed inspections of compliance with these Standards and Specifications.
- F) Contractor shall mean a person, partnership or corporation in overall charge of a development or subsequently becomes owners of properties for which the water mains, sanitary sewers and associated infrastructures are being designed and installed. The contractor shall be or shall employ persons duly licensed in the State of Colorado for construction of water mains, sanitary sewers and associated infrastructures.
- G) Consultant shall mean a person, partnership or corporation duly registered according to Colorado statutes who is hired by the Contractor and is empowered to act as his agent.
- H) Surety shall mean the entity, which is bound with and for the Contractor for the performance of the work as described in these Specifications.
- I) Wherever the words, "as directed", "as required", "as permitted" or words of like meaning are used, it shall be understood that the direction, requirements or permission of the engineer is intended. Similarly, the words "approved", "acceptable", "satisfactory" shall refer to approval by the Engineer or Director.
- J) Standard Specifications and Methods of Testing Materials. Whenever references are made to standard specifications, methods of testing materials, codes, practices and requirements, it shall be understood that the latest revision of said references shall govern unless a specific revision is stated.
- K) Wherever the words "these specifications" or words of similar connotation are used, it shall be understood that reference is made to the "Town of Bennett's Sanitary Sewer and Water System, Design and Construction Standards", including all parts, supplements and revisions pertaining thereto.

- L) Guest House shall mean an accessory building which is physically detached from a single-family dwelling unit, is serviced through the same utility meters or connections as the principal use, and is intended for occupancy only by guests of the family residing in the single-family dwelling. Kitchen facilities are not allowed.
- M) Water Mains and Sanitary Sewers shall mean any pipe intended to serve two or more service connections.

1.11 AUTHORITY OF THE ENGINEER OR DIRECTOR

The Engineer and Director are designated by the Town to exercise all authority on behalf of the Town to ascertain that all construction of facilities is equal to or better than the minimum construction requirements set forth in these Specifications. The Engineer or Director shall be represented by an inspector to check any and all work performed under a permit issued for construction, including all materials to be incorporated in the work, excavation, bedding, backfill and all construction methods and practices. The Engineer shall have the sole authority to issue, in writing, any deviations from the provisions of these Specifications or changes to any previously approved drawing.

1.12 AUTHORITY OF THE INSPECTOR

Inspectors are assigned by the Engineer or Director to assist the Contractor to comply with these Specifications. They have the authority to reject defective materials, inferior materials, defective workmanship, and to suspend work which, is not in accordance with the Town of Bennett Standards or Project Specifications until such time as the Contractor shall correct the situation to the Inspector's approval. Any deviation from the approved plans and specifications, which have been approved by the Engineer or Director must be received by the Inspector prior to implementing the deviation. The Inspectors are not authorized to alter any provisions or to issue instructions contrary to these Specifications, or to make any changes to any previously approved drawing. The Public Works Department must be notified at least 24 hours prior to any construction. When Inspectors are required to work overtime or on legal holidays, it shall be at the

Contractor's expense. Payment for such overtime work shall be made by check to the appropriate Town of Bennett Department.

1.13 REJECTED MATERIALS AND WORK

Whenever defective materials and work are rejected, the Contractor shall promptly remove such defective materials and construction from the job site and replace all defective portions to the satisfaction of the Engineer or Director of Public Works. In the event the Contractor fails to remove rejected items from the job site within a reasonable length of time, the Engineer or Director of Public Works may arrange for such removal at the expense of the Contractor.

1.14 INSPECTION FACILITIES

The Contractor shall furnish all reasonable facilities and shall assist the Inspector as necessary for the proper inspection of materials to be used and the workmanship involved in the construction.

1.15 TRAFFIC CONTROL

The flow of traffic in streets and access to private property shall be reasonably maintained at all times. The Contractor shall provide a safe roadway, and shall erect and maintain warning sign, barricades and sufficient safeguards around all excavations, embankments and obstructions. The Contractor shall provide suitable warning lights or flares and shall keep them lighted from one-half hour prior to sunset until one-half hour after sunrise and all other times when visibility is limited. The Contractor shall further provide such flagmen and watchmen as required by the Engineer, Director of Public Works or Inspector for the protection of the public. The roadway shall be properly maintained and the Contractor shall coordinate his operations with the Director of Public Works in order that suitable arrangements may be made for detours, parking, access to private property, etc. Whenever a street is closed or partially closed, the Town's Fire and Police Departments shall be notified of the closing and also when normal service is resumed. In the event it is determined that the Contractor is not maintaining a safe roadway, the Engineer or Director of Public Works may improve the roadway conditions at the Contractor's expense. The Contractor shall conform at all times to the U.S.

Department of Transportation Manual on Uniform Traffic Control Devices, Part VI.

1.16 UTILITIES COORDINATION

The Contractor shall at all times coordinate his work with the Town's Public Works Department. When it is necessary to close existing portions of any water or sewer system due to construction operations, at least 24 hours prior notification must be given to the Public Works Department. All water valves that are in service, shall be operated only by authorized Water Division personnel. Unauthorized operation of the valves; are subject to fines. The Contractor shall conduct his operations in such a manner as to minimize inconvenience to the public due to disconnected utility services. Should it become necessary to temporarily disconnect any utility, the Contractor shall first obtain the approval of the Director at Public Works. Such utility shall then not be disconnected before 9 a.m. and shall be restored by 4 p.m. the same day. If the Contractor's operations require or cause the utility service to be disconnected beyond the limits stated above, he shall, make arrangements suitable to the Director of Public Works to provide temporary utility service. Such temporary service shall be at the Contractor's expense. In the event a utility is disconnected beyond the hours stated above, the Director at Public Works shall have the authority to order a temporary utility service installed either by Town forces or by a third party at the Contractor's expense.

1.17 ACCEPTANCE OF WORK

- A) Partial Acceptance. The Town reserves the right to accept and make use of any completed section of the work without obligating the town to accept the remainder of the work or any portion thereof; however, the warranty period shall start when the project is complete and the Town has issued the initial acceptance.
- B) Initial Acceptance. When the final clean-up has been performed, the Contractor shall notify the Director of Public Works that all work has been completed. Within a reasonable time, the Public Works Inspector shall perform all necessary inspection procedures on the completed work. The

Contractor shall be notified of any defects in the project. Initial acceptance will be issued after all defects have been corrected.

- C) Final Acceptance. The Town may re-inspect the project during the warranty period after the initial acceptance. Any defects noted prior to the warranty expiration; shall be corrected by the owner/developer and/or Contractor, at his expense. Final acceptance shall be issued, in writing, when all defects are corrected.

1.18 DAMAGES

The Contractor hereby expressly binds himself or itself to indemnify and save harmless the Town and its officers and employees against all suits or actions of every kind and nature brought or which may be brought, or sustained by any person, firm, corporation, or persons, firms or corporations. In connection with or on account of the Contractor's work or in consequence of any negligence in connection with same, or on account of any poor workmanship, or on account of any act of commission or omission of the Contractor. Or his, its, or their agent or employees, or for any cause arising during the course of construction.

1.19 CLEANING UP

The Contractor shall frequently clean up all refuse, rubbish, scrap materials and debris as a result of his operations, so that, at all times, the site of the work shall present a neat, orderly and workmanlike appearance. Upon completion of the work, the Contractor shall remove from the site and any occupied adjoining property, all plants, buildings, rubbish, unused materials, form lumber and other materials belonging to him or his subcontractor. Any costs incurred by the Town due to failure by the Contractor to clean up to the Town's satisfaction will be charged to the account of the Contractor or his Surety.

1.20 PROTESTS

If the Contractor considers any work demanded of him by the Inspector to be outside the requirements of the Specifications, he shall immediately ask for a written decision or instructions and shall proceed to perform the work to conform with the Inspector's ruling. If the Contractor considers such instructions

unsatisfactory, he shall, within twenty-four (24) hours after their receipt, file a written protest with the Engineer or Director of Public Works, stating his objections and the reasons therefore. Unless protests or objections are made in the manner specified and within the time limit stated herein, the Contractor hereby waives all grounds for protests.

1.21 GENERAL

The Contractor shall notify the Public Service Company, Telephone Company, and all other necessary parties prior to commencement of work in order to insure that there will not be interruptions of these services during progress of the work. Existing power lines, telephone lines, trees, shrubbery, fences, water mains, gas mains, sewers, cables, conduits, ditches, embankments and other structures in the vicinity of the work not authorized to be removed. Shall be supported and protected from injury by the Contractor during the construction and until completion of the work affecting them. The contractor shall be liable for all damages to such existing facilities and structures, as herein provided, and he shall save the City harmless from any liability or expense for injuries, damages or repairs to such facilities.

1.22 UNDERGROUND UTILITIES

The type, size, location and number of all known underground utilities are approximate when shown on the drawings. It shall be the responsibility of the Contractor to verify the existence and location of all underground utilities along the route of the work. The Contractor shall be responsible for unknown underground utilities.

1.23 RESPONSIBILITY TO REPAIR

The Contractor shall notify the Town or owners of the existing utilities, whether above ground or underground, prior to proceeding with trench excavation whenever such trenching operations are within 10' of any existing utility. Should any such utility be damaged in the trenching operations, the Contractor shall immediately notify the owner of such utility, and unless authorized in writing by the owner of the utility, the Contractor shall not attempt to make repairs. Duplicate copies of any written

authorization given to the Contractor to make repairs shall be filed with the Director of Public Works and shall be so worded as to save harmless the Town of any responsibility whatsoever relative to the sufficiency of the repairs.

In the event that during construction, it is determined that any underground utility conduit including sewers, water mains, gas mains, drainage structures and any above ground utility facilities are required to be relocated. The Contractor shall notify the utility owner well in advance of his approach to such utility so that arrangements with the Town or owners of the affected utility can be completed without delay to the work.

1.24 SAFETY REQUIREMENTS

The Contractor must conform to the Rules and Regulations of the current OSHA and COSHA requirements. In addition, the Contractor shall also conform to all applicable rules and regulations adopted by the Town of Bennett. In the event of conflict between two or more rules and regulations, the more restrictive shall apply. It shall be the responsibility of the Contractor to fully comply with these regulations and to provide the safety requirements for the Contractor, his employees and the public during the time of construction.

1.25 PROTECTION OF WORK AND PROPERTY

The Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Town's property from injury or loss arising in connection with his construction. He shall make good any such damage, injury or loss except such as may be by agents or employees of the Town. He shall adequately protect adjacent property as herein provided. He shall provide and maintain all passage ways, guard fences, lights and other facilities for protection required by public authority or local conditions.

The Contractor shall be responsible for protection of all public and private property on and adjacent to the site of the work. He shall use every precaution necessary to prevent damage to pipes, conduits and other underground structures and to overhead wires and

to roadways, alleys, bikeways and sidewalks. He shall protect carefully from disturbance or damage all land monuments and until a registered land surveyor has witnessed or otherwise referenced their location and shall not remove them until directed. The Contractor is subject to State statutes regarding destruction of monuments. When any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work. Or in consequence of the non-execution thereof on his part, such damaged property shall be restored by the Contractor at his own expense to a condition similar or equal to that existing before such damage or injury.

1.26 ACCIDENT PREVENTION

The Contractor shall at all times, whether or not so specifically directed by the Inspector, take necessary precautions to insure the protection of the public. The Contractor shall furnish, erect and maintain, at his own expense, all necessary barricades, suitable and sufficient warning lights, construction signs, provide a sufficient number of watchmen and take all necessary precautions for the protection of the work and safety of the public through or around his construction operations.

1.27 SANITARY REGULATIONS

The Contractor shall be responsible for providing proper health and sanitation facilities for his employees. Rules and regulations of the State Board of Health or other bodies having jurisdiction, shall be fully complied with.

The Contractor shall at all times provide an abundant supply of safe drinking water for his employees and shall give orders against the use of water in the vicinity of the work, known to be unsafe. At convenient places the Contractor shall provide fly-proof outside toilets which are to be maintained in a sanitary condition. Privy toilets, which require a hole in the ground, shall not be allowed.

1.28 PREVENTION OF WATER POLLUTION

The Contractor shall comply with applicable Federal and State laws, orders and regulations concerning the control and abatement of water pollution.

The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris and other objectionable pollutants and wastes into streams, flowing or dry water courses and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sewage effluent, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts and thermal pollution. Sanitary wastes shall be disposed of on land by burial at approved sites or by other approved methods.

De-watering work for structural foundations or earthwork operations adjacent to or encroaching on the lake, streams or water courses, shall be conducted in a manner to prevent muddy water and eroded materials from entering lake, streams or water courses. By construction of intercepting ditches, bypass channels, barriers, settling ponds or by other approved means. Excavated materials shall not be deposited or stored in or alongside detention/retention lake or watercourses where it can be washed away by high water or storm runoff.

Waste waters from aggregate processing, concrete batching or other construction operations, shall not enter the streams, water course or other surface waters, without the use of such turbidity control methods as settling ponds, gravel-filter entrapment dikes, approved flocculation processes (that are not harmful to fish), systems for washing of aggregates, or other approved methods. Any such waste waters discharged into surface waters shall be essentially free of settable material. Settable material is that material which will settle from the water by gravity during a one-hour quiescent detention period.

1.29 ABATEMENT OF AIR POLLUTION

The Contractor shall comply with applicable Federal, State and local laws and regulations concerning the prevention and control of air pollution.

In conduct of construction activities and operation of equipment, the Contractor shall utilize such practicable methods and devices as are reasonably

available to control, prevent and otherwise minimize atmospheric emissions or discharges of air contaminants.

The emission of dust into the atmosphere will not be permitted during the manufacture, handling and storage of concrete aggregates; and the Contractor shall use such methods and equipment as are necessary for the collection and disposal or prevention of dust during these operations. The Contractor's methods of storing and handling cement and pozzolans shall also include means of eliminating atmospheric discharges of dust.

Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.

Burning of materials resulting from clearing of trees and brush, combustible construction materials and rubbish will be permitted only when atmospheric conditions for burning are considered favorable by appropriate State or local air pollution and fire authorities and on site(s) designated by the Public Works Director. In lieu of burning, such combustible materials shall be removed from the site.

1.30 DUST ABATEMENT

During the performance of the work required by these Specifications or any operations appurtenant thereto, whether on right-of-way provided by the Town or elsewhere. The Contractor shall furnish all the labor, equipment, material and means required. And shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance and to prevent dust which has originated from his operations from damaging crops, orchards, cultivated fields and dwellings or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from his operations under these Specifications on right-of-way or elsewhere.

1.31 STANDARDS AND SPECIFICATIONS

- 1) The Standards and Specifications contained herein shall be the minimum technical specifications for

construction of water mains, re-use lines, sanitary sewers and associated appurtenances. The Consultant shall be responsible for determining the need for additional provisions not covered by these standards and specifications. The Consultant shall submit, along with drawings for proposed water main, re-use line and sanitary sewer, technical specifications that are part of contract documents for proposed construction of water mains, re-use lines and sanitary sewers. Where conflicts or ambiguities between these standards and specifications and those contained in contract documents for the proposed construction occur, the more stringent requirements shall govern, as determined by the Director of Public Works or Town Engineer.

- 2) Calculations. If, in the opinion of the Engineer or Director of Public Works, review of proposed construction drawings and specifications indicates that the proposed design does not meet the requirements of these standards and specifications, detailed design calculations for the proposed utilities, may be required to be submitted by the Consultant to the Engineer or Director of Public Works.
- 3) All work in connection with the facility authorized by the Construction Permit shall be done in a neat and workmanlike manner to the satisfaction of the Town. The details of construction of the same shall conform to the requirements in effect at the time of permit issuance.
- 4) All utilities including water, sanitary sewer, re-use lines and storm sewer shall be stubbed out to the R.O.W. at all locations that are planned for future tie-ins. Other reasonable stub-outs may be requested by the Town based on sound engineering judgement and knowledge of adjacent development.
- 5) All manhole lids, utility access covers and range box access covers shall be depressed $\frac{1}{4}$ " to $\frac{1}{2}$ " below the adjacent finished street surface.

- 6) During initial construction, Utility Companies shall install all utilities within a Schedule 40 PVC sleeve across all public streets to accommodate future repairs without street cuts. Sleeves shall be installed at a minimum depth of 42" to the top of the pipe from the top of the curb. Sleeve location shall be determined on a case-by-case basis.
- 7) A minimum of six (6) additional 4" PVC sleeves on arterials and a minimum of four (4) additional 4" PVC sleeves on collectors, shall be required to be installed by the Developer. At all street intersections along both sides of all collectors and arterials and at intersections of local streets where there is a utility corridor. Any intersection along a collector or arterial, which may warrant signalization, shall have additional sleeves (as described above) installed across all streets at the intersection.
- 8) Review and Acceptance of Drawings and Specifications. Prior to the Contractor beginning any construction on a water main, re-use line or sanitary sewer, all construction drawings and specifications, shall be accepted by the Town of Bennett. The Contractor shall allow time for review and shall coordinate his submittals with scheduled Board meetings. The Engineer shall review said drawings, specifications and calculations and return them with either a letter of acceptance or a letter designating necessary revisions required to receive acceptance. Upon presentation of drawings and specifications revised in accord with the letter designating revisions, the Engineer will accept the drawings and specifications without undue delay if such revisions are completely acceptable.
- 9) Soils Report. It shall be the responsibility of the Consultant to determine the extent of evaluation of soil conditions. The Town reserves the right to require a complete soil report to be prepared for a development if sub-surface abnormalities are suspected. If such a report is required, it shall be prepared by a registered Professional Engineer and shall contain adequate

information to evaluate water main, re-use system and sanitary sewer design submittals.

- 10) Effective Date. Construction drawings and specifications accepted by the Director shall be effective for a period not to exceed twelve consecutive months from the official date of acceptance. After this period the drawings and specifications shall be re-submitted to the Engineer for review and approval.
- 11) Changes to Accepted Drawings and Specifications. Should circumstances warrant changes to the accepted drawings or specifications, the proposed revision shall be submitted to, and acceptance shall be obtained from, the Director or Engineer. No work shall proceed on that portion of the project being revised until said revisions are submitted and accepted. Minor deviations from the drawings or specifications shall be by written permission from the Engineer or the Director of Public Works only.
- 12) Record Drawings. Prior to water main, re-use line or sanitary sewer installation being placed in operation, two sets of copies and one reproducible mylar set of record drawings, verifying all final elevations, utility locations, service locations and reflecting any and all changes to the original construction drawings, shall be submitted to the Engineer and the Director. Record drawings shall be certified "as-recorded" and signed by a registered Professional Engineer, licensed to practice in the State of Colorado.
- 13) Information recorded and certified "as-recorded" may be checked at random by a licensed surveyor hired by the Town.
- 14) If drawings are submitted as record drawings and are found to be just copies of the original construction drawings without recorded information; or if the information contained on the recorded drawings does not agree with that checked by a surveyor hired by the Town, the engineer certifying the record drawings shall pay

all costs associated with verifying information contained on the record drawings.

1.32 ACCEPTANCE OF PIPELINE SYSTEM BY THE TOWN

The water main, re-use system or sanitary sewer pipeline system shall be placed into operation or be released for service connections only after all required back-filling, surface restoration and all required cleaning, testing and inspections have been completed. The record drawings have been submitted and accepted. And written permission has been granted by the Director of Public Works. However, final acceptance of the system shall not take place for a warranty period of 2 years from the date written permission is granted for placing the system into operation. During the two year period, any defects in the system resulting from defective materials, poor workmanship or any other cause attributable to the Contractor responsible for the construction of the system, shall be corrected at the Contractor's expense and to the satisfaction of the Director of Public Works.

The Director may internally photograph a sanitary sewer line prior to final acceptance. Any defects revealed by this photography; shall be corrected by the Contractor.

1.33 NOTICE BEFORE BEGINNING WORK

The Contractor shall notify the Director at least 24 hours before beginning any water main, re-use system or sanitary sewer construction. If, for any reason, work should stop on a project during any stage of construction for a period of more than one normal work day, it shall be the responsibility of the Contractor to notify the Director, at least 24 hours prior to any resumption of work on the project. If the Contractor intends to work extended shifts, double shifts or hours other than the normal workday of Town personnel, he shall notify the Director at least 24 hours prior to such extension, except in the event of an emergency. The Contractor shall notify the Town Volunteer Fire Department 24 hours prior to temporarily placing any fire hydrants out of service.

1.34 REJECTED MATERIALS

All materials installed shall be free of defects. Any

defective or damaged materials found in the construction or on the construction site shall be marked and removed from the site. In the event the Contractor fails to remove rejected materials from the construction site within a reasonable length of time, the Director may arrange for such removal at the expense of the Contractor.

1.35 CONTRACTOR'S RESPONSIBILITIES

It shall be the responsibility of the Contractor to read and fully comply with all the provisions of these Standards and Specifications and all laws and regulations that apply to local and state agencies.

1.36 EASEMENTS

A) Permanent. All water mains and sanitary sewers shall be installed in public right-of-ways. If it is impossible to place the water main or sanitary sewer in the public right-of-ways, permanent easements shall be obtained. All permanent easements shall be a minimum of 20' wide and shall be mutually exclusive for the Town of Bennett water main, re-use main, sanitary sewer or storm drainage utilities. See paragraph 7.10 within Chapter 7 of this Manual for further details on required easement dimensions.

B) Construction Easements. It shall be the responsibility of the Contractor to determine the adequacy of the public right-of-way or permanent easement. If the Contractor determines that a temporary construction easement is required to perform the work, it shall be the Contractor's responsibility to obtain these easements. Any damage to property, either inside or outside the limits of easements, shall be the responsibility of the Contractor. The Contractor shall remove, protect and replace all fences or other items encountered on public or private property. Before final acceptance shall be authorized by the Director, the Contractor shall be required to furnish the Town with written releases from property owners or public agencies, where side agreements or special easements have been made by the Contractor. Or where the operations of the Contractor, for any reason, have not been kept within the permanent or temporary construction

rights-of-way.

1.37 PROTECTION OF EXISTING FACILITIES

- A) General. The Contractor shall notify all utility companies and others affected by the work, prior to commencement of work in order to insure that services will not be interrupted during construction. The Contractor shall be liable for all damages to existing structures and property, public or private and he shall save the Town harmless from any liability or expense for injuries, damages or repairs to such facilities.
- B) Responsibility for Repair. Should any utility be damaged in the construction operations, the Contractor shall immediately notify the owner of such utility and unless authorized by the owner of the utility, the Contractor shall not attempt to make repairs.

In the event that during construction it is determined that any underground utility conduit, including sewers, water mains, re-use mains, gas mains, drainage structures, electrical conduit and any above ground utility facilities are required to be relocated. The Contractor shall notify the utility owner well in advance of his approach to such utility so that arrangements with the Town and/or Owners of the affected utility can be made to complete the relocation without delay of the work.

1.38 MINIMUM DESIGN CRITERIA

Preliminary Submittals.

- A) General. A preliminary report and plan drawing shall be submitted to, reviewed by and accepted by the Town Engineer or Director of Public Works; prior to preparation of final water main, re-use system and sanitary sewer construction drawings and specifications. Acceptance of these preliminary submittals shall constitute only a conceptual approval and shall not be construed as acceptance of specific design details.
- B) Report. The report shall include the following information:

- 1) The estimated maximum and average water demand in gallons per minute (GPM) required for the developed area. The estimated maximum water demand shall be included for both the consumptive use and for the estimated required fire flow to meet the UBC Standards and the recommendations of the NFPA Handbook, latest edition, for the type of building assumed to be built.
 - 2) If the development is to include irrigation services, the approximate maximum irrigation water demand in GPM must be submitted separately.
 - 3) The initial and ultimate area, in acres, which could be served by the proposed sanitary sewer.
 - 4) The estimated population densities and total population to be served by the proposed sanitary sewer.
 - 5) The estimated quantity and quality of any commercial and/or industrial wastewater to be discharged to the sanitary sewer system.
 - 6) Average and peak wastewater design flow rate for the proposed development area and infiltration allowance for proposed sanitary sewer.
 - 7) If alternate methods of providing water, re-use water and sanitary sewer services are possible; the report shall provide an evaluation of the alternative methods.
 - 8) Any additional information that would affect the Town's ability to provide water, re-use water and sanitary sewer service to the proposed area.
- C) Preliminary Plan Drawing. The preliminary plan drawing shall include the following information:
- 1) The proposed methods of achieving the desired water, re-use water and sanitary

sewer services. Alternate methods of providing desired services, if possible.

- 2) A preliminary plan drawing of the development showing lots and rights-of-way, USGS contours and benchmarks, existing utilities and fire hydrants within 400' of the proposed development, the legal boundaries of the property to be developed. And the approximate boundaries of all adjacent properties and any unusual existing and proposed features. Such as creeks and drainage facilities which might influence the location of underground utilities, a general layout of the proposed water main, re-use main, fire hydrant and sanitary sewer locations, and phasing of construction, if appropriated.

1.39 WATER MAINS

1.39.1 Town of Bennett water main systems shall be designed in detailed conformance with the requirements referenced in Chapter 7 of this Manual. In general the following shall apply:

A) Flow.

- 1) Minimum size of service for single family dwelling shall be $\frac{3}{4}$ " diameter.
- 2) Peak daily commercial and industrial water demand shall be as accepted by the Director of Public Works or Town Engineer.
- 3) Minimum size of all water mains shall be 6". Larger sizes shall be required as needed to provide proper water distribution and fire protection. Should the Town decide that due to anticipated future development, the diameter of the water main should be larger than that required by the Contractor seeking acceptance of his drawings and specifications, then the Town shall pay the difference in material costs between the larger

diameter water main and the water main required by the Contractor.

4) Water mains shall be sized to provide fire protection flow to meet the UBC Standards and the recommendations of the NFPA Handbook, latest edition, for the buildings to be served.

B) Pressure. All water mains shall be designed to have a maximum static head of 250' (108 psig), a minimum static head of 100' (43 psig) to maintain a 20 psig residual pressure during required fire flow. And to maintain a 40 psig residual pressure in residential areas ring peak residential flows.

C) Location and Cover. Water mains shall in general be placed 10' north of the centerline in east/west streets and 10' east of the centerline in north/south streets. A minimum of 4' of cover from the top of the pipe to the final finished grade shall be maintained over all existing and proposed water mains.

D) Looping Requirement. Water mains shall be designed through a subdivision or development so that a continuous loop is provided for an alternate source of supply.

E) Separation. Water main crossing of sanitary and storm sewers shall be designed and constructed in accordance with the following:

1) Horizontal separation. Water mains shall be located at least 10' horizontally from any existing or proposed sanitary sewer main, re-use main, storm sewer or sewer manhole. The distance shall be measured from Outside-of-pipe to outside-of-pipe.

- 2) Vertical Separation. Whenever a sanitary or storm sewer must cross under a water or re-use main, the sewer shall be designed and constructed such that the top (crown) of the sewer is at least 18" below the bottom (invert) of the water or re-use main. When the elevation of the sewer cannot be varied to meet this requirement, the water and/or re-use main shall be relocated to provide this vertical separation and reconstructed with mechanical joint ductile iron pipe, or encased with concrete, for a distance of 10' on each side of the sewer. One full length of water and/or re-use main shall be centered over the sewer so that both joints of the water and/or re-use main will be as far from the sewer as possible.

Concrete encasement shall be constructed to conform with the standard concrete encasement detail in these Water Main and Sanitary Sewer Standards and Specifications and shall be subject to the acceptance by the Director of Public Works or Town Engineer.

When a water or re-use main passes under a sanitary or storm sewer, adequate structural support shall be provided for the sewer to prevent damage to the water and/or re-use main. The water and/or re-use main shall be encased with concrete, for a distance of 10' on each side of the sewer. One full length of water and/or re-use main shall be centered under the sewer so that both joints on the water and/or re-use main will be as far from the sewer as possible.

When a water or re-use main passes under a storm sewer and 4' of cover between the top of the water or re-use main and the bottom of the storm sewer is not maintained, the water and/or re-use main shall be insulated to prevent freezing. Insulation requirements shall be determined by the consultant and accepted by the Director of Public Works or Town Engineer.

- 3) When local conditions prevent horizontal and vertical separation as stipulated above, water main, re-use both the water main and sewer shall be constructed of mechanical joint ductile iron pipe and may be pressure tested to assure water tightness, if required by the Director of Public Works or Town Engineer.

F) Water Main Crossings of Drainage Ways Including Natural Creeks, Irrigation and Drainage ditches and Flood Channels.

- 1) Where a water or re-use main crosses under a drainage way, the minimum depth of cover shall be 5' from the top of the water and/or re-use main to the bottom of the drainage way. Backfill for the trench of the water and/or re-use main crossing shall be brought to within 1½' of the proposed finished grade of the drainage way and 1' of medium-sized rip rap or river rock material shall be added. The final 6" of backfill above the rip rap shall consist of a material that approximates the existing drainage way bottom.
- 2) Where the water and/or re-use main crosses under Kiowa Creek, it shall be placed in a concrete encasement. All concrete encasement shall be constructed to conform with the standard detail of these Standards and Specifications and be subject to acceptance by the Director of Public Works or Town Engineer.
- 3) Where the water or re-use main crosses under a major drainage way and the drainage way is contained in a culvert, the minimum depth of cover over the water and/or re-use main shall be 4.5'. The concrete encasement shall extend a horizontal distance beyond both outside edges of the culvert of not less than the vertical distance from the ground surface to the bottom of the encasement, minus the outside vertical dimension of the culvert. In no case shall the encasement extend less than 5' beyond

each side of the culvert.

- 4) Where water and/or re-use main fittings and elbows are used to lower the mains to cross under a drainage way, the fittings and elbows shall not be located less than 20' from either end of the concrete encasement.
- 5) All water and/or re-use main crossings under a drainage way shall comply with the United States Army Corps of Engineers stream crossing permit requirements.

G) Water Main Pipe and Fittings.

1) Pipe. All water mains shall be ductile iron pipe and shall be designed, manufactured and furnished according to the following criteria:

- a) Meet ANSI Standard Specification A21.51-81. Iron grade of pipe shall be 60-42-10.
- b) Joint shall be either push-on joint single gasket or mechanical joint single gasket.
- c) Minimum thickness shall be as per paragraph 7.16.3 within Chapter 7.
- d) Lined according to paragraphs 7.15.2 and 7.15.3 within Chapter 7.
- e) Pipe furnished shall have a normal laying length of 18' or 20'.

2) Fittings. All fittings shall be ductile iron and shall be designed, manufactured and furnished according to the following criteria;

- a) Meet AWWA C-110 or ANSI A 21.10 for mechanical joints and AWWA C-111 or ANSI a 21.11 for push-on joint. The rubber joint gasket shall conform to the requirements of AWWA C-111, as amended.
- b) Valves and fittings shall be Class 200.
- c) Fittings shall be wrapped in polyethylene.

H) Valves and Valve Boxes.

1) Valves shall be located, where possible, at a point on the water main, which would be intersected by the extension of a property line.

- 2) The maximum spacing between valves shall not be greater than 600'.
- 3) Where there are connections to other water mains, all connecting mains shall also be valved at the connection. If the connecting main is 8" or larger in diameter, there shall be two valves at a tee-type connection and three valves at a cross-type connection.
- 4) All isolation valves shall be resilient seat gate valve, manufactured in accordance with AWWA C500, as amended and shall be equipped with 2" square operating nuts.
- 5) Valve boxes 5½" in diameter of the 3-piece screw type shall be provided for all valves. The word "water" shall be cast in the valve box covers. Valve boxes shall be centered and plumb over the wrench nut of the valve and shall allow at least 6" of adjustment above and below specified depth of cover over pipe.
- 6) If the road surface above a valve is gravel, the valve box cover shall be located 4" to 6" below the gravel surface. If the valve is located below a paved road-surface, valve box cover shall be located at grade.
- 7) Where practical, valves associated with tees and crosses at intersections shall be placed in line with the intersection right-of-way lines.
- 8) No valve shall be placed in a position where vehicles may be parked on top of them on a routine basis.
- 9) Valves shall be placed at each fire hydrant and at all permanent blow-offs.
- 10) Air and Vacuum Release valves. All water mains shall have combination automatic air and vacuum release valves installed at each high point on the line, as determined by the Director of Public works or Town Engineer. Air and vacuum release valves shall be installed in concrete manholes or vaults fitted with air vents open

to the atmosphere and in accordance with the standard detail for air and vacuum release valves.

11) Blow-off Valves. A 1" permanent blow-off assembly is required at the end of mains extended into cul-de-sacs. Temporary 2" blow-offs assemblies shall be installed in those portions of the water mains, which could not be chlorinated, flushed or tested by other means. Permanent blow-off assemblies shall be installed at each high point in all water mains 12" in diameter or larger. Blow-off valves may be fire hydrants for lines smaller than 12". Blow-off assemblies shall consist of all valves, pipe and material necessary to install the blow-off complete in place and shall be constructed in accordance with the standard detail for blow-off installation.

12) Pressure Reducing and Regulating Valves. Pressure reducing and regulating valves shall be of the type capable of maintaining pre-adjusted downstream pressures with varying rates of flow and upstream pressure without causing water hammer and shall be installed in concrete valve vaults of sufficient size to provide adequate maintenance and operation. They shall be installed at locations as required to maintain pressure within acceptable ranges and may be required at the discretion of Director of Public Works or Town Engineer.

I) FIRE HYDRANTS.

1) Fire hydrants shall be located so that in no case would a hose longer than 300' be required to reach any part of an area covered by the hydrant. One hydrant shall always be in sight of least one other hydrant. Closer spacing of hydrants may be required in business and high density residential areas.

2) All hydrants shall stand plumb. Nozzles shall be parallel with or at right angles to, the fire hydrant main line. Hydrants shall be set to established grade, with

nozzles at least 18" above the ground.

- 3) Each hydrant shall be connected to the water main with a 6" ductile iron branch controlled by an independent 6" gate valve and valve box located adjacent to the tee on the water main. The valve shall be located at or within 3' of the tee from the main water line. The branch line and hydrant shoe shall have tie-rods and be wrapped with polyethylene. The main water line tee shall be thrust blocked.
- 4) Hydrant drainage. A drainage pit 3' in width and 3' deep, shall be excavated below each hydrant and completely filled with washed rock (as designated on the typical fire hydrant and assembly detail). Under and around the shoe of each hydrant to a level 6" above the top of the pipe lateral offsets.
- 5) Six-inch ductile iron manufactured offsets may be used on ductile iron branch lines to allow proper elevation setting of the hydrant shoe.
- 6) All plugs, bends, reducers, tees and fire hydrants, shall be anchored by rods and clamps, in accordance with the details on the typical fire hydrant and assembly detail.
- 7) Fire hydrants shall be red-colored and as per Chapter 7, paragraph 7.15.6, of this Manual. The fire hydrants shall have one 5¼" valve opening, with two 2½" hose nozzles, and with "National Standard Screw Threads for Fire Hose Couplings and Fittings", as amended, published by the Insurance Services Office. Hydrant valves shall be opened by turning left (counter clockwise). Inlet connection to the water main for the valve shall be 6", mechanical joint. For further details see paragraph 7.14.2 of this Manual.

- J) Thrust Blocks. All plugs, tee, bends and hydrants shall be provided with thrust blocks. The thrust blocks shall be placed between the undisturbed earth of the trench wall and the fitting; the backing shall be so placed that the pipe and fitting joints will be accessible for repair. The fitting shall be protected from concrete by 8 mil thick polyethylene. Thrust block, type and strength of concrete and dimensions shall be in accordance with the pertaining thrust block paragraphs and details within Chapter 7 of this Manual.
- K) Concrete Vaults and Valve Manholes. All valve manholes, air relief and vacuum valve vaults, pressure reducing valve vaults, meter vaults and other vaults shall be pre-cast or poured-in-place concrete. Design of vaults and valve manholes shall be for traffic loading and shall include aluminum rungs, sump pit, cast iron rings and covers of a pattern acceptable to the Director of Public Works with the word "water" cast thereon. All vaults and valve manholes shall be watertight and all joints, pipe openings and other places where infiltration could exist shall be sealed from the outside of the vault or manhole with a mastic waterproof seal. All inside joints shall be grouted. They shall be in conformance with the performing paragraphs and details within Chapter 7 of this Manual.
- L) Water Services.
- 1) Each residential, commercial or industrial structure shall be served by a separate water service line and meter; except for "guest houses". Water service lines shall be located 10' north or east of sewer services. Water service line shall be installed in a continuous straight line and shall enter the property at the center of the lot, unless otherwise shown and dimensioned on the accepted construction plans. They shall be in conformance with Section 7.23 of Chapter 7 in this Manual.
 - 2) The location of meters and meter pits shall be determined and verified with the Director

of Public Works.

- 3) Water meters shall comply with AWWA Standard C700-77 for accuracy, capacity, pressure loss and dimensions.
- 4) All service lines shall consist of corporation stops, curb stop, meter and the service pipeline. Service lines of diameter 2" and smaller shall be Type K (soft) copper. All water service lines shall have minimum cover specified in the UPC.
- 5) Cross-connections. There shall be no physical connection between any water service line, inside or outside of any property or building and any pipes, pumps, hydrants or tanks where any unsafe or contaminated water including steam condensation or cooling water could be discharged or drawn into the water system.

M) Water Meters and Appurtenances.

- 1) All water meters shall be installed on the interior of the residential, commercial or industrial building unit in a freeze-proof location, with a remote register installed on the exterior of the building at eye level in a location easily accessible as determined by the Director of Public Works. Meters shall be of the same size as the service line between the water main and the meter. All water meters, regardless of size, connected to a property owner's water utility system, shall be furnished by and remain the property of the property owner.
- 2) No outside meters or meter pits shall be allowed unless otherwise accepted by the Director of Public Works.
- 3) Water meters shall comply with AWWA Standard C700-77 for accuracy, capacity, pressure loss and dimensions.

N) Pipe Thawing Materials.

- 1) When requested by the Director of Public

Works a thaw cable shall be installed at each valve box on the water main. It shall extend from the lid of the valve box to the water main, and shall be connected to the pipe using a thermite weld.

- 2) All water main pipe joints shall be bonded. Joint bonds shall be connected to the pipe using a thermite weld.

1.40 SANITARY SEWER

1.40.1 The Town of Bennett Sanitary Sewer main Systems shall be designed in detailed conformance with the requirements referenced in Chapter 10 of the Manual. In general the following shall apply:

A) Flow.

- 1) The sewage flows shall be determined as per paragraph 10.3.1 at Chapter 10 of this Manual.

- 2) The average sewage flow shall be multiplied by a peak factor to obtain the peak sewage flow. Peak factors shall be as follows:

| | <u>Peak Factor</u> |
|--|--------------------|
| 10 inch and smaller diameter sanitary sewers | 4.0 |
| 12 inch and 15 inch diameter sanitary sewers | 3.5 |
| Larger than 15 inch diameter sanitary sewers | 3.0 |

- 3) The sewage flow used for design of sanitary sewers shall be the sum of the peak sewage flow (average flow multiplied by peak factor) and the flow due to infiltration and flows from existing and projected future upstream sanitary sewers. Actual requirements for existing sanitary sewer lines that are tributary to those under design shall also be included.

- 4) Sanitary sewers 15" in diameter and smaller shall be designed to convey the design flow at a maximum flow depth of one-half of the pipe diameter. Sanitary sewers 18" in diameter and larger may be designed to convey the design flow up to a maximum flow depth of three-quarters of the pipe diameter.
- 5) Roof drains, foundation drains, surface drainage, cooling water and other storm water connections to sanitary sewers are prohibited.

B) Location and Cover.

- 1) Sanitary sewers shall in general be located in the street centerlines, a clear distance from re-use or water lines.
- 2) All sanitary sewer manholes shall be located to be accessible to sewer maintenance and cleaning vehicles currently utilized by the Town.
- 3) The minimum depth of cover for sanitary sewers shall be 8' from finished grade to the top of pipe. Sanitary sewers shall be designed deep enough to prevent freezing and backup. Where possible, sewers shall be installed deep enough to accommodate all future extensions and connections that can be foreseen.
- 4) Sanitary sewers shall cross below water and re-use lines and shall be constructed to provide a separation of at least 18" between the bottom of the water and/or re-use main and the top of the sanitary sewer. Sanitary sewers shall be constructed at least 10' horizontally from any water or re-use main or its appurtenances, measured from outside-of-pipe to outside-of-pipe. When local conditions prevent a

vertical or horizontal separation as described above, the sanitary sewer and water main shall be constructed as specified in the Water Main Design Criteria Section Regarding Separation.

C) Size, Alignment and Slope.

- 1) No sanitary sewer shall be less than 8" in diameter.
- 2) Individual dwelling or building sanitary sewer service lines may be 6" or 4" in diameter, provided hydraulic capacity is not exceeded.
- 3) Sanitary sewers shall be designed so that the pipeline between any 2 adjacent manholes is on a straight line.
- 4) Material changes, changes in slope and changes in pipe size shall occur at manholes only.
- 5) All slopes between manholes shall be uniform.
- 6) Slopes shall provide mean velocities no less than 2.0' per second at the design flow rate. Minimum slopes for sanitary sewers based upon the Manning equation with $n = 0.013$ shall be:

| <u>Size of Sanitary Sewer</u> <u>(inches)</u> | <u>Minimum Slope</u> <u>(foot/foot)</u> |
|--|--|
| 8 | 0.004 |
| 10 | 0.0025 |
| 12 | 0.0020 |
| 15 | 0.0015 |
| 18 | 0.0011 |

- 7) When it is necessary to design or install sanitary sewers with a slope greater than that required to achieve a maximum velocity of 10' per second at the design flow rate, anchoring of
1.35

sanitary sewer pipe shall be required. Concrete collars shall be provided as detailed in the anchoring detail.

D) Crossings. Sanitary sewer crossings of drainage ways shall conform to the requirements for water main crossings of drainage ways as outlined in the Water Main section of this Manual.

E) Encasement and Casings.

1) Concrete encasements shall be installed on sanitary sewers under the following conditions. Where sewers are too shallow to sustain traffic or other loads; where horizontal movement of sewer may be experienced; at potable water main or re-use main crossings; at all locations where infiltration may occur; and at any location designated by the Director of Public Works or Town Engineer. Concrete encasements shall be designed and constructed in accordance with the Standard Detail for Concrete Encasements within Chapters 7 and 10 of this Manual.

2) Pipe casings for sanitary sewers shall be used where borings under rights-of-way are required by the using agency. All casings shall conform with the Standard Pipe Casing Details within this Manual and shall be subject to the acceptance of the Director of Public Works or Town Engineer.

F) Sewer Pipe, Fittings and Joints.

1) Rigid Polyvinylchloride Pipe (PVC).
All PVC pipe shall be manufactured in accordance with the requirements of ASTM D-1784 "Rigid Poly (Vinyl Chloride) and Chlorinated Poly (Vinyl Chloride) Compounds" and D 3034-SDR 35 "Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings", as

amended. Pipe and fitting markings shall include the appropriate ASTM Designations and Bell Classification Numbers (12454-B or 12454-C or other acceptable Classifications), name or trademark of Manufacturer and nominal diameter. Pipe joint assemblies shall be bell and spigot with an "O-ring" rubber gasket.

- 2) Ductile Iron Pipe. Ductile iron pipe shall be bell and spigot pipe, centrifugally cast and shall conform to ANSI A21.51 AWWA Specification C-151-76, as amended. All ductile iron pipe used for sanitary sewer line construction shall contain a PVC lining according to ANSI A21.4 and AWWA C-104. Class of pipe shall be Class 50 unless a higher class is required for strength.

G) Manholes.

- 1) All manholes shall be a minimum of 48" in diameter and shall be installed at the upper end of each sanitary sewer line, at all changes in slope, size, alignment or pipe material and at all road intersections. Manholes installed in mid-block shall be aligned with the extension of property lines. Manholes shall conform to the manhole standard details within the back of Chapter 10.
- 2) Manholes shall be located in areas which are not subject to flooding from surface runoff.
- 3) Manhole spacing shall be as per paragraph 10.15.2 in Chapter 10 of this Manual.
- 4) All dead-end manholes, where future sewer extension is anticipated, shall have sanitary sewer pipe laid through

the manhole a maximum of one pipe length and plugged with a plug acceptable to the Director of Public Works.

- 5) A monitoring manhole shall be constructed on the sanitary sewer service lines of all industrial users as determined by the Director of Public Works or Town Engineer. The monitoring manhole shall contain provisions for installation of a permanent wastewater flow monitoring device and a platform for supporting an automatic waste water sampling device.
- 6) Manholes preferably are pre-cast concrete cast-in-place and shall conform to the manhole standard details. Pre-cast manhole risers and cones shall be manufactured in conformity with ASTM C478, as amended, and shall be so marked by the manufacturer. Manhole access openings shall be 24" or greater.
- 7) The base on all manholes shall be a minimum of 8" thick and the overall outside dimensions of the base shall be 1' greater than the outside dimensions of the manhole constructed thereon.
- 8) Where a second sanitary sewer line enters a manhole, the invert on the second sewer line shall enter the manhole at least 0.2' higher or match crowns of pipe with different size pipe, than the invert of the outlet sewer line. In no case shall a second sewer line be allowed to intersect with the outlet line at an angle less than 90°. If alignment and slope allow, the sewer main shall be laid through the manhole. A minimum drop of 0.2' shall be required from

invert to outlet.

- 9) All manholes located outside of dedicated streets rights-of-way shall be designed and constructed with a locking-type cover and the manhole ring shall be bolted to the manhole frame as specified.
- 10) Manhole frames and covers shall be solid 400 pound cast iron, 24" inside diameter, acceptable to the Director. Covers with more than one lifting hole shall not be acceptable. The lifting notch shall not allow surface water to enter the manhole.
- 11) If the road surface above a manhole cover is gravel, the cover shall be located 4" to 6" below the gravel surface. If the manhole is located below a paved road surface, the manhole cover shall be located at grade.
- 12) Individual sanitary sewer service lines shall not be allowed to connect directly to manholes unless otherwise accepted by the Director or Public Works or Town Engineer. No sanitary sewer service line shall connect to the main sewer line closer than 5' from the uphill manhole.
- 13) All cement used in concrete and mortar for constructing manholes shall conform to ASTM C-150, Type II, as amended.
- 14) Inlet and outlet pipes shall be joined to the manhole with a gasketed flexible water tight connection or any water tight connection arrangement acceptable to the Director of Public Works provides for differential settlement to take place between the sanitary sewer pipe and

manhole wall.

- 15) The invert of the lowest pipe entering a manhole shall be at least 8" above the top of the base slab so that the sewer flow channel in the manhole may be installed and shaped. The flow channel through manholes shall be made to conform in shape, slope and smoothness to minimize hydraulic losses through the manhole section. Cut pipe shall not extend beyond the inside face of the manhole wall.

- 16) Drop Manholes. Drop manholes shall be avoided whenever possible. No drop greater than 0.17', other than the drop required for change in pipe size, will be allowed, unless more than 2', (on the average), extra excavation depth for the sanitary sewer is required to avoid creating a drop manhole. Drop manholes shall be constructed exactly as regular manholes except the manhole base shall be extended upstream far enough to form a base for the concrete encasing the sewer pipe drop entering the bottom of the drop manhole. The drop entering the manhole shall be completely encased in concrete up to the spring line of the pipe of the main sanitary sewer line. A clean-out shall be placed in the manhole at the level of the main sanitary sewer line. All drop manholes shall be completely lined with coal tar epoxy, except for PVC drop sections. Drop manholes shall conform to the drop manhole standard detail.

- 17) For additional Manhole Details and Specifications, see the pertaining sections and paragraphs in Chapters 7 and 10 of this Manual.

H) Sanitary Sewer Services. Each building or structure shall be served by a separate sanitary sewer service line connected to a sanitary sewer main. The service line shall be perpendicular to the main sewer line while in the public right-of-way.

1.41 ELECTRICAL

All electrical controls, enclosures and other associated appurtenances shall be "UL" tested and approved. Evidence of such shall be submitted to the Director of Public Works, for review and approval, prior to installation.

Failure to comply shall be corrected at the Owner/Developer's expense.

1.42 OTHER SYSTEMS AND REQUIREMENTS

All other systems and requirements shall be designed and constructed as per the requirements of each pertaining Chapter within this Manual. Re-use mains shall in general be located 10' south of the centerline in east/west streets and 10' west of the centerline in north/south streets.