

## IOWA WASTEWATER FACILITIES DESIGN STANDARDS

### CHAPTER 11

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IOWA WASTEWATER FACILITIES DESIGN STANDARDS  
CHAPTER 11  
Project Submittals

## 11.1 GENERAL

A construction permit issued by the Iowa Department of Natural Resources is required for the construction, installation or modification of any disposal system or part thereof or any extension or addition thereto. A permit to construct minor sewer extensions may be obtained from a local public works department when the Department's permitting authority has been delegated to the local public works department under section 455B.183 of the Code of Iowa and Chapter 567 IAC 9.

### 11.1.1 Exceptions from a Permit

A construction permit shall not be required for the following:

- a. Storm sewers that transport only surface water runoff.
- b. Any new disposal system or extension or addition to any existing disposal system that receives only domestic or sanitary sewage from a building or housing occupied by fifteen persons or fewer.
- c. Replacement of previously approved construction where the replacement is done with the same methods, materials, capacities and design considerations as the original construction.
- d. Sanitary sewer service connections, defined as any connection from a single property unit to an existing sanitary sewer. However, where construction of a collection system is proposed that will serve multiple property units and use an alternative or innovative technology, rather than the public gravity sanitary sewers as described in Chapter 12 of these standards, the design for each sanitary sewer service connection will be reviewed for approval prior to the Department issuing a permit to construct the sanitary sewer.
- e. A pretreatment facility where a treatment unit(s) is owned and operated by a person or firm which provides partial reduction of the strength or toxicity of the waste stream prior to additional treatment and disposal by another person, firm, or municipality. However, the Department may require that the design basis and construction drawings be filed for information purposes. This exception for a permit to construct a pretreatment facility does not apply to earthen lagoons.
- f. In-plant modifications of industrial or commercial installations, such as process changes, waste reductions, segregation and rerouting of wastes. However, the Department should be informed of all such changes which result in significant process alterations or reductions in waste strength or volume.
- g. A holding tank for the retention or storage of wastewater from a single property unit pending removal for further treatment or disposal by another person, firm or municipality. This exception for a permit to construct a holding tank does not apply to earthen lagoons.
- h. Where approved standard CIPP lining specifications from the governing agency or private engineering firm are used and on file with the Department in accordance with Section 11.4.2 of these standards, non-structural reconstruction of a partially deteriorated sanitary sewer (as determined by a licensed engineer) using Cured in Place Pipe (CIPP) liners in accordance with ASTM F 1216. This exception for a permit to construct does not apply to sanitary sewer reconstruction funded by a Clean Water State Revolving Fund loan.
- i. Where approved standard cementitious lining specifications from the governing agency or private engineering firm are used and on file with the Department in accordance with Section 11.4.2 of these standards, reconstruction of a sanitary sewer manhole using a protective cementitious liner system in accordance with ASTM F2551. This exception for a permit to construct does not apply to sanitary sewer manhole reconstruction funded by a Clean Water State Revolving Fund loan.
- j. Where approved standard spot sanitary sewer repair specifications from the governing agency or private engineering firm are used and on file with the Department in accordance with Section 11.4.2 of these standards, spot sanitary sewer repair by pipe replacement (generally 10 to 20 feet) in accordance with Section 12.4 (Materials), Section 12.5 (Details of Design) and Section 12.6 (Details of Construction) of these standards. This exception for a permit to construct does not apply to spot sanitary sewer

repair by pipe replacement funded by a Clean Water State Revolving Fund loan.

- k. Alterations rectifying imminent public health or safety emergencies. Contact the local DNR field office within seven days of the start of such construction to report the incident. The Department may require that “As Built” plans be submitted for information purposes.

#### 11.1.2 Engineering Services

Engineering services to obtain a construction permit and complete the approved construction shall be performed in three stages:

- a. Engineering report or facilities plan (not required for minor sewer extensions).
- b. Preparation of construction plans, specifications and contractual documents.
- c. Construction inspection, administration, compliance and acceptance.

All engineering documents including reports, plans and specifications, addenda and change orders shall conform to Chapter 542B of the Code of Iowa and Agency 193C of the Iowa Administrative Code.

The final plans and specifications should not be prepared until the engineering report has been approved. This enables the Department to review the concept and design basis, make appropriate comments, and indicate to the applicant the general acceptability of the proposal before additional expenses are incurred for developing final plans and specifications. Amendments to the engineering report or facilities plan, if any, should be submitted to the Department at least 90 days prior to the date when action by the Department on the engineering report or facilities plan is desired. After the engineering report has been approved, the final plans and specifications shall be submitted in accordance with Rule 567 IAC 60.4 or in accordance with the Iowa Operation or NPDES Permit or other mandatory schedules. Final plans and specifications shall be prepared in accordance with the approved engineering report or facilities plan. Any changes from the approved report must receive prior approval from the Department before incorporation into the plans and specifications.

#### 11.1.3 Application for a Permit

An application for a permit to construct shall consist of the following, at a minimum:

- a. For minor gravity sewer extensions that do not include a lift station, an inverted siphon, a trunk or interceptor sewer or other major appurtenance:
  1. Two sets of plans and specifications and one copy of construction permit application Schedules A, B and C. One set of the plans should be half size to accommodate scanning (11 X 17 preferred).
  2. Sewage treatment agreement form (DNR Form 542-3219), if applicable.
  3. Application fee and fee form (DNR Form 542-1245).
- b. For projects other than minor sewer extensions:
  1. Two copies of the facilities plan or engineering report and any supplements with one copy of construction permit application Schedules A, F and G. A letter report with Schedule A may be accepted by the Department on a case by case basis for minor improvements.
  2. Two sets of plans and specifications with one copy of all applicable construction permit application schedules. One set of the plans should be half size to accommodate scanning (11 X 17 preferred).
  3. Application fee and fee form (DNR Form 542-1245).

A construction permit will not be issued until a complete application has been submitted to the Department, in accordance with Rule 567 IAC 60.4. Construction shall not be initiated until the Department has issued a permit to construct. The construction must be completed in accordance with the approved plans and specifications. The construction permit shall expire if construction is not commenced within one year of the date of issuance. The Director may grant an extension of time to commence construction when it is found necessary or justified.

The design engineer should obtain the Wastewater Engineering Construction Permitting Process Manual for a basic outline of the Department's procedures and requirements. Other local, state and federal agencies or authorities also have jurisdiction over proposed projects falling within the statutory authority of the Iowa Department of Natural Resources and must be contacted for the appropriate action as necessary.

## 11.2 ENGINEERING REPORTS OR FACILITIES PLANS

The engineering report or facilities plan assembles basic information; presents design criteria and assumptions; examines alternate projects with preliminary layouts and cost estimates; examines system reliability with the largest unit out of service, treatment facility reliability class, and applicable provisions for power source reliability; describes financing methods giving anticipated charges for users; reviews organizational and staffing requirements; offers a conclusion with a proposed project for client consideration; and outlines official actions and procedures to implement the project. The engineering report or facilities plan must include sufficient detail to demonstrate that the proposed project will meet applicable criteria.

The concept (including process description and sizing), factual data, and controlling assumptions and considerations for the functional planning of sewerage facilities shall be presented for each process unit and for the whole system. These data form the continuing technical basis for detail design and preparation of construction plans and specifications.

Architectural, structural, mechanical, and electrical designs are usually excluded. Sketches may be desirable to aid in presentation of a project. Outline specifications of process units, special equipment, etc., are occasionally included.

Engineering reports and facilities plans shall be submitted in accordance with Section 11.1 of these standards. The criteria in Section 11.2 of these standards shall be used as a guideline for preparation of the engineering report or facilities plan for projects of significant scope. For projects of limited scope, all items in Section 11.2 of these standards may not apply. Any item deemed necessary by the Department shall be included. Depending on the scope, a letter report that has been certified by a licensed engineer will be accepted by the Department for a minor improvement.

Supplemental information in accordance with Section 18C.2 (Supplement to Engineer's Report) of these standards shall be submitted for lagoon projects.

Supplemental information addressing Section 14.4.3 (New Process, Equipment and Application Evaluation and Contingency Plan) of these standards shall be provided for projects proposing innovative technologies.

Facilities plans for Clean Water State Revolving Fund projects shall meet the content and format requirements of Chapters 567 IAC 90, 91 and 92 as well as the items listed in Section 11.2 of these design standards.

### 11.2.1 Title of Project

### 11.2.2 Letter of Transmittal

A one page letter typed on the firm's letterhead and bound into the report which shall include a statement that this report has been accepted by the client, a statement of the feasibility of the recommended project, an acknowledgement to those giving assistance, and a reference to the project as an outgrowth of an approved area-wide wastewater management plan, if appropriate.

### 11.2.3 Title Page

The title page shall include the title of the project; the municipality, county or other sponsoring agency; the names of officials, managers, superintendents; the name and address of the firm preparing the report; and a certification statement by a professional engineer licensed to practice in Iowa, including signature, number and date in conformance with Chapter 542B of the Code of Iowa and Agency 193C of the Iowa

Administrative Code.

#### 11.2.4 Table of Contents

The table of contents shall include section headings, chapter headings, subheadings, maps, graphs, illustrations, exhibits, diagrams, and appendices. Number all pages and cross reference by page number.

#### 11.2.5 Summary

The summary shall highlight, very briefly, what was found from the study.

##### 11.2.5.1 Findings

- a. Population.
- b. Land use and zoning.
- c. Receiving waters.
- d. Established effluent limitations and expected effluent quality.
- e. Wastewater characteristics and concentrations.
- f. Immediate and deferred collection system needs.
- g. Selected treatment process and site description.
- h. Environmental assessment of the selected process.
- i. Proposed project cost.
- j. Energy requirements.
- k. Financing.
- l. Administrative organization.
- m. Changes - discuss situations that could alter recommended project.

##### 11.2.5.2 Conclusion

##### 11.2.5.3 Recommendations

The recommendations shall include the following appropriate step-by-step actions for the client to implement the conclusions:

- a. Official acceptance report.
- b. Adoption of recommended project.
- c. Submission of report to appropriate agencies for review and approval.
- d. Authorization of engineering services for approved project (construction, plans, specifications, contract, documents, etc.).
- e. Legal services.
- f. Enabling ordinances, resolutions, etc., as required.
- g. Adoption of a sewer-use ordinance and rate structure.
- h. Adoption of operating rules and regulations.
- i. Financing program requirements.
- j. Organization, administration and staffing requirements.
- k. Time schedules, including implementation, construction and completion dates which reflect applicable hearings, stipulations and abatement orders.

#### 11.2.6 Introduction

##### 11.2.6.1 Purpose

The purpose shall include the reasons for the report and the circumstances leading up to the report.

##### 11.2.6.2 Scope

The scope shall include a definition of the extent of the project and a discussion of the factors, limitations, etc. which were considered in determining the scope of the project.

### 11.2.7 Existing Conditions and Projections

The report shall include a section on existing conditions and projections including the following:

#### 11.2.7.1 Planning Period

The planning period shall include the total period of time over which waste treatment is evaluated.

#### 11.2.7.2 Land Use

- a. Existing service area, expansion, annexation, intermunicipal service, and ultimate planning area.
- b. Drainage basin and portion covered.
- c. Residential, commercial and industrial land use, zoning, population densities, and industrial types and concentrations.

#### 11.2.7.3 Demographic and Economic Data

##### 11.2.7.3.1. Demographic Data

- a. Population growth, trends and increase during design life of facility (graph).
- b. Employment from within and outside service area.
- c. Transportation systems and effect of commuter influx.

##### 11.2.7.3.2. Economic Data

- a. Sources of funding and status of these sources.
- b. Recommended ordinance amendments, revisions, or cancellation and replacement.
- c. Sewer-use ordinance.
- d. Industrial wastewater surcharges.
- e. Existing contracts and agreements (intermunicipal, industrial, etc.).
- f. Enforcement provisions including inspection, sampling, detection, penalties, etc.

### 11.2.8 Existing Facilities Evaluation

The report shall include a section on existing facilities evaluation.

#### 11.2.8.1 Existing Collection System

- a. Inventory and map of existing sewers.
- b. Isolation from water supply wells.
- c. Adequacy to meet project needs (structural, condition and hydraulic capacity tabulation).
- d. Flow monitoring and determination of the amounts of dry weather flow, infiltration and inflow.
- e. Overflows and required maintenance, repairs, improvements, and methods for elimination or control.
- f. Repair, replacement, and stormwater separation requirements. The collection system should be surveyed to determine if reconstruction is required in reaches of sewer where history of spot repairs have occurred or where the maximum week flow (excluding major commercial and industrial flows) exceeds 275 gpcd after the removal of all inflow sources such as roof drains, manholes and storm sewer connections.
- g. Sewer system rehabilitation priorities, if selected.
- h. Recommended annual program to maintain the sewer system. Where the maximum week flow (excluding major commercial and industrial flows) does not exceed 275 gpcd, not less than 2 percent of the collection system (including all sanitary sewer service connections) should be reconstructed and/or replaced annually.
- i. Required annual expenditures.

11.2.8.2 Existing Treatment Plant Site

- a. Area for expansion.
- b. Terrain.
- c. Subsurface conditions.
- d. Isolation from habitation.
- e. Isolation from water supply structures.
- f. Enclosure of units, odor control, landscaping, etc.
- g. Flooding (elevation of 25 and 100-year flood stage).

11.2.8.3 Existing Treatment Facilities

- a. Capacities and adequacy of units (wastewater treatment, sludge processing, and sludge disposal). Tabulate.
- b. Relationship and/or applicability to proposed project; consider present design standards.
- c. Age and condition.
- d. Adaptability to different usages.
- e. Structures to be retained, modified, or demolished.
- f. Outfall line.

11.2.8.4 Existing Wastewater Characteristics

- a. Water consumption from records [total, residential (total and per capita), commercial, and industrial].
- b. Wastewater flow data - average dry weather, average wet weather, maximum wet weather and peak hourly wet weather flows. (Verify accuracy of installed metering equipment).
- c. Physical, chemical, and biological characteristics, concentrations and mass loadings (pounds).
- d. Residential, commercial, industrial, infiltration and inflow fractions; considering organic, solids, toxic, corrosive, etc., substances. Tabulate each fraction separately and summarize.

11.2.9 Proposed Facilities Evaluation

The report shall include a section on proposed facilities evaluation.

11.2.9.1 Proposed Collection System

- a. Area of service.
- b. Inventory and map of proposed additions and rehabilitation, including initial and projected loadings.
- c. Isolation from water supply wells, reservoirs, facilities, etc.
- d. Unusual construction problems.
- e. Utility interruption and traffic interference.
- f. Restoration of pavements, lawns, etc.
- g. Basement flooding prevention during power outage.

11.2.9.2 Design Wastewater Characteristics

- a. Design wastewater flow - average dry weather, average wet weather, maximum wet weather, and peak hourly wet weather flows.
- b. Design physical, chemical, and biological characteristics, concentrations, mass loadings (pounds), and design temperature.
- c. Design residential, commercial, industrial, infiltration and inflow fractions; considering organic, solids, toxic, corrosive, etc., substances. Tabulate each fraction separately and summarize. Treatment agreement forms (DNR Form 542-3221) shall be submitted for each significant industrial user as required in Paragraph 567 IAC 64.3(5)“d”.
- d. Character of wastewater necessary to insure amenability to process selected.
- e. Evaluation of the need for pretreatment of industrial wastewater before discharge to sewers.

11.2.9.3 Receiving Stream Considerations

- a. Downstream water uses including water supply, recreation, human health, aquatic life, agricultural, industrial, etc.
- b. Impact of proposed discharge on receiving waters.
- c. Correlations of plant performance versus receiving water requirements.

11.2.9.4 Treatment Plant Site Requirements

All sites must comply with all applicable siting requirements in Subrules 567 IAC 64.2 (2) and (3) and Rule 567 IAC 64.4. Compare advantages and disadvantages relative to cost, hydraulic requirements, flood control, accessibility, enclosure of units, odor control, landscaping, etc., and isolation with respect to potential nuisances and protection of water supply facilities. If the project lies in the flood plain, the Flood Plain Management and Dam Safety Section of the Iowa Department of Natural Resources should be contacted for appropriate action.

11.2.9.5 Alternatives

All alternatives shall be conformed with the established effluent limitations. The effluent limitations shall be delineated. Alternatives shall consider such items as regional solutions, optimum operation of existing facilities, flow and waste reduction, location of facilities and outfalls, phased construction, necessary flexibility and reliability, sludge disposal, alternative treatment sites, alternative processes, and institutional arrangements. The evaluation of the alternative processes and sites shall include the following:

- a. Describe and delineate each alternative (schematic diagrams).
- b. Preliminary design for cost estimates.
- c. Estimates of project costs (total) dated, keyed to construction cost, index, escalated, etc.
- d. Advantages and disadvantages of each.
- e. Individual differences, requirements, and limitations.
- f. Characteristics of process effluent for each.
- g. Comparison of process performance.
- h. Environmental assessment of each (including both primary and secondary impacts).
- i. Operation and maintenance expenses and energy requirements.
- j. Annual expense requirements including tabulation of annual operation, maintenance, personnel, and debt of obligation for each alternative.

11.2.9.6 Selected Process and Site

- a. Identify and justify process and site selected.
- b. Adaptability to future needs.
- c. Environmental assessment.
- d. Identify and justify outfall location.
- e. Describe immediate and deferred construction.
- f. Describe method of providing treatment during construction.

11.2.9.7 Project Financing

- a. Review applicable financing methods.
- b. Effect of state and federal assistance.
- c. Assessment by valuation, front foot, area unit, or other benefit.
- d. Charges by connection, occupancy, readiness-to-serve, water consumption, industrial wastewater discharge, etc.
- e. Existing debt service requirements.
- f. Bond retirement schedule.
- g. Tabulate all expenses.
- h. Show how representative properties and users are to be affected.



- i. Show anticipated typical annual charge to users and non-users.

#### 11.2.9.8 Legal, and Other Considerations

- a. Enabling legislation, ordinances, rules and regulations.
- b. Statutory requirements and limitations.
- c. Contractual considerations and intermunicipal cooperation.
- d. Public information and education.

#### 11.2.10 Combined Sewer Studies

A study of the treatment and control of all combined sewer system flow shall be required in the engineering report or facilities planning stage, where applicable.

##### 11.2.10.1 Definition of Combined Sewer

A combined sewer is defined as a sewer designed and constructed with capacity to carry both storm water and sanitary flow.

##### 11.2.10.2 Scope of Combined Sewer Study

Prior approval of the scope of the study must be obtained before initiation of the study. As a minimum the following information must be contained in the scope of the combined sewer study and submitted for approval.

- a. Description of the known or estimated extent of the combined sewers in the system.
- b. Receiving stream characteristics and water quality criteria.
- c. Potential health hazards.
- d. Scope of work necessary to comply with study requirements contained in subsection 11.2.10.3 of these standards.
- e. Cost of study.
- f. Other pertinent information.

##### 11.2.10.3 Combined Sewer Study Requirements

Good engineering practice dictates and it will be a requirement that the following be submitted during the engineering report or facilities planning stage.

- a. The controls and associated cost estimates needed to protect the beneficial use of the stream must be addressed.
- b. The alternative and associated general cost estimates for eliminating bypassing of sanitary wastes by installing a separate storm sewer system must be addressed.
- c. The alternative and associated general cost estimates for providing treatment to handle all excess flows and eliminating any bypassing must be addressed. This may be accomplished by either building a storm water retention lagoon and gradually returning the excess flow to the treatment plant in a timely manner during off-peak periods or providing a plant large enough to handle all flows. Either of these alternatives must provide treatment to meet the limitations of the Operation or NPDES Permit. This evaluation should include duration, frequency and intensity data for rainfall. In addition, the methodology of arriving at treatment plant unit capacities and storage volumes and the mode of operation of the plant during extended wet and dry periods and during the flow transition should be outlined. Where the storage volume requirement must be minimized, a plant hydraulic capacity approaching the expected MWW flow is recommended.
- d. The alternative and associated general cost estimates for segregating sanitary sewers from the area served by combined sewers must be addressed. This alternative should include the rerouting of the present separate sewers and the prevention of any sewer extensions tributary to the existing combined sewers.
- e. A long range plan should be presented for segregation of combined sewers for those areas

where neither elimination nor treatment are determined to be feasible.

#### 11.2.10.4 Required Action Resulting from Combined Sewer Study

This Department will review on a case-by-case basis the necessary action needed to minimize, reduce, or eliminate the volume and frequency of bypassing. The alternative plans presented will be used in evaluating the controls necessary in each case. The required controls may be elimination of the combined sewers, providing treatment, segregation of combined sewers or varying combinations of all three options. The applicant will be informed of the action required during the engineering report or facilities planning stage of the treatment upgrade.

#### 11.2.11 Appendices: Technical Information and Design Criteria

The report shall include an appendices section including the following, as appropriate:

##### 11.2.11.1 Collection System

- a. Design tabulations - flow, size, velocities, etc.
- b. Regulator or overflow design.
- c. Pump station calculations, including energy requirements and stand-by power.
- d. Special appurtenances.
- e. Stream crossings.
- f. System map.

##### 11.2.11.2 Process Facilities

- a. Influent hydraulic and organic loadings to wastewater and sludge processes - minimum, average, peak and effect of variability.
- b. Process selection and basis - flow equalization, preliminary treatment processes (screening and grit removal), biological treatment processes, tertiary treatment processes, disinfection and solids handling system.
- c. Chemical addition and control facilities.
- d. Physical control and flow metering facilities.
- e. Recycle flows.
- f. Unit dimensions.
- g. Rates and velocities.
- h. Detentions.
- i. Loadings to and removal efficiencies through each unit operation; total removal efficiency and effluent quality (concentration and mass).
- j. Energy requirements.
- k. Flexibility.
- l. Unit process reliability and power source reliability.

##### 11.2.11.3 Process Diagrams

- a. Wastewater flow diagram showing process configuration, interconnecting piping, reliability, flexibility, flow measurement, sampling, etc.
- b. Solids handling flow diagram showing process configuration, interconnecting piping, reliability, flexibility, sampling, etc.

##### 11.2.11.4 Collection System Operation and Maintenance

##### 11.2.11.5 Process Facilities Operation and Maintenance

##### 11.2.11.6 Laboratory Testing, Personnel, Space and Equipment Requirements.

##### 11.2.11.7 Office Space for Administrative Personnel and Records

11.2.11.8 Personnel Services - Locker Rooms and Lunch Rooms

11.2.11.9 Support Data

- a. Outline unusual specifications, construction materials, and construction methods.
- b. Maps, photographs, and diagrams.
- c. Other.

11.3 PLANS

11.3.1 General

All plans for sewage works shall bear a suitable title showing the name of the municipality, sewer district, institution or other owner; and shall show the scale in feet, a graphical scale, the north arrow, and the date and signed certification statement by a professional engineer licensed to practice in Iowa, including signature, number and date in conformance with Chapter 542B of the Code of Iowa and Agency 193C of the Iowa Administrative Code. A space should be provided for signature and approval stamp of the appropriate reviewing and approving officials and agencies.

The plans for the application shall be clear and legible (suitable for microfilming). They shall be drawn to a scale which will permit all necessary information to be plainly shown. Full size plans should not be larger than 30 inches by 42 inches nor smaller than 22 inches by 36 inches. Datum used should be indicated. Locations and logs of test borings, when made, shall be shown on the plans. Blueprints shall not be submitted. Where appropriate, half size plans are preferred.

Detail plans shall consist of plan views, elevations, sections and supplementary views which, together with the specifications and general layouts, provide the working information for the contract and construction of the works. Dimensions, relative elevations of structures, location and outline form of equipment, location and size of piping, water levels, and ground elevations shall be included.

Plans for Clean Water State Revolving Fund projects shall meet the content and format requirements of Chapters 567 IAC 90, 91 and 92 as well as the items listed in Section 11.3 of these standards.

11.3.2 Plans of Sewers

Plans shall be submitted in accordance with Section 11.1 of these standards.

11.3.2.1 General Location Plan

A comprehensive plan of the existing and proposed sewers for projects involving new sewer systems and additions to or replacement of existing systems shall include the following:

- a. Existing or proposed streets and all streams or water surfaces shall be clearly shown.
- b. The boundary lines of the municipality or the sewer district and the area to be sewered shall be shown.
- c. For new sewer systems, the plan shall show the location, size and direction of flow of all proposed sanitary sewers draining to the treatment works. For sewer extensions to existing systems, the plan shall show the location, size and direction of flow of all existing and proposed sanitary and combined sewers in the adjacent area. An index to the location of the detail plan sheets shall be included.

11.3.2.2 Detail Plans

Profiles should have a horizontal scale of not more than 100 feet to the inch and a vertical scale of not more than 10 feet to the inch. Plan view should be drawn to a corresponding horizontal scale and preferably be shown on the same sheet. Plans and profiles shall show:

- a. Location of streets and sewers.

- b. Line of ground surface; size of pipe; length between manholes; invert and surface elevation at each manhole; and grade of sewer between each two adjacent manholes. All manholes shall be numbered on the profile. Where there is any question of the sewer being sufficiently deep to serve any residence, the elevation and location of the basement floor shall be plotted on the profile of the sewer which is to serve the house in question. The engineer shall state that all sewers are at least 2 feet below adjacent basement floor elevations except where otherwise noted on the plans.
- c. Locations of all special features such as inverted siphons, concrete encasements, elevated sewers, etc.
- d. All known existing structures and utilities, both above and below ground, which might interfere with the proposed construction, particularly water mains, gas mains, storm drains, and telephone and power conduits.
- e. Special detail drawings, made to a scale to clearly show the nature of the design, shall be furnished to show the following particulars:
  - All stream crossings and sewer outlets, with elevations of the stream bed and of normal and extreme high and low water levels.
  - Details of all special sewer joints and cross-sections.
  - Details of all sewer appurtenances such as manholes, lampholes, inspection chambers, inverted siphons, regulators, and elevated sewers.

### 11.3.3 Plans of Wastewater Pumping Stations

Plans shall be submitted in accordance with Section 11.1 of these standards.

#### 11.3.3.1 General Location Plan

A location plan shall be submitted for projects involving construction or revision of pumping stations. This plan shall show the following:

- a. The location of the pumping station, force main, and downstream sewer.
- b. The location and the extent of the tributary area.
- c. Any boundary lines of the municipality, sewer district or development within the tributary area.

#### 11.3.3.2 Detail Plans

Detail plans shall be submitted showing the following, where applicable:

- a. Topography of the site.
- b. Existing pump station.
- c. Proposed pumping station, including provisions for installation of future pumps or ejectors.
- d. Elevation of high water at the site and maximum elevation of wastewater in the collection system upon occasion of power failure.
- e. Maximum hydraulic gradient in downstream gravity sewers when all installed pumps are in operation.
- f. Soil borings and groundwater elevations.

### 11.3.4 Plans of Wastewater Treatment Plants

Plans shall be submitted in accordance with Section 11.1 of these standards.

#### 11.3.4.1 General Location Plan

A location plan shall be submitted, showing the wastewater treatment plant in relation to the remainder of the system.

Sufficient topographic features shall be included to indicate its location with relation to streams and the point of discharge of treated effluent.

#### 11.3.4.2 General Layouts

Layouts of the proposed wastewater treatment plant shall be submitted, including:

- a. General plant layout showing topography of the site, location of plant structures, location of utility systems serving the plant processes, location of soil borings, and areas for future expansion.
- b. Schematic flow diagram showing the flow through various plant units.
- c. Piping diagram, including any arrangements for bypassing individual units. Materials handled and direction of flow through pipes shall be shown.
- d. Minimum, average and peak hydraulic profiles showing the flow of wastewater, supernatant liquor, and sludge.

#### 11.3.4.3 Detail Plans

Detailed plans shall show the following:

- a. Location, dimensions, and elevations of all existing and proposed plant facilities.
- b. Detailed piping arrangement for wastewater and sludge streams.
- c. Elevations of high and low water level of the body of water to which the plant effluent is to be discharged.
- d. Adequate description of any features not otherwise covered by specifications or engineer's report.
- e. Drainageways on treatment plant site and existing and proposed erosion controls.
- f. As necessary, existing and design sludge storage volumes.

### 11.4 SPECIFICATIONS

#### 11.4.1 General

Complete technical specifications for the construction of sewers, wastewater pumping stations, wastewater treatment plants, and all appurtenances shall accompany the plans.

Specifications shall be submitted in accordance with Section 11.1 of these standards.

Specifications for Clean Water State Revolving Fund projects shall meet the content and format requirements of Chapters 567 IAC 90, 91 and 92 as well as the items listed in Section 11.4 of these standards.

#### 11.4.2 Standard Specifications

Governing agencies and private engineering firms may file for approval of their standard sanitary sewer construction specifications with the Department. Two copies of the proposed standard specifications shall be submitted. The standard specifications must contain the following:

- a. Certification statement by a professional engineer licensed to practice in Iowa, including signature, number and date in conformance with Chapter 542B of the Code of Iowa and Agency 193C of the Iowa Administrative Code.
- b. If the engineer preparing the specifications is not a permanent, full time employee of the agency submitting the specifications, then the governing body of the agency submitting the specifications must also submit a resolution adopting the specifications as the official specifications of the agency.

Where standard specifications for sanitary sewer construction have been approved, the Department will not require submission of specifications with the plans. When standard specifications are used, all plans must contain a statement that all construction shall be in accordance with the approved standard specifications currently on file with the Department. Additional special provisions or amendments to the standard specifications for a particular project can also be utilized in conjunction with approved standard specifications. The applicant should submit copies of the special provisions properly certified by an

engineer. When a revision to an approved standard specification is required by revision of Department standards or governing agency initiative, two copies of the revision, properly certified and adopted, shall be submitted.

Applicants may incorporate the Iowa Statewide Urban Design Standard Specifications (SUDAS) by reference without adoption by the applicant.

#### 11.4.3 Content

The specifications shall include a certification statement by a professional engineer licensed to practice in Iowa, including signature, number and date in conformance with Chapter 542B of the Code of Iowa and Agency 193C of the Iowa Administrative Code.

The specifications accompanying construction drawings shall include, but not be limited to, all construction information not shown on the drawings which is necessary to inform the builder in detail of the design requirements as to the quality of materials and workmanship and fabrication of the project and the type, size, strength, operating characteristics, and rating of equipment; allowable infiltration; the complete requirements for all mechanical and electrical equipment, including machinery, valves, piping, and jointing of pipe; electrical apparatus, wiring, instrumentation, and meters; laboratory fixtures and equipment; operating tools; construction materials; special filter materials such as stone, sand, gravel, or slag; miscellaneous appurtenances, chemicals when used; instructions for testing materials and equipment as necessary to meet design standards; and performance tests for the completed works and component units. It is suggested that these performance tests be conducted at design load conditions wherever practical.

#### 11.4.4 Operation During Construction

Specifications shall contain a program for keeping existing treatment plant units in operation during construction of plant additions. Should it be necessary to take plant units out of operation, a shutdown schedule which will minimize pollutional effects on the receiving stream shall be reviewed and approved in advance by the Department and shall be adhered to.

### 11.5 REVISIONS TO APPROVED PLANS AND SPECIFICATIONS (ADDENDA AND CHANGE ORDERS)

Any deviations from approved plans or specifications affecting capacity, flow, operation of units, or point of discharge shall be approved in writing before such changes are made. Plans or specifications so revised should, therefore, be submitted well in advance of any construction work which will be affected by such changes, to permit sufficient time for review and approval. The applicant or a representative shall submit a minimum of two copies of each revision. The submittal shall include any appropriate revised construction permit application schedules.

Structural revisions or other minor changes not affecting capacities, flows, or operation will be permitted during construction without approval. If requested, "As Built" plans clearly showing such alterations shall be submitted to the Department.

Revisions for Clean Water State Revolving Fund projects shall meet the content and format requirements of Chapters 567 IAC 90, 91 and 92 as well as the previously listed items in Section 11.5 of these standards.

### 11.6 OPERATION AND MAINTENANCE MANUALS

A complete operation and maintenance (O&M) manual shall be provided for each wastewater treatment facility with larger than 15 P.E. design capacity prior to the beginning of the operation of the facility. No later than 12 months following the start of operation, the applicant or a representative shall submit to the appropriate regional field office of the department a copy of the O&M manual that has been approved by the engineer or, if appropriate, an amendment to an existing O&M manual.

The manual shall be written in a manner easily understandable to the treatment plant operator and should have two distinct sections: operational section and maintenance section. The manual should cover the Iowa Operation

or NPDES Permit for the facility and all reporting requirements contained therein. The manual should cover all details of the operation and maintenance of the wastewater treatment facility including valve or gate settings, piping diagrams, lubrication schedules, safety, emergency operation, sludge disposal and other items of concern.