Technical Advisory Committee Comments for Draft IDNR WWDS

General

1. Have these changes been reviewed by USDA Rural Development to determine if there are any conflicts with their requirements?

   DNR Response: The USDA Rural Development was made aware of the proposed updates. We e-mailed a copy. To date, no comments have been received.

2. Provide both English and Metric units throughout design standards.

   DNR Response: IDNR's rules and application forms use customary units of expression.

3. IDNR does not appear to have staff to review structural and electrical design requirements. The technical advisory committee (TAC) recommends removing structural and electrical standards. Indicate that the design shall meet local and state building code requirements instead.

   DNR Response: See Section 11.1 General.

   Iowa's standards include minimum requirements for design and construction. The issuance of a permit by the Department in no way relieves the permittee of the responsibility for complying with any other local, state, and federal laws, ordinances, regulations or other requirements applicable to the facility.

   See Section 14.8 Safety.

4. General: If an engineer wants to propose a new/innovative technology to DNR, does a process need to be developed for submittal and included as part of Chapter 11?

   DNR Response: A cross-reference to Section 14.4.3 (New Process, Equipment and Application Evaluation, Project Coordination Meetings and Project Performance Standards) has been added to the 6th paragraph of Section 11.2 Engineering Reports or Facilities Plans.

Chapter 11 - Project Submittals

1. 11.1.1(b) – With the increasingly onerous nitrogen and e. coli limits, has there been any discussion of increasing the 15 or fewer persons minimum? We have had several projects recently that are right on this line. They are just over 1,500 gpd. To us, there is more benefit to the receiving streams if this can be changed somehow so *something* is done in these situations. Often the community, trailer

park, campground, etc. just continues to violate the existing NPDES permit, or the new development project is totally stopped because the owner cannot afford to meet the proposed NPDES standards. If the county sanitarians could implement projects in these situations, all would benefit: the wastewater would be cleaned up, the cost would be reduced, and process would be sped up.

DNR Response: Once it has been determined that construction may be necessary and Chapter 567 IAC 60 applies, a work record request should be submitted to the Wastewater Engineering Section.

To help bridge the gap between private sewage disposal systems (1,500 gpd or less) and much larger systems, design guidance manuals specific to communities with populations in the range of 25 to 250 are available at the following web site: https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Wastewater-Construction/Design-Guidance-Documents

Delegation of the duties of the Department as they relate to the construction of semipublic sewage disposal systems has been added to Section 11.1 General. To date, no county has accepted delegation.

2. 11.1.2. Chapter 542 simply says that engineering documents must be prepared by a licensed engineer. It does not seem to define reports, plans and specs, addenda, or change orders? Please clarify the intent of this requirement in the text.

   DNR Response: Subsection 11.1.3.1 Engineering Report or Facilities Plan is intended to address requirements found in section 542B.16 of the Code of Iowa. All engineering documents must contain a seal and certification of responsibility. An agency shall not approve any engineering document which does not comply with section 542B.16.

3. 11.1.2. Is Agency 193C the best way to refer to the board?

   DNR Response: Under Subsection 11.1.3.1 Engineering Report or Facilities Plan, the name of Agency 193C has been added.

4. 11.1.2. Delete “Amendment 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.” Author(s) of engineering report has/have no control over IDNR comments resulting in a requirement for an amended plan so establishing a timeline is inappropriate.

DNR Response: The text has been revised. Under Subsection 11.1.3.2 Final Plans and Specifications, any changes from the approved report must receive prior approval from the Department before incorporation into the final plans and specifications.

5. 11.3.1.a.1. Are full size plans still required with one half size set for scanning. Can pdfs or other electronic files be submitted? If so, why would a scan be needed? TAC suggests deleting size requirements and merely specifying number of plan sets needed. Then, submittal format can be determined on a case by case basis.

   DNR Response: Under Section 11.1.4 Application for a Permit, final plans and specifications shall be submitted electronically unless the applicant certifies in writing or by email that they do not have the capability to submit final plans and specifications electronically without acquiring new office services or equipment. When a paper copy is requested by the Department, it shall be submitted for review.

   Plan size requirements are provided in Section 11.3.1 General.

6. 11.1.3.b.2. Same comment as 5 above.

   DNR Response: See response to Chapter 11, Comment No. 5.

7. 11.1.3. What is the relevance of referencing the Wastewater Engineering Construction Permitting Process Manual? Process manual is not a statutory or rule driven document, but this reference makes it a rule supported document. Wastewater Engineering Section can direct to or share the manual at any time without including in WWDS.

   DNR Response: Mention of the Wastewater Engineering Construction Permitting Process Manual has been removed from Section 11.1 General.

8. 11.2. What is the relevance of the first three paragraphs? Introductory text does not serve a regulatory purpose. Further, a great deal of this is mostly redundant to Ten States Standards. Can IDNR cross-reference the definition and identify differences? If this paragraph is retained, changes all “shalls” to “should”

   DNR Response: The introductory paragraphs to Section 11.2 Engineering Reports or Facilities Plans provide an overview of the requirements for the initial stage of 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.

The "Recommended Standards for Wastewater Facilities" by the Great Lakes-Upper Mississippi River Board is a guide. Section 11.2 Engineering Reports or Facilities Plans is intended to be specific to Iowa.

9. 11.2 Fourth paragraph – delete paragraph. This is redundant to Section 11.1.

   DNR Response: A cross-reference to a submittal requirement that may accommodate the review and approval of an engineering report is intended to help users of Iowa standards.

10. 11.2 Fifth paragraph – Is this covered in Section 18.2? If so, delete.

    DNR Response: A cross-reference to a submittal requirement that may accommodate the review and approval of a lagoon project is intended to help users of Iowa standards.

11. 11.2 Sixth paragraph – Is this covered in 14.4.3? If so, delete here.

    DNR Response: A cross-reference to a submittal requirement that may accommodate the review and approval of an emerging technology is intended to help users of Iowa standards.

12. 11.2.2 Letter of transmittal requirements seem dated for many planning level studies.

    DNR Response: Letter of transmittal requirements have been updated.

13. 11.2.3. Change "shall" to "should".

    DNR Response: Mention of officials, managers and superintendents in the title page will be a recommendation.

14. 11.2.4. Change "shalls" to "should". Is IDNR wanting the actual maps, graphs, and illustrations in the TOC, or is IDNR wanting titles of maps, titles or captions for graphs, and titles or captions for illustrations in the TOC? Please clarify.

    DNR Response: For the table of contents, lists are requested.

15. 11.2.5. Who is the target audience for the summary in this requirement? Does IDNR intend to review the summary only? If so, why is the rest of the plan or report needed in the IDNR submittal? Change “shall” to “should”.

    DNR Response: The target audience is any individual, consultant, municipality or agency who may use and/or approve the report.

    The summary shall highlight, very briefly, what was found from the study. The contents of the report shall support the summary.

16. 11.2.5.1.f. How can a treatment planning document be required to include collection system needs? Suggest changing text to clarify that appropriate sections need to be included.

    DNR Response: The criteria in Section 11.2 Engineering Reports or Facilities Plans of these standards shall be used as a guideline for preparation of the engineering report or facilities plan. The listed items under Section 11.2 of these standards may not apply to all projects.

    See Subsection 11.2.6.2 Scope.

    For minor projects, see 4th introductory paragraph to Section 11.2.

17. 11.2.5.1.h. Environmental assessment has a different connotation with SRF requirements. Not sure if that is intended definition here. Suggest rewording or deleting 11.2.5.1.h.

    DNR Response: An environmental assessment of the selected process may be different. Often, the review conducted by Environmental Review Services for a CWSRF loan supplements the environmental assessment prepared by the Engineer.

    See response to Chapter 14, Comment No. 19.

18. 11.2.5.1.l. What is the administrative organization and what is the relevance? Are you wanting a summary of recommended staffing needs? Please clarify.

    DNR Response: The engineering report or facility plan reviews organizational and staffing requirements.

    See Subsection 11.2.5.3 Recommendations.

    Under Subsection 11.2.9.5 Alternatives, the evaluation shall include annual expense requirements including tabulation of annual operation, maintenance, personnel, and debt obligation for each alternative.

The engineering report should cover changes in applicable operator education and experience qualifications.

Under Section 17.1 Design Considerations, the selection of sludge handling and disposal methods shall address staffing requirements.

If necessary, the department may require the system to submit a business plan.

19. 11.2.5.3. Change “shall” to “should”. Who is the “client”? Is IDNR a consultant? Please clarify. Is there a better term than “client” here?

    DNR Response: “Client” has been changed to “Applicant”.

20. 11.2.5.3.e. Delete.

    DNR Response: Routinely, legal services are necessary to successfully implement a project of significant scope in a timely manner.

    See Subsection 11.2.9.8 Legal, and Other Considerations.

    Similar to engineering services, legal services are an allowable cost for CWSRF loan funding.

21. 11.2.7. change “shall” to “should” and indicate that it “may include some or all of the following”:

    DNR Response: See response to Chapter 11, Comment No. 16.

22. 11.2.7.3.1.b. Delete.

    DNR Response: See response to Chapter 11, Comment No. 16.

23. 11.2.7.3.1.c. Delete.

    DNR Response: See response to Chapter 11, Comment No. 16.

24. 11.2.8. Change “shall” to “should”.

    DNR Response: See response to Chapter 11, Comment No. 16.

25. 11.2.8.1. Clarify for collection system facility plans (not all facility plans/engineering reports have collection system components).

    DNR Response: See response to Chapter 11, Comment No. 16.

26. 11.2.8.1 f: Proposed text says that collection system “should” be surveyed in areas with history or repairs or flow exceeds 275 gpcd after removal of all inflow sources.

    DNR Response: The text has been removed from the draft.

27. 11.2.8.1 h: Proposed text says 2 percent of collection system “should” be replaced annually when maximum week flows exceed 275 gpcd. What is DNR’s expectation here? Mandatory or recommended? It is a good recommendation, but if mandatory could open issues with affordability. This issue needs to be discussed and text modified/clarified

    DNR Response: The text has been removed from the draft.

28. 11.2.8.3.a. Delete word “tabulate”. The format should be left to the utility and their engineer to determine the best presentation approach; e.g. spreadsheet, database, etc.

    DNR Response: A summary prepares the grounds for analysis and interpretation.

29. 11.2.8.4.d. Delete “Tabulate each fraction separately and summarize.”

    DNR Response: A summary prepares the grounds for analysis and interpretation.

30. 11.2.9.1. This is beyond the scope of many planning projects and pertains more directly to pre-engineering reports or detailed plans and specs.

    DNR Response: See response to Chapter 11, Comment No. 16.

31. 11.2.9.2.c. Treatment agreement forms are NDPES forms. It is good to educate that treatment agreement forms are needed, and this may be done in the construction permitting manual, but not directly a WWDS and should be deleted.

    DNR Response: The text has been removed.

32. 11.2.9.4. This is again “manual” reference material. Retain first sentence and delete the rest. Change “must” to “should”.

    DNR Response: Meeting the minimum site separation criteria under Chapter 567 IAC 64 is required.

    See response to Chapter 11, Comment No. 7.

33. 11.2.9.5. Suggest deleting the first two sentences. By definition, alternatives provide effluent meeting NPDES discharge requirements, and this does not need to be included in the WWDS.

    DNR Response: The purpose of facility planning is to demonstrate, with sufficient detail, that the proposed project will meet applicable criteria.

    All alternatives shall be conformed with the established effluent limitations.

34. 11.2.9.6.c. Is the environmental assessment based on SRF needs? If so, it is a separate analysis, and should be deleted here.

    DNR Response: No, the review conducted by the Environmental Review Services for a CWSRF loan is separate from the environmental assessment prepared by the Engineer.

    See response to Chapter 14, Comment No. 19.

35. 11.2.9.7.d - h. Much of this is included in a separate specialized rate studies and not in planning study work.

    DNR Response: See response to Chapter 11, Comment No. 16.

36. 11.2.9.8. Delete.

    DNR Response: See response to Chapter 11, Comment No. 16.

37. 11.2.10.2. Who gives prior approval? Are CSO studies specially regulated and beyond the scope of WWDS? Would it be more appropriate to reference CSO regs.

    DNR Response: The Department must concur with the scope of study for a facilities plan.

38. 11.2.10.3. Change “dictates and it will be a requirement” to “supports that”.

    DNR Response: The referenced sentence has been removed.

39. 11.2.10.3. Delete. It is up to the utility and their engineers to find and evaluate alternatives.

    DNR Response: These are minimum study requirements. In addition to Subsection 11.2.10.3 Combined Sewer Study Requirements, Subsection 11.2.9.5 Alternatives supports the evaluation of alternatives.

40. 11.2.11. Change “shall” to “should”. Use of the word “shall” and “as appropriate” conflict.

DNR Response: The wording “as appropriate” has been removed. See response to Chapter 11, Comment No. 16.

41. 11.2.11.9. Construction materials and methods are beyond the scope of many planning level documents.

    DNR Response: The word “unusual” is included to limit the scope.

42. 11.3.1. Change all “shalls” to “should”.

    DNR Response: Under Subsection 14.1.3.1 Standard Required, the term “should” indicates desirable procedures or methods which should be considered but will not be required. The terms “shall” or “must” are used when it is required that the standard be used.

43. 11.3.1. Does IDNR still microfilm or is this hopelessly outdated? Will IDNR continue microfilming until the next set design standards update? Suggest deleting “(suitable for microfilming)”.

    DNR Response: The reference to “microfilming” has been removed. The Department no longer makes microfilm copies.

44. 11.3.1. Delete “Blueprints shall not be submitted”; blueprints are no longer used.

    DNR Response: Mention of the prohibition to submitting blueprints has been removed.

45. 11.3.1. Delete third paragraph. All of this is needed to construct a project. Simply make clear that draft final or final construction documents are to be submitted.

    DNR Response: Final plans and specifications are required.

46. 11.3.2. Same as comment 43 above.

    DNR Response: See response to Chapter 11, Comment No. 43.

47. 11.3.2.1. IDNR should not dictate scaling in feet, but simply indicate appropriate scaling.

    DNR Response: Section 11.3.1 General has been revised to allow appropriate scaling.

48. 11.3.2.2. Same comment as 43 above.

    DNR Response: See response to Chapter 11, Comment No. 43.

49. 11.3.3. Same comment as 43 above.

    DNR Response: See response to Chapter 11, Comment No. 43.

50. 11.3.4. Same comment as 43 above.

    DNR Response: See response to Chapter 11, Comment No. 43.

51. 11.4.2. Does SUDAS meet or exceed IDNR WWDS in all cases? Will it in the future? Which version of SUDAS? Please clarify.

    DNR Response: Each update of SUDAS is submitted to the Department for review.

52. 11.4.3. Same as comment 43 above.

    DNR Response: See response to Chapter 11, Comment No. 43.

53. 11.6. Delete. While and O&M manual may be a requirement for SRF funding (and may be specified as a requirement by the SRF group), it is not a specific “design standard”.

    DNR Response: O&M manuals are required for all wastewater treatment plants regardless of funding.

Chapter 12 - Iowa Standards for Sewer Systems

1. General: Should the following be included or referenced in this section:
    a. CIPP
    b. Hazardous gases
    c. Odor control
    d. Airlocks

    DNR Response:

    a. Cured-in-Place-Pipe (CIPP) is one of a number of available trenchless pipe renewal methods and in our experience it is the most commonly used. The DNR has historically considered the rehabilitation of a sewer using this technique to constitute a modification requiring a construction permit even though there are no criteria specific to CIPP within the design standards. CIPP alters the pipe interior diameter (slightly) and selection of an appropriate liner material strength and thickness is determined through evaluation of anticipated site specific host pipe and loading conditions. Proposed revisions to Chapter 11 allow an exemption from construction permitting for CIPP projects except for those funded through CWSRF, for which a construction permit is part of the SRF administration process.

We feel that inclusion of requirements for CIPP within Chapter 12 would obligate the department to develop standards for other trenchless renewal methods (e.g., sliplining, MSL, CFP, ILR & ThP), which would significantly expand the scope of the Chapter. The department has often received comments expressing a desire to exclude small CIPP projects from the requirement for a construction permit, but to-date we have not received comments expressing a desire for additional design standards for pipe renewal techniques. A general reference to sewer system rehabilitation considerations could be included but we feel that the topic is broad, abundantly covered by available literature and would lean more heavily toward design guidance than minimum design standards.

b. We agree that hazardous gases, or hazardous atmospheres are of concern and have added the following paragraphs:

12.1.4 Electrical Equipment

Refer to Section 13.4.7 of these design standards for the requirements concerning electrical systems and components located in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present.

12.1.5 Safety

It is the facility owner's responsibility to ensure that the Occupational Safety and Health Administration (OSHA), NFPA 70, NFPA 820, and other applicable building and construction codes and requirements are met during construction and subsequent operation. During construction this requirement may be met by including references to OSHA, NEC and other applicable building and construction codes in the contract documents.

c. Odor control is a broad topic with applications in the both the collection system and treatment process. Since measurement of odor is subjective it is difficult to establish definitive criteria. However, Chapter 12 includes a number of provisions that indirectly address odor control.

1. 12.3.4, which mandates that pipes carry the design flow at less than full pipe flow. Surcharged sewers without airflow are more likely to develop anaerobic conditions and generate sulfide. Also, blocked airflow at

surcharged points in the collection system can result in exit of larger air volumes at fewer or specific locations resulting in odor problems.

2. 12.5.3, which establishes minimum velocities. Adequate velocities prevent solids deposition & accumulation that lead to sulfide generation as well as help to provide surface reaeration to maintain aerobic conditions.
3. 12.5.4, which requires straight alignment between manholes thus avoiding turbulent directional changes.
4. 12.5.7.2, which provides for drop pipes for sewers entering a manhole 24 inches or more above the invert to minimize turbulence.
5. 12.5.7.6, which recommends shaping of manhole flow channels to avoid turbulence and solids deposition.

In addition, we have added the following language to Section 12.5.10, Inverted Siphons:

Ventilation and odor control measures should be considered due to the headspace blockage created by a siphon unless an air jumper is used.

We feel a more detailed discussion of odor control (e.g., sources, measurement, sampling, monitoring, abatement measures and treatment) is beyond the scope of Chapter 12 and, if desired in addition to available literature on the topic, deserving of a separate chapter in the design standards.

d. We infer that the term airlock as used here means a condition where air is trapped at a point in a pipe system restricting or blocking flow. At this juncture we are not aware that this has been a significant issue of concern in gravity sewer designs or operation. Building vents and manholes at regular spacing (assuming most are not completely airtight) generally provide an abundance of ventilation points and conventional gravity sewer layouts lack high points where air can become trapped. For further reference, Metcalf & Eddy's Collection and Pumping of Wastewater, Sections 4-2 and 7-3 discuss gravity sewer ventilation at length. WPCF MOP FD-5 Chapter 6 also discusses ventilation, albeit in less detail.

2. 12.1.3.1 Delete, this is a legal definition and not a WWDS definition.

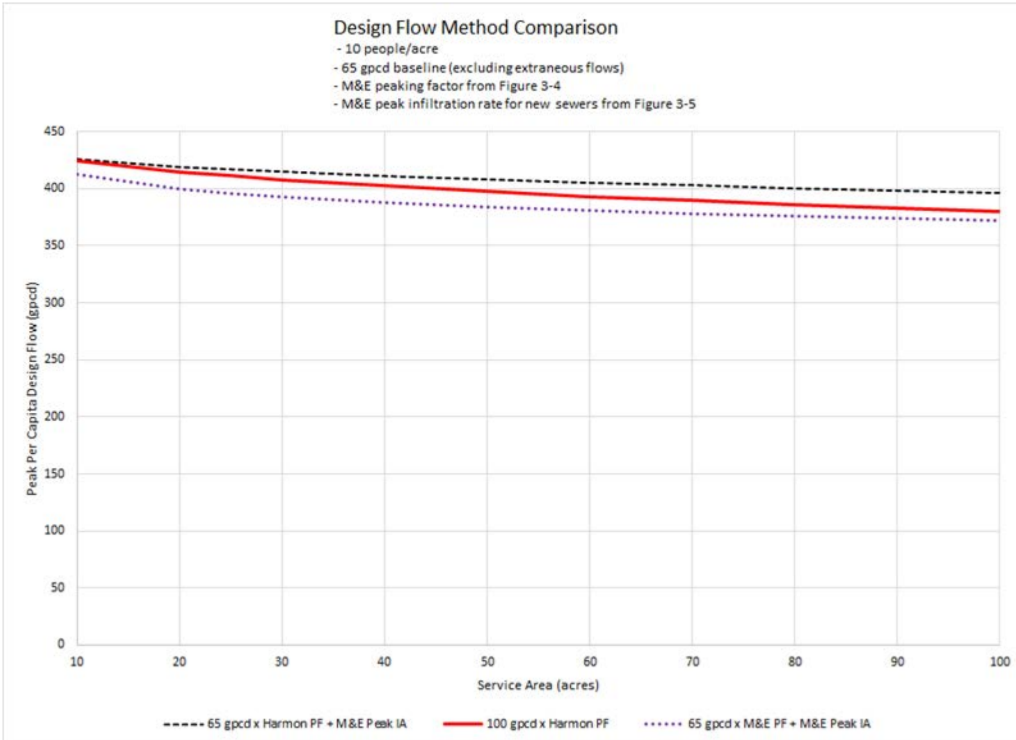
DNR Response: We have consulted with DNR's Legal Services Bureau and they have advised that there is no issue from a legal perspective with the explanation of terms.

3. 12.3.2. 100 gpcd is becoming obsolete as a baseline with water efficiency improving; however, I/I may increase above 100 gpcd with older systems. Need to separate baseline flow from I/I moving forward.

   DNR Response: The 100 gpcd value is intended to account for both baseline flow and extraneous flows associated with sewers built using modern construction techniques. Domestic water withdrawals/deliveries for Iowa in 2005, 2010 and 2015 were constant at 65 gpcd according to the respective USGS reports for water use in the U.S. Assuming that 65 gpcd constitutes a baseline flow for new sewers this leaves 35 gpcd as an average per capita infiltration rate allowance within the 100 gpcd value.

   We do agree that segregating baseline flow from ultimate/end of design life extraneous flows for new sewer construction is a rational approach, but it is also more laborious and appears to offer little additional precision where one is attempting to project extraneous flows for a new system out 50 years into the future. The most difficult aspect of such an approach may be arriving at a suitable basis to estimate a peak infiltration allowance. Local jurisdiction peak infiltration allowances for new sewers across the nation vary widely and in some cases appear to confuse allowances for construction acceptance with allowances intended to cover the design life of the sewer including contributions from private service lines.

   One reference including peak infiltration allowances for modern (gasketed) sewers is Metcalf & Eddy's Collection and Pumping of Wastewater. For comparison we evaluated design flows for different service areas with a 10 person per acre density using (a) the 100 gpcd assumption multiplied by the Harmon peaking factor in Appendix 12-A and (b) a baseline assumption of 65 gpcd multiplied by either the Harmon or Metcalf & Eddy peaking factor plus a peak infiltration allowance for new sewers. The results are remarkably similar:



4. 12.3.3. Development density is up to planning board(s) and not IDNR. May offer a recommended value, but not an absolute or minimum requirement.

   DNR Response: We agree that planned development densities may differ and have added the following language:

   > *Where the local jurisdiction has established planned population densities for the project service area alternative residential equivalents may be approved.*

5. 12.3.3.d. Commercial flow is dated given water efficiency improvements. Suggest referencing Metcalf and Eddy or something more up to date as a planning basis.

   DNR Response: Commercial and industrial flow rates vary widely. Metcalf & Eddy's 5th Edition includes multiple tables for different commercial, institutional and recreational sources and Section 12.3.3 allows the use of this or other references for specific types of development. However, caution should be exercised in applying such references in sanitary sewer design as the values given are average rates that do not account for diurnal peaks or infiltration allowances.

6. 12.3.3.e. Industrial is completely dependent on industry type. EPA provides extensive reference information for industrial flows as a function of type. Not necessary for IDNR to “guess”.

   DNR Response: We are uncertain what EPA reference information is being cited but 12.3.3 does allow the use of reference values for specific types of industries. Again, the designer should understand the averaging period that is being used by the reference and apply appropriate peaking factors.

7. 12.3.3. In the last paragraph change “minimum design equivalents” to maximum design equivalents”.

   DNR Response: We feel the use of “minimum” is appropriate in the context of this standard. The equivalents are minimums for development areas where the specific commercial or industrial facilities are unknown, but do not constitute upper limits for commercial or industrial facilities. For example, car washes and laundromats are commercial facilities that would typically be expected to produce peak hourly wastewater flows far in excess of 5,000 gpd/acre.

8. 12.3.4. Why are we limiting to less than 94-100% of pipe carrying capacity? If a safety factor is desired, indicate to provide a safety factor and justify desired safety factor. Significant overdesign of systems requires flushing to clear out pipe at low flow conditions. Would IDNR be held liable for such conditions if design requirements result in overdesign causing operational issues?

   DNR Response: The DNR has previously explored the rationale behind this standard. See the attached “Design Maximum Depth of Flow” paper.

9. 12.4.1. What about when all soil in trench is replaced with suitable material?

   DNR Response: We are not certain what portion of 12.4.1 this question is referring to, but assume it is with respect to “soil or groundwater contamination”. If soil in the trench is replaced with non-contaminated material and doing so will prevent future migration of contamination such that the sewer will be protected from contact with the contaminant(s) of concern that would potentially degrade the pipe or pipe joints or introduce prohibited pollutants enumerated in 567 IAC 62.1(8) then special pipe materials would not be necessary to address contamination.

10. 12.4.2. Label tables appropriately and clean up formatting, clarify which version of each reference standard is intended in tables, and define acronyms.

DNR Response: Please see the "Clean Copy" of the draft standards posted at https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Wastewater-Construction/Design-Standards. By necessity, the "Compare Copy", which shows markups from the original, is rather cluttered.

We prefer not to reference specific revision years. The most common material standards are ASTMs, for which revisions are issued on a frequent basis. For example, ASTM D3034 was revised in 2000, 2004, 2006, 2008, 2014, 2015 and 2016. Reference to a specific revision year ensures obsolescence before the design standards revisions make it through rulemaking and could be interpreted as requiring conformance to older versions of the ASTM or AWWA standards and prohibiting use of the active standard.

ASTM stands for American Society for Testing and Materials. PVC is Polyvinyl Chloride. AWWA is the American Water Works Association. ABS is Acrylonitrile Butadiene Styrene. ANSI is the American National Standards Institute. We prefer not to formally define these acronyms within the design standards as their usage in water and wastewater conveyance applications is extremely common and well known.

11. 12.4.2.e. more appropriate to simply indicate that designer/supplier should provide equivalent performance to established pipe materials.

    DNR Response: We respectfully disagree with this comment. Pipe materials have disparate characteristics that tend to make them unique. Requiring equivalent performance to "established pipe materials" prompts the questions of which established pipe materials and what performance characteristics? For example, while both PVC and ductile iron are established pipe materials, in many ways their performance characteristics vary significantly and likewise they are evaluated differently (e.g., short and long term behavior under static and dynamic loads, bedding requirements, deflection testing, etc.).

12. 12.5.1 and 12.5.3 – We have done several unsewered community projects in the past. Often these are small enough to fall under the jurisdiction of Chapter 69, so this may not be an issue very often; however these sections conflict with the DNR Alternative Collection System Manual recommendations. We have had success with STEG systems (septic tank effluent gravity). The septic tank settles all solids out, and we can then reduce the sewer main slope and size. We are then only designing for 1 fps velocity, and often have several homes on a 4" main.

    DNR Response: STEG, STEP or LPS systems are allowed to deviate from non-applicable provisions of Ch. 12 or Ch. 13 without waivers. See the DNR

Alternative Collection Systems Technology Assessment and Design Guidance document at https://www.iowadnr.gov/Environmental-Protection/Water-Quality/Wastewater-Construction/Design-Guidance-Documents.

13. 12.5.3 – For changing the minimum sewer slopes for pipes 48” and larger from 2 fps to 3 fps is acceptable but it should be recognized the n value decreases from 0.013 to approximately 0.010 for pipes this large because of the reduced pipe wall perimeter when compared to the flow area. Recommend changing 0.013 to 0.010 for sanitary sewers 48” in diameter and larger. Alternatively, if pipe material is specifically designed to give a different “n” value, IDNR to defer to supplier for n-value.

    DNR Response: Manning’s n value can be shown to vary with the hydraulic radius by combining the Manning and Darcy-Weisbach equations such that:

$$n = kRh^{1/6}f^{1/2}$$

    Where k is a constant and f is the D-W friction coefficient. The D-W f coefficient itself is a function of hydraulic radius, relative roughness, velocity and viscosity. Solving this relationship for different pipe sizes indicates that n increases with increasing pipe diameter.

    The “n” value is set at 0.013 based on historical precedent and because it is a conservative value for a parameter that includes time dependent variables that cannot be ascertained with a high degree of accuracy at the time of design. The actual “n” value is expected to increase (to an arguably unknowable extent) over the 50-year design life of the sewer due to increased flow resistance from slime/sediment buildup or internal corrosion/coating as well as initial and time dependent structural defects that may impede flow. This expected increase in the “n” value over time is believed to be adequately accounted for by selection of a conservative value for design which may or may not ultimately provide some margin of safety in terms of pipe capacity at the end of the pipe’s useful life.

14. 12.5.3. “Oversizing of sewers will not be approved to justify using flatter slopes where a smaller pipe diameter can accommodate the design flow at the proposed slope based on Kutter’s formula using an “n” value of 0.013 and the requirements of Section 12.3.4.” Is this a stand-alone statement or is it related to the instances where the velocities are less than 2.0 fps as stated at the beginning of the paragraph?

    DNR Response: This statement would apply to situations where a 2.0 fps velocity is required or for the exceptions where velocities down to 1.5 fps are allowed.

15. 12.5.3. Section 12.3.1 says that the sewer shall be designed not to flow full, but 12.4. says to design for 2 fps when flowing full. Which does IDNR want? This needs to be reconciled.

    DNR Response: The full flow velocity of 2 feet per second is given as a consistent method to calculate minimum required pipe slopes. Pipe capacity is calculated independently.

16. 12.5.3. Paragraph 3 indicates that IDNR is concerned about self-cleaning when previous design standard results in an oversized pipe. IDNR needs to reconcile or revert to performance based requirements.

    DNR Response: The referenced paragraph recommends consideration of particle transport for self-cleansing, e.g. tractive force design, for both initial and ultimate flows. Gravity sewer design may be thought of as a number of competing desires for large solids passage, self-cleansing velocities for granular sediments, minimum hydraulic profile and pipe capacity with headspace available for transport of both wastewater and air. Historically, full flow 2 foot per second slopes have been considered adequate for self-cleaning. However, the more precise but significantly more complex tractive force methodology may be used to account for factors that minimum tabled slopes with a single ultimate peak design flow estimate cannot.

    For example, a sewer serving an initial population of 50 and an ultimate population of 100 may use an 8-inch line at a minimum 0.4% slope. This arrangement would be capable of flushing a 1 mm diameter piece of grit with a specific gravity of 2.7 (a typical "design" particle) at an ultimate design peak flow value of 0.04 MGD. However, to move the same particle at an initial peak flow of 0.02 MGD the required slope would be approximately 0.6%. Either condition would utilize only a small fraction of the pipe's hydraulic capacity, but the latter would be "oversized" to a greater degree yet more effectively transport solids, particularly for the initial population condition.

17. 12.5.6 – Provide list of protection requirements for velocities between 15% and 20% slope.

    DNR Response: The slope threshold for required anchoring in this section is 20%, which has been in 10-States Standards since the 1990 edition and is the most commonly referenced threshold we were able to locate. We are unaware of a basis to lower the threshold to 15% but the standard is a minimum and does not prohibit anchoring or other protections for slopes lower than 20%. Dependent upon the pipe size velocities in excess of 15 feet per second can occur at slopes much shallower than 15%. Pipe and/or manhole abrasion and joint separation are among the concerns of high velocities. Examples of provisions to address these issues are abrasion resistant pipe materials, restrained pipe joints and drop manholes to both reduce the slope and dissipate energy. However, the choice of which special provisions are necessary to mitigate the effects of high velocities may be site specific or include measures not listed or that the DNR is not currently aware of. Therefore, we would prefer to not make this standard too prescriptive by listing specific measures.

18. 12.5.7.1.a.4. It would be preferable to revise to read "at intervals not exceeding 500 feet for sewers 30 inches or less when adequate cleaning equipment is available." This would make it clearer that a variance is not needed for manhole spacing over 400 feet but less than 500 feet, which seems to be the intent of the design standards.

    DNR Response: 12.5.7.1.a.4 in combination with 12.5.7.1.b is intended to allow spacing of manholes up to 600 feet for all sewers and spacing greater than 600 feet for sewers larger than 30 inches without waivers. However, for spacing in excess of 400 feet for sewers less than or equal to 15 inches, spacing in excess of 500 feet for sewers 16 to 30 inches, or spacing in excess of 600 feet for sewers larger than 30 inches, a written statement from the applicant assuring that they have access to cleaning equipment adequate for the proposed spacing is required. These distances are the same as those provided for under 10-States Standards Section 34.1.

19. 12.5.7.1.b. Clarify that IDNR is proposing allowing manhole spacing up to 600 feet for sanitary sewers 30 inches or less and greater spacing for sewers over 30 inch, providing the operating authority provides assurance that it has access to cleaning equipment.

    DNR Response: This is correct. However, without written assurance of cleaning capability the maximum allowable spacing differs for sewers less than or equal to 15 inches vs. sewers 16 to 30 inches.

20. 12.5.7.2. "Outside drop connections shall be encased in concrete or other material …" Other material should be defined or deleted to eliminate the ambiguity of the statement. Recommend following SUDAS SW 307 detail which has concrete encasement for the base elbow and the rest of the drop encased in class 1 bedding stone, CLSM, flowable mortar or concrete.

    DNR Response: The DNR would prefer to retain the flexibility that the language "…or other material that will prevent displacement that would result from the backfilling operation in the vicinity of the manhole" affords. For example, if the "other material" language is deleted, it is questionable whether or not the referenced SW 307 detail meets the standard since the entire drop is not encased in concrete. On the other hand, if “other material” is narrowed to define the specific arrangements or materials currently provided, future modifications of the SW 307 detail that the SUDAS committee finds acceptable would no longer be compliant with the standard.

21. 12.5.7.4. Assume by this description polymer concrete manholes are acceptable? This type of material replaces the cement with a polymer that acts like cement. Is there another type of manhole besides precast or cast-in-place? Either clarify or delete distinction.

    DNR Response: Polymer concrete manholes are acceptable. The other manhole materials we are aware of are fiberglass and plastic. In the past 25 years the DNR has reviewed four waiver requests proposing use of either FRP or HDPE manholes, one of which was denied. The approved waivers appear to have been for unique applications where hydrogen sulfide corrosion was an overwhelming concern and live loads were not.

22. 12.5.7.5. IDNR requirement for non-vented system can result in airlock. Should be an appropriately vented system instead.

    DNR Response: See the response provided under Comment 1.d.

23. 12.5.8.3. The water main/sewer main separation rules are addressed in this revision, however the distinction between sanitary and storm sewer is not identified. At our last ACEC/DNR meeting DNR presented proposed changes to the water rules (IAC 43.3(2)A(3)). Those revisions gave the option of constructing the water main with ductile iron with nitrile or viton gaskets if the 10’ separation cannot be achieved. Nothing is mentioned about this alternative in the new sewer standards. Maybe DNR is only addressing this in the water rules, but we think it should be mentioned in the sewer section as well. Replacing water main with DIP is most likely always more economical than constructing a storm sewer with water main pipe. Also, max feasible separation’ between water and sewer is vague wording.

    DNR Response: To clarify, Chapter 12 does not and will not require a minimum separation distance between sanitary sewers and storm sewers. However, Section 12.5.13 recommends minimum distances at sanitary and storm crossings. Current draft changes to Ch. 43 include the option of constructing the water main with hydrocarbon resistant pipe and gaskets for water/storm distance exceptions only. For sanitary sewer separation exceptions the alternatives of casing the water main or using water main materials for construction of the sewer are provided.

We have modified 12.5.8.3.b and 12.5.8.5 to clarify that the exception conditions may be met using either of the above alternatives:

b. the sewer main is constructed of water main materials or the water main is enclosed in casing pipe with an evenly spaced annular gap and watertight ends, and a minimum horizontal separation of 2 feet from the water main is provided.

Where the sewer crosses over or less than 18 inches below a water main one full length of sewer pipe of water main material shall be located so both joints are as far as possible from the water main~~. The~~ or one full length of water main shall be located so both joints are as far as possible from the sewer and the water main and end joints shall be enclosed in watertight casing pipe with an evenly spaced annular gap and watertight end seals.

Section 12.5.8.5 currently uses the "maximum feasible" language. The proposed revisions add the same language to 12.5.8.3 and 12.5.8.4 to emphasize that the exceptions allowed by these sections are not to be taken as a matter of convenience. For example, if it is possible to maintain a horizontal separation distance of 2.5 feet while meeting the exception criteria that allows a minimum of 2 feet, a separation distance of 2.5 feet is to be maintained.

24. 12.5.8.4. Same vague verbiage issue as above, for force main.

    DNR Response: See the previous response.

25. 12.5.8.5. Low permeability is indicated. What is the definition of low permeability? Again, better to use a performance type of standard here if needed at all.

    DNR Response: We would generally consider Class IV material as described in ASTM D 2487 to be low permeability soil. We feel that reference to a specific permeability coefficient or rate would be too prescriptive, but that limiting vertical migration of any wastewater leakage towards the water main near the point of the crossing is important.

26. 12.5.11. The word "cover over the top of the line" is removed. We feel removing this language makes the standard more ambiguous. We support making no changes to the paragraph.

    DNR Response: This change was made in response to previous 2007 Ch. 12 TAC comments that the use of "depth below the natural bottom of the stream bed" and "cover over the top of the line" interchangeably was confusing. We agree with the previous comment that the paragraph should refer solely to depth below the natural bottom of the stream bed since this could differ from cover over the top of the line.

27. 12.5.1.1 Sewer Crossing Under a Waterway – The reference to mechanical joints could be removed, as mechanical joints are typically not utilized for joints in long pipe runs. Using typical gasketed joints would provide equivalent construction quality and using restrained gasketed joints would provide greater capability to remain water tight due to changes in alignment or grade.

    DNR Response: We agree that other types of restrained joint (besides mechanical) would be acceptable and have changed the word “mechanical” to “restrained”.

28. 12.5.11. Sewer Crossing Under a Waterway – Consider allowing the use of pipe materials other than ductile iron for sewers entering or crossing streams, at least for smaller streams. This may encourage the use of trenchless technologies for stream crossings in some situations, which could decrease environmental impact, without the need for a variance request.

    DNR Response: Other types of pipe are allowed by this standard provided that they are “otherwise constructed that they will remain water tight and free from changes in alignment or grade”. The new Section 12.6.5 allows for trenchless installations including stream crossings without waivers.

29. 12.6.2 Clarify IDNRs intent when other standards exist to provide a design basis? TAC recommends deferring to designer to design system.

    DNR Response: ASTM standards are referenced in the design standards in much the same manner they are referenced in project plans or specifications or the Statewide Urban Design and Specifications manual. The purpose in Section 12.6.2 is to require bedding designs consistent with acceptable practices that are dependent upon the pipe material. ASTM does not enforce its own standards. ASTMs are meant to be adopted by others, including regulatory agencies. An example ASTM gives on its website is that “All toys sold in the United States must meet the specifications of ASTM F-963, thanks to the U.S. Government Consumer Product Safety Improvements Act of 2008.”

30. 12.6.2.3. This section focuses on installation rather than design as written. As a result, the TAC recommends deleting section 12.6.3 in its entirety.

    DNR Response: With respect to pipe design we feel that installation procedures are an integral part of the design as the pipe & embedment are interdependent, particularly for flexible pipe. All of Section 12.6 focuses on installation procedures. However 12.6.3 generally references installation procedures of the ASTMs to capture items not specifically addressed in 12.6.1, 12.6.2 and 12.6.4 such as minimum cover for load application, use of compaction equipment, trench wall support, etc.

31. Trenchless installation needs to be better defined; what is minimum slope, acceptable horizontal alignment, acceptable vertical alignment, etc.

    DNR Response: The requirements of previous sections will apply for trenchless installation methods (e.g., minimum slopes per 12.5.3, horizontal alignment per 12.5.4 and manhole locations per 12.5.7.1). Section 12.6.5 is intended to allow for trenchless installation methods in place of open cut installation requirements outlined in 12.6.1 through 12.6.4, but does not nullify other Chapter 12 requirements.

32. 12.7. This section focuses on testing rather than design as written. In addition, more sophisticated and detailed test methods may be available; e.g. video testing. As a result, the TAC recommends deleting this section in its entirety.

    DNR Response: Although it may be arguable whether or not testing of new sanitary sewers constitutes "design", such testing is typically specified in the project design documents. We would question the value of requirements for things such as straight alignment and construction with modern materials & water tight joints without subsequent testing to verify and quantify that the requirements have been met.

    We agree that other more sophisticated test methods may be available, but technologies such as acoustic testing, electric and electromagnetic detection or even more innovative methods are more typically applied to provide condition assessments of existing collection systems as opposed to testing of new construction. Video testing is recommended in 12.7.5 and may provide valuable information as an overall condition assessment method or to locate problem areas associated with exceedance of allowable leakage. Deflection testing may be accomplished using laser profiling as 12.7.1 does not mandate that deflection testing be done with a mandrel.

33. 12.7.1. Is deflection test performed with same requirement for all pipe materials and sizes?

    DNR Response: The deflection test is applicable for plastic and composite pipes only.

Chapter 13 - Wastewater Pumping Stations and Force Mains

1. General - Are there performance or reliability requirements for hazardous gases, odor control, airlock prevention?

DNR Response: Adequate ventilation shall be provided for all pumping stations. See Section 13.7.

For fire protection, we reference National Electric Code (NFPA 70 and NFPA 820). Site Separation is covered in Chapter 14. Airlock prevention does not have a performance or reliability requirement.

2. General – Replace all “shalls” with “should”.

   DNR Response: Shall is used when it is required that the standard be used. Should means it is suggested to be done, but not required.

   Under 455B.174, the Department shall not issue a permit to a disposal system which is not viable.

3. 13.1.3. Delete. This is a legal definition and not a WWDS definition.

   DNR Response: See item 2 above.

   Under 455B.174, the Department shall not issue a permit to a disposal system which is not viable.

4. 13.2.3. Paragraph 2, would this paragraph act as a basis for denying installation of a pump station? If not, remove and leave to utility and their design team to decide.

   DNR Response: These items could be used for denial.

5. 13.3.2. What is the relevance of identifying pump station types? Is IDNR the ultimate authority in pump station types?

   DNR Response: We assume this comment references 13.3.1. This has been revised to illustrate the type of pumps covered under these design standards.

6. 13.3.2.4. Would IDNR reject a design based on construction materials? If not, remove and defer to design team.

   DNR Response: Yes. We have rejected designs that propose unsuitable materials.

   Under 455B.174, the Department shall not issue a permit to a disposal system which is not viable.

7. 13.3.3. Odor control should address preventing and/or minimizing the release of odors and hazardous gases from the forcemain as well. Control of generation of gases by controlling septicity in the first place may be impractical.

   DNR Response: This is minimized by adding head space in sewers and manholes.

8. 13.4.1. The code reads that the pumps are to be sized such that they can accommodate the PHWW with *any one* pump out of service. Based on past experience, our understanding is this rule has been interpreted as: the pumps need to be sized such that they can accommodate the PHWW with the *largest* pump out of service. Please clarify.

   DNR Response: This rule refers to "firm" capacity, which is ability to pump the PHWW flow with the largest pump out of service.

9. 13.4.2. Delete.

   DNR Response: This standard was revised to make the use of screening optional instead of required (trash baskets).

10. 13.4.3. Pump Openings – It would be best to clarify that the minimum 3" solids capacity is not applicable when using grinder pumps or chopper pumps, or that this requirement only applies to non-clog pumps. The current version of the design standards exempts grinder pumps from this requirement.

    DNR Response: "Unless grinder pumps are used, pumps" will be added back into this standard to clarify this exemption.

11. 13.4.3 Pump Openings – Recent previous variance requests for pumps not capable of passing 3" solids have been approved on the basis that a trash basket with openings smaller than the solids capacity of the pump is acceptable. It would be best to clarify this in the standards to decrease the number of variances required when using pumps with a smaller solids capacity, even if a lower limit for capacity is established in the standards.

    DNR Response: We clarify this in 13.4.3 as follows: "An exception to the requirement for passing solid spheres of at least 3 inches in diameter may be made on a case by case basis when the design includes equivalent protection from clogging". This will allow the use of the smaller impeller without requiring a waiver.

12. 13.4.4. Delete.

DNR Response: Replaced “shall” with “should”.

13. 13.4.5. This text does not provide a clear basis for design or a clear design standard. Recommend deferring to Hydraulic Institute Standards instead.

    DNR Response: Use of Hydraulic Institute Standards has been added to this requirement.

14. 13.4.6. How will IDNR check this design requirement? Recommend deleting.

    DNR Response: This requirement is recommended, but not required.

15. 13.4.7. Recommend deleting all electrical standards as this is outside of the scope and expertise of WES. Ok instead to require following local and state building codes, which cover this in better detail.

    DNR Response: Electrical standards are essential to the design of raw wastewater wet wells or enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present. The need to develop NFPA 820 was based on fire or explosion incidents that, while infrequent, are relatively severe when they do occur.

    It is the facility owner’s responsibility to ensure that the Occupational Safety and Health Administration (OSHA), NFPA 70, NFPA 820, and other applicable building and construction codes and requirements are met during construction and subsequent operation. See Section 14.8.

16. 13.5.1. Minimum and maximum velocities are given but not the corresponding flow condition. While the min and max can be readily evaluated for constant speed pump systems with on/off controls, pumping systems with variable frequency drives will see significant variability that may extend beyond these velocities (without problem) in some scenarios. Recommend deleting absolute velocity requirements.

    DNR Response: Minimum velocities are required regardless of the flow condition. VFDs can be used to increase or decrease the flow, but not above or below minimum requirements to maintain solids suspension or reduce cavitation potential and head loss.

    In Iowa Standards, the term “recommended” indicates a desirable procedure or method which should be considered but will not be required.

17. 13.5.2.2. Delete "and shall be placed on the horizontal portion of discharge piping. Ball checks may be placed in the vertical run for very small installations or where a wastewater pumping station is upgraded and no horizontal option exists." This text conflicts with itself (horizontal only except when vertical) and it places rigidity on design that can be overcome by innovative equipment and system designs.

    DNR Response: We are stating that check valves must be horizontal. The one exception is a ball check valve in vertical installations in special cases.

18. 13.7. This section is outside of the scope of IDNR review. Delete. Requirement to follow local and state building codes is sufficient here.

    DNR Response: Ventilation standards are essential to the design of raw wastewater wet wells or enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present. The need to develop NFPA 820 was based on fire or explosion incidents that, while infrequent, are relatively severe when they do occur.

    It is the facility owner's responsibility to ensure that the Occupational Safety and Health Administration (OSHA), NFPA 70, NFPA 820, and other applicable building and construction codes and requirements are met during construction and subsequent operation. See Section 14.8.

19. 13.8.1. Elapsed time meters shall be installed on all pumps? Do you mean installed as part of the monitoring system for pumps? What about flow totalizers for monitoring total daily flow? This is not entirely clear as written. TAC suggests that rather than getting into specifics, WWDS should indicate that flow measurement is required (or should be included) with capability for monitoring total daily flows and peak hourly flows.

    DNR Response: Wording has been revised as suggested.

20. 13.8.4. TAC recommends deleting 13.8.4. Defer to local and state building codes on lighting requirements.

    DNR Response: Electrical standards are essential to the design of raw wastewater wet wells or enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present. The need to develop NFPA 820 was based on fire or explosion incidents that, while infrequent, are relatively severe when they do occur.

It is the facility owner's responsibility to ensure that the Occupational Safety and Health Administration (OSHA), NFPA 70, NFPA 820, and other applicable building and construction codes and requirements are met during construction and subsequent operation. See Section 14.8.

21. 13.9. Section is conflicting in requiring 15 feet of suction lift, but then permitting higher lifts. Delete "The maximum lift for suction lift pumps shall not exceed 15 feet." Why is there a 22 foot limit on suction lift plus NPSHr? Why not just NPSHa – NPSHr > XX ft (preferably 0 + safety factor; SF = 2 ft). Required net positive suction head is more commonly abbreviated NPSHr. Please clarify.

    DNR Response: Modified to follow Ten States Standards.

22. 13.10.3. TAC recommends deleting this section; defer to state and local building codes.

    DNR Response: Electrical standards are essential to the design of raw wastewater wet wells or enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present. The need to develop NFPA 820 was based on fire or explosion incidents that, while infrequent, are relatively severe when they do occur.

    It is the facility owner's responsibility to ensure that the Occupational Safety and Health Administration (OSHA), NFPA 70, NFPA 820, and other applicable building and construction codes and requirements are met during construction and subsequent operation. See Section 14.8.

23. 13.10.4 – For small submersible pump lift stations, it is possible to have the check valve be removable with the pump. An exception should be added for check valves that can be removed with the pump assembly. We often then get into a discussion about the location of the shut off valves with submersible pump lift stations with the removable check valves. We have seen them in the wet well just below the hatch, buried like a water main valve, and in a separate valve manhole. We recommend the shut off valves be allowed to be buried like a water main valve or located in a separate valve manhole but not allowed to be in the wet well.

    DNR Response: We would prefer to address this in a waiver.

24. 13.11. Portable standby unit availability is an operational consideration and not a design element.

DNR Response: We believe the time limit of 30 minutes is a design element. Purpose is to minimize bypasses.

25. 13.11. Third paragraph indicates, "shall be designed to drain by gravity or by pumping…" Is there another way to drain? Are you suggesting not to drain by siphon? Perhaps it is more appropriate to indicate what is not allowed for draining basins? If it is not clear what is not allowed, TAC recommends deleting this text.

    DNR Response: Modified to "drain back to the wet well".

26. 13.11.1. Internal combustion equipment? Are you talking power generation? Please clarify.

    DNR Response: This refers to gas powered pumps in place of a generator.

27. 13.11.1.2. Does IDNR review control requirements for standby power? If not, please delete.

    DNR Response: Changed "shall" to "should".

28. 13.12.3. Air relief/vacuum valves should be evaluated for high points, horizontal runs, pump discharges, and decrease in upslopes rather than strictly at high points. TAC recommends that WWDS instead defer to consulting engineers (consultant or valve supplier) with expertise in critical placement of air/vacuum relief valves.

    DNR Response: "Force main configuration and head conditions should be evaluated as to the need for and placement of air relief and vacuum valves" text has been added to the standard.

29. 13.12.5. Delete second and third paragraphs. This is a design standard and not an installation standard. Third paragraph is redundant to requirements in Chapter 12.

    DNR Response: Chapter 12 covers gravity sewer only. Chapter 13 covers pressure sewers.

30. 13.12.7. Delete. Redundant to Chapter 12.

    DNR Response: See comment on number 29.

31. 13.12.8. Delete. Redundant to Chapter 12.

DNR Response: See comment on number 29.

32. 13.12.11. A wide range of values is possible with a wide array of material options. Recommend not specifying a "C" factor. Higher or lower "C" factor for receiving or splitting structures? Recommend deleting section in its entirety.

    DNR Response: Use of C factor with Hazen and Williams formula has only two choices for material. This standard only covers force mains. Not intended for splitting structures.

Chapter 14 - Wastewater Treatment Works

1. General – Chapter 14 has not been updated with requisite text needed to define and support biological nutrient removal (BNR) systems. As a result, it cannot be supported as updated until BNR is appropriately included.

   DNR Response: Denitrification processes and biological phosphorus removal systems may be proposed under Section 19.4 Other Supplemental Treatment Processes. They are not a part of this rule making. Criteria to support biological nutrient removal will be included in the next update of these standards. We are looking forward to working with stakeholders on Chapter 18B, but until more detailed information is provided in the design standards, greatest flexibility may be proposed in the design of such processes and systems.

2. This section needs to be expanded to include a discussion of Iowa Nutrient Strategy. There are several aspects of wastewater treatment regarding BNR that are not included in these standards. May want to overhaul the section in its entirety to change to a more technology and goal standard instead of being prescriptive. Also need to include a discussion of blending and/or wet weather side stream treatment to align with the EPA's blending language.

   DNR Response: Iowa's Nutrient Reduction Strategy is a NPDES program requirement specific to facilities with an AWW flow greater than 1 mgd.

   Criteria to support biological nutrient removal will be included in the next update of these standards. We will be working closely with a technical advisory committee when they are updated.

   As described in Subsection 14.5.2.4"c" Unit Process Reliability Exceptions, duplication to accommodate denitrification as a supplemental treatment process to nitrification will not be a minimum requirement under Iowa's Nutrient Reduction Strategy.

   Annual limits provide the greatest flexibility in operation and the least risk of violations.

See response to Chapter 14, Comment No. 17.

3. 14.1.3.2.d(1) Definitions – Clarify that for the purpose of this chapter, recreation trails are not included in the definition of “Public Use Area.”

   DNR Response: The definition for “Public Use Area” as proposed is consistent with section 459.102 of the Code of Iowa.

4. 14.1.3.2 Definitions
   a. g. Remove “pumping stations” from list of Treatment Works. Separation should not apply to pumping stations. Too restrictive.
   b. Need a definition of “innovative technology” vs. “technology not fully developed”
   c. Define effective and substantial.

   DNR Response: Pumping stations are treatment works. See section 455B.171 of the Code of Iowa.

   Definitions for “Innovative Technology” and “Technology Not Fully Developed” have been added to Subsection 14.1.3.2 Definitions.

   The words “effective” and “substantial” are common terms.

5. 14.2.3: Will the separation distance apply equally to open water basins vs. enclosed structures or buildings?

   DNR Response: Unless a separation distance exception is provided in the “Iowa Wastewater Facilities Design Standards”, the separation distance criteria for treatment works shall apply. See Section 14.2.5 Separation Distance Exceptions.

6. 14.2.3 f. Delete separation requirement of 300 feet from property lines and rights of way.

   DNR Response: The distance of 300 feet is a recommendation. It is not a requirement.

7. 14.2.4 Anaerobic Wastewater Treatment Lagoons – Consider adding wet weather flow equalization basins to the list of systems that the separation distances in 14.2.4 do not apply to.

   DNR Response: Section 14.2.4 Anaerobic Lagoons has been revised to eliminate any potential for ambiguity with other types of treatment works.

8. 14.2.4. Delete separate site separation requirements for anaerobic wastewater treatment lagoons. This is text borrowed from Air Quality Regulations that has

been inappropriately applied with no clear distinction between covered and uncovered anaerobic lagoons and the treatment purposes of anaerobic lagoons. IDNR legal has already supported a different interpretation. As a result, this WWDS cannot and will not be supported.

DNR Response: Section 14.2.4 Anaerobic Lagoons has been updated and supports the distances used by the Department as well as the conditions recently applied to one project requesting less separation.

9. 14.2.4.a and b – change to inhabitable structure or commercial building

   DNR Response: This change to Section 14.2.4 Anaerobic Lagoons is accepted and revised.

10. 14.4.5 and 6 – reference Chapter 69?

    DNR Response: The rules in 567 IAC Chapter 69 are applicable only to private sewage disposal systems.

    See response to Chapter 14, Comment No. 30.

11. 14.2.5.a. Separation Distance Exceptions – Regarding the last sentence, please clarify whether screening or addition of chemicals for odor or corrosion control would be considered treating wastewater.

    DNR Response: Most remote pumping stations include sewage works solely to accommodate the conveyance of flows (e.g., coarse screens to protect pumps and sewers from clogging or damage, etc.). Historically, sewage works installed at remote pumping stations for the purpose of odor and/or corrosion control have not been considered wastewater treatment facilities for the purpose of determining minimum site separation requirements under Paragraph 567 IAC 60.4(1)"c".

12. 14.2.5.a. Match with requirements of 12.5.8.2 (lift station and force main separation)

    DNR Response: Separation from force mains will be addressed by Chapter 12 Iowa Standards for Sewer Systems.

13. 14.2.5 a Delete "However they are recommended." In the last sentence. Delete this sentence. What about pumping stations with screening, is this treatment?

DNR Response: Section 14.2.5 Separation Distance Exceptions has been revised to make a clear distinction between the separation distance requirement and the basis for a separation distance exception.

See response to Chapter 14, Comment No. 11.

14. 14.2.5.b. Delete “However they are recommended.”

    DNR Response: See response to Chapter 14, Comment No. 13.

15. 14.2.5.e. What are the life time health advisory level standards, and how will this impact systems? What if stripping tower is coupled with a scrubbing tower to create a closed loop system (for gases); e.g. fertilizer production? Need to reword this or delete. An ammonia stripper may be combined with an ammonia scrubber in a closed loop air approach to capture ammonia stripped as a separate stream (particularly with sidestream treatment). As a result, the site separation requirement should be different, if not completely deleted.

    DNR Response: An exception has been added for all wastewater facilities permitted by the IDNR Water Supply Engineering Section. See Section 11.1.1“h” Exceptions from a Permit.

    Mention of stripping towers has been removed.

16. 14.2.6: Protection to the 100-year flood seems too low. May need to update. Consider flood protection to 500 year plus 1 feet versus 100 year plus 1 foot.

    DNR Response: Protection from physical damage by the 500 year flood plus 1 foot shall be considered in the evaluation of alternatives under Subsection 11.2.9.5 Alternatives of these standards.

17. 14.3. In the sentence “The minimum degree of treatment shall be standard secondary treatment…”
    a. This sentence needs to be further defined. The Department contends that all flow needs to go thru a secondary treatment process which is clearly not what was intended by the Clean Water Act. The CWA indicates that secondary treatment is a measure of treatment quality defined by $cBOD_5$, TSS and pH. There is no list of processes that equal “standard secondary treatment”. The Department is being more stringent here than the EPA.
    b. This paragraph needs to be updated to account for the EPA’s blending rules. When these are implemented, all flow will <u>not</u> need to go through secondary treatment.

c. Why add the “and” in last sentence? Permits only contain 30-d average and max day limits. There is no 7-day average limit. Is IDNR planning to add 7-day limits to permits?

DNR Response: The term “degree of treatment” means a measure of the removal effected by treatment processes with reference to solids, organic matter, BOD, bacteria, or any other specified parameter.

The wording “standard secondary treatment” is referring to wastewater treatment facilities that meet design standards, including applicable reliability criteria, and secondary effluent standards.

There are no USEPA blending regulations. The USEPA is in the process of developing regulations for blending.

Seven-day average effluent standards for secondary treatment are in Rule 567 IAC 62.3. These effluent standards are not more stringent than the USEPA criteria.

18. The proposed language for using a new process is too stringent. What is “suitably sized”? Does the demonstration need to be in the State of Iowa? Paragraph e – “three separate and representative full scale installations” is too restrictive. Also, “representative installations should have been operated for not less than three consecutive years…” is too restrictive.

DNR Response: The sizing required for “suitably sized” prototypes is not stated. Nor should it be stated.

If the application is similar, demonstration of the technology need not occur in Iowa.

In some instances, one prototype may be sufficient.

19. 14.4.3 d: Can “environmental impacts” be clarified?

DNR Response: Wording has been revised to “environmental assessment, including both primary and secondary impacts.”

20. 14.4.3 3: Need to discuss the intent with DNR and better define this section. How will (or should?) the failure of a “new” technology be handled differently than the failure of an “old” technology?

DNR Response: Section 14.4.3 New Process, Equipment and Application Evaluation, Meetings and Project Performance Standards has been revised to include project performance standards.

21. 14.6.4.e Effluent Diffuser System – This paragraph implies that multiple headers are required. Please clarify redundancy requirements for the headers.

    DNR Response: Duplication of headers is not necessarily required.

22. 14.4.1.1. What does this section mean? Does this mean to conduct a planning exercise? TAC recommends deleting this section.

    DNR Response: The factors governing design of wastewater treatment facilities are complicated and extensive. Engineering services to obtain a construction permit and complete the approved construction shall be performed in three stages. Careful consideration shall be given to the type of treatment selected in the engineering report or facilities plan as required by Subsection 11.2.9.5 Alternatives of these standards.

    See response to Chapter 14, Comment No. 28.

23. 14.4.1.3.j. Just because it is nutrient deficient, does not mean it cannot be treated with high efficiency. Nutrient deficiency can be corrected with chemical addition just like alkalinity deficiency can be treated with alkalinity addition. Recommend deleting this section

    DNR Response: An assessment may determine that a nutrient deficient waste can be accepted.

24. 14.4.1.3.k. Wastes that cause excessive physical deterioration of one material type can be supported by another material type. Recommend deleting this section.

    DNR Response: An assessment may determine that a corrosive waste can be accepted.

25. 14.4.4. Definitions are dated. Suggest defining and consideration of:
    a. Base Flow (no I/I)
    b. Average Annual or statistical average annual
    c. Maximum 180-day or statistical maximum 180-day
    d. Maximum 30-day or statistical maximum 30-day
    e. Maximum 7-day or statistical maximum 7-day (Industry)
    f. Maximum day or statistical maximum day

Note, baseline or ADW flow is almost meaningless except for establishing a condition that occurs 1/12 of the time or less and giving a starting point for analysis. Instead, average annual flow gives a more important basis for evaluating operational and maintenance considerations than the historical ADW.
Does peaking factor in Appendix I have a runoff/storm component?
How is peak flow to be adjusted for storm? Rational method may not be an appropriate approach. Depends on system specific circumstances; i.e. inflow characteristics.

DNR Response: The five flow conditions critical to the design of the treatment plant are specified in Subsection 14.4.5.2 Critical Flow Conditions, Municipal. It is expected that the Engineer will use good engineering judgement in selecting the design flow.

The Waste Load Allocations for NPDES permits are based, in part, on the approved design flow. The hydraulic flows used to determine cell sizes in accordance with Section 18C.6.1 Sizing of Aerated Facultative Ponds are based on the criteria in Subsection 18C.4.1.2 Aerated Ponds.

If needed, Subsection 14.4.5.3 Existing System, Municipal provides for the determination of additional flow conditions.

Appendix 12-A is from a study which determined peaking factors under dry weather conditions. Not to be confused with the term average dry weather (ADW) flow, “dry weather flow” is the sum of the volume of wastewater discharges and the volume of groundwater infiltrating the collection system.

Flow modeling should be considered for disposal systems impacted by infiltration and inflow from ordinary storms.

26. 14.4.5.1: Suggest revising flow condition criteria to match more commonly used modern terminology and definitions.

    DNR Response: This update includes a new term, Maximum Seven Day Wet Weather (MSDWW) flow.

    Terms (i.e., ADW, AWW, MWW and PHWW) have been used to describe flow conditions critical to the design of the treatment plant since 1977, but in 2017 additional guidance for the design of flow equalization was requested.

    The hydraulic design may be adjusted to account for infiltration and inflow which is eliminated by sewer system rehabilitation.

Under Rule 567 IAC 62.3, reasonable efforts to prevent and abate infiltration of groundwater into sewers, and prevention or removal of any significant source of inflow, are required.

See Rule 567 IAC 60.2 Definitions.

27. 14.4.5.2: Consider minimum three years of flow data instead of five.

    DNR Response: The minimum has been revised to three years.

28. 14.4.5.2. Evaluation of wastewater should be defined based on loading (as in Schedule G) and not strength. Using concentration evaluation may and often does give inappropriate conclusions. A maximum day load may occur with a 60^{th} percentile flow whereas the concentration at a 90^{th} percentile flow may be relatively weak. As a result, underdesign of system would result. TAC suggests not using word “strength” in order to avoid confusion. Also, loading does not depend on I/I except for maybe peak TSS loading. Need to be clear with this or do not include.

    DNR Response: The plant design shall provide the necessary flexibility to perform satisfactorily within the expected range of waste characteristics and volumes. This includes the early years of operation.

    See Section 14.4.6 Organic Design.

29. 14.4.5.2. At a minimum, need to include $cBOD_5$, TSS, VSS, TKN, TN, and TP as loading parameters. Further recommend COD, ammonia and OrthoP.

    DNR Response: See Subsection 11.2.9.2 Design Wastewater Characteristics.

30. 14.4.5.3. Design based on “100 gallons per capita per day” is too high to reflect water saving fixtures. Suggest something less, commonly see 80 gpcd. Then, I/I component of per capita flow varies too much from system to system to define in WWDS.

    DNR Response: The design of collection systems is regulated by Chapter 12 Iowa Standards for Sewer Systems. For plant design, exceptions to the minimum criteria of 100 gpcd may be made on a case-by-case basis. See Subsection 14.4.5.4 New Systems, Municipal.

31. 14.4.5.4. Industries operate on weekly production schedules. Suggest better defining maximum 7-day flow and load evaluation requirements.

DNR Response: Subsection 14.4.5.5 Critical Flow Conditions, Industrial addresses the flow conditions that must be considered due to production patterns.

32. 14.4.5.4. Define unrestricted flow. Gravity flow? Open gates? Other?

    DNR Response: The text for Section 14.4.5.6 Flow and Load Equalization has been revised. Hydraulic restrictions and incoming sewers designed for unrestricted flow are mentioned in Ten States Standards (2014 edition). See Paragraph 11.242 Hydraulic Capacity for Wastewater Facilities to Serve Existing Collection Systems and Paragraph 53.5 Conduits.

33. 14.4.5.5: Please clarify what is meant by unrestricted flow? Would a low head surcharged gravity sewer or siphon structure be considered restricted if that is how it is intended to operate?

    DNR Response: See response to Chapter 14, Comment No. 32.

34. 14.4.5.5: As the draft currently reads, the "where feasible" and "should" indicates that use of wettest seven days of record for wet weather sizing is a recommendation and not a mandate. There is too much variability among different collection systems and wet weather criteria should be flexible. Please confirm.

    DNR Response: It is flexible. Under Subsection 14.1.3.1 Standard Required, the term "should" indicates desirable procedures or methods which should be considered but will not be required. The terms "shall" or "must" are used when it is required that the standard be used.

35. 14.4.5.5 A discussion of blending needs to be included here. Delete the reference to minimum plant capacity should be MSDWW flow.

    DNR Response: Where the hydraulic capacity of the treatment plant is equal to or above the level of the MSDWW flow and automated control is used to return excess flows to the plant in a timely manner, the storage volume requirements to eliminate or prevent bypassing can be significantly reduced.

36. 14.4.6.1. With existing data, growth increment to match existing per capita strength rather than defaults may be more appropriate. Need to add TP component in order to support nutrient reduction at a minimum. Why adding per capita TKN loading (0.036 ppcd and 0.046 ppcd) that exceeds typical values in M&E and MOP 8 (0.029 ppcd without kitchens waste; 0.032 ppcd with kitchen waste)? Why using higher than typical values?

DNR Response: As a minimum, new plants should be designed for a domestic load contribution of at least 0.17 lbs BOD_5/capita/day, 0.20 lbs TSS/capita/day and 0.036 lbs TKN/capita/day. The TKN default loading can be found in Ten States Standards (2014 edition) and MOP 8 (6^{th} edition).

As necessary, Subsection 11.2.9.2 Design Wastewater Characteristics must be addressed, but defaults in addition to the listing in Subsection 14.4.6.1 Domestic Loadings are not suggested.

The loadings that must be used for the design of secondary treatment and nitrification facilities are not necessarily the same statistic as the amount typically discharged by an individual.

37. 14.6.4: An pumping station is not always necessarily required to ensure adequate head to the diffuser. An effluent pump station that is otherwise not required would be expensive and wasteful.

    DNR Response: Pumping is recommended. In inverted siphon design, a cleansing velocity of at least 3 feet per second should be achieved in the smallest barrel at least once daily, even during the early years of operation.

38. 14.6.4 Effluent diffuser pump station requirement…why needed if hydraulic profile allows for continued discharge at high water? This should be a consideration, but not a requirement for all systems.

    DNR Response: Pumping is recommended. In addition to high water conditions, clogging caused by low flow conditions must be considered.

39. 14.7.2.2.c. Need to define “significantly different”

    DNR Response: Where flow is equalized by a wastewater treatment process, additional flow measurement and recording is required.

40. 14.7.2.3: In addition to mag meters, would other types of meters such as area-velocity-pressure meters be considered?

    DNR Response: Other types may be considered. See Subsection 14.7.2.1 General.

41. 14.7.3. Clarify that the last sentence only applies to treatment plants that accept septage.

DNR Response: This recommendation is accepted.

42. 14.4.8.2. Delete “this shall be accomplished by means of gravity drains or pumping.”

    DNR Response: The inability to dewater tanks for repair is a design deficiency that has been identified by the USEPA in publication 625/6-82-007.

43. 14.4.8.3. What safety factor on buoyancy is required? Clarify how WES will evaluate a structural/building standard? Recommend deferring to state and local building code and competent structural engineer.

    DNR Response: A safety factor is not specified. Rather, Subsection 14.4.8.3 Buoyancy establishes a performance standard.

    See response to General, Comment No. 3.

44. 14.4.8.5. Delete. This is not a design standard.

    DNR Response: Tools, accessories and spare parts may be included in the final plan and specification documents to be bid for the project. Under Section 14.9 Laboratory, careful consideration should be given to the laboratory facilities needed for the operational control of each plant.

45. 14.4.8.6. Delete. This is not a design standard.

    DNR Response: Effective site erosion and sediment control shall be provided during construction.

46. 14.4.8.7. Reword to “…should be graded so that surface water is not permitted to drain into any unit.”

    DNR Response: Grading to prevent surface water from draining into units will be required.

47. 14.4.8.8. Sludge disposal during construction is a construction consideration and not a WWDS. Do not need to say that IDNR or federal codes need to be followed in WWDS. Delete.

    DNR Response: Sludge removal may be required when upgrading an existing disposal system. The approved sludge processing, storage and disposal plan may be implemented by inclusion in the final plan and specification documents to be bid for the project.

48. 14.5. Recommend reevaluating approach to defining reliability classes and criteria. Would be more straightforward to define classes and criteria together; particularly given that there is significant overlap between the two. On the other hand, note two reliability classes covered by one reliability criterion (Criteria A). This would be more straightforward to simply define reliability requirements as either A.) A function of discharge requirements or B.) a function of treatment type, and not some undefinable mix of both. Reliability would seem to be more appropriately governed by the dependability of treatment technology rather than discharge requirements. Treatment technology is applied to meet discharge requirements. Suggest redefining reliability as a function of treatment technology. Then, may increase reliability requirements for innovative technology and minimize or delete limitations on innovative technologies in remaining WWDS.

    DNR Response: Not to be confused with the word reliable, “reliability” is a measure of the ability of a component or system to perform its designated function without failure. This measure is not based on whether a technology is innovative or proven. Reliability standards have been updated.

49. 14.5. What are design flow and loading conditions? Maximum month?

    DNR Response: The design flows and loadings are required by the application forms for a permit to construct.

50. 14.5. What are reliability requirements for BNR?

    DNR Response: Regardless of the configuration, denitrification processes and biological phosphorus removal systems are supplemental treatment processes. As such, duplication is not necessarily required.

    In addition to phosphorus removal by chemical treatment, emerging technologies (such as side-stream fermentation tanks for deep anaerobic treatment of recycled activated sludge) may be considered for low rbCOD:TP wastewaters.

    Filtration of the plant’s secondary effluent may be used as a tertiary treatment device. Reliability criteria for the design of such systems is found in Chapter 19 Supplemental Treatment Processes.

    Chapter 18C Wastewater Treatment Ponds is applicable to the construction, installation or modification of any lagoon type disposal system. The dominant mechanism for nitrogen removal from a facultative pond, under favorable conditions, is thought to be volatilization.

For sludge handling and disposal, treatment of side-stream flow is addressed by Section 17.1“h” Design Considerations. Duplication is not mentioned.

51. 14.5. Word duplication is used throughout. Is that the word that is intended? Does IDNR want duplication (a full copy; i.e. three units require three additional units) or does IDNR intend for an additional unit? Please clean this up.

    DNR Response: As used in Section 14.5 Treatment Facility Reliability Classes, the word “duplication” means more than one unit whereas the phrasing “duplicate units” means two or more equally sized units.

    For mechanical plants, the extent of required design load capacity with the largest unit out of service varies. Depending on the type of unit operation, the duplication requirement could be 100 percent, 75 percent or 50 percent.

    Exceptions to duplication are provided in Subsection 14.5.2.4 Unit Process Reliability Exceptions.

52. 14.5.2. Is there another type of process besides physical, chemical or biological or is this unnecessary wording? Is IDNR concerned separately with reliability criteria for nuclear or quantum processes?

    DNR Response: The term “effluent quality” means the physical, biological, and chemical characteristics of wastewater or other liquid flowing out of a basin, reservoir, pipe, or treatment plant.

53. 14.5.2.2. No exemption criteria given so this means discharge fits into this requirement? Can that be written more clearly?

    DNR Response: At mechanical facilities for standard secondary treatment with no nitrification requirement and which are not regulated by Unit Process Reliability Criteria A, Unit Process Reliability Criteria B applies. Unit process reliability exceptions are listed in Section 14.5.2.4 of these standards.

54. 14.5.2.2.2. Reliability criteria apply to primary clarifiers only if primary clarifiers are counted on for treatment to support capacity for secondary process. If secondary process can provide capacity without primary clarifiers, no duplication should be required.

    In at least one instance where no BOD_5 reduction was required of a primary settling tank unit operation and this unit operation preceded activated sludge biological treatment, the Department approved a waiver to allow construction of only one primary settling tank. The design standards contain the term “if used” to address the comment.

55. 14.5.2.2.3. Does this conflict with Criterion A when read literally?

    DNR Response: At mechanical facilities for standard secondary treatment with no nitrification requirement and which are not regulated by Unit Process Reliability Criteria A, Unit Process Reliability Criteria B applies.

56. 14.5.2.2.4. What is the relevance to this section? Is this a general requirement that could be written outside of the reliability requirements?

    DNR Response: Adequate sludge handling and disposal is a vital component for the required level of treatment.

    See Section 17.1 Design Considerations.

57. 14.5.2.3. This section lists clear separate reliability requirements for carbonaceous oxidation and nitrification. As a result, need to evaluate $cBOD_5$ and TKN as design loading parameters and not BOD_5 (which includes variable elements of TKN).

    DNR Response: Under Subsection 14.5.2.3“b” Unit Process Reliability Criteria C, there is no difference in the unit operation reliability requirements for single stage combined carbonaceous oxidation and nitrification based on the strength of the carbonaceous oxygen demand versus the strength of the nitrogenous oxygen demand. For all, it is 50 percent.

58. 14.5.2.3. Refer to comment 34 regarding primary clarifiers.

    DNR Response: See response to Chapter 14, Comment No. 54.

59. 14.5.2.3.4. Delete.

    DNR Response: See response to Chapter 14, Comment No. 56.

60. 14.6.4. Effluent diffuser section text reads, “…not well established…” but then goes on to provide several paragraphs of requirements. This seems to be a conflicting statement.

    DNR Response: The conflicting statement has been removed.

61. 14.6.4. Are effluent diffusers and instream mixing covered by the new Wasteload allocation guidelines? Is it better to reference these guidelines rather than potentially conflicting with the guidelines?

    DNR Response: Section 14.6.4 Effluent Diffuser System has been coordinated with the Water Resources Section and reviewed by their staff.

62. 14.6.4.a. Add "If needed," at the beginning of this section.

    DNR Response: This wording has been added.

63. 14.6.4.b. What is "adequate mixing". Either define or delete this section if IDNR cannot define. Ensure this section does not conflict with Wasteload allocation guidelines or requirements for instream mixing.

    DNR Response: Section 14.6.4 Effluent Diffuser System has been coordinated with the NPDES Permits Section, the Water Resources Section and reviewed by their staff.

64. 14.7.3. Delete electrical requirements and refer instead to local and state building codes.

    DNR Response: Most, if not all, composite sampling equipment is not explosion proof.

    See response to General, Comment No. 3.

65. 14.8. This is ideally written. Suggest moving to the beginning of this chapter as a general guideline and deleting all remaining OSHA, electrical, and building code related requirements.

    DNR Response: The wording in Section 14.8 Safety has been added to Chapter 12 Iowa Standards for Sewer Systems and Chapter 13 Wastewater Pumping Stations and Force Mains.

66. 14.9. Is it better to reference Ten States Standards than to have specific separate requirements as a part of IDNR WWDS?

    DNR Response: The "Recommended Standards for Wastewater Facilities" by the Great Lakes-Upper Mississippi River Board is a guide. Section 14.9 Laboratory is intended to be specific to Iowa.

67. Appendix 14C – Clarify what the requirements are for the final disposal site required. Is the intent to require owners of treatment plants to acquire the property (or a legal agreement) for land application sites at the time of the treatment plant construction? Suggest deleting sludge disposal requirements from this section since already well-governed in other code requirements?

    DNR Response: Appendix 14C has been removed. Sludge disposal must be considered in the evaluation of alternatives. Access to a disposal site may be necessary, but there is no requirement per se to purchase land.

    See Section 17.1 Design Considerations.

68. Appendix 14C. Agree that reliability is critical, but why is this so complicated as to require this table? IDNR has made this unnecessarily complex by separating classes and criteria. Then, the table fails to clarify since Secondary treatment only criteria apply to reliability classes II and III.

    DNR Response: The table has been removed.

Chapter 18c - Wastewater Treatment Ponds (Lagoons)

69. 18C.7.3.2 Seal and Seal Testing – Are there requirements for testing synthetic liners after installation or are leak test results from the qualified manufacturer's representative acceptable?

    DNR Response: Synthetic liner shall be installed under the supervision of a qualified manufacturer's representative. Pond liner installation under supervision of a qualified manufacturer's representative does not have to do a water balance test to check the adequacy of seal. Certified synthetic liner leak test results provided by a qualified manufacturer's representative are acceptable. Pond built with synthetic liners can submit leakage test results either with certified synthetic liner leak test or a water balance test.

70. 18C.7.4.1 Material - Should include AWWA C900 water main pipe to be used for all piping within the lagoon including the influent lines.

    DNR Response: Generally accepted material for underground sewer construction will be given consideration for the influent line to the pond. AWWA C900 can be accepted for buried sewer line installation as long as it can be anchored securely and withstand exceptionally heavy external loadings.

71. 18C.7.6.1 Pond Piping Material – Consider allowing the use of pipe materials other than ductile iron where not located within a pond cell, such as PVC water main pipe.

DNR Response: Pond withdrawal and transfer piping has been revised to include PVC material.

72. 18C.7.6.1. What is the justification for changing to DIP only for lagoon piping? PVC has better corrosion resistance and is less expensive than DIP. Also, some funding agencies require multiple pipe materials to meet federal “free and open bidding” rules.

    DNR Response: See response for Chapter 18C, Comment No. 71.

73. 18C.7.6.1. Remove strike through PVC. PVC should be defined as AWWA C900 water main pipe but should be allowed to be used for all piping within the lagoon including the influent lines in 18.C.7.4.1.

    DNR Response: See response for Chapter 18C, Comment No. 71.

74. 18C7.6.2.b – Define MSDWW

    DNR Response: Please see Subsection 14.4.5.2 Critical Flow Conditions for the definition

75. 18.C.6.5.3. What constitutes detailed justification to show perched and to show adequacy of proposal?

    DNR Response: Due to rarity of perched groundwater in Iowa, we have deleted the perched groundwater section in the revision after TAC comments. Investigation of perched groundwater and justification shall be included in lagoon soils report that includes groundwater level determination, soil characteristics such as color and mottling and other pertinent information. NRCS Soil scientist can also be consulted with to determine the groundwater.

76. 18.C.7.3.2.a – remove leakage test based on filling cells and add permeability requirements

    DNR Response: Either water balance test or pond seal core permeability lab test is acceptable for lagoon leakage test. Pond liner installation under supervision of a qualified manufacturer’s representative can use certified leak test results performed during the synthetic liner installation in lieu of a water balance test to check the adequacy of seal.

77. 18.C.7.4.4. Add requirements for influent on top of floor.

DNR Response: The revised 18C.7.4.4 has changed the standards of influent lines locating along the bottom of the pond and the top of the pipe below the average elevation of the seal from “shall” to “may.” Plus, the same paragraph has added the department will review design where the influent line is placed over the pond seal.

78. 18.C.7.6.1. Transfer piping needs to allow PVC (piping between structures, not exposed to ice action)

    DNR Response: See response for Chapter 18C, Comment No. 71.

79. 18C.8.1. Influent – Add word “continuous” to the first sentence so it reads “The design shall include equipment and structures required to measure and record continuous flow rates, and obtain 24-hour composite samples.”

    DNR Response: Added “continuous” before flow rates.

80. 18C.8.2 Effluent – This has been interpreted differently by different review engineers. Should be clarified. The way this reads now it can be interpreted that V-notch weirs are only allowed for controlled discharge ponds or it can be interpreted that V-notch weirs are allowed for both continuous and controlled discharge ponds.

    DNR Response: We made clarification in the design standards paragraph 18C.8.2. Both influent and effluent flow monitoring is required for controlled discharge lagoon. Influent or effluent flow monitoring is required for aerated lagoon. If design population equivalent is greater 100, continuous monitoring of flow is required.

81. 18C.9. This states the need for disinfection will be determined on a case-by-case basis for lagoons. What criteria will be used for the determination? Our experience has been that most controlled discharge lagoons, and many aerated lagoons can meet e. coli limits. Adding disinfection to a lagoon system can add significant cost with minimal improvements in water quality. This is especially true for systems that currently have no electricity or potable water onsite.

    DNR Response: Due to Iowa streams classification and water quality standards change, we have seen more and more NPDES permits for wastewater treatment ponds being issued with bacterial limits and/or bacterial monitoring requirements. For example, control discharge lagoons with 180-day detention time was assumed to be able to meet E Coli limits in the past, but are now being given E Coli monitoring requirements or E Coli limits. The lagoon wastewater treatment facilities should consult with professional design engineers to evaluate whether their current wastewater lagoons can meet NPDES bacterial limits with no modification, with operational optimization, or with design upgrade. There is no one-size-fit-all solution in terms of lagoon disinfection capability in meeting effluent E Coli limits. DNR review for lagoon disinfection design will be based on a case-by-case approach.

82. 18.C.10.6. Allow pipes with staff gauges and other devices commonly used.

DNR Response: Calibrated pipes are allowed in the standards.

Design Maximum Depth of Flow

Introduction: *Various maximum depths of flow are cited in the literature, state and municipal standards and various texts for the design of gravity sewers. Section 12.3.1.6 of the current Iowa Wastewater Facilities Design Standards (Adopted Sept. 6, 1978 and amended March 28, 1979 and May 20, 1987) states that "Pipe sizes 8" - 15" shall carry the design flow at a depth of no more than 0.75 of the pipe diameter." This requirement has been recognized as a typo in the standards by DNR engineering staff with the requirement originally intended as "Pipe sizes 8" – 15" shall carry the design flow at a depth of no more than 2/3 of the pipe diameter. Pipes larger than 15" shall carry the design flow at a depth of no more than ¾ of the pipe diameter." However, the exact source or reasoning behind the 2/3 requirement for smaller pipe diameters has not been found.*

Few of the most commonly accepted standards make reference to or require a maximum design depth of flow but references in the literature and municipal standards/specifications are common. The requirements/recommendations vary from maximum depth/diameter (d/D) ratios of ½ to designs for full flow capacity. Some examples include but are not limited to:

> *From the ASCE Gravity Sanitary Sewer Design and Construction/WPCF MOP No. FD-5 (1982): "It is customary to design sanitary sewers with some reserve capacity. Generally, sanitary sewers through 375 mm (15 in.) in diameter are designed to flow half full. Larger sanitary sewers are designed to flow three-fourths full."*
>
> *From USACE manual EM 1110-3-174 Ch. 3, Hydraulic Design of Sewers (1984): "Generally, it is not desirable to design sewers for full flow, even at peak rates. Trunk and interceptor sewers will be designed to flow at depths not exceeding 90 percent of full depth; laterals and main sewers, 80 percent; and building connections, 70 percent."*
>
> *From the City of Anaheim, CA's Sewer Design Manual (2006):*

Maximum depth of flow (at peak flow condition):

10" and smaller:	2/3 D, d/D=0.67	(d: depth of flow)
12" and larger:	¾ D, d/D = 0.75	(D: diameter of sewer pipe)

Utilizing a design depth of flow less than the maximum pipe capacity (which occurs prior to full pipe flow) is essentially a safety factor to account for potential error in the estimated peak flow to prevent surcharging and potentially, sanitary sewer overflows or basement backups during peak flow conditions. Given this, it is understandable why there appears to be no universally accepted values and the required or recommended design depths tend to vary among sources. There are a number of considerations in setting forth a requirement for a maximum d/D ratio in design:

1. *How accurate is the peak flow estimate?*
2. *What safety factor does the maximum d/D ratio provide?*
3. *Should the requirement vary for different pipe sizes and if so, what requirement for what range of pipe sizes?*
4. *What role should pipe velocity play in determining the required d/D ratio?*
5. *What are the design implications for a given required d/D ratio?*

Considerations/Discussion

1. How accurate is the peak flow estimate?

Ideally, the safety factor applied via the d/D ratio should be proportional to the degree of uncertainty associated with the design flow estimate. In practice, assigning a definite value to this uncertainty would prove difficult or impossible. It is likely that most engineers would argue that their designs are conservative. However, many installations remain in place well beyond their expected design life and the degree to which infiltration/inflow will affect a sewer system as it ages is difficult to predict with any certainty at the time of design.

Iowa's design standards require a minimum design flow of 100 gpcd multiplied by a peaking factor plus consideration of contributions from industrial, inflow and infiltration, and pumping station capacity. The 100 gpcd value may include maximum allowable infiltration with adequate justification (typically the 100 gpcd value is used for sewer extensions serving new developments under the assumption of limited I/I contributions associated with modern pipe/manhole materials and jointing techniques).

Uncertainty regarding the design flow may be associated with (a) the population estimate (b) the 100 gpcd value or the allowances used for I/I (c) industrial/commercial flow estimate(s) and (d) the peaking factor. The variability/uncertainty associated with these items tend to be site specific and a full discussion is beyond the scope of this paper. However, it is safe to say that regardless of the best efforts of the designer, there is appreciable uncertainty in any peak flow estimate, particularly for sewers where the design period encompasses a 50-year planning period or the timeframe associated with ultimate development.

2. *What safety factor does the maximum d/D ratio provide?*

d/D ratios of 0.5, 0.67 and 0.75 correspond to approximate q/Q_{max} ratios of 0.46, 0.73 and 0.85, respectively, where q = flow at depth d and Q_{max} = maximum pipe capacity. See Table 1 and Figures 1 and 2 for 8" and 24" pipe at minimum slopes shown below.

Table 1. Pipe Flow Capacities (MGD) Using Kutter's Equation, n = 0.013

Pipe Size	Slope (%)	$Q_{2\text{ fps initial}}$	$Q_{d/D = 1/2}$	$Q_{d/D = 2/3}$	$Q_{d/D = 3/4}$	Q_{max}	$Q_{full\ (2fps)}$
8	0.40	0.23	0.23	0.36	0.42	0.49	0.45
10	0.28	0.36	0.35	0.56	0.65	0.76	0.70
12	0.22	0.49	0.51	0.82	0.95	1.12	1.03
14	0.17	0.70	0.69	1.09	1.27	1.50	1.38
15	0.15	0.83	0.78	1.24	1.44	1.70	1.56
16	0.14	0.91	0.90	1.43	1.66	1.96	1.80
18	0.12	1.13	1.15	1.82	2.12	2.50	2.30
21	0.10	1.45	1.59	2.52	2.94	3.46	3.19
24	0.08	1.99	2.05	3.24	3.77	4.44	4.09
27	0.067	2.56	2.57	4.07	4.74	5.58	5.15
30	0.058	3.15	3.18	5.02	5.85	6.89	6.36
33	0.052	3.69	3.89	6.14	7.15	8.42	7.78
36	0.046	4.42	4.62	7.29	8.49	10.00	9.25
39	0.041	5.24	5.41	8.52	9.92	11.69	10.81
42	0.037	6.10	6.26	9.87	11.49	13.54	12.52

Figure 1: 8" Sewer @ 0.4%

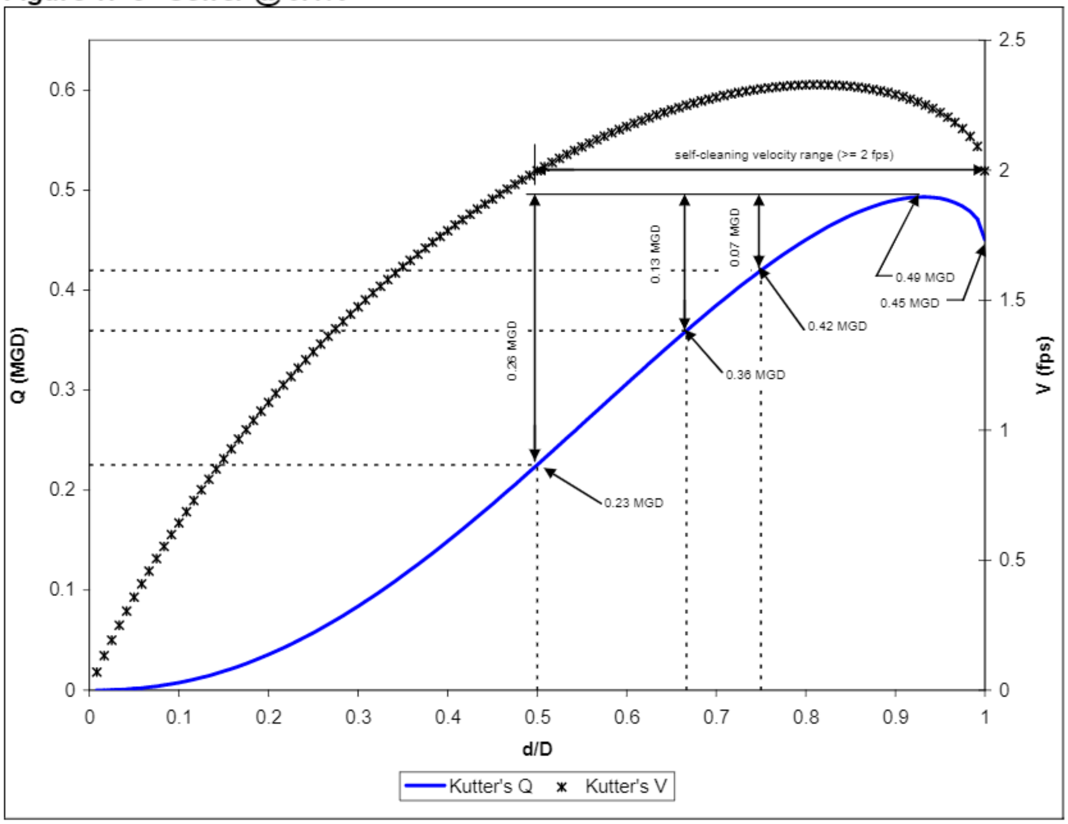
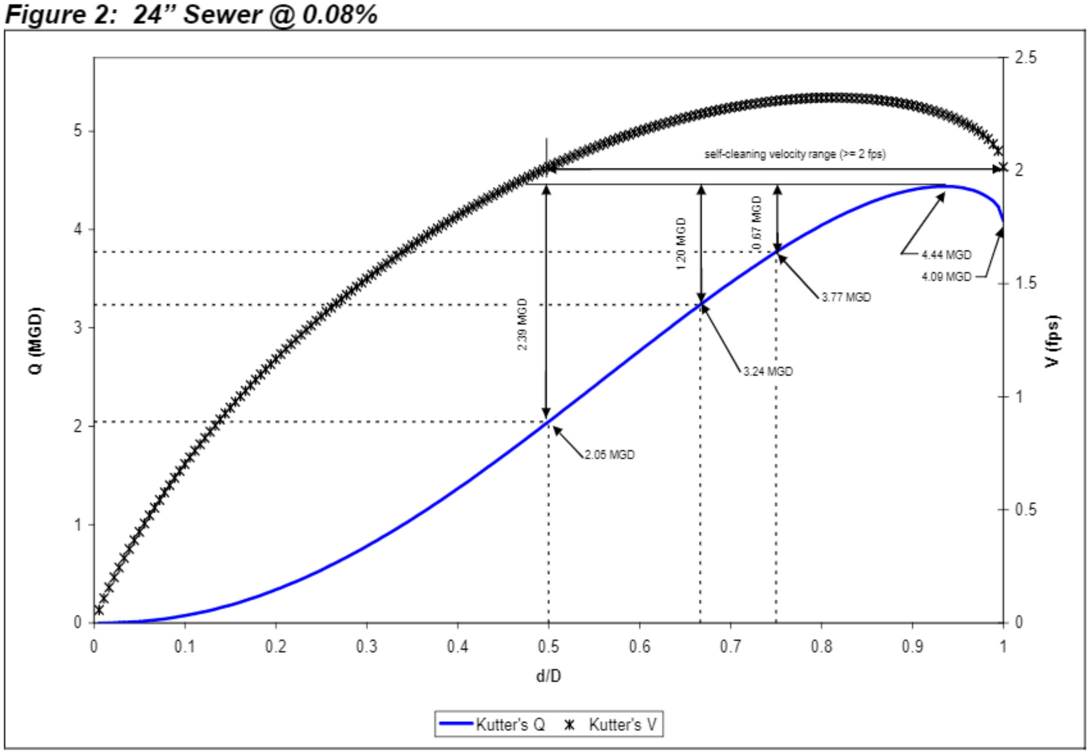


Figure 2: 24" Sewer @ 0.08%



3. *Should the requirement vary for different pipe sizes and if so, what requirement for what range of pipe sizes?*

Most sources recommend or require a smaller d/D ratio (greater safety factor) for smaller sewers, presumably due to their smaller carrying capacity (less "in-line" storage) and perhaps greater uncertainty in estimating the design flows that will occur in collector sewers as opposed to trunk sewers. Conversely, it is typically recommended that larger sewers be designed based on a higher d/D ratio at peak flow. Although I could not find a reference where the reasoning behind this was explicitly stated, it would seem that peak flow attenuation in lower reaches of a collection system due to greater "in-line" storage capacity, greater certainty regarding flow estimates and a higher perceived cost/benefit ratio for providing a large safety factor for larger pipe sizes are among the potential reasons. Maintenance of higher velocities for larger pipe sizes may also be desirable if larger sewers are considered to carry larger and/or heavier solids. However, there are several arguments that can be made against a variable d/D ratio dependent upon pipe size:

a) *The applied peaking factor, which is based on an empirical relationship, already accounts for peak flow attenuation in lower sewer reaches. That is, as the population serviced increases the applied peaking factor decreases.*
b) *Arguably, the flow estimates developed for a trunk sewer design are no less uncertain than those for a smaller sewer unless the design is based on the results of a detailed system evaluation using long-term, measured flow rates.*
c) *Surcharging of a trunk sewer has greater environmental impact since downstream conditions will affect upstream conditions (surcharging of a trunk sewer may cause overflows and/or basement backups in multiple upstream service areas).*
d) *Large sewers are typically laid on very flat grades and therefore subject to greater deviation from design capacity for a given invert elevation discrepancy that may occur due to error in installation or pipe settlement.*

4. *What role should pipe velocity play in determining the required d/D ratio?*

As stated previously, the primary reasoning for a maximum allowable d/D ratio for design is to provide a safety factor to account for inevitable error in the design flow estimate and prevent hydraulic overloading of the sewer system. However, the design flow estimate may be either underestimated (resulting in hydraulic overloading) or overestimated (resulting in lower actual pipe velocities and reduced self-scouring capability of the pipe). In addition, due to the long design life of most sewer designs, initial flows may be much less than those anticipated for ultimate development.

The most commonly accepted minimum design velocity to achieve an acceptable degree of self-cleansing is 2 fps. For organic material (assumed specific gravity = 1.01) this velocity is predicted to effectively transport a 15 mm (0.59 inch) particle. For sewers where larger particles are expected or for sewers that receive substantial grit/sand/inorganic loadings (which have a much larger specific gravity than organic particles) velocities higher than 2 fps are desirable.

It should be noted that for smaller sewers, achieving a scouring velocity of 2 fps is often difficult or impossible to achieve in design due to the minimum allowable sewer diameter and the need to use slopes that will allow gravity service connection of the service area. For example, an 8" sewer laid at the minimum allowable slope of 0.4% will not achieve a velocity of 2 fps for flows less than 0.23 MGD (see Figure 1). Assuming an average flow of 100 gpcd and using the peaking factor equation referenced by the Iowa Wastewater Design Standards, a minimum service area population equivalent of 1,760 is needed to attain a velocity of 2 fps during the design peak flow. Thus, many sewer extensions for small service areas and even smaller communities in Iowa may not produce sufficient flow to achieve a velocity of 2 fps in 8" sewer laid at minimum grade.

Clearly, not all gravity sewer designs can provide for actual velocities at or above 2 fps at peak flows given the constraints of minimum sewer size, local terrain and existing fixed downstream sewer elevations. In such cases, the design should maximize velocity within the given constraints. However, the owner is ultimately resigned to providing any additional maintenance warranted due to lesser velocities or considering a pumping station in place of gravity service.

5. *What are the design implications for a given required d/D ratio?*

A maximum allowable d/D ratio set by the standards will limit pipe selection for a given design flow and desired (or achievable) slope. The design flow will rarely be precisely the same as the pipe capacity at the maximum allowed depth of flow and therefore most designs will be conservative relative to the d/D requirement. As noted previously, the design should not only provide for excess capacity but also consider the scouring velocities that will be achieved. By setting a maximum allowable d/D ratio most designs will be conservatively sized to provide reserve pipe capacity. But will this excess capacity be at the expense of reduced pipe velocity?

For example, consider a system with an estimated design flow of 1.5 MGD where a minimum slope is desired to extend gravity service as far as possible. If a maximum allowable d/D ratio of 0.67 is required, an 18" pipe @ 0.12% can be used (see Table 1). The pipe velocity will reach the initial 2 fps velocity threshold at a flow of 1.13 MGD and will have a maximum capacity of 2.50 MGD. The design will allow for 1.00 MGD of capacity above the estimated design flow prior to surcharging but if actual initial or ultimate flows are more than 0.37 MGD below the design flow a pipe velocity of 2 fps will not be achieved. Therefore, it could be argued that a lower maximum d/D requirement will reduce pipe velocities and create concern for increased maintenance due to solids accumulation.

To further examine this concern, consider the example above where the maximum allowable d/D ratio is 0.75. The higher maximum depth of flow will allow the designer to use a 16" pipe @ 0.14% whereas the previous d/D of 0.67 necessitated an 18" pipe. The 16" pipe velocity will reach the initial 2 fps velocity at 0.91 MGD and will have a maximum capacity of 1.96 MGD. This allows for a 0.59 MGD negative deviation from the design flow to achieve 2 fps velocities during peak flows and a positive deviation of 0.46 MGD prior to surcharge conditions. This situation appears to provide a greater balance between reserve capacity and maintenance of self-scouring capability than the first example.

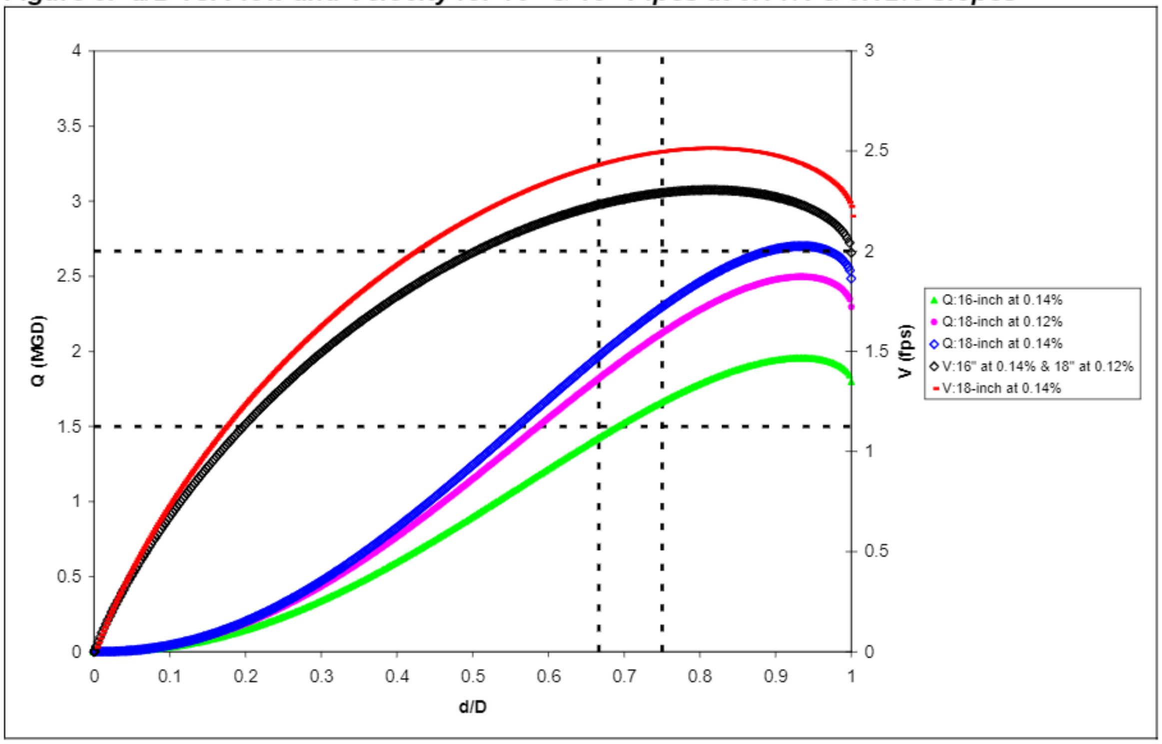
However, if a 16" pipe at 0.14% can be used then it is likely that an 18" pipe could also be used at the same slope. In this case (a design flow of 1.5 MGD with 18" pipe @ 0.14%) the 2 fps velocity threshold occurs at 0.92 MGD and the maximum pipe capacity is 2.70 MGD. Thus, for the same slope, the velocity safety factor would be approximately the same for both 16" and 18" pipe although the 18" pipe would be weighted more heavily towards providing additional flow capacity.

It should be noted that the above scenarios would occur for any design where the estimated design flow marginally exceeds a smaller pipe's capacity at the maximum allowable depth of flow, requiring either an increase in slope or pipe diameter to meet the criteria. In selection of the criteria, the question becomes whether it is better to pick a value that is weighted more heavily toward ensuring high pipe velocities where the design flow is marginally above the criteria for a given pipe size or toward ensuring adequate reserve pipe capacity when the design flow is at or near (but still below) the criteria.

Ideally, specification of a range of d/D values (e.g., minimum d/D = 0.6, maximum d/D = 0.75) would be desirable to account for the variability in design flows and available pipe sizes.

However, specification of a minimum d/D is problematic because slopes for a given design may be significantly above the minimum.

Figure 3. d/D vs. Flow and Velocity for 16" & 18" Pipes at 0.14% & 0.12% Slopes



Conclusions/Recommendations

Although a number of sources recommend a maximum d/D ratio of 0.5 for smaller sewers, this value corresponds with the initial threshold for 2 fps velocities at minimum slopes and does not appear to provide adequate consideration for maintenance of self-scouring velocities. If the design flow is overestimated and/or the actual area development is overestimated or proceeds in multiple stages, actual pipe velocities during peak flows may be significantly below 2 fps, potentially leading to sewer maintenance problems associated with solids accumulation.

Many sources also advocate a maximum d/D ratio of 0.75 for larger sewers. The rationale for selection of a value of 0.75 and why a larger d/D ratio should be applied for larger sewers is not clear, and arguably, inconsistent with the relative importance of preventing surcharged conditions in trunk sewers vs. laterals. Also, the pipe size "cutoff" value for which a larger vs. smaller d/D ratio is applied varies by the source referenced. The 0.75 value does coincide approximately with the beginning of the flow range where maximum pipe velocity occurs and recommendations for this ratio may be associated with maximizing velocity in larger pipes to account for larger or heavier solids.

Although no written rationale for a 0.67 d/D ratio was found, a closer look at the d/D vs. flow & velocity relationships offers a simple explanation. As seen in Figure 4, the flow at a d/D value of 0.67 for a sewer at minimum grade is approximately equidistant from the minimum flow needed to achieve a 2 fps velocity and the maximum pipe capacity. Figure 4 is shown for 8" sewer at minimum grade but the relationship holds for any sewer at 2 fps full flow velocity. Thus, setting of the design flow depth at 2/3 of the pipe diameter represents a balance between the safety factor applied for the estimated design flow and the design full flow pipe velocity. Alternatively stated, this operating point provides for approximately the same positive or negative deviation on the flow curve before surcharging would occur and prior to the point where the flow would fail to provide the minimum self-scouring velocity of 2 fps for sewers at minimum slope.

Figure 4. 8" Sewer @ 0.4% d/D = 0.67