HAMILTON-SOUTHEASTERN UTILITIES, INC.

DESIGN SPECIFICATIONS
FOR
SANITARY SEWER FACILITIES

CONTENTS

SECTION 1 – GENERAL

1.01 Definitions

For the purpose of these Design Specifications for Sanitary Sewer Facilities ("Design Specifications"), the following definitions shall apply:

A. "HSEU" shall mean Hamilton Southeastern Utilities, Inc., the public utility which provides sanitary sewer service in the Project (as hereafter defined) area. HSEU's address is 11901 Lakeside Drive, Fishers, Indiana 46038, and HSEU's phone number is (317) 577-2300.

B. "Engineer" shall mean the engineer for HSEU, which is Sanitary Management & Engineering Company, Inc. ("SAMCO") or SAMCO's engineers. SAMCO's inspector shall be Engineer's representative during construction of the Project. SAMCO's address is 11905 Lakeside Drive, Fishers, Indiana 46038, and SAMCO's phone number is (317) 577-1150.

C. "Subscriber" shall mean those signatories identified as Subscribers under a Special Contract for Extension of Sewer Mains and Facilities with HSEU through which the Project is being undertaken. Subscriber is generally the Owner under a construction contract. This definition is intended to include all employees, sub-contractors and/or agents acting in the interest of Subscriber.

D. "Contractor" shall mean any construction contractor approved by HSEU to construct, install, maintain, repair, and remove public or private sanitary sewer facilities within the HSEU service area. This definition is intended to include all employees, sub-contractors and/or agents acting for or on behalf of Contractor's company.

E. "Design Engineer" shall mean the engineer sealing the Construction Plans, as opposed to Engineer for HSEU who is also defined under these Design Specifications. This definition is intended to include all employees, sub-contractors and/or agents acting for or on behalf of Design Engineer's company.

F. "Record Drawing Engineer" shall mean the engineer who will certify the record drawings, as opposed to Engineer for HSEU and Design Engineer, both of whom are also defined under these Specifications. Record Drawing Engineer and Design Engineer may be the same person or represent the same company. This definition is intended to include all employees and/or agents acting for or on behalf of Record Drawing Engineer's company.

G. "Project" shall mean any sanitary sewer facilities constructed within the service area of HSEU and shall include all work necessary for the installation of all sanitary sewer infrastructure and appurtenances in conformity with HSEU approved construction drawings and the standards, specifications, and details of HSEU.

H. "Conveyed" with regards to sanitary sewer facilities means Projects for which HSEU has received title.

I. "Private" shall mean Projects from which sewage flows into HSEU's sanitary sewer facilities, but for which title for the sanitary sewer facilities is not to be conveyed to HSEU.

J. "Completed" shall mean any Projects which are acceptably constructed, tested and through which customer service has been authorized by HSEU. All applicable fees must be paid to HSEU prior to a Project being deemed Completed.

K. "Construction Plans" shall mean primary plats, secondary plats, sets of construction drawings, architectural plans, shop drawings, landscaping plans, record drawings, easements, deeds, covenants and restrictions and any other documentation to be submitted under these Design Specifications. Construction Plans must meet the applicable standards in effect at the time the documents are submitted.

L. "Completion Documentation" shall mean record drawing and other documentation to be submitted under HSEU's "Sanitary Sewer Completion Specifications". Completion Documentation must meet the applicable standards in effect at the time the documents are submitted.

M. "EDU" shall mean Equivalent Dwelling Unit. One EDU equals three hundred (300) gallons per day which is the anticipated water usage of one residence in HSEU's service area.

N. "Ultimate Depth" as it pertains to separation distances shall mean the greatest depth of cover from the invert of the pipe to grade, whether constructed initially or increased by additional fill placed in the future.

1.02 Purpose

The purpose of these Design Specifications is to define the standards for engineering design, preparation of construction drawings and plats, construction specifications and easements related to the Project which will allow for the orderly and proper installation of sanitary sewer facilities constructed within HSEU's service area.

These Design Specifications presume its user will possess a basic understanding in civil engineering design, construction, or land alteration. Readers of these Design Specifications who are not qualified by education or experience should consult with a more qualified person or persons possessing professional expertise in one or more of these fields prior to application of the requirements set forth herein.

1.03 Applicability

These Design Specifications are applicable for all public and private sanitary sewer facilities which will be connected to HSEU's sanitary sewer system. This includes Private Projects which will not initially be connected to HSEU's sanitary sewer system but at some future date may be connected to the system.

1.04 Liability and Costs for Project

No direction, field directive or other instruction contemplated by these Design Specifications and/or conducted by others shall accrue any liability, charge, or cost to HSEU, Engineer or Engineer's inspectors. The Utility will not assume responsibility for noncompliance with the referenced specifications as a result of information not provided in these Specifications.

1.05 Specifications and Details Sheets

A. HSEU's Gravity Sanitary Sewer Details sheet, Sanitary Sewer Specifications sheet, Horizontal Bore Specifications sheet, Lift Station Electrical Diagram sheets, Lift Station and Force Main Details sheet, Lift Station and Force Main Specifications sheets, Standards for Design and Construction of Laterals, Rules and Regulations, and Master Plan are integral parts of these Design Specifications. Design Engineer should become familiar with these documents prior to the initiation of any sanitary sewer facility design to be constructed within HSEU's service area.

B. These Design Specifications and HSEU's Master Plan and other standards, specifications and details are complementary in nature and should not be interpreted individually.

C. These Design Specifications and HSEU's Master Plan and other standards, specifications and details are subject to revision at any time. Any changes that may occur during design of the Project must be incorporated before approval. These documents are also subject to revision at any time during construction when, in Engineer's opinion, those revisions materially affect the maintenance, operation or life of the Project. All such revised documents must replace the corresponding documents in the construction drawings.

D. HSEU reserves the right to modify or waive any of these Design Specifications and/or its Master Plan and other standards, specifications, and details in its best interest.

1.06 Drawing Discrepancies and Omissions

A. Design Engineer must notify Engineer of any conflicts between these Design Specifications and HSEU's Master Plan and other standards, specifications, and details. Resolution of any such conflict shall be at Engineer's sole discretion.

B. Any design requirements which are not covered in these Design Specifications or HSEU's other standards, specifications, and details, but are required for construction of the Project, must be approved by Engineer prior to approval of the construction drawings.

1.07 Notices

All notices required by these Design Specifications must be given to both HSEU and Engineer at their respective business offices.

1.08 Compliance

A. Engineer will make final determinations as to the ability to reasonably comply with these Design Specifications.

B. These Design Specifications are intended to define the design requirements of sanitary sewer facilities which are constructed and operated under typical conditions in HSEU's service area. Depending on field conditions and the composition and characteristics of the sanitary sewer flow, different or unusual conditions may occur which cannot be anticipated in a document of this nature. Consequently, Engineer may impose additional or special design requirements under such circumstances.

SECTION 2 - GENERAL PROCEDURES

2.01 Contract

Subscriber must enter into an agreement with HSEU to provide sanitary sewer service to the Project.

2.02 Fees

A. Preliminary Plan Review ("PPR").

PPR fees will need to be paid to HSEU prior to Engineer reviewing the Construction Plans and issuing formal comment review letters on the Project. For commercial projects where EDU's are determined from the Architectural, Floor and Plumbing Plans, one (1) comment letter can be issued prior to receiving PPR fees.

B. Contribution.

C. Connection.

D. Inspection.

E. Subsequent Connectors (If Applicable).

F. Contact HSEU with questions regarding monthly fees and fee structure for surcharge of high strength effluent.

2.03 Affected Party

A. HSEU and Engineer must both be listed as an affected party on the Indiana Department of Environmental Management ("IDEM") permit application for all Projects within HSEU's service area.

B. When connecting into a sanitary sewer controlled by an entity other than HSEU (For example, a City or Town), that party must be listed as an affected party on the IDEM permit application.

2.04 Waste Load Allocation Letter

HSEU will not issue the IDEM waste load allocation letter until the following:

A. PPR fees have been paid to HSEU.

B. Sanitary sewer plans are compliant with the Design Standards and either ready for HSEU approval or contain minor items of corrective action.

C. An Indiana Department of Environmental Management (IDEM) "327 IAC Article 3 Construction Permit – Sanitary Sewer Design Summary Form" is submitted by Design Engineer to HSEU for review prior to IDEM submission.

2.05 Contractors

A. An HSEU approved Contractor must construct all mainline sanitary sewer facilities, including Private sanitary sewer facilities.

B. An HSEU approved lateral Contractor must construct all laterals, including Private sanitary sewer facilities.

C. All HSEU approved Contractor foreman and pipe layers are subject to an annual review to demonstrate a capable aptitude of the HSEU specification requirements.

2.06 Inspection

A. Engineer's inspector may be required to always be present for construction inspection of all sewer facilities, including Private sanitary sewer facilities per Engineer's discretion. For requirements regarding the inspection of gravity sanitary sewer mains refer to HSEU's Gravity Sanitary Sewer Specifications, force mains refer to HSEU's Lift Station and Force Main Specifications, and laterals refer to HSEU's "Standards for Design and Construction of Laterals."

B. To schedule inspections of mainline sewers and force mains, contact HSEU a minimum of twenty-one (21) days prior to the initiation of construction.

C. To schedule inspections of lateral hookups, contact HSEU a minimum of seventy-two (72) hours prior to initiation of construction. See "Standards for Design and Construction of Laterals" for additional requirements that must be met at that time.

D. All sanitary sewer facilities, including Private sanitary sewer facilities, will be assessed inspection fees.

2.07 Testing

All sanitary sewer facilities, including Private sanitary sewer facilities, will be tested in accordance with procedures outlined on either HSEU's Gravity Sanitary Sewer Specifications sheet, Horizontal Bore Specifications sheet, or Lift Station and Force Main Specifications sheet.

SECTION 3 - EASEMENTS AND DEEDS

3.01 Platted Easements

A. All sanitary sewer facilities which will be conveyed must be constructed within land platted or recorded as a sanitary sewer or utility easement or land to be deeded to HSEU. At Engineer's discretion, sanitary sewer facilities may be constructed within public rights-of-way with written approval from the appropriate governmental agency.

B. The definition of sanitary sewer and utility easements must allow for the construction, extension, operation, inspection, maintenance, reconstruction, and removal of sanitary sewer facilities and give HSEU the right of ingress/egress. If the plat includes sanitary sewer and utility easements, the definition of utility easements must also include the uses specified in sanitary sewer easements.

C. Easements may be requested to provide sanitary sewer service to adjoining parcels. These easements may be in the form of standard sanitary sewer/utility easements or easements "in favor" of an adjoining parcel. Depending on site-specific conditions, Engineer will determine the appropriate easement type.

3.02 Off-site Easements

A. All off-site sanitary sewer facilities will need to be constructed in a sanitary sewer easement. Sanitary sewer facilities will be considered off-site unless they are contained within a platted sanitary sewer or utility easement immediately following construction Completion.

B. It will be the responsibility of Design Engineer to identify and notify Engineer of any gaps or overlaps. Depending on the route of the sanitary sewer facilities, a route survey may need to be prepared to prevent gaps between dedicated easements.

C. Engineer will determine the appropriate easement type. For example, metes and bounds, route survey, etc. Early coordination is recommended to eliminate delays during Construction Plan approval process.

D. HSEU's standard sanitary sewer easement agreements must be utilized. A fully completed (including name and address of grantor) and executed agreement must be submitted to Engineer for review and approval prior to being recorded. Engineer will record all easements granted to HSEU. Easements granted to HSEU that have not been reviewed and approved may need to be re-recorded.

E. A copy of the current deed for all parcels over which the easement is to be granted must be submitted with the easement documentation (legal description and drawing). If the current deed is not a Warranty deed or other extenuating circumstances exist (Land Contract, Affidavit of Survivorship, etc.), additional deeds may be required. In these instances, contact Engineer for clarification.

F. A copy of the current land title survey for all parcels over which the easement is to be granted must be submitted with the easement documentation.

G. A legal description prepared as follows must be submitted with the easement documentation:
   1) Labeled as "Exhibit A".
   2) Contain all appropriate controlling calls. Controlling calls are required to minimize problems with gaps or overlaps.
   3) Design Engineer shall also consider the appropriate basis of bearings.

H. A standard scale (1"=50', 1"=100', etc.) drawing of the legal description labeled "Exhibit A" must be submitted. The drawing will be recorded with the easement agreement; however, it may be prepared as a stand-alone document on legal or letter size paper. The drawing must provide the following:
   1) Complete name of property owner(s) and other affected parties (For example, properties under a land contract, etc.).
   2) Type of document (Warranty Deed, Quitclaim Deed, Land Contract, etc.) for current property owner(s) and other affected parties with instrument numbers.
   3) Commencement points and commencement calls.
   4) Point of Beginning.

5) North arrow and scale.
6) Bearings and distances.
7) Section corners and section lines.
8) Approximate location of all affected parcel lines with deed references.
9) All other easements with instrument numbers.
10) Identify the easement on the drawing. Please cross hatch the area rather than shade the area. Shading does not copy clearly.

I. The legal description and drawing must also include the following:
1) Signed and certified by an appropriately registered Indiana land surveyor.
2) For metes and bounds descriptions, the calculated closure of the description must be within 0.03 +/- feet.
3) Sheet numbers in the form of "Sheet 1 of 2," "Sheet 2 of 2," etc.
4) Indicate a revision date.
5) Comply with the requirements of the Hamilton County Recorder's Office.

J. Copies of additional deeds (Adjoiner's deed, Land Contract, Affidavit of Survivorship, etc.), referenced documents (Land Title Surveys, State Highway construction plans, etc.), other utility easements across the affected parcels, etc. must be submitted with the easement documentation.

K. Encroachment agreements when crossing existing exclusive utility easements or rights-of-way, legal drains, railroads, etc. must be submitted with the easement documentation.

3.03 Minimum Easement Width

A. Minimum easement width is based on the Ultimate Depth of sanitary sewer facilities as follows:

Depth of Sewer	Easement Width
Up to 15 feet	20 feet
15 to 20 feet	25 feet
20 to 25 feet	30 feet
25 to 35 feet	40 feet
Over 35 feet	Case by case basis

B. Larger easement widths may be required based upon soil/groundwater conditions and Master Plan issues.

C. Where possible, all sanitary sewer facilities shall be centered in the easement. If it is not possible to center the sewer within an easement, easement will need to be increased so the minimum separation between the centerline of the sanitary sewer facilities and the edge of the easement is at least one-half the easement width required at that depth.

D. For sanitary sewers twenty-four (24) inches and larger, the easement width will be determined on a case-by-case basis but shall not be less than a minimum of fifty (50) feet in width.

E. Based on as-built locations of sanitary sewer facilities, Engineer may request additional easements to comply with the required minimum horizontal separation distances (from edge of easement to center of sanitary sewer facilities) versus Ultimate Depth. To avoid requests for additional easements, Engineer recommends the following:

1) Subscriber and Design Engineer may wish to grant wider easements.
2) Prior to recording the plat and based upon as-built location/depth of sanitary sewer facilities, Design Engineer should review minimum horizontal separation distances and adjust easements accordingly.

3.04 Additional Easements

A. HSEU reserves the right to require additional easements due to the configuration of sanitary sewer facilities and/or development.

B. Wider easements may be required for installation of an access drive. For example, at all angle breaks in the route of sanitary sewer facilities.

C. Temporary or permanent easements may be required for specific issues related to construction or maintenance of Project. For example, storage of materials and accessibility of construction equipment.

D. Sanitary sewer facilities not constructed adjacent to a public right-of-way may, at HSEU's discretion, require ingress/egress easements. The means of access and easement width will be determined on a case-by-case basis.

3.05 Easements or Rights-of-Way Granted to Other Entities

A. HSEU will request copies of proposed/existing easements and rights-of-way crossing over sanitary sewer facilities or contained within the boundary of Project.

B. HSEU may request encroachment agreements from entities impacted by construction of a Project. Generally, encroachment agreements will be requested when the entity has been granted a previously recorded exclusive easement.

3.06 Deeds for Lift Stations

A. Prior to Completion, a Warranty Deed granted to HSEU is required for all lift stations. The legal description and drawing shall be prepared as described in Section 3.02 Off-site Easements (G - I).

B. A sanitary sewer easement that adjoins the lift station parcel will also need to be granted to HSEU.

C. Lift station parcel and surrounding easement must be of adequate size to allow for full excavation of lift station, considering the excavated material will need to be stored on lift station parcel according to the "Storage Capacity (In Tons) of Cone- or Tent-Shaped Stockpiles of Sand or Gravel" table described in the Highway Extension and Research Project for Indiana Counties and Cities ("HERPICC"), "Job Guide."

D. Engineer will approve size of the deeded parcel and surrounding easement.

E. After construction is Completed, Design Engineer will be required to monument (capped re- bar) lift station property corners.

SECTION 4 - COVENANTS AND RESTRICTIONS

4.01 Standard Requirements

The following comments must appear in the Declaration of Sewer Restrictions and be recorded against the deed of the property:

A. "All Roadways, Blocks, Common Areas, and Easements including but not limited to Sanitary Sewer, Drainage, Citizens Energy Group, Sewer, Non-Access, Variable, Landscaping, and Utility and or the combination thereof on the Real Estate may be used for the construction, extension, operation, inspection, maintenance, reconstruction, and removal of sanitary facilities and provide HSEU the right of ingress/egress."

B. "Pavement or concrete, including driveways and sidewalks, shall not be constructed on or within one (1) foot horizontal distance of any sanitary sewer castings."

C. "The drip line of all trees must be located a minimum of ten (10) feet from the center of sanitary sewers and manholes. No trees shall be planted directly over building sewers (laterals). Any landscaping placed within easements or rights-of-way is at risk of being removed by utilities without the obligation of replacement."

D. "No other utilities (natural gas service, electric power lines, electrical transformers, telecommunications equipment, etc.) shall be placed within five (5) feet of a manhole ~~casting~~. Owner (Builder/Developer) is responsible for removal, repair and/or redirection required of utilities which are located within the sanitary sewer easement or utility easement which violate the required separation or may be disturbed due to construction or maintenance access of sanitary manhole infrastructure during the period of an active construction bond for the infrastructure."

E. "No landscaping, toe of slope of earth mounding, lighting, fencing, signage, retaining/landscaping/entrance walls, irrigation lines, etc. shall be placed within ten (10) feet of the center of the sanitary sewer facilities. Owner is responsible for all repairs and replacement to landscaping, mounding, lighting, fencing, signage retaining/landscape/entrance walls, irrigation lines, etc. that are located within a sanitary sewer or utility easement which may be disturbed due to the construction or maintenance of the sanitary sewer facilities."

F. "A minimum of twenty (20) feet of horizontal separation must be maintained between sanitary sewer facilities and the top of bank of all water ways, including lakes and dry detention areas. Owner is responsible for all repair, replacement, and dewatering costs."

G. "Subscribers are responsible for all maintenance, repair and replacement of all grinder/ejector pumps, force mains and laterals from the building to its connection to the sanitary sewer main."

H. "The discharge of clear water sources (foundation drains, sump pumps, roof drains, etc.) to the sanitary sewer is prohibited."

I. "Grade changes across sanitary sewer facilities must be approved in writing by Hamilton Southeastern Utilities, Inc."

J. "Hamilton Southeastern Utilities, Inc., its successors or assigns are granted the right of ingress/egress over and across all paved or concrete surfaces."

K. "The covenants and restrictions contained herein shall run with the Real Estate and shall bind Owner and its successors and assigns and all subsequent Owners of the Real Estate and shall inure to the benefit of Hamilton Southeastern Utilities, Inc. and its successors and assigns as providers of sanitary sewer service to the Real Estate."

4.02 Conditional Requirements

The following comments must appear in the Declaration of Sewer Restrictions and be recorded against the deed of the property when the described condition exists:

A. "The Homeowner's Association will be responsible for all repairs to decorative (surfaces other than broom finished concrete or asphalt) or private streets due to construction or maintenance of sanitary sewer facilities." Note: This comment needs to appear when private (not maintained by the City of Noblesville, Hamilton County Highway, Town of Zionsville, or Boone County Highway) streets are constructed.

B. "Hamilton Southeastern Utilities, Inc. will not be responsible for damages due to sewer backups into wet well/buildings served by I&A tanks or grinder/ejector pumps."

4.03 Review

To eliminate amendments, HSEU recommends that Engineer review the covenants and restrictions of each Project prior to them being recorded.

SECTION 5 - MASTER PLANNING

5.01 Service Area

Sanitary sewer facilities must be designed to serve the anticipated flows from the entire upstream service area. When service will be extended beyond a Project, Design Engineer may be requested by Engineer to provide the following:

A. A drawing or map indicating the upstream service area for which the Project's sanitary sewers are designed to service. A preliminary layout, to scale, of the upstream service area shall be shown. Layout is to be plotted at one of the following scales: 1" = 10', 20', 30', 40', 50', 60', or 100' and include pipe size, and manhole Top of Casting and invert elevations. The service area will generally follow parcel boundaries and drainage sheds. However, in certain drainage sheds, Engineer has performed detailed master planning which indicates the anticipated service route of certain parcels. Design Engineer should refer to HSEU's most current master plan for further information and request relevant information from Engineer.

B. Calculations of the upstream service area with all applicable lift station connections from other drainage sheds (in acres), developable/flood plain area (in acres), anticipated developed density (EDU's per acre and total EDU's) and anticipated flows (average flows in GPM, peaking factor, and peak instantaneous flows in GPM if anticipated to be different from peaking factor).

5.02 Service to Adjoining Parcels

A. Sanitary sewer facilities must be designed to accommodate connection of all future subdivision sections and/or unserved parcels within the service area. Sanitary sewer facilities must be designed to the boundaries of a Project when future extensions are anticipated.

B. It will be the responsibility of Subscriber to extend interior sanitary sewer facilities to boundary of the development for future service to adjoining properties as directed by Engineer.

C. Easements shall be requested to provide sanitary sewer service to adjoining parcels.

5.03 Design Considerations

A. Gravity sanitary sewers that will be extended in the future must connect to existing manhole at the lowest possible elevation and extend upstream at minimum grade and/or demonstrate sanitary service availability for upstream areas compliant with the Utility's Master Plan.

B. No more than four (4) connections to manholes, three (3) incoming and one (1) outgoing, will be allowed. Connections to existing manholes will be evaluated on a case-by-case basis to determine if rehabilitation will be required. Rehabilitation methods will be determined on a case-by-case basis.

C. Sanitary sewer facilities constructed near waterways must be designed at an adequate depth that allows gravity access across the waterway to the opposite side. Gravity access must be designed to maintain adequate separation (from bottom of waterway) or as specified for regulated drains and storm sewers, water ways and field tiles as instructed by Engineer.

SECTION 6 - DESIGN REQUIREMENTS

These design requirements are applicable to gravity sewers, force mains and lift stations.

6.01 Vertical Datum

A. All sanitary sewer facilities must be designed based upon an HSEU approved vertical control monument on a vertical datum of NAVD 1988. Vertical control monuments are detailed in HSEU's "Horizontal and Vertical Control Data" which is available upon request from Engineer.

B. A permanent Benchmark is to be established near the entrance of Section 1 on a new development.

C. At least one (1) local Temporary Benchmark (TBM) is to be maintained within one thousand (1,000) feet of active work.

6.02 Improvements to Downstream Sanitary Sewer Facilities

A. Engineer will make the determination as to the need for improvements to downstream sanitary sewer facilities. Early coordination is recommended to eliminate delays during design.

B. Engineer will evaluate downstream capacity of the receiving sanitary sewer. Engineer will rely upon the following:

1) Available Data/Information including:
   a) Existing flow monitoring data
   b) Sanitary sewer studies
   c) Maintenance records
   d) Complaint records
   e) Past and/or proposed projects
   f) Any other information deemed relevant by Engineer.
2) Additional Data/Information may be required from applicant if Available Data/Information is not adequate to make an informed decision on the adequacy of downstream facilities. The necessary task will be conducted at no cost to the utility. Such task may include:
   a) Temporary monitors: complexity of the downstream system will determine number required.
   b) Monitoring duration shall be a minimum of sixty (60) days or until two (2) rainfall events of one (1) inch or more in a 24-hour period is recorded, whichever is the greater period of time.
   c) If possible, part of the monitoring period shall be done during the months of March, April, May, and June. However, if monitoring cannot be done during those months, Engineer will consider an alternate time period.
   d) Monitoring shall not be done during the month of January.
   e) Temporary rain gauges shall be installed at or near temporary flow monitoring site(s) during the flow monitoring period unless monitors are located within one-half (1/2) mile of an operating utility rain gauge.
   f) Flow Monitoring Data and Format shall include the following as a minimum:
      I. Depth/Velocity Hydrographs
      II. Flow Hydrographs
      III. Scatterplots / Scatter graphs
   g) Other requirements as deemed necessary.
3) Hydraulic Modeling - Engineer may require extension of the utilities existing sanitary sewer collection system model to the point of connection of proposed development. If a Model extension is necessary, the SWMM Model shall be used. To assure consistency, the Model shall be coordinated with the consultant currently being used by the utility.
4) Lift Station System Evaluation - Engineer may require an evaluation of one or more lift station systems. The evaluation may include the following systems:
   a) Hydraulic

b) Electrical
c) Mechanical
d) Instrumentation & Control

5) Other evaluations as deemed necessary.

C. If Engineer determines downstream capacity is not available for proposed flow from the development, Applicant has the following options:
   1) Make additional capacity in the system, and/or
   2) Connect to an alternate point within sanitary sewer system. A downstream analysis of alternate system may be required.

D. Improvements may include, but are not limited to:
   1) Upgrades and/or additions to the pumps, flow meters, controls, and station piping of downstream lift stations.
   2) Installation of parallel force mains for downstream lift stations.
   3) Installation of coatings in manholes and lift stations facilities to be approved by Engineer.
   4) Installation of odor control facilities. Contact Engineer for specific applications.

6.03 Size

A. Sanitary sewer facilities must be designed to serve anticipated flows from the entire upstream service area. Subscriber shall contact Engineer to determine the applicability of over-sizing costs for each Project.

B. No public gravity sewer will be less than eight (8) inches in diameter.

C. No public force main will be less than four (4) inches in diameter, except in a low-pressure common force main system.

6.04 Slope

A. HSEU will not accept gravity sewers designed or installed below minimum slope as specified in Recommended Standards for Wastewater Facilities "Ten States Standards" (most recent Edition) and/or 327 IAC Article 3, whichever is more restrictive. It is strongly recommended that gravity sewers be designed at slopes greater than the minimum regulatory requirements (i.e., 0.45% for 8"). This additional slope allows Contractor some leeway during construction.

B. Where possible, minimum slope of end-run gravity sewers shall be 2.00% but in no case be less than 1.00%. End run length shall be maximized to reduce the number of manholes. An end-run sewer is defined as follows:
   1) Upstream manhole has no influent flows, and
   2) A sewer is not planned to be extended from the upstream manhole in the future.

C. If a drop manhole can be constructed to avoid slopes greater than 4.00%, then HSEU generally will require the drop manhole to be constructed.

D. If Engineer permits gravity sewers to be designed at slopes greater than 4.00%, then Design Engineer must provide sealed calculations regarding a hydraulic jump in the downstream manhole. Design Engineer must provide calculations for design flow and determine flow rate at which the hydraulic jump would occur.

E. Concrete restraining blocks keyed into the adjacent trench wall may be required for lines designed at slopes greater than 15.00%. Provide sealed calculations of the dimensions necessary for the restraining blocks with Construction Plans. Contact Engineer for a standard detail to be incorporated into the plans if concrete restraining blocks are required.

F. Force mains must be designed at a constant positive slope from low points to air/vacuum relief valves.

6.05 Cover and Concrete

A. A minimum of seven (7) feet of vertical cover must be maintained from grade to the crown of all gravity sanitary sewer mains.

B. Laterals should maintain a minimum cover of five (5) feet. The least amount of cover is generally where the lateral crosses below the gutter of the street on the far side of the road. Engineer calculates lateral cover by assuming:

1) Lateral invert elevation is the top of pipe elevation of the main line to which the lateral connects.
2) Lateral is installed at 1.00%.

C. If adequate vertical cover cannot be maintained on gravity sewer laterals, then:

1) Concrete capping must be installed when cover is four (4) to five (5) feet.
2) Concrete encasement must be installed when cover is three (3) to four (4) feet.
3) On the Sanitary Plan and Profile sheet, Plan View must label the concrete and graphically indicate any concrete capping or encasement.
4) Add an easily identifiable note in the Plan View near the appropriate lot/building which states, “Lateral(s) servicing (provide lot number or building name) must be installed at maximum depth. Depending on cover, lateral(s) may require concrete capping or encasement from (provide beginning station) to (provide ending station).”
5) Under no circumstances will vertical cover be permitted to be less than three (3) feet.

D. When wyes are installed on main line sewers at an Ultimate Depth of twelve (12) feet or greater, the wye shall be concrete capped.

1) Plan View must graphically indicate the concrete capping.
2) Add an easily identifiable note to the Plan View near the appropriate lot/building which states, “Depending on cover, wye servicing (provide lot or building) shall be concrete capped.”

E. A minimum of five (5) feet of vertical cover must be maintained from grade to the crown of all force mains.

F. A minimum side cover of ten (10) feet (as measured horizontally from the sewer spring line) should be maintained from grade.

G. If adequate side cover cannot be maintained
   1) The side slope must be protected with gabions in accordance with Indiana Department of Transportation standards or a concrete retaining wall (design approved by HSEU) must be installed when cover is six (6) to ten (10) feet.
   2) Under no circumstances will side cover be permitted to be less than six (6) feet.

6.06 Materials of construction

A. Based on the Ultimate Depth of the gravity sanitary sewers, the following types of pipe are to be used:

Depth of Sewer	Pipe Type
Up to 30 feet	PVC: ASTM D-3034 (SDR 26) or ASTM D-2241 (SDR 21, PS 225 or greater) or AWWA C-900 (DR 18, PS 364 or greater) or AWWA C-905 (DR 25 or DR 18, PS 115 or greater) or PE: ASTM D3350 or AWWA C906 (DR11)
Over 30 feet.....	Contact Engineer.

B. Vitrified Clay Pipe (VCP), Reinforced Concrete Pipe (RCP), Truss and Closed Profile Large Diameter PVC Pipe for gravity sewer construction is not permitted.

C. Pipe blue in color shall not be used to avoid confusion with water pipes unless approved by Engineer, marked appropriately, and documented as such in the Utility's GIS system.

D. Upon request, Design Engineer shall submit all calculations verifying pipe selected is acceptable.

E. PVC pipe must be free from fading and discoloration.

F. PVC pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape; illegible markings as required; deep or excessive gouges or scratches of the pipe wall; fractures, punctures, or cracks passing through the pipe wall; damaged ends where such damage would prevent making a satisfactory joint and thickness variations.

G. All field cutting of pipe shall be done in a neat, trim manner without overlap using a hand or power saw, and the cut end shall be beveled using a file or wheel to produce a smooth bevel of approximately fifteen (15) degrees and be a minimum depth of one third (1/3) the pipe wall thickness or beveled as specifically recommended by the pipe manufacturer. Field cut pipe will only be installed at manholes, at prefabricated tees and wyes, and at the connection of new sanitary sewer to existing sanitary sewer.

H. Force mains must be constructed of PVC Pressure Pipe conforming to
   1) 36" or smaller - ASTM D-2241 (SDR 21 class 200)
   2) 4" to 12" - AWWA C-900 (DR 18, class 150)
   3) 14" to 48" - AWWA C-905 (DR 18, class 235 or DR21, class 200)
   4) PE when used at a directional bore unless otherwise approved by Engineer in writing.

6.07 Buoyancy

A. The buoyancy of sanitary sewer facilities must be incorporated into the design of a Project when high ground water conditions are anticipated or intermittent saturation of granular backfill around manholes and lift station facilities to a shallow depth.

6.08 Sanitary Sewer Manholes

A. The maximum allowable distance between gravity manholes is six hundred (600) feet for sewers eight (8) inch diameter or greater, per IDEM Alternative to Technical Standards.

B. Location

1) Gravity manholes must be installed at the following:
    a) End of each stub, if greater than one hundred (100) feet.
    b) Changes in alignment.
    c) Changes in size.
    d) Changes in slope.
    e) At the intersection of all main line sewers.
    f) Engineer may require manhole with change of pipe type or material.
    g) Number of manholes should be kept to a minimum and Engineer may require a realignment to facilitate this.
    h) To minimize the potential for I/I, manholes shall NOT be designed or installed in any drainage path such as, but not limited to:
        I. Swales or ditches
        II. Roadside gutters
        III. Low points
        IV. Adjacent to storm water inlets
        V. Other areas Engineer deems necessary.
2) Pavement or concrete, including driveways and sidewalks, must not be constructed on or within one (1) foot horizontal distance of any sanitary sewer casting.
3) Where practical, manholes should be located on lot lines within subdivisions.
4) Manholes cannot be located in the rear of a lot unless approved by Engineer, and access must be provided as described in Section 6.08-C Sanitary Sewer Manholes (Access).
5) Manholes must be located to maintain minimum horizontal separations of five (5) feet around the perimeter from utilities, streets, storm sewers, etc.
6) When extending a gravity sewer, manholes located near the boundary may be required to be removed and gravity sewer extended as directed by Engineer.

C. Access

1) All-weather, highway-rated access drives must be provided for manholes that are not readily accessible (closer than one hundred (100) feet) from a public thoroughfare. Access drives must be constructed per the Asphalt Access Drive Detail on HSEU's Lift Station & Force Main Details sheet which must be included with the Construction Plans if an access drive is being constructed. If access drives are to be constructed, then add the following note to the Plan View near the access drive, "Construct all access drives per HSEU's Asphalt Access Drive Detail on sheet (provide sheet number)."

a) Gates must be added for all fence crossings. The distance from the open face of the gate to rights-of-way must be a minimum of thirty- five (35) feet and provide a clear access open width of twelve (12) feet.
b) If a gate is to be installed at a fence crossing, then add the following note in the Plan View near the fence crossing, "Contractor shall install gate and coordinate with SAMCO as to the direction the gate opens. Gate shall be installed with a hasp for use with a HSEU approved lock. Contractor shall purchase pad lock from HSEU."

2) Grading around manhole structures is to maintain a minimum flat area of a five (5) foot radius clear of any protruding structures (i.e. transformers, communication pedestals, retaining walls, fencing, etc.) and side slopes of 3:1, around top of casting.

D. Protection

1) Fixed pipe bollards will be required around all manholes that could be subjected to vehicular/farm traffic. Generally, pipe bollards will be required when manholes are located in an undeveloped area. Add note to profile near respective manhole that reads, "Contractor to construct pipe bollards around MH#(s) (provide manhole number(s))."
2) Removeable/lockable pipe bollards may be used at access drives.
3) HSEU's Gravity Sanitary Sewer Details sheet must be included with the Construction Plans.

E. Diameter

1) In general, the inside barrel diameter for manholes on sewers eighteen (18) inches or smaller in size is four (4) feet.
2) In general, the inside barrel diameter for manholes on sewers twenty-one (21) inches or larger in size is five (5) or six (6) feet as determined by Engineer.
3) Depending on size, quantity and orientation of the connecting sewers, larger barrel diameters may be required.
4) In general, only the bottom eight (8) feet of the manhole will be required to be larger than four (4) feet in diameter.
5) If a manhole needs to be installed with a diameter greater than four (4) feet, then add the following note to the profile near the respective manhole, "Contractor to provide (provide diameter) feet diameter base and barrel sections for MH #'s (provide manhole numbers)."

F. Manhole Steps

1) Design Engineer must consider placement of manhole steps relative to future extensions, whether on-site or off-site.
2) If future extensions may be connected to a structure, then add the following note to the profile near respective manhole, "Contractor must install the steps on the (provide astronomical direction) side of MH# (provide manhole number) to avoid conflicts with future extensions."

G. Top of Casting Elevation

1) Elevations must be set to ensure drainage away from manholes. Top of Casting elevations must be a minimum of four tenths (0.4) foot above finish dirt grade.

2) Elevations should be set eighteen (18) inches above current published DNR 100-year flood elevation of nearby water ways (including, but not limited to, lakes, ponds, streams and emergency spillways or storm water routing).
3) If an existing manhole top of casting needs to be adjusted, and adjustment involves more than just installing or removing adjustment rings, then add the following note to the profile near respective manhole, "Contractor to vacuum test MH # (provide manhole numbers) after top of casting is adjusted. Until final build out, a minimum of one (1) 4" adjustment ring must be installed on each manhole."

H. Watertight Castings

1) Design Engineer must consider the impact of emergency storm water routing on sanitary sewer facilities. Watertight bolted and gasketed manhole castings must be installed when top of casting elevation is less than projected for storm water routing.
2) Bolted and gasketed castings or other locking type castings must be installed on manholes located within the boundary of day care centers, schools, or other facilities where children are present.
3) When bolted and gasketed manhole castings are installed, add note in profile near respective manhole that reads, "Watertight bolted and gasketed castings are required for MH#(s) (provide manhole number(s)."

I. Invert Elevation Differences

1) Invert elevation difference shall be one tenth (0.10) foot in manholes in which the effluent and influent pipes create an angle of one hundred thirty-five (135) degrees to one hundred eighty (180) degrees.
2) Invert elevation difference shall be two tenths (0.20) foot in manholes in which the effluent and influent pipes create an angle of ninety (90) degrees to one hundred thirty-five (135) degrees.
3) Invert elevation difference for manholes in which the effluent and influent pipes create an angle of less than ninety (90) degrees will be determined on a case-by-case basis. This situation will only be allowed where no other alternative is available, and invert elevation difference shall be a minimum of three tenths (0.30) foot.
4) Invert elevation difference in which a smaller sewer joins a larger one is determined as specified in accordance with the Recommended Standards for Wastewater Facilities "Ten States Standards" (latest edition).

J. Cored Holes, Penetrations, etc.

1) For cored holes, penetrations and/or other openings through a manhole or other sanitary structure, HSEU recommends an internal separation of greater than eighteen (18) inches between outer edges of the openings, a larger diameter manhole shall be considered to suit the specific application as deemed necessary by Engineer.
2) All cored holes, penetrations and/or other openings through a manhole or other sanitary structure must have a minimum internal separation of eight (8) inches from outer edge of the openings.
3) All cored holes, penetrations and/or other openings into a manhole or other sanitary structure must have a minimum separation of six (6) inches from any joint.

4) If an existing manhole needs to be cored, then add note to the profile near existing manhole that reads, "Contractor to core existing manhole and install Press Wedge II boot. Contractor must contact SAMCO after completion of first joint to obtain as-built invert elevation of the core. After completion of work, Contractor must vacuum test manhole."

K. Drop manholes maybe allowed by HSEU's Engineer where the application is deemed justifiable. Excepting obvious extreme elevation changes, the Design Engineer must first show gravity service availability to all potential upstream service areas beyond the proposed drop manhole. Drop manholes will not be allowed when there could be a negative impact on future gravity service to potential upstream service areas. Pipe slope should be increased (not to exceed 6.00%) to preclude the use of drop manholes.

1) A drop manhole will need to be constructed when the influent invert elevation is more than one (1) foot above the effluent invert elevation.
2) Drops of eighteen (18) inches or more are to be constructed on the exterior of existing manholes pending review and approval of HSEU's Engineer. For new manholes, the drop(s) will be required to be integral to the manhole.
3) Sewers larger than ten (10) inches proposing drop connections will be evaluated on a case-by-case basis.
4) Internal drops will only be allowed if accepted by Engineer in writing. When approved, internal drop must be constructed as follows:
    a) Connections must be cored and sealed as approved by Engineer.
    b) Connection must be centered between the joints of the barrel section with a minimum of eight (8) inches of separation from the cored hole to any joint or seam.
    c) All piping within the manhole must be Polyethylene DR11 fusion welded joints.
    d) Top of the drop must be a tee fitting with one branch capped. Cap will prevent flow from by-passing the drop.
    e) Internal drop must be anchored to the wall of the manhole with stainless steel support bands/rods and stainless steel "Red Head" anchor bolts. Maximum separation between support is six (6) feet.
    f) Manhole must be grouted in such a manner that a channel is formed within the bench wall allowing for smooth flow.

L. Stubs

1) Stubs should be installed in manholes in which the orientation of future extensions are known.
2) HSEU generally does not allow stubs greater than one hundred (100) feet without the addition of a manhole. If Engineer determines that an exception should be granted, then no buildings or structures shall be connected to that segment of sanitary sewer until a manhole is added.
3) For testing purposes, the minimum length of any stub is five (5) feet. Plugs directly into the boot are not allowed.
4) If a stub is installed in a manhole, then add note in the profile near the manhole or stub that reads, "Prior to backfilling, Contractor must coordinate with Surveyor to obtain an upstream as-built invert elevation and accurate horizontal location. Contractor to mark end of stub location with a painted green 2" x 4"."

5) Typically, stubs will be removed and replaced when sewer is extended. Where connection to an existing stub is to be made, Design Engineer must field verify the size and type/class of pipe to ensure proper compliance with Utility specifications and details.

M. Bench Walls
1) If a manhole has no stubs **and** will be extended in the future, then no bench wall shall be installed until the extension is constructed. Add note in the profile view near the manhole that reads, "MH# (provide manhole number) must be installed without a bench wall."
2) If a manhole will not be extended in the future, then add note in the profile view near the manhole that reads, "Bench wall must extend across the entire width of MH# (provide manhole number) with a grouted flow transition at far wall to the top of the bench wall."
3) Generally, HSEU does not allow lateral connections into a manhole, however, if a connection is permitted, then the bench wall must be formed to receive flow from the lateral.

N. Sampling Considerations
1) All non-residential Subscribers must have an access point for sampling.
2) Engineer may require connection of a building's lateral directly to receiving manhole. Engineer will determine orientation of the lateral connection within receiving manhole.

O. Adding Manholes to Existing Sanitary Sewer Facilities
1) HSEU does not allow "saddle" or "doghouse" manholes.
2) Generally, HSEU does not allow manholes to be added to sanitary sewer facilities beyond those installed during original construction. Therefore, consideration of future connections must be addressed in the design process. If it is determined by Engineer that an exception should be granted, then the following considerations will apply:
   a) New manhole must be constructed per the Sanitary Manhole Detail on HSEU's Gravity Sanitary Sewer Details sheet.
   b) Ductile iron fittings may be used outside of new manhole at Engineer's discretion in writing.
   c) Contractor will need to perform low pressure air and deflection tests on the entire segment of existing sewer, both sides of the new manhole, and vacuum test the new manhole while maintaining continuous service.
   d) Engineer may require concrete encasement of the disturbed sanitary sewer facilities and/or a "mud slab" under the proposed manhole to prevent settlement.
3) If a new manhole is added onto an existing sewer, then add note in the profile near the respective manhole that reads, "Construct new manhole per HSEU's Gravity Sanitary Sewer Details sheet with ductile iron fittings. A "saddle" or "doghouse" structure will not be permitted. Contractor to low pressure air and deflection test the entire segment of existing sewer, both sides of the new manhole, and vacuum test the new manhole while maintaining continuous service. Segmentation of the line may be required if existing customers are connected into the sewer."

P. Clean-outs
1) HSEU does not permit the installation of a clean-out in place of a sanitary sewer manhole.

Q. Fiberglass or Corrosion Protected Manholes

1) Unless otherwise specified by Engineer, fiberglass manhole structures are to be used on interceptor sewers eighteen (18) inches or greater in size. In consideration of the upstream flow characteristics, alternative corrosion resistant high build coating systems applied across the lower eight (8) feet may be considered by Engineer.
2) If a manhole needs to be installed as a fiberglass or special coated structure, then add note in the profile near respective manhole that reads, "Contractor to install MH #'s (provide manhole numbers) as a one-piece fiberglass reinforced polyester manhole or approved corrosion protective coating applied. Contact SAMCO for specifications."

R. Refer to HSEU's Gravity Sanitary Sewer Details sheet for further information.

6.09 Laterals

A. HSEU prefers not to install laterals on sewers with an Ultimate Depth of twenty (20) feet or greater and/or to sewers eighteen (18) inches or larger. Therefore, Design Engineer shall contact Engineer to discuss alternatives.

B. HSEU may, at Engineer's discretion, allow lateral connections to a sewer beyond those installed during original construction. Laterals must connect to the sanitary sewer only at manufactured fittings. No "saddle" connections to the sanitary sewer will be allowed. Therefore, consideration of future connections must be addressed in the design process. If it is determined by Engineer that an exception should be granted, then add the following notes in the plan view near the respective lot:

1) By-pass pumping may be required to maintain continual service to all upstream users.
2) Disconnect existing sewer at an existing joint.
3) Contractor to maintain existing line and grade for reconstructed sewer.
4) Ductile iron coupling with transition gasket for the wye/existing sewer connection may be used if PVC couplings are not available. Water Grade fittings with "sanitary sewer" marker tape may also be used for limited applications as permitted by Indiana Administrative Code
5) Additional wye and coupling must be concrete encased.
6) Contractor will need to perform low pressure air and deflection tests on the entire segment of sewer, both sides of the new wye, while maintaining continuous service. Low-pressure air test may require segmentation of the sewer.

C. All gravity laterals must be a minimum of six (6) inches in diameter and size based on anticipated flows. For example, a lateral servicing a pool house may need to be larger based on peak filter backwash flow.

D. All PVC fittings must be ASTM D-3034 SDR-26 heavy wall minimum. Bell to spigot fittings may only be approved by Engineer.

E. Lateral length

1) Unless approved by Engineer in writing, no more than one hundred and fifty (150) feet of a lateral shall exist within a public right-of-way or beyond the boundary of the lot or parcel for which the lateral is designed to service.

2) Unless approved by Engineer in writing, no lateral shall be greater than two hundred (200) feet in length.

F. Slope
   1) Slope requirements must conform to the latest edition of the State of Indiana (Uniform Plumbing Code), local codes or these Design Specifications, whichever is more stringent.
   2) Laterals must be installed at a minimum of 1.00% and where possible, not exceed 6.00%.

G. No more than one (1) building or residence will be permitted to connect into a lateral. For multi-family residences (i.e., townhomes, condos, etc.) each unit will require a separate lateral.

H. Laterals cannot connect directly into a manhole, except as follows:
   1) Approved by Engineer in writing.
   2) On deep (greater than twelve (12) feet) or interceptors greater than ten (10) inches in diameter.
   3) On buildings in which HSEU may wish to flow monitor or sample flow characteristics.
   4) On buildings in which additional access to the lateral would be helpful. For example, schools.
   5) If a lateral is connected to a shallow (less than twelve (12) feet) manhole to avoid connection onto an interceptor, then add note in the profile near the respective manhole that reads, "Contractor to core existing manhole for the lateral servicing lot (provide lot number) and install Press Wedge II boot. The bench wall must be formed to receive flow from the lateral."
   6) If a lateral is connected to a deep (greater than twelve (12) feet) manhole to avoid connection onto a deep interceptor, then add note in the profile near the respective manhole that reads, "Contractor to core existing manhole for the lateral servicing lot (provide lot number) and install Press Wedge II boot. The bench wall must be formed to receive flow from the lateral. The lateral and fittings must be SDR 26 within five to eight (5 to 8) feet of final grade."

I. Laterals must connect to the main line sewer at an angle (as measured from the direction of flow) that is greater than ninety (90) degrees.

J. Tee wyes for laterals located on the sanitary sewer mainline must be designed and installed to obtain a minimum of fifteen (15) feet from the center of the manhole structures.

K. Laterals must be located to maintain minimum horizontal separations from utilities, streets, storm sewers, waterways, buildings, etc. as described in Sections 6.12 to 6.16.

L. Where possible, wyes and laterals should be located to avoid the following situations:
   1) Installation on interceptors greater than ten (10) inches.
   2) Installation on sewers constructed of AWWA C900 pipe.
   3) Installation below pavement or concrete, including streets, driveways, parking lots, etc.
   4) Installation below storm sewers or water ways.
   5) Installation below other utilities.
   6) Installation below mounding, retaining/landscaping/entrance walls and landscaping.

M. When practical and possible, HSEU recommends laterals be designed with a separation of ten (10) feet from boundary lines for future repair service.

N. When a lateral crosses a parcel other than the property it is intended to service, it must be constructed within a sanitary sewer easement or utility easement.

O. During construction of mainline sewer, laterals must terminate within a sanitary sewer or utility easement and be sealed with a manufactured cap/plug made specifically for the purpose of sealing/capping the end of the sanitary sewer to ensure 100% water tightness.

P. All laterals must be installed with an insulated #10 copper tracer wire along the top of pipe from the wye to the terminus. Mainline Contractor shall install the wire from the wye to the lateral marker at the surface. Lateral Contractor shall extend the wire from the terminus to the cleanout adjacent to the building.

Q. No fittings of greater than forty-five (45) degrees (1/8 bend) can be used.

R. Separation between wye fittings for opposite side laterals to be one (1) foot minimum for bell to bell. Bell to spigot may be adjacent only when approved by Engineer. For same side laterals, a minimum five (5) foot separation must be used. Common trenches for more than one lateral are not allowed, unless the minimum horizontal spacing between laterals can be maintained.

S. Laterals must have a wye clean-out located near the building's exterior wall and shall contain a backwater valve.

T. Subsequent clean-outs must be installed at a maximum interval of one hundred and fifty (150) feet. Therefore, no section of lateral between the building and mainline sewer shall exceed one hundred and fifty (150) feet without the installation of a clean-out.

U. From the building to the mainline sewer, it is recommended that a clean-out be installed after every three (3) fittings of twenty-two and a half (22.5) degrees or more, but in no case exceeding five (5) fittings between clean-outs.

V. When service is from the rear, a clean-out must be installed either on the side or front of the building so that a clean-out is always accessible, not fenced in.

W. Type 1 clean-outs must be installed in grass or landscape areas located within three (3) feet of building's exterior wall. All other installations must be Type 2 or Type 3.

X. Clean-outs on backwater valves shall be sized per backwater valve manufacturer's recommendations. All other clean-outs must be same diameter as the horizontal lateral into which the clean-out is connected, being a minimum of six (6) inches.

Y. Top of clean-out elevation must be designed in same fashion specified for Sanitary Sewer Manholes in section 6.08-G-2&3 Sanitary Sewer Manholes (Top of Casting Elevation).

Z. If off-site laterals are being installed, then add note in the plan view near respective lateral(s) that reads, "Contractor must install all off-site laterals with a minimum cover of six (6) feet from top of pipe to grade." Note: Laterals will be considered off-site if they are constructed in an area that will not be platted immediately following construction Completion.

AA. For further information, refer to HSEU's Design and Construction of Building Sewer Laterals, the Service Lateral Detail and Typical Cleanout details on HSEU's Gravity Sanitary Sewer Details sheet.

6.10 Force Mains and Common Force Mains

A. Air/Vacuum Relief Valves

1) Air/vacuum relief valves must be located at all high points along the force main and at distance intervals deemed appropriate by Design Engineer and approved by HSEU's Engineer.
2) The Design Engineer is to determine the location of air, vacuum or combination relief valves for approval by HSEU's Engineer. All of the valves are to have at least a three (3) inch base openings and be of stainless-steel construction as manufactured by ValMatic Corporation.
3) Design Engineer must consider both initial and ultimate flow ranges in sizing air/vacuum relief valves if larger than stated minimum. Design Engineer must submit calculations for review and approval.
4) Top of casting elevation of air/vacuum relief manholes must be designed as specified.
5) Access to air/vacuum relief manholes must be designed as specified.
6) Refer to the Air/Vacuum Release Manhole Detail of HSEU's Lift Station & Force Main Details sheet for further information.

B. Velocities in force mains of less than three (3) feet per second will only be accepted if the lift station or pumps are planned to be upgraded in the future.

C. No fittings of greater than forty-five (45) degrees (1/8 bend) can be used, except within the valve vault.

D. Where applicable, joint restraints shall be used. Restraining bolts and rods shall be stainless steel.

E. Thrust blocks must be installed as detailed on the Force Main Thrust Blocking detail of HSEU's Common Force Main Details sheet.

F. In accordance with "Recommended Standards for Wastewater Facilities" (latest edition) there shall be at least a ten (10) foot horizontal separation between water mains and sewer force mains except for crossings. Crossings shall be at 90 degrees or nearly so with an eighteen (18) inch separation between mains.

G. Flow Monitoring Considerations shall be as deemed necessary at Engineer's discretion.

Possible installation of a transit time or Mag meter with Data Logger mounted to the control panel or similar device:

1) Provide manufacturer and model number.
2) Provide a list of the required "options".

3) Contractor will need to supply shop drawings that will be reviewed and approved by Engineer.
4) Must be installed in a "straight through" manhole.
5) A manhole width of five (5) feet or larger is required.
6) To avoid turbulence, manholes must be constructed to maintain linear flow pursuant to the manufacturer's recommendations either upstream or downstream from the manhole with the monitoring device.
7) In the area of the flow monitor, the force main must be designed too always be full.

H. Force Main Discharge

1) Discharge to gravity sewers
   a) Discharge directly to gravity sewer lines via an existing pressure rated wye is the preferred method for force mains that are smaller than the gravity sewer to which the connection will be made.
   b) If a wye does not exist, contact Engineer to discuss adding a pressure rated wye.

2) Discharges to manholes
   a) Channels must be provided in the manhole for all force main discharges.
   b) Channels must be the size of the effluent sewer.
   c) Channels must be straight (not with a radius) to the greatest extent possible.
   d) Channels must be designed with the same elevation difference as specified for Sanitary Sewer Manholes.
   e) Refer to the Force Main to Manhole Detail of HSEU's Lift Station & Force Main Details sheet for further information.
3) If a force main connects to an existing gravity sewer, then Design Engineer shall contact Engineer to determine the upstream and downstream manholes that will be coated with Engineer approved method. This coating is to be applied to all structures, both upstream and downstream, within five hundred (500) feet or greater, if determined by Engineer, of the point of connection. Add note to profile near discharge point that reads, "Contractor shall provide a coating as approved by Engineer to the interior of any manhole within five hundred (500) feet either upstream or downstream of the point at which the force main is discharged."
4) If a force main connects to a proposed gravity sewer, then Design Engineer shall contact Engineer to determine the specification and extent of upstream and downstream manholes that will potentially be installed as one-piece fiberglass reinforced polyester manholes.
5) A bolted and gasketed casting must be installed on each manhole within two hundred (200) feet of a force main discharge.
6) Refer to the Force Main to Gravity Sewer Detail on HSEU's Common Force Main Details sheet for further information.

I. Odor Control facilities will typically be required in lift stations and manholes receiving discharge from a force main with a substantial length or lift station with a substantial cycle time. Engineer will make the determination as to the need for odor control. Early coordination is recommended to eliminate delays during design.

J. No storm sewer or utility crossings will be permitted within eighteen (18) inches above or six (6) inches below force mains.

K. Contractor must install insulated #10 copper tracer wire with all force mains.

L. Common Force Mains:

1) If a common force main will be installed, then add the following note in the required notes section, "Contractor must install a service valve adjacent to the mainline force main for each connection. Valve boxes (equal to water meter pit diameter) must be installed at the time of initial construction. Castings may need to be adjusted after final grading. Each connection must also be installed with an I&A tank as approved by Engineer."
2) If a home or building is serviced by an I&A Tank, a grinder pump or effluent pump and the service line is greater than fifty (50) feet, then add the following note in the plan view near the respective lot, "Contractor must install tracer wire, insulated #10 copper, immediately adjacent to the top of the service force main. Tracer wire must extend to the surface at the service valve box and wet well."
3) It is highly recommended that pumps be external to the building. Sewage backups into the wet well/building may occur due to failure of the pump, check valve or appurtenances, allowing sewage to flow into the wet well/building. Any backup into the wet well/building will be the sole responsibility of the property owner.
4) The top of the wet well/sump must be:
    a) Eighteen (18) inches above the current DNR 100-year flood elevation of nearby waterways.
    b) And it is highly recommended to be one (1) foot below the lowest elevation to have sanitary service in the home or building.

6.11 Lift Stations, Grinder Pumps and Effluent Pumps

A. Required calculations, for proposed and future conditions, include:

1) Cycle time at 1/2 pump rate (minimum cycle time),
2) Cycle time at average flow,
3) Cycle time at low flow,
4) Total dynamic head ("TDH"), including:
    a) Static head,
    b) Pipe and fitting head losses within lift station, and
    c) Pipe head losses in the force main.
5) TDH curve plotted with proposed pump curve, and
6) Buoyancy

B. Calculations that may be required, at Engineer's discretion, include:

1) Common force main head conditions.
2) Maximum and average residence time of sewage in the force main.

C. Calculations will be required for initial and future operating conditions and may be required for intermediate conditions.

D. Calculations must be signed and sealed by an appropriately registered Indiana professional.

E. Pumps must have motors sized to be non-overloading throughout the entire range (from shut-off head to the end of the curve) of the pump curve.

F. All I&A Tanks, grinder pumps and effluent pumps must have an electrical disconnect switch mounted adjacent to the wet well.

G. In accordance with "Recommended Standards for Wastewater Facilities" (latest edition), materials selected for use in and around the lift station shall be appropriate for use under conditions of exposure to hydrogen sulfide and other corrosive gases, greases, oils, and other constituents frequently present in wastewater. This is particularly important in the selection of metals, elastomers, and coatings. Contact between dissimilar metals should be avoided or other provisions made to minimize galvanic action.

H. Consideration must be given to the size of guide rails, base elbows, and discharge piping to ensure they can handle the ultimate pumps anticipated for the lift station.

I. Consideration must be given to provide adequate area for all electrical components along with more than adequate safe serviceability in consideration of open access hatches. Sufficiency of site lighting of all aspects of the lift station, inclusive of vehicular parking. All electrical components are to be serviceable from a common concrete pad which incorporates lift station and valve vault access.

J. Design Engineer must consider the following while sizing the wet well:
   1) Ultimate size/horsepower of pumps.
   2) Manufacturers suggested pump installation requirements. Under no circumstances is a solid, flush-bottom mount of base elbow installation to be compromised due to wet well diameter selected.
   3) Venting shall be accomplished from the perimeter of the concrete interconnecting pad. Potential trip hazards are to be avoided.

K. Design Engineer must consider the following while sizing the valve vault:
   1) A minimum separation of three (3) feet must be maintained between external piping and the wall of the valve vault.
   2) A minimum separation of two (2) feet must be maintained between the ladder (each side) and the wall of the valve vault.
   3) Venting shall be accomplished from the perimeter of the concrete interconnecting pad. Potential trip hazards are to be avoided.

L. Top of wet well and valve vault elevations must be set eighteen (18) inches above current DNR 100-year flood elevations of nearby water ways (including, but not limited to, lakes, ponds, streams and emergency spillways or storm water routing).

M. Grading of the lift station site must be designed to ensure drainage away from the wet well and valve vault. A diversion swale around the lift station may be required.

N. An asphalt drive will be required from the nearest public street to the wet well. The asphalt drive must be designed to maintain an elevation of one (1) foot above the current DNR 100-year flood elevation if

applicable to the location. Contact Engineer for required vehicular parking on site and turning radius requirements.

O. Lift station site must be situated to allow vehicles access to the wet well for pump removal without driving over valve vault or manholes of the influent sewers.

P. An electrical generator must be provided at each lift station site and inclusive to access serviceability of all electrical components.

Q. A fence may be installed around the wet well and valve vault. The following items must be considered while determining the area enclosed by the fence:

1) Adequate work area for all maintenance workers and equipment.
2) Adequate work area to read all meters and open all doors.
3) Adequate space for the emergency generator.
4) At a minimum, the section of fence with the gate must be sixteen (16) feet wide.
5) Distance from the open face of gate to right-of-way must be a minimum of thirty-five (35) feet. There shall be adequate paved parking area for a 14-cu. Yard vactor truck to turn around and exit onto public roadway with other vehicles parked on site.

R. Buoyancy of lift stations must be considered. When designing the concrete collar, the minimum width to height ratio should be 1.5:1 with a minimum height of twelve (12) inches.

6.12 Separation from Buildings and Structures

A. All buildings and structures must be constructed a minimum horizontal distance from sanitary sewer facilities. Based on the Ultimate Depth of sanitary sewer facilities, zone of building foundation influence, instability of associated over-dig soils, minimum horizontal separation (as measured horizontally from the spring line of the pipe to the edge of the building foundation) is:

Depth of Sewer	Separation
Up to 15 feet	12.5 feet
15 to 20 feet	15 feet
20 to 25 feet	17.5 feet
25 to 35 feet	20 feet
Over 35 feet	Case by case basis

Additional separation may be required based upon soil/groundwater conditions.

B. If the sanitary sewer facilities trench is going to be constructed across an existing structure where debris could be a problem, then add the following note in the profile at the station of the existing structure, "Contractor shall use extreme care while excavating near the existing (provide a description of the structure) so that no building debris will be used as backfill."

C. No sanitary sewer facilities should be designed to cross below any permanent or temporary buildings or structures.

D. Based on the Ultimate Depth of sanitary sewer facilities, all bridges must be designed to maintain a minimum horizontal separation (as measured horizontally from the spring line of the pipe to the edge of the wing wall foundation) of:

Depth of Sewer	Separation
Up to 15 feet	30 feet
15 to 20 feet	40 feet
20 to 25 feet	50 feet
25 – 35 feet	60 feet
Over 35 feet	Case by case basis

6.13 Separation from Water Supplies

A. Sewers must be laid at least ten (10) feet horizontally (as measured from the spring lines) from any existing or proposed water main. Should specific conditions prevent this separation, Design Engineer must notify Engineer for specific instructions.

B. Whenever the sewer (main or lateral) crosses a water main, it should be laid at least eighteen (18) inches below the water main.

C. If minimum separations from water supplies to sanitary sewer facilities required by 327 IAC 3-6-9 cannot be maintained, then add the following note to the profile near the respective location, "The sewer must be constructed of PVC ASTM D-2241 SDR 21 or AWWA C-900/C-905 DR 18 pressure sewer pipe with compression fittings. The joints must be located equidistant in both directions from the water main. The sewer must be the type of pipe described above for a minimum of ten (10) feet beyond the cross point. Special structural support for the water main and sewer may be required."

D. All crossings are to be at an angle of 45 degrees or greater.

E. All water main fittings and thrust blocks must be separated from the sanitary sewer by one half (1/2) the distance specified in Minimum Easement Width (Section 3.03) for the sanitary sewer in question.

F. Separation from water wells shall be in accordance with current State of Indiana Standards.

1) Public Water System Drinking Water Wells within 300 feet of the sanitary infrastructure are to be shown on plans.

The minimum separation distance between sanitary sewer facilities and public water system drinking water wells shall be:

a) Sanitary Sewers - Two Hundred (200) feet

Sanitary Sewers may be located within two hundred (200) feet, but under no circumstances less than fifty (50) feet, from a public drinking water well if pressure rated PVC or DIP, as specified for force mains, is used.

b) Manholes - Two Hundred (200) feet

c) Lift Stations - Two Hundred (200) feet

G. Sewer/water supply separations and pipe classifications must conform to 327 IAC 3-6-9.

6.14 Utility Separation and Utility Crossings

A. All utilities should be designed to cross sanitary sewer facilities as close to ninety (90) degrees as possible.

B. Based on the Ultimate Depth of sanitary sewer facilities, all utilities must be designed to maintain a minimum horizontal separation (as measured horizontally from the spring lines) of:

Depth of Sewer	Separation
Up to 15 feet	10 feet
15 to 20 feet	12.5 feet
20 to 25 feet	15 feet
25 to 35 feet	20 feet
Over 35 feet	Case by case basis

C. Design Engineer should carefully review vertical conflicts of sanitary sewer facilities (including laterals) with all utilities.

D. Lateral Tee wyes/Wyes are to be located so that no storm sewer, water main or gas main (four (4) inch or larger) crossing will be located over the fitting. The minimum separation as measured horizontally between the fitting and crossing shall be equal to the depth of cover between the fitting and crossing utility.

E. When a vertical separation of eighteen (18) inches or less (as measured from outside-of-pipe to outside-of-pipe) between gravity sanitary sewer facilities and any non-pressurized pipe (i.e., storm sewer) exists, a concrete cradle must be incorporated into the design. A minimum clear distance of three (3) inches must be provided to maintain structural integrity of the concrete.

F. When crossing a gas/petroleum pipeline a minimum vertical separation of two (2) feet between outside of pipes must be maintained. Add note in the profile at station of crossing that reads, "Contractor must maintain a minimum vertical separation of two (2) feet (from outside of pipe to outside of pipe) between the pipeline and sanitary sewer infrastructure. Contractor must coordinate crossing with pipeline owner."

G. It is the responsibility of Subscriber or their authorized representative to coordinate with and get approvals from various utilities (including governmental agencies) that have jurisdiction locally over areas where proposed work is to be performed. Further, it is the responsibility of Subscriber to get authorization to encroach upon any other utility easement(s) and secure such recorded encroachment prior to construction.

6.15 Street Separation and Street Crossings

A. All sanitary sewer facilities should be designed to cross streets or hardscape surfaces as close to ninety (90) degrees as possible.

6.16 Storm Sewers and Water Ways

A. Design Engineer should carefully review vertical conflicts of sanitary sewer facilities (including laterals) with all storm sewers.

B. Where possible, storm sewers should be designed to cross sanitary sewer facilities as close to ninety (90) degrees as possible.

C. If laterals are designed with less than fifteen (15) feet of horizontal separation from storm structures, then add the following note in the plan view near the respective lateral, "Laterals servicing lots (provide lot numbers) must be installed to maintain a minimum horizontal separation of ten (10) feet from all storm structures."

D. A minimum of twenty (20) feet of horizontal separation (as measured horizontally from the sewer spring line) must be maintained between gravity sewers and the top of bank of all water ways, bodies of water and dry detention areas.

E. At minimum cover (5 feet), a minimum of ten (10) feet of horizontal separation must be maintained between force mains and the top of bank of all water ways, bodies of water and dry detention areas. Minimum separation distance will increase depending on the Ultimate Depth of force main.

F. When crossing a water way, sanitary sewer facilities should be designed to cross as close to ninety (90) degrees as possible. HSEU will not permit the crossing of bodies of water including lakes and retention/detention ponds or dry detention areas.

G. When crossing a water way, sanitary sewer facilities must be concrete encased to ten (10) feet beyond the top of banks.

H. The following are recommended by the Hamilton County Surveyor's office when sanitary sewer facilities are constructed within a legal drain:

1) A minimum cover of ten (10) feet must be provided from the bed of the water way to the top of the concrete encasement.
2) A minimum horizontal separation of thirty (30) feet must be maintained between the top of bank and the center of sanitary sewer manholes and clean-outs.
3) Contractor must verify flow line elevation of legal drain prior to construction and notify Engineer if variance exists.

I. If construction of sanitary sewer facilities crosses a legal drain, then add the following note in the profile view near the legal drain crossing, "Contractor must contact Hamilton County Surveyor's office 48 hours prior to the crossing of (provide name of legal drain) to schedule an inspection. Contractor must also comply with the Utility Installation Cross Section and Open Drain Crossing Details issued by the Hamilton County Surveyor's Office."

J. If construction of sanitary sewer facilities crosses a water way which is not a legal drain, then add the following note in the profile near the water way crossing, "Contractor to install 6" hand laid rip/rap along trench width from top of bank to top of bank."

K. If less than five (5) feet of cover is provided from the bed of the water way to the top of the concrete encasement, then the sanitary sewer facilities must be installed as AWWA C-900 DR 18 pipe to ten (10) feet beyond the top of banks. HSEU may also require a maintenance agreement and fee for future relocation.

6.17 Landscaping, Retaining Walls, Lighting, Fencing, Signs, etc.

A. Owner may place, or permit to be placed, any trees or other deep-rooted landscaping with separation from sanitary sewer facilities as specified by the municipality. Any trees or landscaping placed within easements or rights-of-way are at risk of being damaged or removed by HSEU without the obligation of replacement.

B. Trees or shrubs cannot be planted directly over building laterals.

C. Based on Ultimate Depth, mounding installed parallel to a sewer must be designed to maintain the same minimum horizontal separations as those indicated for Utility Separation and Utility Crossings.

D. Mounding, even when crossing at ninety (90) degrees, must not be constructed directly over sanitary sewer facilities.

E. Lighting, fencing, signs, retaining/landscaping/entrance walls, irrigation lines, walking paths that are not within the right-of-way or within existing easements, etc. must be designed to maintain a minimum horizontal separation of ten (10) feet (possibly further depending on Ultimate Depth) as measured from the nearest edges to the center of sanitary sewer facilities.

F. HSEU does not generally permit installation of sanitary sewer facilities below retaining/landscaping/entrance walls, however, if a crossing is permitted it must meet these criteria:
1) Engineer must approve crossing in writing.
2) Sanitary sewer facilities should be designed to cross as close to ninety (90) degrees as possible.

3) Sanitary sewer facilities must be designed as PVC pipe with a casing a minimum of ten (10) feet beyond each side of the wall. Engineer will determine the appropriate procedure.

4) Refer to the Typical Boring detail (for railroads) of HSEU's Gravity Sanitary Sewer Details sheet for further information.

G. HSEU may perform field inspections after final build-out to verify compliance with the above-mentioned requirements. If a violation exists, Subscriber will be asked to immediately remedy the situation or record a Waiver of Responsibility. Therefore, Subscriber and Design Engineer should thoroughly review the impact of landscaping items to the Project.

6.18 Bores

A. Street bores must extend beyond street surface at a 1:1 ratio relative to depth of sanitary sewer facilities and extend beyond the existing/proposed right-of-way.

B. Railroad bores must extend beyond the center of the tracks at a 1:1.5 ratio relative to depth of sanitary sewer facilities and extend beyond railroad right-of-way.

C. Refer to the Typical Boring detail of HSEU's Gravity Sanitary Sewer Details sheet for further information.

D. Engineer will evaluate the use of directional bores based upon required minimum slope of 1% for gravity sewers, results of soil borings (ground water elevation, location of rock, etc.), and location of other utilities.

6.19 Future Land Use

When sanitary sewer facilities cross undeveloped parcels, Design Engineer should consider future land use of the parcel pertaining to:

A. Installation of all-weather access drives for maintenance access to sanitary sewer facilities.

B. Installation of a stronger grade of pipe for areas that may receive fill in the future.

C. Installation of granular backfill over sanitary sewer facilities in areas that may receive vehicular traffic (roads, drives, parking areas, etc.).

D. Location of manholes so that pavement or concrete, including driveways and sidewalks, will not be constructed on or within one (1) foot horizontal distance of manhole castings.

E. Correct location of manholes and wyes to be installed during construction related to future connections.

F. Other factors impacting the proper design and construction of sanitary sewer facilities.

6.20 Private Sanitary Sewer Systems

A. All applicable fees, including Preliminary Plan Review, Availability, Connection, Inspection and Subsequent Connector fees will need to be paid to HSEU.

B. If portions of sanitary sewer facilities are to be a Private sanitary sewer system, then add note in the profile near the respective segments of Private sewer that reads, “MH # (provide manhole number) to MH # (provide manhole number) is a private sanitary sewer system and will not be conveyed to HSEU. Castings on MH#(s) (provide manhole numbers) must be lettered “SEWER” or “PRIVATE SEWER”.”

C. Easements granted to HSEU are not required for Private sanitary sewer facilities; however, Subscriber may need to obtain off-site easements in favor of Subscriber for construction, operation, inspection, maintenance, reconstruction, and removal of sanitary sewer facilities. Off-site easements will be required to maintain Minimum Easement Width as described.

D. Engineer may request easements to the property boundary for future service to adjoining parcels.

E. HSEU will require an agreement regarding ingress/egress rights for inspection and maintenance of Private sanitary sewer facilities.

F. All Private sanitary sewer facilities must be designed, constructed, inspected, and tested in accordance with these Design Specifications and HSEU’s other standards, specifications, and details. Design Engineer may request a variance on certain design requirements; however, Engineer’s decision regarding variances will be final.

G. Record drawings in accordance with HSEU’s Sanitary Sewer Completion Specifications will be required for Private sanitary sewer facilities.

H. If at some point in the future, Subscriber wishes to Convey Private sanitary sewer facilities to HSEU, Engineer will need to perform a study, including inspection and testing, to determine compliance with all HSEU’s requirements. If sanitary sewer facilities do not comply with the requirements, HSEU may deny Conveyance until the system has been repaired or upgraded to conform to HSEU’s requirements. Subscriber shall reimburse HSEU for Engineer’s fees to perform the study.

SECTION 7 - CONSTRUCTION PLAN DOCUMENTATION

7.01 Permits

Prior to approval of construction drawings, HSEU will request copies of approved permits or written approval from any government agency or public entity impacted by the construction of a Project. This includes permits and approvals from:

A. Indiana Department of Environmental Management.

B. Indiana Department of Transportation.

C. Corp of Engineers.

D. Department of Natural Resources.

E. County Surveyor.

F. County Highway.

G. City or Town.

H. Port Authority.

I. Any other government agency or public entity.

7.02 General

A. Construction Plans and associated documentation must be reviewed and approved by Engineer, as HSEU's representative, for compliance with these Design Specifications and HSEU's Master Plan and other standards, specifications, and details.

B. The minimum amount of review time per submittal, required by Engineer, is fourteen (14) days. Additional review time will be required for complex Projects, including off-site sewers, large scale architectural projects, connection of existing building, etc. When submitting to Engineer, Subscriber and Design Engineer should carefully consider the complexity of the Project and amount of review time required to avoid delays in the issuance of approvals and permits.

C. When submitting to Engineer, provide complete set of Construction Plans with all supporting documentation including, architectural plans, bridge plans, etc. The Construction Plans must be provided as a PDF and in most current AutoCAD Release.

D. Every sheet of the Construction Plans must include:

1) Most current name of the Project, including section/phase number.
2) Certification indicating the following:
   (a) Stamped by an appropriately registered Indiana professional.
   (b) Signed.
   (c) Dated.
3) All drawings must be plotted with a horizontal scale of 1" = 10', 20', 30', 40', 50' or 60' and a vertical scale of 1" = 1', 2', 3', 4', 5' or 6'. The scale of the drawing shall present the information clearly and allow Engineer the ability to scale dimensions. If Engineer has difficulty scaling dimensions or reading the data, Design Engineer may be requested to re-plot drawings at a different scale.
4) All drawings must be true to scale.
5) Scale and a north arrow must be indicated.
6) All dimensions, distances, elevations, etc. shall be displayed in feet, except pipe diameters which shall be displayed in inches. All top of casting and invert elevations must be indicated to the hundredth of a foot and display all significant digits. For example, 80.05 is not acceptable, it must read 780.05. Note: Proposed top of casting elevations can be indicated to the tenth of a foot.

7) HSEU must be listed as the local sanitary sewer utility. Address - 11901 Lakeside Drive, Fishers, Indiana 46038. Telephone number - (317) 577-2300.

7.03 Primary Plats

Primary Plats must include:

A. A label stating, "Primary Plat."

B. Information including:
   1) Easements.
   2) Rights-of-way.
   3) **Entire** project boundary.
   4) Lot lines.
   5) Sub-section or phase lines.
   6) Building lines.
   7) Street names.
   8) Lot numbers.
   9) Block/common area designations

C. Graphical representation of all proposed off-site easements.

D. Location of all proposed and existing sanitary sewer facilities including:
   1) Gravity sewers and manholes.
   2) Lift stations (wet well and valve vault) and HSEU Engineer approved limited applications of grinder/effluent pumps.
   3) I&A tanks.
   4) Force mains, force main fittings, and air/vacuum relief manholes.
   5) Lateral (Type 1, 2, or 3) clean-outs.
   6) End of stubs (no matter the length of the stub).
   7) Septic fields.

E. Indicate all pavement within the boundary of the Project and off-site pavement to be constructed to service the Project.

F. Storm sewers and top of bank of all water ways (including, but not limited to, lakes, ponds, streams, and emergency spillways).

G. Legal drain and flood way limits.

H. Topography.

7.04 Secondary Plats

A. A secondary plat must be provided with each set of original/revised Construction Plans submitted.

B. Graphical representation of all recorded on-site easements and Certificates of Correction with their corresponding instrument numbers.

C. All sanitary sewer facilities that will be constructed within a block, common area, etc. must be contained within land to be platted as a sanitary sewer easement or utility easement.

D. All variable easements must be geometrically defined so that their size and or location is not left open to interpretation.

E. Refer to Section 3 Easements and Deeds for further information.

7.05 Title sheet

Title Sheet must include:

A. Current project name.

B. Developer with contact information.

C. Design Engineer with contact information.

D. Index of pages.

E. A site map which indicates all on-site and off-site sanitary sewers and manholes, manhole numbers, lot numbers and lot lines.

7.06 Site Development Plan

A. Site Development Plan must indicate:

1) Easements.
2) Rights-of-way.
3) Entire boundary indicated with a bold line.
4) Lot lines.
5) Label sub-section or phase lines and indicate with a bold line.
6) Building lines.
7) Street names.
8) Lot or building numbers.
9) Block/common area designations.

B. Graphical representation of all previously platted, recorded or proposed off-site easements, rights-of-way, lot lines, building lines, etc. encompassing sanitary sewer facilities constructed with the Project.

C. Graphical representation of the entire boundary for all recorded on-site easements (affecting the sanitary sewer facilities or crossing within the boundary of the Project), Certificates of Correction (affecting sanitary sewer facilities or otherwise) and deeds (for lift station parcels) with their corresponding instrument numbers.

1) Provide copies of recorded easements to Engineer.
2) Indicate the name of grantee(s).
3) It may be necessary to add leaders to distinguish the boundaries.

D. Location of all proposed or existing (indicate as a "screened" line type) sanitary sewer facilities including:
    1) Gravity sewers and manholes.
    2) Wyes, laterals, and lateral fittings.
    3) Lift stations (wet well and valve vault) and grinder/effluent pumps.
    4) I&A tanks.
    5) Force mains, force main fittings, isolation/service valves and air/vacuum relief manholes.
    6) Lateral (Type 1, 2 or 3) clean-outs.
    7) End of stubs (no matter the length of the stub).
    8) Special structures (including, grease traps, grit traps, oil/water separators, neutralization tanks, etc.).

E. Clearly label all sanitary structure numbers and provide top of casting elevations.

F. Location of all proposed or existing utilities.

G. Existing water, gas, or oil wells and/or septic fields within two hundred (200) feet of sanitary sewer facilities.

H. Proposed elevations:
    1) Pad elevations.
    2) Minimum finished floor elevations must be specified if pad elevations do not comply with the required vertical separation from top of casting elevations as described.
    3) Lowest elevation of gravity sanitary sewer service if other than the finished floor elevation.
    4) Lot grades.
    5) Street grades.

I. Add an easily identifiable note which states, "Unless approved otherwise by HSEU, the finished floor elevation on a plot plan for a lot in this development cannot exceed the corresponding minimum finished floor elevation (MFFE) shown hereon by more than five tenths (0.50) foot."

J. Buildings:
    1) Existing buildings (even if they will be demolished) such as homes, barns, etc.
    2) Proposed buildings (except homes in a subdivision) such as apartments, guard houses, club houses, maintenance barns, etc.

K. Indicate all pavement and/or access drives within the boundary of the Project and off-site pavement to be constructed to service the Project.

L. Indicate storm sewers and their structure numbers.

M. Indicate top of bank and 100-year flood/normal pool elevations of all nearby water ways (including, but not limited to, lakes, ponds, streams and emergency spillways and storm water routing). 100-year flood/normal pool elevations must be on the same vertical datum as the Construction Plans (NAVD 1988).

N. Indicate legal drain and flood way limits.

O. Indicate emergency storm water routing.

P. Indicate topography.

Q. All items required on Landscaping and other related plans if a separate Landscaping Plan will not be submitted with the construction set.

R. Miscellaneous

1) If a sanitary sewer manhole is proposed to be removed during construction, then add note near the appropriate manhole which states, "MH # (provide manhole number) to be removed."
2) If existing structures do not appear on a sanitary sewer plan and profile sheet, and the top of casting elevations need to be adjusted, provide the existing and proposed top of casting elevations. Add note which states, "Contractor to vacuum test MH # (provide manhole number) after top of castings are adjusted. Until final build out, a minimum of one (1) 4" adjustment ring must be installed on each manhole."
3) If existing buildings or structures are on-site and will be serviced by gravity sanitary sewer service, provide elevation of the finished floor and lowest point to have gravity sanitary sewer service (if other than the finished floor elevation).
4) If a lateral was provided to an existing lot or building beyond the platted boundary, then that address must also be provided.
5) If a lateral is to be abandoned, add note at the end of lateral that states, "This lateral to be abandoned in place." Note: Engineer may require a Type 2 or Type 3 clean-out to be installed at the end of a lateral that will be abandoned.
6) If a Type 2 or Type 3 clean-out is to be installed on a lateral, the clean-out must be labeled (as a Type 2 or Type 3 clean-out) and the top of casting elevation must be provided.
7) If a lot or property is proposed to be serviced by a grinder/ejector pump or I&A Tank, add note on each individual lot which states, "(provide lot number or building name) is proposed to be serviced by a grinder/ejector pump or I&A Tank. Grinder pump applications shall not be permitted where "Common Force Main" are considered. An electrical disconnect switch mounted adjacent to the wet well must be installed."
8) If a special structure (including grease traps, grit traps, oil/water separators, neutralization tanks, etc.) is to be installed, the structure must be labeled, and top of casting elevation must be provided.
9) If access drives are proposed for maintenance purposes, the drives must be labeled and appear in their design location.
10) If a well will be abandoned, add note with leader pointing to the well which states, "Contractor shall abandon well in conformance to the standards outlined in the latest amendment of Title 312 IAC 13-10."
11) A note is to be placed on the Site Development Plan stating, "Contractor shall stamp the letter "S" in the curb perpendicular to the lateral marker."

12) If a septic tank or field is to be abandoned, add note with leader pointing to the tank or field which states "Contractor shall abandon septic tank or septic field in accordance with Hamilton County Health Standards."

7.07 Sanitary Sewer Plan and Profiles (Gravity and Force Main)

A. General

1) Plan and Profile sheets are required for all mainline gravity sewers and force main systems. The sanitary sewer or force main must be depicted on sheets utilized specifically for that purpose. Profiles of storm sewers, streets, etc. must not appear on the Sanitary Plan and Profile sheets.

2) Plan view must include:
   - (a) Complete boundary of any parcel or lot serviced by laterals connected to the sewer identified in the profile view.
   - (b) Sanitary sewer structure numbers.
   - (c) Sanitary sewer facility alignment, including horizontal alignment of stubs (no matter the length of the stub). For stubs, either the location of the manhole the stub is to serve, or the angle from the out-going pipe must be shown.
   - (d) Labeling of all Type 2 and Type 3 clean-outs including top of casting (TC) elevations.
   - (e) All proposed or existing easements and rights-of-way. Existing easements and rights-of-way must also indicate the name of grantee(s) and instrument number.
   - (f) Streets and street names.
   - (g) Lot lines and lot numbers or building designations (number, address, name, etc.) for each wye and lateral proposed to be constructed with the Project.
   - (h) Storm sewers and structure numbers.
   - (i) All other utilities including overhead lines and their support poles and or support towers, underground vaults, signal poles and electrical transformers/switch gear.
   - (j) Existing water, gas, or oil wells within two hundred (200) feet of sanitary sewer facilities.
   - (k) Septic fields.
   - (l) Existing fence lines.
   - (m) Access drives.
   - (n) Match lines.
   - (o) Proposed wye station (from the center of the nearest downstream manhole) and lateral length for all laterals proposed to be constructed with the Project. Note: If a lateral connects directly into a manhole and was approved by Engineer, indicate the station as "Out of manhole".
   - (p) If laterals were previously constructed with another Project, the as-built wye station and lateral length must be indicated.
   - (q) If a lateral crosses a storm sewer, provide the invert elevations of the lateral and storm sewer at point of crossing.
   - (r) If a lateral crosses a water main, provide the invert elevations of the lateral and water main at point of crossing.
   - (s) Graphically indicate and label concrete cradles required at lateral/utility crossings.

3) Profile must include:
   (a) Sanitary sewer structures.
      I. Structure number.
      II. Top of casting elevation.
      III. Invert elevations of all connecting pipe including non-profiled stubs, top and bottom drop, lateral (if approved) and force main connections – indicate size of pipe, type of pipe, and direction (north, south, etc.) of connection of invert.
      IV. If a structure appears multiple times in the Construction Plans, the top of casting and all invert elevations must be provided in each profile.
      V. For existing structures, provide field verified as-is information for that structure.
   (b) Sanitary sewer facility alignment.
   (c) If air/vacuum relief valves are installed, identify valves as air/vacuum or air only.
   (d) Accurately indicate existing and proposed grade lines, especially considering mounding, street crossings and low points.
   (e) Diameter of pipe (inches).
   (f) Length of sanitary sewer facilities (measured from center of manhole to center of manhole and rounded to the nearest foot.)
   (g) Slope of pipe (rounded to the hundredth of a percent.)
   (h) Type and wall thickness class of pipe (For example, PVC SDR 26). If the pipe designation is other than ASTM D-3034, then provide the appropriate designation. For example, ASTM D-2241, ASTM F-679, AWWA C-900, AWWA C-905, etc.
   (i) At all utility crossings, indicate pipe size and type with invert elevations at point of crossing. For force mains, also provide the invert elevation of the force main at crossing.
   (j) Concrete cradles.
   (k) Granular backfill with stationing.
   (l) Elevations on the profile grid.
   (m) No match lines - complete runs of pipe from manhole to manhole. Orientation must be approximately the same as the plan view above the line profiled.

B. A vertical elevation must be provided, in the profile, every five hundred (500) feet (maximum interval), at all fittings (ells, tees, valves and adapters) and low points for all force mains.

C. If a sanitary sewer manhole is going to be removed when sanitary sewer facilities are extended:
   1) In the plan view, indicate the next downstream manhole.
   2) In the profile, indicate the next downstream manhole with as-built top of casting and invert elevations.
   3) In the profile, provide pipe information (size, type and class, distance, slope, etc.) for both the manhole to be removed to the next upstream manhole and the next downstream manhole to the next upstream manhole.
   4) If any portion of the existing sanitary sewer facilities (laterals, manholes, sewers, force mains, etc.) is to be disconnected or removed, add note "Contractor shall (describe what and how the sewer facility is to be removed or disconnected.)" to the respective sheet.

D. Graphical representation of all bores related to the installation of sewer facilities. Indicate bores in the profile and add an easily identifiable note (depending on the type of bore) to the respective sheet which states:
   1) For bores with casings, "A (provide size) inch casing is required from station (provide beginning station) to (provide ending station). Upon completion of the bore, invert elevations must be provided to a SAMCO inspector."
   2) For directional bores, "A directional bore is required from station (provide beginning station) to (provide ending station). Upon completion of the bore, invert elevations must be provided to a SAMCO inspector."

E. Graphical representation of fittings proposed to transition from one type of pipe to another. Indicate fittings in the profile and add an easily identifiable note to the profile which states, "A transition fitting is required at station (provide station)" to the respective sheet.

F. All stationing must reference the center of nearest downstream manhole.

G. Required notes on all Sanitary Sewer Plan and Profile sheets (Gravity and Force Main).
   1) "Manhole or clean-out castings may need to be elevated after final grading to ensure drainage away from structures."
   2) "Pavement or concrete, including driveways and sidewalks, must not be constructed on or within one (1) foot horizontal distance of sanitary sewer castings."
   3) "All rough grading (on-site and off-site) must be finished to within one (1) foot of final grade prior to the start of construction of the sanitary sewer infrastructure."
   4) "All laterals shall terminate within a sanitary sewer or utility easement."
   5) "At inspector's discretion, a concrete cradle may be required for all lateral/utility crossings."
   6) "Contractor to maintain a flat area with a five (5) foot radius around the casting."
   7) "Underground utilities must maintain at least five (5) feet of separation from the outside of any sanitary sewer manhole."
   8) "Any field changes made which, in Engineer's opinion, materially affect the project are to be made by Design Engineer and amended digital plan sheets provided prior to completion of sanitary sewer infrastructure installation and operation."

H. Required notes on all Gravity Sanitary Sewer Plan and Profile sheets.
   1) "Sanitary sewer mains must maintain seven (7) feet or more of vertical cover from top of pipe to grade."
   2) "Sanitary sewer laterals should maintain five (5) feet of cover from the top of pipe to grade. If adequate cover cannot be maintained, then concrete capping must be installed when cover is four (4) to five (5) feet and concrete encasement must be installed when cover is three (3) to four (4) feet. Under no circumstances will cover be permitted to be less than three (3) feet."
   3) "All bench walls shall extend to the crown of the highest influent pipe."
   4) "Tee wyes located on the sanitary sewer mainline must be designed and installed to maintain a minimum of fifteen (15) feet from the center of the manhole due to problems encountered in the field with tee wyes failing when located in the over dig of manholes."

I. Required notes on all Sanitary Sewer Force Main Plan and Profile sheets.

1) "The as-built elevation of the base material must be verified by an appropriately registered Indiana professional prior to setting or pouring of the wet well base. Provide as-built elevation to SAMCO and Design Engineer."
2) "Force mains must maintain 5 feet of cover from the top of pipe to grade. Under no circumstances will cover be permitted to be less."
3) "Force mains must be constructed at a constant positive slope from low points to air/vacuum relief valves."
4) "A horizontal location and vertical elevation are required every 500 feet (maximum interval), at all fittings (ells, tees, valves, adapters, etc.) and low points of the force main. If as-built information is not provided, Contractor must excavate the force main to provide necessary as-built information."
5) "Contractor must install tracer wire, insulated #10 copper, immediately adjacent to the top of the force main. Tracer wire must extend to the surface at all structures and fiberglass field markers." Tracer wire must extend around all air/vacuum relief manholes.
6) "Contractor must provide #8 stone bedding above and below the force main, with at least three (3) inches of sand that must be placed as a cushion around the force main, wherever construction is below the water table or unstable soil conditions are encountered."

J. Miscellaneous notes

The following easily identifiable notes must appear on the respective Sanitary Sewer Plan and Profile sheets in the following situations:

1) If the sanitary sewer facilities trench is going to be constructed above existing grade, add the following note in the profile adjacent to all such areas, "Contractor to provide 95% Standard Proctor compaction of suitable fill in six (6) inch lifts or excavate to undisturbed soil and bed with #8 stone for all portions of sanitary sewer infrastructure designed above existing grade."
2) If sanitary sewer facilities are to be constructed across a wooded easement, add the following note in the plan view near the respective location, "All trees and brush must be removed within the entire limits of the sanitary sewer easement."
3) If sanitary sewer facilities are located in flood areas, add the following note in the notes section "Mounding around manholes located in flood areas to maintain side slopes of 3:1."

7.08 Lift Station Plan Sheet

A. Add HSEU's Lift Station and Force Main Details sheets.

B. Provide a Lift Station Information section.

C. Provide dimensions in a Dimension Chart.

D. Provide elevations in an Elevation Chart.

E. Add a Lift Station Site Plan per HSEU Lift Station Details:

1) Wet well and valve vault orientation.
2) Control panel location.

3) Fencing and gate locations.
4) Asphalt access drive from public right-of-way.
5) Parking stops.
6) Grading and drainage arrows.
7) Boundary of lift station parcel to be granted to HSEU.
8) Odor control facilities.
9) Area for emergency generator.
10) Limits of compacted #53 stone and polyethylene film (if required by the site orientation).
11) All other information that will allow for a detailed review of the site plan.

F. Required notes on Lift Station Plan sheet:
1) "Upon completion of the lift station site, Contractor must coordinate installation of lift station property corner monuments (capped re-bar) with Design Engineer."
2) "Contractor must coordinate capping of de-watering well points at grade with SAMCO."
3) "Contractor shall provide a corrosion protective coating by Mainstay or as approved by Engineer to the wet well interior."
4) "Valve vault shall be provided with an extendable access ladder/handrail."

7.09 Storm Sewer Plan and Profile Sheets

A. Storm Sewer Plan and Profiles must be included with each set of Construction Plans submitted for approval.

B. Indicate all sanitary sewer facility crossings with pipe size, type of pipe, and invert elevation.

C. Indicate concrete cradles required at sanitary sewer facility crossings, including laterals.

D. Add an easily identifiable note which states, "Except for force mains, Contractor to install concrete cradles when the vertical separation (as measured from the exterior of the pipes) between sanitary sewer facilities and storm sewer is 18" or less".

7.10 Water Plan and Profile Sheets

A. Water Plan and Profiles must be included with each set of Construction Plans submitted for approval.

B. Indicate all sanitary sewer facility crossings with pipe size, type of pipe, and invert elevation.

7.11 Detail and Specification Sheets

A. Add HSEU's entire Gravity Sanitary Sewer Details sheet to all Projects involving construction of gravity sewers or manholes.

B. Add HSEU's entire Sanitary Sewer Specifications sheet to all Projects involving construction of gravity sewers or manholes.

C. Add HSEU's entire Lift Station & Force Main Details sheet to all Projects involving construction of lift stations or force mains.

D. Add HSEU's entire Lift Station & Force Main Specifications sheet to all Projects involving construction of lift stations or force mains.

E. Add HSEU's entire Horizontal Directional Drill Specifications sheet to all Projects involving directional bore type construction.

F. If requested by Engineer, additional specifications/details may need to be added to the construction drawings when the Project includes special construction situations affecting sanitary sewer facilities. These specifications/details may have already been created by Engineer or may need to be generated by Design Engineer and approved by Engineer.

7.12 Shop Drawings

A. Provide shop drawings of special structures affecting sanitary sewer facilities including lift station pumps and equipment, grease traps, grit traps, oil/water separators, neutralization tanks, etc.

B. Shop drawings will need to be reviewed and approved by Engineer prior to Construction Plan approval.

C. Special structures that are installed without prior approval (regarding manufacturer, model number, size, capacity, configuration, etc.) from Engineer may be required to be removed and constructed as specified in the approved shop drawings. Therefore, Subscriber and Design Engineer shall thoroughly review the impact of special structures to the Project.

D. HSEU will perform field inspections after final build-out to verify compliance with approved shop drawings.

7.13 Architectural Plans

A complete set of architectural plans must be submitted for all buildings/structures to be constructed so that Engineer can thoroughly understand the intended use of the proposed structure and determine the projected number of EDU's. Engineer's primary focus will be:

A. Floor Plan:
   1) Label or describe the use of each Room.
   2) Indicate a seating configuration.
   3) Provide building or structure numbers.
   4) Provide finished floor elevation.
   5) Provide a floor plan for each building or structure to be constructed.

B. Plumbing Plan:
   1) Indicate plumbing layout with proposed floor plan.
   2) Label all fixtures.
   3) Indicate special structures affecting sanitary sewer facilities including grease traps, grit traps, oil/water separators, neutralization tanks, etc.
   4) Indicate appropriate (either Type 1, 2 or 3) external clean-out(s).
   5) Indicate external plumbing as six (6) inches.
   6) Indicate exit point of the lateral consistent with Site Development Plan and Plan and Profile sheets.

7) Indicate invert elevation of the lowest point to have gravity sanitary sewer service. Design Engineer should carefully consider the lowest elevation. For example, the invert of trench drains or outlet of swimming pool sump pit may be the lowest point.
8) Indicate plumbing isometrics with fixtures labeled.
9) Indicate building numbers.
10) Provide a plumbing plan for each building or structure to be constructed.

C. Equipment Plan - Provide description, quantity, manufacturer, and model number of proposed equipment.

D. Shop Drawings – As required.

7.14 Landscaping, Site Lighting and Other Related Plans

A. Landscaping plans must indicate:
1) All existing and proposed plants (trees, shrubs, flowers).
2) The drip line of all trees.
3) Retaining/landscaping/entrance walls.
4) Fencing.
5) Mounding.
6) Site lighting.
7) Signs.
8) Irrigation lines, etc.

B. Add easily identifiable notes to all sheets of the landscaping plans which state:
1) Owner may place or permit to be placed any trees or other deep-rooted landscaping with separation from sanitary sewer facilities as specified by the municipality. Any trees or landscaping placed within easements or rights-of-way are at risk of being damaged or removed by HSEU without the obligation of replacement.
2) Toe of slope of earthen mounding cannot be placed within ten (10) feet horizontal distance of sanitary sewer mains, laterals, or manholes.
3) Retaining/decorative/entrance walls cannot be placed within ten (10) feet horizontal distance of sanitary sewer mains, laterals, or manholes.

C. Add an easily identifiable note to all sheets of the site lighting and related plans which states: Lighting, signs, irrigation lines, etc. must be constructed to maintain a minimum horizontal separation of ten (10) feet from the center of sanitary sewer facilities.

7.15 Revisions

A. Revision blocks must be filled out for all subsequent (after the original set of Construction Plans) sets submitted to HSEU for approval. Revision block must reflect all changes (including, but not limited to, grading/earthwork, storm sewers, streets/sidewalks, other utilities, landscaping, site lighting, signs, etc.) to the construction documents.

B. All easement revisions must appear on the plat, Site Development Plan, respective Plan and Profile sheets and all other affected sheets.

C. All revisions to top of casting and invert elevations must be noted on the respective Plan and Profile sheets, structure table (if a table is used) and all other affected sheets.

D. All revisions of sanitary/storm sewer orientation must appear on the Site Development Plan, respective Plan and Profile sheets (plan view and profile) and all other affected sheets.

E. All storm/sanitary sewer crossing revisions must appear on the respective Plan and Profile sheets (revised invert elevations in the profile) and all other affected sheets.

F. PPR fees are charged for review of the original submittal of Construction Plans, generation of a comment review letter (if necessary) and review of up to two additional sets of Construction Plans. If Engineer is required to generate more than (3) comment review letters, Subscriber will be charged additional Construction Plan review fees.

G. To expedite the approval process, Engineer recommends that a letter, detailing actions taken in response to each item of the comment review letter, accompany each set of revised Construction Plans.

H. Each set resubmitted must include one (1) complete set of Construction Plans with supporting documentation.

7.16 Construction Plan Approval

A. Approval will not be issued until all sheets of the Construction Plans comply with these Design Specifications and all issues of comment review letters are resolved, plans have been entered into GIS, IDEM approval received, and Subscriber has entered all necessary agreements and authorization with, and all required fees paid to HSEU.

B. Plan approval will be authorization to proceed with construction of the Project, however, it shall not be construed as authority to violate, cancel, or set aside any of HSEU's requirements or the laws, codes, regulations and permit processes of governmental agencies or public entities. Approval will be evidenced by an "Approved - Hamilton Southeastern Utilities, Inc." date stamp on the construction drawings.

C. Design Engineer must receive formal written approval with stamped set of Construction Plans from Engineer prior to any sanitary infrastructure related work being performed.

D. Plan approvals will be valid for a period of six (6) months from the date of approval stamp. After date of expiration, HSEU reserves the right to require revisions to approved Construction Plans based on the most current design standards, details, specifications, and master plan. Extensions of this time limit may be requested from Engineer if extenuating circumstances exist. Engineer's decision regarding time extensions will be final.

E. Construction Plan approval does not relieve Subscriber, Design Engineer or Contractor from any requirements of HSEU's standards, specifications, details, etc.

7.17 Initiation of Construction

A. Contractor will not be permitted to initiate construction until construction drawings are formally approved in writing.

B. Contractor will not be permitted to initiate construction until all applicable permits have been approved by and obtained from all affected government agencies and public entities. Copies of permits must be submitted to Engineer for review.

C. Contractor will not be permitted to initiate construction until all off-site easements have been reviewed, approved, and recorded by Engineer.

D. Design Engineer may be required to attend a pre-construction meeting with Contractor, Engineer's inspector, construction manager, Engineer, Subscriber, and any other affected party to discuss construction issues relative to the Project.

7.18 Governing Laws, Codes, and Regulations

A. Plans, including professional certification, scales, north arrows, capacities, design requirements and other engineering details must meet all applicable laws, codes or regulations and be in accordance with the requirements of all governmental agencies and public entities having jurisdiction.

B. These Design Specifications shall not be considered as a substitute, nor shall they supersede any state or federal law, code or regulation related to the design. In the event of a conflict between any state or federal law, code or regulation governing the design and these Design Specifications, the more stringent requirement will apply.

C. All persons on site must abide by all Indiana Occupational Safety and Health Administration ("IOSHA") standards including but not limited to "General Construction Practices" and "Trench Safety Standards".

D. All persons, including but not limited to Subscribers, Contractors, sub-contractors, Design Engineers, Record Drawing Engineers, and surveyors must abide by HSEU's "General Procedure for Manhole Opening and Entry" or the most recent IOSHA confined space entry standards, whichever is more stringent.

7.19 Completion Documentation

A. HSEU's "Sanitary Sewer Completion Specifications" specify requirements which must be met prior to the time the Project is placed into service.

B. Contractor and Record Drawing Engineer must maintain record drawings and a digital file as the project progresses. At the end of construction, record drawings, in a digital format, must be delivered by Contractor and Record Drawing Engineer in the name of Subscriber to Engineer within thirty (30) days. If Completion Documents have not been provided within sixty (60) days of the date of this notification, HSEU will procure the services necessary to generate or otherwise acquire the record drawings and other Completion Documentation at Subscriber's expense.

C. Contractor must submit a HSEU Lateral Location form detailing all wye connections to Engineer daily. Lateral Location form identifies the as-built wye station, direction, lot serviced and length of all sewer lateral connections. The as-built location of wye station can be supplied by measuring along the pipe section and assigning a station to each connection from the nearest downstream manhole. An accuracy of two (2) +/- feet is required.

D. Record Drawing Engineer must also submit Sanitary Sewer Record Drawing Information sheets for all manhole structures which have not been previously as-built. These sheets must be submitted to Engineer within fourteen (14) days of construction completion

E. Contractor must complete all outstanding items detailed in HSSEU Engineer's correspondence and supply all necessary information, including construction cost documentation, with all applicable change orders.

F. Sanitary sewer inventory form, lateral location forms, television logs, etc. are the responsibility of Inspector, who shall provide them to HSEU's Engineer.

G. If a manhole top of casting is adjusted after as-builting, Contractor must supply HSEU's Engineer with new measure down from the top of casting to the flow line.

H. Contractor must provide to HSE, monthly unless otherwise determined, copies of all contracts, invoices, statements, material lists, payment requests, and all other related documents pertaining to the construction costs of the Project. Contractor must submit any other items required by Engineer.

I. Cost associated with final as-built documentation review by HSEU's Engineer and its inclusion to update HSE's GIS infrastructure database shall be at Subscriber's expense.

J. HSEU may withhold connection permits if Completion Documents are not received in a timely manner.

SECTION 8 - IMPROVEMENT LOCATION PERMITS ("ILP")

For these Design Specifications, ILPs are all other Projects except single family residential subdivisions.

8.01 General Requirements

A. Comply with all applicable items previously mentioned in these Design Specifications.

B. Comply with HSEU's "Rules and Regulations".

C. Changes of grade over existing sanitary sewer facilities will not be permitted, unless approved, in writing, by Engineer.

D. Include a Site Development Plan. In particular, the following items will be important:

1) Location of all proposed or existing sanitary sewer facilities.
2) Entire overall boundary of the Project.
3) All structures including buildings, pools, playing fields, etc.
4) All asphalt or concrete surfaces including parking lots, sidewalks, etc.

5) Graphical representation of all existing or proposed easements (sanitary sewer or otherwise) and rights-of-way within the boundary of the Project with their corresponding instrument numbers.
6) Proposed grading.

8.02 Architectural Requirements

A. Comply with the most recent edition of HSEU's "Standards for Design and Construction of Building Sewer Laterals".

B. Engineer will not permit sources of clear water discharge into sanitary sewer facilities. This includes but is not limited to:
1) Foundation/footing drains,
2) Sump pumps with foundation drains or other clear water sources,
3) Roof drains,
4) Heat pump/Geo-Thermal discharge,
5) Cooling water,
6) Trench/floor drains subject to storm water run-off and/or,
7) Any other sources of clear/unpolluted water.

C. If a room contains a floor drain or trench drain and has an exterior door, the entrance to the room must have either a three (3) inch sill or ramp to prevent storm water from entering the sanitary sewers. The sill or ramp must be indicated in the Construction Plans.

D. All external concrete or pavement must slope away from building or structure at maximum grade consistent with requirements. This must be noted in the Construction Plans.

E. Upon exiting building, lateral must maintain a minimum cover (from finished grade to top of pipe) of three (3) feet. Laterals with less than three (3) feet of cover at the building will not be accepted by HSEU.

F. Pipe size, invert elevation at the building and location of the lateral must be consistent between Site Development Plan, Plan and Profile sheets and the Plumbing Plan.

G. If applicable, grease trap(s) sized for the application and equal to HSEU minimum requirements or greater is to be provided for each tenant space. No internal grease traps shall be permitted.

8.03 EDU Calculation

A. Provide digital seating plan and interior plumbing plan from the architectural plan set for all existing or proposed buildings/structures so that Engineer can thoroughly understand intended use of proposed buildings and determine the projected number of EDU's.

B. For an existing building/structure supply two (2) years of water consumption data. If building/structure is to be constructed, then supply two (2) years of water consumption data from two (2) similar buildings (square footage, number of employees, equipment, etc.).

C. Identify all equipment that will directly or indirectly drain into sanitary sewers. Provide water consumption data on the equipment.

D. Housekeeping procedures. For example, wash down of equipment.

E. Provide number of full time and part time employees working at the facility in a twenty- four (24) hour period. For schools, provide current and future student body.

F. To assist the permitting process, Subscriber shall provide a list on legal or letter size paper indicating:
   1) For apartment complexes - A list of building numbers with proper number of units. The list shall also include all other buildings (for example clubhouses, maintenance buildings, etc.) being connected to sanitary sewer facilities.
   2) For strip malls - A list of tenants (company name) with name and phone number of contact person.
   3) For other uses - To be determined.

G. EDU assessments are contingent upon approval by the respective municipality.

H. HSEU requires a Sewer Service Agreement be recorded against the deed of the Project for payment of monthly sewer fees.

8.04 Existing Buildings/Structures and the Connection of Existing Sewers

A. Provide the elevation of lowest point in each building/structure to have gravity sanitary sewer service.

B. Design Engineer must conduct a site investigation to identify all possible sources of clear water discharge. For example:
   1) Foundation/footing drains,
   2) Sump pumps with foundation drains or other clear water sources,
   3) Roof drains,
   4) Heat pump/Geo-Thermal discharge,
   5) Cooling water,
   6) Trench/floor drains subject to storm water run-off and/or,
   7) Any other sources of clear/unpolluted water.

C. Identify location(s) in which the plumbing exits the building/structure.

D. Engineer requires testing to determine potential sources of infiltration/inflow ("I/I"). Therefore, all existing sanitary sewer facilities, which are to remain in service, shall be televised. Based on the review of the video by Engineer, additional testing such as smoke testing, low pressure air testing, dye testing, vacuum testing, etc. may be required. If sanitary sewer facilities do not pass these tests, repairs or replacement may be required to bring the infrastructure into compliance.

E. Provide record drawings and/or shop drawings in accordance with HSEU's "Sanitary Sewer Completion Specifications" for all existing sanitary sewers that will connect into HSEU's sanitary sewer facilities.

F. Identify areas serviced by special structures affecting sanitary sewer facilities including grease traps, grit traps, oil/water separators, neutralization tanks, etc. Provide a shop drawing or detail for each structure.

G. Special structures affecting sanitary sewer facilities including grease traps, grit traps, oil/water separators, neutralization tanks, etc. must be cleaned and/or pumped out prior to being connected to HSEU's sanitary sewer facilities.

H. For a single-family residence requiring only a lateral extension, Design Engineer must provide a plot plan with all pertinent information required by these Design Specifications.

I. If other than a single-family residence, provide complete digital set of architectural plans for all existing buildings/structures as they relate to Floor and Plumbing.

J. Engineer may perform a field inspection to identify areas of concern when existing buildings, existing sanitary sewers, or special structures (including grease traps, grit traps, oil/water separators, neutralization tanks, etc.) are connected to HSEU's sanitary sewer facilities.

K. Design Engineer is reminded that on-site wastewater disposal systems must be closed per state and local requirements. HSEU and Engineer will not review or enforce proposed closure process.

8.05 Sources of Contamination

A. Design Engineer must identify all potential sources of contamination that could enter sanitary sewer facilities. For example, contamination from above ground/underground fuel tanks, fuel oil from boilers, chemicals associated with boiler or cooling systems, neutralization tanks, etc.

B. Engineer may request information on the strength of effluent and the characterization of constituents. For example, BOD, TSS, NH3, TPH, oil/grease, etc.

C. Engineer may request copies of Safety Data Sheets (SDS), quantities, discharge rates, temperature, pH, etc. for all chemicals stored on-site.

D. To prevent contaminants from entering sanitary sewer facilities, dikes may be required around floor drains or trench drains.

E. Refer to HSEU's "Rules and Regulations" as to sources of contamination. No discharge into the sanitary sewer system shall violate the sanitary sewer ordinance of the public wastewater treatment facility receiving HSEU sanitary flow.

8.06 Pools

A. Supply digital swimming pool plans with cross sections of the pool and a layout of the surrounding pool/deck area.

B. If applicable, supply flow rate of the peak filter backwash.

C. If pump house is a separate building from the clubhouse, two (2) laterals will need to be installed.

D. Supply restroom/locker room floor plans with number of showers, water closets, urinals, lavatories, etc.