Date: January 8, 2016

To: Heidelberg Beach Homeowner’s Association
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Vermillion, OH 44089

From: OHM-Advisors, Inc.
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Executive Summary

In recent years, the Heidelberg Beach Community, located in Vermillion Township, Erie County, Ohio, has endured many repairs and higher than normal maintenance costs to operate the existing utilities located throughout the site. The services of OHM Advisors, Inc. was retained by the Heidelberg Beach Homeowner’s Association to perform a feasibility study exploring available options to improve the existing utilities and lower recurring and unexpected costs while improving environmental impact. The following study provides an in-depth look at the options for Heidelberg Beach to improve their drinking water distribution system, sanitary sewer system, storm collection system, and roadway restoration.

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1. Introduction

The Heidelberg Beach Community, located in Vermillion, Erie County, Ohio is an older development composed of 48 cottages and 98 leaseholder lots with room for future development. The existing infrastructure is outdated and was installed prior to modern compliance requirements. Much of Heidelberg’s infrastructure is in need of repair or replacement due to age and/or failures. OHM Advisors has completed the following feasibility study to provide the most cost effective solutions and to provide the development the best possible infrastructure moving forward.

2. Existing Conditions

Water Service

Drinking water is provided to the Heidelberg Beach development via a 6-inch water main west of the main entrance and branching off of the 8-inch water main running along Cleveland-Sandusky Rd. (U.S. Route 6). This single main provides a water supply to every lot as well as existing fire hydrants. Water is routed along the main entrance road to Kentucky Rd. Upon reaching the end of Kentucky Rd., the main splits and runs along the entire length of Ohio Rd. and branching off at the remaining streets travelling south. Exhibit 1 shows the existing water line within the development based on record drawings provided by the association.

Fire Protection

The Heidelberg Beach development is protected by two existing fire hydrants. The first hydrant is located near U.S. Route 6 (Cleveland-Sandusky Rd.) tying into the Heidelberg Beach water main immediately downstream of the connection to the 8-inch main. The second hydrant is located within the development on the south side of Willowdale Dr. directly across from the Kentucky Rd. intersection. Current requirements require hydrants to be connected to a minimum 8-inch water line. A 6-inch line does not provide enough pressure to adequately provide protection to fire department standards.

Sewers

The Heidelberg Beach development utilizes a combined sanitary and storm sewer. In its current state, the pipe network is failing and collapsing due to the age of the system. Each dwelling is connected to a private septic tank, with the outflow connecting to the storm collection sewer, effectively becoming a grey water sewer. The sewer outfalls to a stream located south of Willowdale Dr. which ultimately flows into Lake Erie. The effluent from this type of system contains higher nutrient loads than typical treatment processes which contributes to the
harmful algal blooms throughout Lake Erie, especially if a number of septic tanks are failing. Stormwater is collected into the sewer via a series of yard drains located throughout the development. Failures in the current system lead to disturbing the Earth surrounding pipes, ultimately leading to damaging sink holes. During our site investigation, we determined some manholes throughout the community have been paved over. Exhibit 1 shows the existing sewer line within the development based on record drawings provided by the association.

**Roadway**

The existing streets within the Heidelberg Beach development are extremely narrow, providing only a single lane between 9’ and 10’ wide for two-way travel. Furthermore, standard right-of-way width throughout the community is 20’ with exception to Willowdale Dr., Pennsylvania, and Michigan Rd. which are 30’, 16’, and 16’, respectively. There are also 6’ right-of-ways located between each of the north/south streets behind each property. The existing roads have exhibited failure due to the underlying pipe failures and sink holes.

3. **Proposed Improvements**

**Water Service Improvements**

The existing water mains throughout the development area have exceeded their estimated service life and should be upgraded. Given the age of the system, it is likely experiencing more than normal maintenance as well as leakage and infiltration issues. Furthermore, the current layout of the system does not meet modern requirements of the Ohio Environmental Protection Agency (OEPA) as well as the “10 State Standards” for drinking water distribution systems. As it stands, the cost to continually “patch” the existing system outweighs the cost of building a new system. It is better to budget for a new and improved infrastructure. The two largest issues with the current system are that every branch of the system has a “dead end” main and the entire system does not have sufficient separation (10 feet) from sewer utilities. It is recommended that mains be configured in a loop whenever possible to prevent drinking water from stagnating inside the pipe. Stagnant water will lose the necessary chlorine residual and allow for biological growth within the pipe leading to potential health concerns. Inadequate separation between the drinking water distribution system and the sanitary sewer system allows for the potential for leaking sewer systems to infiltrate the drinking water system and creating a human health hazard.

The Heidelberg Beach Community will need to work with Erie County to obtain a Developer's Agreement to turn over ownership of the proposed utilities to the County upon completion of the project. Currently, the potable water system is private downstream of the existing master meter and sewer is conveyed to the existing stream. Under private ownership, the Association is responsible for the operation and maintenance of the systems. However, it is possible for the county to assume ownership of these systems as long as the systems
meet their specifications. If the master meter were abandoned and the new main turned over to the county, each home would need to be metered and the buying and selling of water would no longer be the responsibility of the HOA. However, individual tie-ins will have a larger upfront cost, requiring individual meters and new service connections. The county specifications for drinking water can be found in appendix B.

The entire drinking water distribution system could be replaced with PVC pipe in the street ROW. The configuration of streets within the development is conducive to water main loops. The proposed main size would be 8” around the perimeter of the development (Willowdale Dr., Michigan, Ohio, and Pennsylvania Rd.) and 6” running through the center of the development (West Virginia, Kentucky, and Indiana Rd.), and a (optional) 2” running to the beach pavilion. The proposed water main would tie into the existing 8” water line or a future 16” water line that is to be constructed along U.S. Route 6 approximately 5 years from now (2020). The future water main, along U.S. Route 6, should have little impact on the scope of the project. If Heidelberg Beach ties into the existing 8”, the transition to the 16” main will be the responsibility of the County. There would be slightly less cost to tie into a smaller 8” main than to a 16” main.

Because of the narrow right-of-ways (ROWs) and existing gas line, it will be impossible to maintain a 10’ horizontal separation required by the OEPA. A variance can be obtained from the OEPA as long as separation is maximized and potential leakage is minimized. OHM has dealt with obtaining variances from the OEPA and is confident that it could be done for Heidelberg Beach. Exhibit 4 shows the typical layout of how the utilities will be within the ROW.

Fire protection upgrades (i.e. hydrants) will be part of the water main upgrades. Heidelberg Beach is located within “District A” of Erie County Department of Environmental Services water service area. For public systems, Erie County DOES as well as the Vermillion Township fire department require that the minimum water main size (with fire protection) be 8 inches in diameter with a maximum of 500 feet between fire hydrants. OHM recommends that 8 hydrants be placed throughout the development (See exhibit 2 for proposed locations). After contacting the Township Fire Chief, preliminary permission was given verbally for the placement of hydrants to place them less than 5 feet from the edge of pavement as well as slightly greater than 500 feet if necessary. This permission will need to be finalized in writing during final design. In this way, the hydrants will be able to be placed inside the public right-of-way and not need easements/permissions from private residents.

**Sewer Improvements**

The existing sewer within the Heidelberg Beach development is outdated and does not conform to current sanitary sewer requirements. Furthermore, many of the residential septic tanks located throughout the community are likely failing/leaking. This system has the potential to cause environmental and human health concerns. It is recommended that the combined sewer be separated into storm and sanitary sewer collection
systems. A new storm sewer should be constructed with adequate ties to roof drains and inlets. The existing sanitary laterals would be abandoned as well as filling in or removing the existing septic tanks. New sanitary laterals would be tied into the proposed sanitary sewer. The existing catchment structures would be replaced and tied into the proposed storm sewer. The proposed storm collection system would utilize PVC yard basins, concrete catch basins, and SDR35 plastic pipe to meet current specifications.

The new sanitary collection system would run parallel to the storm sewer. The collection system would utilize open trench excavation. Open trench excavation is possible with temporary parking, however construction equipment in the narrow ROWs will mean the closure of the streets or infringement on personal property during construction. Proper construction management and planning would minimize necessary street closures. The collection system would gravity drain from the north of the development to a pump station on the southeast corner of the property.

The existing ground would be graded to provide a flat grade for the pump station as well as an access drive from U.S. Route 6. The sanitary sewer would flow by gravity under the existing stream and outfall into a proposed wet well pump station. The pump station force main would tie into an existing force main on U.S. 6. Stream crossing are required to utilize directionally drilled High-density polyethylene (HDPE) pipe in order that the waterway not be disturbed. Exhibit 3 shows the proposed layout for the sewer collection systems. The precise location and aesthetics of the proposed pump station is customizable. An exterior pump station has a small footprint. However, in conversation with Bill Fleck (County Environmental Engineer), an indoor pump station is allowable if desired. While a building may be more aesthetically pleasing, it will come at a much higher cost. Wastewater treatment buildings have a higher cost to build due to the fact that the electrical and HVAC systems must be explosion proof and must meet fire codes specific to wastewater structures. The building must also be constructed of either masonry or prefabricated fiberglass due to the corrosive nature of wastewater gases. Furthermore, the building would need to be heated to prevent piping inside the building from freezing. Photographs of example pump stations can be found in Appendix A.

Traditionally, home owners are billed for sanitary sewer based on their drinking water usage. If the residents tie in with a drinking water meter in every home, they will be billed on an individual basis. Furthermore, a public sanitary collection system will eliminate liability on the housing association for maintaining the proposed pump station and collection system. Because the county owns and operates many pump stations throughout the county, they have staff that is trained to operate and maintain the system. If possible, the HOA should turn over ownership of the pump station to the county regardless of an increase in cost. The alternative is to hire maintenance staff trained to operate the systems and would require annual fees. The County specifications for sanitary sewer can be found in Appendix C.
OHM reviewed the options for a low pressure sewer and vacuum sewers concluding these systems were not feasible for this site. The operation and maintenance of such systems would be cost prohibitive.

**Roadway**

The existing roads appear to be in good condition for the time being. However, the average width between 9’ and 10’ is not adequate for 2-way traffic. However, it’s likely that the existing residents would not like such a change to One-Way traffic. The streets should be widened to a minimum of 10 feet throughout the development. This would still be inadequate for two-way travel but should allow most traffic to pass one another without the need to drive off the street. The existing street will need to be completely removed in order to install all the proposed underground utilities. The proposed pavement will be designed according to the most current ODOT specifications (except for width) for local roads. Roadway material will be reused as base material for the proposed roadway to provide a reduction in cost.

**Miscellaneous Utilities**

The background information we received regarding the existing gas line is approximate at best. The actual location of the line will need to be verified by the gas utility company. There is a good possibility that a portion of gas line will need to be relocated by the gas company. Depending on the age and condition of the existing gas lines, they may determine replacement is necessary.

The current electricity, telephone, and television services run overhead throughout the development. It will be difficult to relocate these utilities underground. Per discussions with Doug Linn, an engineer with Ohio Edison, he does not believe that such a project is feasible. Ohio Edison would require 10’ easements outside of the current ROW. This would put the easement very close to the front of many cottages. The construction would destroy most of the trees and vegetation within the easement. The contractor for the project would be responsible for cutting the trench, at which point Ohio Edison and Time Warner Cable could relocate their services into a shared trench. After that point, an electrical contractor would have to relocate each service underground between the main and the meter box for every house. The preliminary cost estimate to relocate only the electric not including services, trenching, or site clearing is $150,000. Each service would be approximately $2,000 which would total $96,000. Because services already exist, 100% of the relocation cost would have to be paid by the housing association. The cost to relocate the Time Warner Cable services would likely be a similar cost making the total cost for overhead utility relocation over $500,000. Furthermore, costs must be paid to the utility companies in full before construction can begin and this would likely not be covered in any of the public funding.
4. Preliminary Estimate of Probably Cost

The preliminary cost for the scope of the proposed project was divided into five categories: water works, sewer collection, roadway, erosion control, and miscellaneous (design, construction services, contingencies, etc.). A breakdown of cost for each Category can be found in Appendix D. The total estimated cost to design, construct, and inspect the proposed project is $2,238 million.

Water Service

The estimated cost for water services is $617,750. This includes all of the water main pipes and fittings, hydrants, and services to each home and building (including fees). The service to each home consists of a 1-inch copper service pipe from the structure, a curb stop, water meter with pit, and tap into the water main.

Sewer Collection

The estimated cost for a sewer collection system is $828,491; $224,000 for storm sewer and $604,491 for Sanitary Sewer. This includes the cost for all the piping, collection structures, sewer laterals from each home (including fees), pump station, and tie into the existing force main on U.S. Route 6. The sanitary sewer includes a cost for a building to house the proposed pump station.

Roadway

The estimated cost for roadway replacement is $195,066. This includes any landscaping due to construction.

Erosion Control

The estimated cost for erosion control is $6,500. Environmental regulations require that all sediment within a construction site is prevented from leaving the site via water runoff. This includes installation of silt fence, building temporary material storage and cleanout areas, and drain inlet protection.

Miscellaneous

The estimated cost for misc. items is $600,500. This includes engineering design, overhead construction costs (e.g. maintaining traffic, mobilization, bonding, etc.), construction inspection and contingency. The estimated costs for bonding, engineering design, construction inspection, and contingency are estimated based on percentages of the estimated construction cost. These percentages are 1%, 10%, 5%, and 10%, respectively.
5. **Funding Options**

**Public Funding**

OHM Advisors has a lot of experience in obtaining public funding through government agencies. We can guide the project through the application processes and handle many of the administrative responsibilities before, during, and after construction. Below is a list of possible avenues of government funding available to Heidelberg Beach. It is important to note that eligibility requirements and loan availability change from year to year at every agency. The funds that will be available and interest rates being offered will be dependent on when the housing association decides to proceed with design. Availability is also prioritized based on criteria such as health and environmental impacts, median household income, etc. This means that even though Heidelberg Beach may qualify for a loan does not necessarily mean they will get approved for one. Also, public funding will most likely not cover construction that is typically the responsibility of the homeowner such as the service connections between the ROW and the houses. Private funding would still be required for this portion of the project.

**County**

OHM has been in contact with Pete Daniel (Erie County Administrator), Bill Fleck (Erie County Environmental Engineer), and Bill Monaghan (President of the Board of Commissioners). It appears that it may be possible for the county to fund the necessary improvement projects, however it is not recommended by the county to proceed this way. Ultimately, the decision to proceed in this way would be up to the County.

In order for the county to fund the project, the ownership of the existing infrastructure (water and sewer) would need to be turned over to the County. A special assessment would be performed of each homeowner. The homeowners would then be responsible to pay back the cost of the project plus interest, through property taxes, over a predetermined amount of time, usually 20 or 30 years. In general, the county does not like to assume ownership of a failing system. This type of arrangement requires that the county take a certain amount of risk. If property owners fail to pay back their portion of the assessment, the county is still responsible to pay back their financing. The county made it clear that this has been a problem in the past.

Lastly, the County may not be willing to fund all of the necessary improvements desired by the housing association. For instance, the County may not want to assume ownership of the storm system and they will probably not assume ownership of the roads. Furthermore, the County specifications clearly state that the water and sanitary laterals from the home to the curb is the responsibility of the homeowner. That means that these items will still need to be funded by other means. The details of what the County would and would not cover would need to be negotiated with the County. If the Association would like to explore options with the county, it is recommended that a meeting be set up between the County, the Association, and OHM.
Small Communities Environmental Infrastructure Group

The SCEIG Committee is not a funding source but instead is a group composed of many funding organizations including OEPA, USDA Rural Development, Ohio Public Works Commission (OPWC), Ohio Water Development Authority (OWDA), and the Ohio Development Services Agency (CDBG Block Grant). The SCEIG committee holds meetings in Columbus, OH throughout the year in which applicants planning to perform infrastructure projects can present and get input from organization representatives about what amounts and types of funding available. It is recommended that Heidelberg Beach Housing Association allow OHM to present the project at this meeting to discuss possible funding options. The next meeting of the SCEIG finance committee will be February 12, 2016. Applications to present at this meeting must be submitted 15 days prior to any meeting (January 28th). If Heidelberg Beach wishes to attend this meeting, the application should be started as soon as possible in order to meet the deadline. Otherwise, the next meeting will be April 8, 2016.

Ohio Rural Communities Assistance Program (OHRCAP)

This organization does not provide funding but they provide other resources such as grant and application writing, assessments, and planning. They also have a vast knowledge of available funding and specialize in helping small communities. I spoke with John Rauch (State Director) and recommended the Association contact him at 740-989-0596. In his conversation, he pointed to the Ohio EPA and the USDA Rural Development as the most likely sources for public loan funding since the Housing Association is a non-profit and not a government entity. Because they get subsidized funding to provide these services, they may be able to help in the funding process at little to no cost. In this way, OHM could partner with OHRCAP in a technical and advisory capacity.

Ohio Environmental Protection Agency

OEPA has programs in place for community improvements. The largest of the funding sources is the Water Pollution Control Fund (WPCLF) and the Water Supply Revolving Loan Account (WSRLA). This is the most feasible funding option for Heidelberg Beach. These programs offer loans and grants based on the community needs and income levels. The Household Median Income for Heidelberg Beach as of 2013 is $50,268. This income is relatively high for obtaining grants but may meet some low income interest rates. In general, the interest rates on these loans are low (between 1% and 3%). Funding through these programs can cover a portion or all of the project including design, construction, and inspection. EPA funding offers a payback period of up to 30 years, depending on the estimated life expectancy of the system being installed.

United States Department of Agriculture (USDA)

The USDA offers the Water and Waste Disposal Loan and Grant Program. This is another feasible avenue of funding for the project. As before, the median household income will most likely be too high for any
grants but low interest loans should be available. At this time, it appears that Heidelberg Beach is located in an eligible area to receive funding through this program. USDA funding offers a payback period of up to 40 years, depending on the estimated life expectancy of the system being installed.

Ohio Water Development Authority (OWDA) and Ohio Public Works Commission (OPWC)

OWDA and OPWC funding is reserved only for government entities and excludes non-profit organizations.

Private Funding

Private Banks

One option to fund the project is through private banks. The only advantage to private funding is that Heidelberg Beach does not have to pay prevailing wages which can save 10-15% on construction costs. However, the interest on the financing would most likely cost more than the principal savings depending on the bank. The repayment period private financing is likely going to be a shorter time as well, typically 15 years minimum but may vary from bank to bank.

Alliance Association Bank (AAB) is an example of a bank that specifically caters to Housing Associations to provide banking and loans. OHM Advisors has little experience in funding of this type but could potentially be an option. The contact for AAB is Josh Ormiston and can be reached at 602-797-3620 or jormiston@westernalliancebank.com. Please note that OHM Advisors does not endorse nor have any affiliation with this banking institution. This is only used as an example of private funding.

6. Construction Schedule

Depending on funding source and schedule, construction may begin sometime in 2017. A full schedule can be created once funding is known.

Planning and Funding

Funding a project with such a unique scope of work will be complex and time consuming and should start as soon as possible. There will need to be discussions with various funding sources as well as lengthy application processes. Getting approval and fund disbursement from funding sources can take a year or longer. A formal property assessment will also need completed to decide what portion of the cost each owner will be responsible for. The assessment can be done during the design phase.

Design
Full engineering design of this project will take approximately 6 months to complete. This includes getting a full survey, soil borings, and proper approvals from the necessary regulatory agencies including the Erie County Engineer’s Office, Erie County Soil and Water Conservation District, and the Ohio Environmental Protection Agency.

Construction

Construction of this project will take about 1 year. It could take longer if there are necessary change orders due to unforeseen problem areas. Construction for utilities can be completed during winter months but pavement will require warmer weather to maintain acceptable performance.
Appendix B

Erie County Water Main Specifications
DEVELOPER PROCEDURES
All Developer Procedures as established by Erie County Commissioners, Erie County Engineer, Erie County Regional Planning Commission and local political subdivisions shall be followed, which includes: entering into a Developers Agreement, following standards and basis of design, inspection, permits, record drawings (as-builts) in pdf format on mylar media, warranty and financial assurances. One (1) electronic copy in pdf format and one (1) set of paper detail drawings (including plan and profiles, proposed and existing topography and all buried utilities) and specifications of all proposed water lines drawings on 24” x 36” sheets shall be submitted for review and approval to: Erie County Sanitary Engineer, c/o D.O.E.S., 554 River Road, P.O. Box 469, Huron, Ohio, 44839. Upon the Sanitary Engineers approval of the detail drawings and specifications for construction, the Developer will have one (1) year from approval date to complete the construction of the water and sanitary sewer lines or will have to resubmit for approval and at a minimum be subject to any new D.O.E.S. requirements.

The cost to record any and all easements and/or plats for Developer’s projects for sanitary sewer lines, water lines, or pump stations to be dedicated to Erie County for ownership, operation and maintenance shall be at the cost of the Developer. The County shall invoice the Developer for these costs. The Developer shall pay said invoice within thirty (30) days of the invoice date.

O.R.C. 307.73 AGREEMENTS
Erie County may agree to an ORC 307.73 Agreement to allow a Developer to install a water line, dedicate it to the County as a public owned and maintained line in an easement and the County will collect and return connection fees from non-participating property owners as allowed under the law under the following terms:

1. Agreement Term: not-to-exceed 10 years.
2. Pro-rated front footage fees shall not exceed the County’s current equalization fee as described in Water Rule 3. Section 1.C at the date of the agreement.
3. No successor and/or assignment of the agreement will be allowed for the Developer.
4. Developer will pay for all costs involved in acquiring easements including the cost of recording said easements.
BASIS OF DESIGN
The Sanitary Engineer and local Fire Department Official shall determine whether or not the County has available adequate water capacity and pressure to allow for a development to proceed. Generally, in single family residential subdivision, the County will attempt to maintain a fire flow of 500 g.p.m. or more, preferably 1,000 g.p.m. in more dense residential areas and in dense commercial and industrial development, a minimum of 1,200 g.p.m. with a preferred 2,000 g.p.m. fire flow. No public water lines shall be installed smaller than eight inch (8") diameter for Water District “A” with fire hydrants, six inch (6") diameter for Water District “B” where fire hydrants may be added, and four inch (4") for Water District “B” where no fire hydrants are planned. Along major routes, water lines will consist of a minimum size of twelve inch (12") diameter. The Sanitary Engineer shall require all water lines and appurtenances to be sized for ultimate development of the entire service area.

Fire hydrants shall be spaced at the maximum 500 feet apart so that no more than 250 feet of fire hose along the frontage plus setback length is needed to reach each structure and in more dense development closer spacing shall be required as determined by the Sanitary Engineer and the local fire department. Fire hydrants along rural roads shall be located at all high spots in line for air release. Locate fire hydrants in curb lawn area in most subdivisions at least seven feet (7’) behind curb to a maximum of fifteen feet (15’) as required by Sanitary Engineer. Local fire departments shall also review and approve fire hydrant spacing.

Line valves shall be installed at all intersections on each branch near the intersection and at least every 2,000 feet elsewhere.

All twelve inch (12") diameter and larger water lines shall contain restrained joints at the fittings before and after, as recommended by the Ductile Iron Pipe Research Association. All dead end water lines eight inch (8") diameter and larger shall utilize restrained joints consisting of EBAA Iron restrained devices for PVC pipe, Series 1600 or approved equal at all joints within sixty feet (60’) of the end of the line and shall include a line valve and fire hydrant at the end.

The Developer and/or Engineer shall not allow other utilities to be installed within five feet (5’) horizontally of an installed water main or in the same trench as the water main except at crossings. Should this occur, the Developer will be responsible for maintaining the water mains and the Sanitary Engineer will not permit taps to said line until the other utility lines are relocated five feet (5’) away from the water main.

Water lines shall be located within the public road right-of-way, along with other County utilities, such as sanitary sewers, storm sewers and drainage swales. All other utilities shall be located in Easements, outside the public right-of-way.
BASIS OF DESIGN (Continued)
Pursuant to EPA requirements, water mains shall be installed with at least a ten feet (10’) horizontal and eighteen inch (18") vertical separation from any sanitary sewers. The County also requires a five foot (5’) horizontal and eighteen inch (18") vertical separation from any storm sewers, measured from out-to-out.

Water lines shall be installed with a minimum cover of fifty-four inches (54") and to a maximum of seventy-two inches (72") over top of pipe.
WATER LINE MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

REVISION DATES: 06/15/1999, 01/14/2000, 12/01/2000, 6/11/01, 7/01/03, 7/01/04, 7/01/06, 7/01/07, 7/01/08, 7/07/10, 7/01/11
LAST REVISION DATE: 7/01/13

IN THE CASE OF CONFLICTS BETWEEN WRITTEN SPECIFICATIONS AND DRAWINGS, THE WRITTEN SPECIFICATION SHALL APPLY.

SHOP DRAWING REQUIREMENTS
Two (2) copies of shop drawings containing manufacturers information concerning meeting the minimum required specifications shall be submitted to the Sanitary Engineer for approval by the contractor prior to installation for the following items: pipe, valves, fittings, fire hydrants, meter vaults, detector checks, reduced pressure backflow preventers, casing pipe, casing spacers, casing end seals, pipe stanchions, and appurtenances. All drawings shall be stamped and initialed as reviewed by the Contractor before submitting these documents to the Sanitary Engineer for acceptance. U.S. manufactured materials are preferred by Erie County and purchased from Erie County vendors where possible.

WATER LINE CONSTRUCTION STAKING
Water lines shall be staked prior to the installation of new pipe. Staking shall be for both line and grade every one-hundred feet (100’) plus at all fittings and off-set at ten feet (10’). A professional surveyor will be required where the contractor does not have competent surveyors.

WATER LINE PIPE MATERIAL
Shall be PVC AWWA C-900 (4”-12”) DR18 with integral bell and spigot joints, PVCO AWWA C-909/CIOD (4”-12”) Class 200psi or high density polyethylene pipe (HDPE), DR11 with butt fused joints. Under special conditions, waterline pipe material may be Class 52 Ductile Iron Pipe with push-on type joints, cement lined (AWWA C-104) and shall meet the requirements of AWWA C-150 and AWWA C-151 where approved by the Sanitary Engineer. Two (2) No. 8 stranded wires shall be buried with all PVC and HDPE water mains located at the 10:00 and 2:00 positions and terminated in valve boxes, along with four inch (4”) wide tape noting “WATER LINE BURIED BELOW” buried over pipe twelve inch (12”) below finish grade.

FITTINGS
For three inch through twenty-four inch (3”-24”) mechanical joint ductile iron, fittings shall meet the requirements of ANSI/AWWA C-153/A21.53 and ANSI/AWWA C111/A21.11. Fittings shall be cement-lined and seal-coated in accordance with ANSI/AWWA C104/A21.4. All HDPE fittings shall be installed with proper expansion devices (flex washers) and stiffeners made for HDPE pipe and approved by Erie County Water Division Superintendent.

Mechanical fittings, when required, will use thrust block and Meg-a-Lugs, Model Ebba Series 1100 or approved equal through shop drawing submittal. All fittings shall utilize 316 stainless steel bolts and specially designed sacrificial anodes will be required.
WATER LINE MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

REVISION DATES: 06/15/1999, 01/14/2000, 12/01/2000, 6/11/01, 7/01/02, 7/01/03, 7/01/04, 7/01/06, 7/01/07,
7/01/08, 7/07/10, 7/01/11
LAST REVISION DATE: 7/01/13

WATER LINE JOINTS
PVC AWWA C-900 and C909 joints shall incorporate rubber gaskets and meet ASTM F-477 and
ASTM D-3139. HDPE pipe joints shall be butt fused. All eight inch (8") diameter and larger pipe
joints shall include restrained joints at the fittings and before and after fittings as recommended by the
Ductile Iron Pipe Research Association. Restrained joints shall be Mega-Lugs, Model Ebba Series
1100 or approved equal through shop drawing submittal. Pipe installed within casing pipe shall be
restrained joints regardless of pipe diameter. D.I.P joints shall incorporate rubber gaskets and meet
requirements of AWWA C-111. All restrained joint bolts and nuts shall be 316 stainless steel.

WATER LINE VALVES
Water line valves three inch through twelve inch (3”-12”) shall be Resilient Wedge Gate Valve
(RWGV) and meet the requirements of AWWA C509 latest edition, line valves shall be of full body
design. Resilient Seat Compact-Type or Thin-Body Type valves are NOT ACCEPTABLE. The
RWGV shall have a 250 PSIG working pressure and a 500 PSIG hydrostatic test pressure. The
RWGV shall open “right” or “clockwise” and shall be supplied with a two inch (2") square-red wrench
nut. The RWGV shall have Type 316 stainless steel bolts and nuts for the stuffing box and bonnet or
specially designed sacrificial anodes may be used. Resilient Wedge Gate Valves shall be American
AVK Series 25 or Mueller A-2360-E30 open right and side tap valves T-2360-16E302 open right, or
approved equal.

Water line valves fourteen inch through twenty-four inch (14”-24”) shall be Resilient Wedge Gate
Valve (RWGV) and meet the requirements of AWWA C515 latest edition. The RWGV shall have a
250 PSIG working pressure. The RWGV shall open “right” or “clockwise” and shall be supplied with
an enclosed bevel gear and a two inch (2") square-red wrench nut. The RWGV shall have Type 316
stainless steel bolts and nuts for the stuffing box and bonnet or specially designed sacrificial anodes
may be used. Resilient Wedge Gate Valves and side tap valves shall be Mueller A2361-E302 open
right or approved equal.

Water line valves for larger than twenty-four inch (24”) diameter pipe shall be Butterfly valves, except
for side tapping valves, and meet with requirements of AWWA C-504 Class/150B latest edition.
Butterfly valves shall have a working pressure of 150 PSI and hydrostatic pressure of 300 PSI and
shall open “right” or “clockwise” and supplied with a two inch (2") wrench nut with Type 316 stainless
steel fasteners on actuators and stem or specially designed sacrificial anodes may be used. Butterfly
valves shall be Mueller B3211 or approved equal.

Side tapping valves shall be as manufactured by Mueller Model No. T-2360-16 E302 open right, or
approved equal by the Sanitary Engineer through a shop drawing submittal.

Air relief valves shall be as manufactured by Val-Matic, Model No. 38 or approved equal and shall be
located in a standard meter crock setting.
WATER LINE VALVES (Continued)
Valve manholes when required by the Sanitary Engineer shall be four feet (4') diameter precast concrete and designed for an H-20 loading.

Valve boxes shall be Tyler Model C, three piece cast iron with bell that will cover valve bonnet with sufficient vertical adjustment to finish grade.

FIRE HYDRANTS
Shall be American AVK 2780 or Mueller Super Centurion A-423-250 or specified herein. Fire hydrants shall comply with AWWA C502 latest edition, Dry-Barrel Fire Hydrants. Hydrants shall be of the compression-type with a five and one-quarter inch (5¼") valve opening, open left. The hydrant shoe shall be six-inch (6") M.J. with all accessories. The complete interior of the shoe shall be coated with a H.P. epoxy. The main valve assembly shall consist of two (2) all bronze drain outlets, a bronze seat ring, a bronze drain ring, and a bronze top main valve plate or upper valve plate. The hydrant stem shall be made of steel rod, one and one-quarter inch (1¼") minimum diameter, except for machined surfaces. All hydrants shall be furnished with one (1) five-inch (5") Red Head Storz nozzle, with 5-36 and two (2) two and one-half inch (2½") N.S.T. hose nozzles. All hydrants shall be drainable into pipe bedding material consisting of No. 8 limestone gravel pocket, unless specified differently by Erie County. All hydrants shall have Type 316 stainless steel bolts and nuts above and below the bury line or specially designed sacrificial anodes may be used, except the M.J. shoe connection T-bolts shall be Cor-Ten steel. Unless otherwise specified, hydrants shall be buried a minimum of five feet (5') deep. Locate fire hydrants in curb lawn area (between sidewalk and curb) in most subdivisions at least three feet (3') behind curb, along areas without sidewalks at least seven feet (7') behind pavement edge to a maximum of fifteen feet (15') as required by Sanitary Engineer.

All hydrants shall be painted red with white bonnet and caps using Rustoleum Red for metal and Rustoleum enamel paint for white, or equal. Paint shall be provided, upon request, by the Erie County Water Division.

All hydrant leads shall consist of anchoring pipe with appropriate concrete thrust blocks. As a minimum anchoring pipe shall include a two foot (2') or longer section of anchoring pipe between the valve and the hydrant. Any spacer pipe required between the tee and the valve shall consist of anchoring pipe or restrained joint pipe. Hydrant piping shall include swivel fittings or hydrant extension kit for height adjustment.

Watch valves shall meet requirements of AWWA C509 and shall open "right" or "clockwise". Watch valve boxes shall meet the requirements of line valve boxes as described.
CATHODIC PROTECTION
All buried ductile iron water pipe materials such as valves, hydrant assemblies, and fittings shall be installed with sacrificial prepackaged anodes for corrosion protection. The following minimum size and type anodes are required: Fire Hydrant Assemblies – a 32# magnesium anode between watch valve and hydrant shoe and a 32# magnesium anode between the main and watch valve. Line Valves – a 32# magnesium anode. Fittings – a 32# magnesium anode. Water Meter Yokes In Pits – a 5# zinc anode.

Wire connections to buried ductile iron will be made with Cadweld Type “HA” soldered connections. The soldered connection will be insulated with electrical potting compound. The anode lead wires shall be ten feet (10’) length and made of #12 copper wire with Type TW insulation, black in color. Each sacrificial anode will be installed with a test station wired to ground surface installed flush with the ground surface.

DISINFECTION
Disinfection of the lines shall take place after the lines have been properly flushed. Erie County shall provide the water necessary for the first flush (1-1/2 times the volume of the line being flushed) at no cost, but will charge for any water required beyond this volume. Disinfection shall be in accordance with AWWA C651 and is the responsibility of the Contractor.

TESTING
Shall be performed after the main has been disinfected and flushed out, and shall be subject to a pressure and leakage test in accordance with AWWA C600 consisting of 150 psi/30 minutes. Testing will be performed by the Contractor under the supervision of the Erie County Department of Environmental Services Inspector or Water Division personnel.

Contractor shall install a one inch (1”) diameter service at the end of all lines to a meter crock with a compression fitting shut off valve in the crock to be used for bacteria testing sampling. The meter crock and valve shall be provided by the D.O.E.S. Water Division. Bacteria sampling will be done by an Erie County D.O.E.S. Water Division employee. There shall be two (2) consecutive safe samples on a line before it will be turned on. Any additional samples beyond this will be subject to additional charges, which will include the cost of the sample and Water Division employee’s time to collect and transport the sample.

SERVICE LINES
From main to meter pit all service lines, two inch (2") diameter and smaller, shall be CTS pipe and constructed of HDPE pipe with compression fittings rated for 200 psi. Larger services shall meet the requirements of Water Line Pipe Material. All service lines (two inch (2") diameter and smaller) from the meter pit to the customers building foundation shall be polyethylene CTS pipe and shall be constructed of pipe material and joints designed for a minimum pressure rating of 200 psi. Larger services shall meet the requirements of Water Line Pipe Material. All services shall be buried with a minimum ground cover of forty-eight inches (48") measured from finish grade.
SERVICE LINES (continued)
The Developer shall be responsible for installing continuous conduit carrier pipes under pavement for service line installations to each lot, building, condominium, etc. to be served which are located across the street from the water main. Continuous conduit carrier pipes shall be two inch (2") in diameter schedule 40 rigid PVC conduit, sunlight resistant gray, and provided by the D.O.E.S. Water Division. The carrier pipe shall be installed from within two feet (2') of the water main to the edge of right-of-way beyond any utilities, such as storm sewers or tile on the opposite side. Erie County Water Division is responsible for tapping the main and installing the service lateral in public right-of-way or in utility easement, plus install the water meter pit, where one inch (1") diameter or smaller service lines are installed. Larger than one inch (1") diameter, the Contractor shall install the meter pits as needed.

Water services for commercial, industrial and institutional installations may be required to have backflow prevention device(s) installed and tested by a certified plumber as determined by the Sanitary Engineer and as required by the State of Ohio. Water services for irrigation are required to have a backflow prevention device. Annual testing and reporting of test results to Erie County will be required for all backflow prevention devices.

THRUST BLOCKS
Thrust blocks shall be provided at fittings, valves or changes in direction of pipe or as determined by the Sanitary Engineer. Thrust blocks shall consist of concrete with a minimum 28-day compressive strength of 4,000 psi and shall be installed using the dimensions shown in the standard drawings. The Contractor shall use forms to ensure all pipe fitting joints and bolts are free of concrete.

Connection to Existing Mains
New mains to connect to existing Erie County water mains shall generally be with tapping valves and sleeves, unless approval is obtained from the Sanitary Engineer to shut-off the existing main. The Contractor shall perform all excavation and provide and install all materials, except the Erie County Water Division shall install the tap. Tapping valves shall meet all requirements of main line valves.
WATER LINE MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

ROAD AND RAILROAD CROSSINGS
Ohio Turnpike and Railroad Crossings:
D.I.P. water mains shall be installed in welded steel encasement pipe with minimum wall thickness of 0.375 inches, with a minimum I.D. of eight inches (8”) larger than the O.D. of the D.I.P. measured at the bell, installed with use of a bore machine. The annular space shall be filled with sand or approved grout mixture. All PVC lines installed in casing pipes shall have restrained joints and shall contain at least (3) stainless or plastic casing spacers (restrained) per pipe length as well as casing end seals as manufactured by Advance Products and Systems, Inc. (318-233-6116), or approved equal. All D.I.P. lines installed in casing pipes shall have restrained joints and shall contain at least two (2) spacers per pipe length; and all HDPE pipe installed in casing pipe shall contain one (1) spacer for every ten feet (10’) of pipe.

State, County, Township, Village and City Roads:
These roads may be directional drilled or opened cut upon applicable political subdivision approval, backfilled and road repaired to the local jurisdiction’s specifications.

WARRANTY
All new public water lines, sanitary sewer lines and appurtenances installed shall have a one year warranty against any manufacturer defects, installation defects, workmanship or failures of the system. Trench backfill and pavement installed as part of a public water or sewer project shall have a two year warranty against settlement, cracking, raveling, deterioration or shrinking of joint seal products, etc. Term of the warranties shall commence upon County written acceptance of the public lines and appurtenances.
Appendix C

Erie County Sanitary Sewer Specifications
DEVELOPER PROCEDURES
All Developer Procedures as established by Erie County Commissioners, Erie County Engineer, Erie County Regional Planning Commission and local political subdivisions shall be followed, which includes: entering into a Developers Agreement, following standards and basis of design, inspection, permits, record drawings (as-builts) on mylar media, warranty and financial assurances. One (1) electronic copy in pdf format and one (1) set of paper detail drawings (including plan and profiles, proposed and existing topography and all buried utilities) and specifications of all proposed water lines drawings on 24” x 36” sheets shall be submitted for review and approval to: Erie County Sanitary Engineer, c/o D.O.E.S., 554 River Road, P.O. Box 469, Huron, Ohio, 44839. Upon the Sanitary Engineers approval of the detail drawings and specifications for construction, the developer will have one year from approval date to complete the construction of the water and sanitary sewer lines or will have to resubmit for approval and at a minimum be subject to any new D.O.E.S. requirements.

The cost to record any and all easements and/or plats for Developer’s projects for sanitary sewer lines, water lines, or pump stations to be dedicated to Erie County for ownership, operation and maintenance shall be at the cost of the Developer. The County shall invoice the Developer for these costs, the Developer shall pay said invoice within thirty (30) days of the invoice date.

O.R.C. 307.73 AGREEMENTS
Erie County may agree to an ORC 307.73 Agreement to allow a developer install a sanitary sewer line, dedicate it to the County as a public owned and maintained line in an easement and the County will collect and return connection fees from non-participating property owners as allowed under the law under the following terms:

1. Agreement Term: not-to-exceed 10 years
2. Pro-rated front footage fees shall not exceed the County’s current equalization fee as described in Water Rule 3. Section 1.C at the date of the agreement.
3. No successor and/or assignment of the agreement will be allowed for the developer.
4. Developer will pay for all costs involved in acquiring easements including the cost of recording said easements.
BASIS OF DESIGN
The Sanitary Engineer shall determine whether or not the County wastewater collection and tributary treatment system has available capacity to allow for a development to proceed. Gravity sewers shall consist of a minimum size of eight inch (8") diameter for mainline sewers and six inch (6") diameter for service laterals at full flow minimum velocities of 2 fps. The Sanitary Engineer shall require sewers and pump stations to be sized and to be installed at depths for the ultimate development of the entire tributary service area. Gravity sewers shall be required in place of force mains/pressure sewers when the Sanitary Engineer determines it is in the public interest to do so.

Generally, design shall be in accordance with Ohio E.P.A. regulations, the latest version of "Ten State Standards" and shall conform to the proceeding Standard Minimum Required Specifications and Standard Drawings.

The Developer and/or Engineer shall not allow other utilities to be installed within five feet (5') horizontally of an installed sanitary sewer or in the same trench as the sanitary sewer except at crossings. Should this occur, the Developer will be responsible for maintaining the sewer mains and the Sanitary Engineer will not permit taps to said line until the other utility lines are relocated five feet (5') away from the sanitary sewer.

Sanitary sewer lines shall be located within the public road right-of-way, along with other County utilities, such as water mains, storm sewers and drainage swales. All other utilities shall be located in Easements, outside the public right-of-way.

Pursuant to EPA requirements, water mains shall be installed with at least a ten foot (10') horizontal and eighteen inch (18") vertical separation from any sanitary sewers. The County also requires a five foot (5') horizontal and eighteen inch (18") vertical separation from any storm sewers, measured from out-to-out.

Bulkheads shall be installed once for every 200 lineal feet of sanitary sewer installed. Bulkheads will consist of an impervious material which will prevent ground water from passing through pipe bedding and backfill materials. Such materials may include native clays, low strength mortar, or a mixture of ODOT 304 limestone with bentonite.
WASTEWATER COLLECTION MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

IN THE CASE OF CONFLICTS BETWEEN WRITTEN SPECIFICATIONS AND DRAWINGS, THE WRITTEN SPECIFICATION SHALL APPLY.

SHOP DRAWING REQUIREMENTS
Two (2) copies of shop drawings containing manufacturers information concerning meeting the minimum required specifications shall be submitted to the Sanitary Engineer for approval by the Contractor prior to installation for the following items: pipe, fittings, manholes with appurtenances, oil/grit interceptors, grease traps, pump stations, electrical controls, valves, castings, casing pipe, casing spacers, casing end seals, etc. All drawings shall be stamped and initialed as reviewed by the Contractor before submitting these documents to the Sanitary Engineer for acceptance. U.S. manufactured materials are preferred by Erie County and purchased from Erie County vendors where possible.

LINE CONSTRUCTION STAKING
Gravity sanitary sewers and force mains shall be staked prior to the installation of new pipe. Staking shall be for both line and grade every fifty feet (50’) plus at all fittings and off-set at ten feet (10’). A Professional Surveyor will be required where the Contractor does not have competent surveyors. All public gravity sewers shall be installed with the use of a laser to insure installed to grade.

GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE
All sewer pipe should be buried below the frost line consisting of thirty-six inches (36”) of cover over the top of the pipe.

Sewer pipe buried less than four feet (4’) of cover in road or driveway areas shall be of Class 52, Ductile Iron Pipe, cement lined, with rubber gasket bell and spigot push on joints or PVC pipe as specified below installed in a rigid sleeve such as D.I.P. or welded steel pipe.

Sewer pipe buried with less than eighteen feet (18’) of cover shall be:
PVC (solid wall pipe, PVC compounds shall meet the requirements of ASTM D-1784, cell class 12454-B), SDR 35 six inch through fifteen inch (6” - 15”) diameter pipe and ASTM F-679 eighteen inch through thirty inch (18” - 30”) diameter pipe, conforming to ASTM D3034, with joints conforming to ASTM D3212. Installed pipe testing shall meet or exceed ASTM D-1784 for leakage and five percent (5%) deflection. Fittings shall conform to ASTM D-3034. Gaskets shall conform to ASTM F-477. Pipe bedding shall consist of No. 8 or 9 limestone to the dimensions shown on the standard drawings haunched in place.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

Sewer pipe buried with more than eighteen feet (18') of cover shall be:
PVC (solid wall pipe, PVC compounds shall meet the requirements of ASTM D-1784, cell class 12454-B), pipe shall meet minimum pipe stiffness rating of PS-115 and shall consist of SDR 26 or thicker walled pipe as needed, as recommended by the manufacturer for the actual buried depth, conform to ASTM D3034 through fifteen inch (15") diameter and ASTM F679 for larger sizes. Installed pipe testing shall meet or exceed ASTM D-1784 for leakage and five percent (5%) deflection. Fittings shall conform to ASTM D-3034. Pipe bedding shall consist of No. 8 or 9 limestone to the dimensions shown on the standard drawings, haunched in place. All new public sanitary gravity sewers shall be CCTV upon completion of installation and provide Erie County DOES with a DVD and log of same.

Special/alternate pipe different than those specified above for gravity sewer installations use may be considered for special conditions, such as directional drilled HDPE or steel encased cement lined D.I.P. for under roads and water courses when sewer grade elevations will permit, or other pipe subject to approval by the Erie County Sanitary Engineer. Care should be taken not to drill through other buried utilities and the Contractor shall provide a 15 year warranty for the repair of damaged utilities.

Service lateral pipe shall be six inch (6") diameter consisting of PVC (solid wall pipe) as meeting the above described specifications. Larger pipe may be required for larger water user customers subject to Sanitary Engineers approval. A typical sanitary sewer service drawing is included at the end of these specifications. Service lateral pipes shall not be installed without a Connection Permit from the County and without calling two (2) work days in advance for inspection at (419) 656-0577. County service lateral inspections will only be performed during normal County work hours. Service laterals shall only serve gravity drains in the customers structure which are above the vertical elevation of the closest downstream public sanitary sewer manhole cover. Drains below this elevation maybe connected using a grinder pump system for lower level sewage to prevent a public sewer backup into the structure. Basement or lower level gravity drains such as floor drains, toilet, sink, showers, slop sinks, clothes washer drains, etc. may not be connected by gravity to a service lateral, but will require a grinder pump system and force main/pressure sewer piped to the gravity service lateral. Service laterals shall have a clean out installed within three feet (3') of the building foundation exterior. Service laterals shall not have any bends other than 45-degree or 22.5-degree bends. 90-degree bends are not acceptable. One cleanout should be installed for every three hundred feet (300') of pipe installed and spaced and located to allow for easy cleaning. Clean water connections of the sanitary sewer are prohibited, including, but not limited to storm water drains, yard drains, driveway drains, roof water drains, exterior footer or foundation subsurface group water by gravity or with interior sump pump, etc.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)
In developments where connection to a service lateral will not occur for more than thirty (30) days, the Developers Contractor shall install locator rings at their cost over the end of the service pipe meeting the inspectors requirements.

The locator ring shall be as manufactured by 3M Scotchmark #1253, green, mid-range sewer markers as sold by Hughes Supply located in Toledo (1.419.874.8487) and in Elyria (1.440.439.4040). The locator ring shall be buried on average of three feet (3’) below finish grade, but not more than four feet (4’) below finish grade. Record drawings shall include detail information locating in plan and vertical depth (m.s.l. elevation) the end of each service lateral.

When a building(s) is abandoned, existing service laterals shall be cut and capped with a watertight cap. A locator ring shall be installed as described above and a record drawing locating the service connection pipe end in plan and profile shall be provided to the Sanitary Engineer by the demolition contractor or property owner.

Connecting service laterals to existing sewer pipe mains shall be as follows:

a. **To PVC Sewer Mains** - cut out a section of existing sewer main, install a manufactured PVC wye (with six inch (6") branch) with water tight Fernco pipe adapter(s). Where applicable Inserta-tees, manufactured by Inserta Fittings Company, (1.503.358.2110) or approved equal. Bed the pipe connection with No. 8 or 9 limestone, haunched in place to twelve inches (12") over top of pipe.

b. **To Concrete Sewer Mains** - core pipe and install a manufactured flexible watertight six inch (6") rubber boot with stainless steel band(s), Model NPC Kor-N-Tee as manufactured by NPC (1.800.626.2180) or approved equal. Bed around the pipe connection with No. 8 or 9 limestone, haunched in place to twelve inches (12") over top of pipe.

c. **To Vitrified Clay Pipe Sewer Mains** - remove one (1) section of existing pipe (joint-to-joint), install a manufactured watertight PVC with six inch (6") branch with sleeve section as needed with two (2) watertight Fernco pipe adapters, or where applicable Inserta-tees, manufactured by Inserta Fittings Company (1.503.357.2110), or approved equal. Bed around the pipe connection with No. 8 or 9, haunched in place to twelve inches (12") over top of pipe.

Service lateral connections to manholes shall use a KOR-N-SEAL or approved equal (only allowed in special cases and only one (1) inside drop per manhole allowed). **Service laterals from the public sewer main to the building foundation shall not be installed until the building foundation and basement construction has been completed.** A native clay bulkhead dam must be installed on all service laterals typically near the Public Road right-of-way.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

GREASE TRAPS
Grease traps shall be installed in services for all food service businesses and oil/grit interceptors on all services for customers with floor drains in garage/warehouse type buildings. They will be sized as required by the State of Ohio Building and Plumbing Codes and local codes with minimum effective size of 500 gallons. The customer shall be responsible to maintain by cleaning/pumping the trap on a regular schedule. Traps shall be constructed water tight and shall meet the requirements of proceeding manhole specifications for joint construction, chemical additive in the concrete mix, external joint seam wrap, pipe connections and infiltration vacuum testing. All seals (water tight pipe to structure seals, precast concrete top and manhole seals) shall be constructed of oil resistant materials. Grease traps and interceptors shall be of precast concrete meeting the requirements of manhole concrete ring walls and ring wall joints. Grease traps and oil/grit interceptors shall be field tested for infiltration using a vacuum test at four inches (4") of mercury for five (5) minutes, with less than a one-half inch (1/2") reduction per ASTM C 1613-069.1.1. Grease trap openings/cleanouts at the top shall be sealed with ConSeal CS-102, or equal, between metal frames, grade adjustment rings, and top of trap. Two (2) openings for cleaning shall be provided, one over the inlet and the other over the outlet area of the grease trap. No internal chimney seal is required. The inlet pipe size from the building foundation to the grease trap shall be four inch (4") diameter with a four inch (4") diameter outlet to three feet (3') outside the tank, then increased to a minimum six inch (6") diameter sewer pipe for the remainder of the service to the public sewer.

Grease traps shall conform to the Ohio Administrative Code 4101:3-13-02. Grease traps for commercial/institutional kitchen wastes shall be installed so they receive all grease bearing waste except those from garbage disposals. Grease traps shall be installed immediately outside the building where there is easy access for cleaning, unless it is impractical, in which case they may be installed adjacent to and outside of the food preparation area. Grease traps shall be at least 500 gallon effective capacity or larger sized to allow for cooling of liquids before discharge. Grease traps shall be inspected frequently and cleaned frequently and as often as necessary to retain the grease wastes. The use of enzymes for the cleaning of grease traps is not permitted.

If external grease trap, follow the above standards. Contact Erie County DOES, Engineering Division, to schedule inspection and testing of new structure.
OIL AND SAND / GRIT INTERCEPTORS
Oil and sand/grit interceptors shall conform to the Ohio Administrative Code 4101:3-13-02. Oil interceptors are required for garages and service stations where automobiles are serviced. Sand/Grit interceptors are required for car washes, garages and other areas where sand, dirt, solids and semisolids, or other heavy solids potentially plugging sanitary service laterals and public sanitary sewers. Oil interceptor effective volumes will be not less than one cubic feet above the outlet for each one hundred square feet of floor area to be drained to the interceptor, should only a portion of the buildings floor area drain to the interceptor only that area needs to be considered in this calculation. Sand/Grit interceptors shall be sized and designed based on the volume of water and wastes produced and the rates of flow, thereof.

PRESSURE SEWER/FORCE MAIN PIPE
Pressure sewer/force main pipe shall be designed for a minimum pressure of 150 p.s.i. and shall consist of:

a. PVC, conforming to AWWA C900, DR 18 (solid wall pipe with PVC compounds meeting the requirements of ASTM D-1784 meeting the requirements of cell classification 12454-A or 12454-B), pipe shall include integral bell gasketed joints with re-enforced gaskets which are locked in place at the factory; or

b. Ductile Iron Pipe (DIP) shall have a minimum wall thickness of Class 52, with push-on type joints, cement lined (AWWA C104), and shall meet the requirements of AWWA C150 and C151.

c. Pressure sewer pipe shall be pressure tested to 150 psi for thirty (30) minutes without leakage.

d. Restrained joints shall be used at a minimum at all joint fittings and at the next pipe joint from each fitting in all directions. Restrained joints shall consist of Meg-a-Lugs, Model Ebba Series 1100 or equal as approved by the Erie County Sanitary Engineer.

e. 412 stainless steel bolts shall be used on all fittings and be subject to equal cathodic protection as required for the “Water Line Material Specification”.

f. Thrust blocks shall be used at all change of direction fittings in addition to the restrained joints, same as required for the “Water Line Material Specifications”.

g. Grinder pump pressure sewers/force mains shall be a flexible, PE 3408, 200 psi, SODR9, ASTM D2737 rated waterline pipe material, jointless material to the gravity sewer.
WASTEWATER COLLECTION MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

REVISION DATES: 06/15/1999, 01/14/2000, 12/01/2000, 6/11/01, 7/01/02, 7/01/03, 7/01/04, 7/01/06, 7/01/07, 7/01/2008, 7/07/10, 7/01/11
LAST REVISION DATE: 7/01/13

GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

PRESSURE SEWER/FORCE MAIN PIPE (Continued)

h. All high points in force main shall have installed an air release valve in a manhole consisting of a one inch (1") sewage combination air valve as manufactured by Apco Valve and Primer Corporation (representatives McStay & Associates: 216-439-7208), or equal.

i. Two (2) No. 8 stranded wires shall be buried with all PVC and HDPE pressure sewer pipes located at the 10:00 and 2:00 positions and terminated in valve boxes, along with four inch (4") wide tape noting “SEWER FORCE MAIN BURIED BELOW” buried over pipe twelve inch (12") below finish grade.

GENERAL PIPE REQUIREMENTS & TESTING
All manufacturers recommendations for installation, unloading, trench preparation, assembly, backfill, pressure or infiltration test, deflection tests, etc. shall be followed unless in conflict with these specifications, latest version of Ten State Standards or with Ohio EPA requirements.

SEWER PIPE BEDDING
Sewer Pipe Bedding shall consist of No. 8 or 9 limestone haunched in place to the dimensions shown on the standard trench drawing for all gravity, service laterals and pressure sewer pipe installed by open trench method to twelve inches (12") over top of pipe. A native clay bulkhead dam will be installed at a minimum for every 200 feet of sewer pipe installed by open trench method and on every service lateral outside of the mainline sewer trench.

STEEL ENCASEMENT PIPE
Under Railroad Crossings and the Ohio Turnpike or as required by the County, sewer pipe shall be installed in welded steel encasement pipe with minimum wall thickness of 0.375 inches, with a minimum I.D. of eight inches (8") Larger than the O.D. of the sewer pipe, (measured at the bell) installed with the use of a bore machine. The annular space shall be filled with sand or approved grout mixture. All PVC sewers installed in casing pipes shall have restrained joints and shall contain at least three (3) stainless steel, plastic, or pretreated wooden casing spacers per pipe length as well as casing end seals or approved equal. All D.I.P. installed in casing pipe shall have restrained joints and shall contain at least two (2) spacers per pipe length; and all HDPE pipe installed in casings shall contain one (1) spacer for every ten feet (10’) of pipe.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

MANHOLES
All manholes are permit required confined spaces and shall be watertight structures made of precast concrete sections with full depth channels and shall meet the requirements of ASTM C478, plus have external joint wraps, chimney seals and use concrete additives for water tightness. All existing manholes, which are to receive a new sewer pipe connection may be required to be replaced if not already constructed to the proceeding specifications as determined by the Sanitary Engineer. All inspections by D.O.E.S. will be performed to determine the need for replacement or rehabilitation.

Concrete ring walls. Concrete for manhole ring walls shall be constructed of Class A, 4,000 psi, 28 day compressive strength (6.5 bags per c.y.), with a waterproofing additive consisting of XYPEX Concentrate Admix C-2000 as manufactured by XYPEX Chemical Corporation, 13731 Mayfield Place, Richmond, B.C., Canada VGU (1.604.273.5265), Ipanex as manufactured by IPA Systems, Inc., 2745 North Amber Street, Philadelphia, Pa., (1.800.523.3834), Penetron Admix as manufactured by ICS/Penetron International, TTD, 45 Research Way, Suite 203, East Setauket, New York 11733 (1.631.941.9700) or approved equal. Reinforced steel and ring wall dimensions shall be as shown on standard manhole drawing. Lift holes if provided shall be filled watertight. Lift holes shall be filled with a non-shrink grout after set in place if they are thru holes. Cone sections shall include a minimum two inch (2") high smooth vertical interior face at the top to allow for the installation of the lower section of the internal chimney seal.

Ring wall joints. Joints shall be formed entirely of concrete employing a round rubber gasket conforming to ASTM C443, shall be self-centering and made a uniform watertight joint. Joints damaged during installation shall be replaced with new ring walls. This joint seal shall be lubricated with Conseal CS-2000 or approved equal. Ring wall joints shall be further sealed for water tightness by installing an external joint/seal wrap consisting of Conseal/Con Wrap CS-212, twelve inch (12") width with CS-75 primer as manufactured by Concrete Sealants, Inc., 8917 South Palmer Road, New Carlisle, OH 45344 (1.800.332.7325), or approved equal. Minor concrete joint damage may be repaired with hydraulic cement in the field under approval of the inspector.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

MANHOLES (Continued)

Connections. All sewer pipe connections shall be flexible and watertight. The sewer pipe at the spring line shall not extend to the manhole flow channel. Any space left between the end of pipe inside the manhole and the concrete channel shall be filled with ConSeal CS-1500, or equal, waterproof flexible joint filler in a smooth workman like manner, which will not restrict solids to pass. Connections shall consist of flexible rubber boots with stainless steel bands. Connections should be installed at the factory when possible, including future sewer pipe stubs. Factory installed connections shall be Z-LOK for four foot (4’) diameter manholes with sewer pipe sizes with O.D. less than 18.25 inches or A-LOK for larger manholes and sewer pipes as manufactured by Products, Inc., P.O. Box 1647, 697 Tullytown, PA 19007 (1.800.822.ALOK), or approved equal. Connections of sewers to existing manholes shall be KOR-N-SEAL, as manufactured by NPC, Inc., 250 Elm Street, P.O. Box 301, Milford, N.H. 03055, (1.800.626.2180) or approved equal.

Manhole Steps. Shall conform to the requirements of ASTM C478 except that the steps shall be polypropylene with steel reinforcement. Manhole steps shall not be installed in shallow manholes (4’ deep or less).

Grade Adjustment. Shall be of precast concrete conforming to ASTM C478, shall be held in place with tar/asphaltic cement, no more than three (3) rings used per manhole and shall not exceed twelve inches (12") of total height adjustment. Precast concrete grade rings shall not be less than a two inch (2") height. One- one inch (1”) grade ring made of plastic or neoprene rubber may be used on each manhole as needed.

Frames and Covers. Shall be gray iron castings conforming to ASTM A48 and shall be cleaned and factory dipped in coal tar pitch varnish at the factory or cleaned and field coat applied with asphaltic paint. Covers shall have solid (without vents) lids, unless otherwise specified. Typical frame and covers shall be Neenah R-1782, East Jordan model 1710, (6-1/2 inch high), East Jordan V-1317, (5 inch high), or approved equal. Watertight frames and covers shall be Neenah R-1916-F, East Jordan “Watertite” 1047 or approved equal.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

MANHOLES (Continued)

**Drop Manhole Connections.** Shall consist of an inside drop, conforming to the preceding connection paragraph with the addition of utilizing a GPK drop pipe fitting as manufactured by GPK Products, Inc., Fargo, ND 58108-2872 (1.701.277.3225) or approved equal, with internal drop pipe clamps at the top and bottom of the drop pipe and every four feet (4’) in between manufactured of 316 stainless steel strap anchored with anchor bolts such as 3/8 inch diameter Stainless Wejet or equal anchors as supplied by Fastenal (1.419.621.8228), or Spoerr Concrete, (1.800.252.5205). Generally, drop pipe diameter shall be one pipe size smaller than the inlet sewer pipe diameter with six inch (6”) diameter a minimum. At the bottom of the drop pipe will be a 45 degree bend directing the flow smoothly into the flow channel, toward the outlet sewer pipe. Leave all caps off GPK ends.

**Invert/Flow Channel.** Invert/flow channels shall be installed at the factory. The minimum flow channel width and depth shall match the O.D. of the outgoing sewer pipe diameter. The minimum radius of flow channel curvature shall be equal to 1.5 times the I.D. of the outlet sewer pipe diameter and shall be smooth. Manhole diameter shall be designed appropriately to allow for the minimum radius. Flow channel shall also be installed for all future stub sewers installed with the installation and for all drop pipe connections. The bench above the channel shall be sloped at a grade of 4:1 toward the flow channel. Flow channels shall be U shaped with a cross section width slightly larger than the outside diameter of the largest pipe connected to the manhole. All flow channel and benches shall be installed in a workman like manner. Non-smooth flow channel manhole bottoms shall be rejected and have to be remanufactured at the factory causing a possible delay to the project. All upstream connecting pipes shall be installed to “match crowns” (top outside of pipes).

**Chimney Seals.** Shall be external chimney seals as manufactured by WrapidSeal external chimney seals as manufactured by CANUSA a division of Shaw Resource Services Inc., 2408 Timberloch Place, Building C-8, The Woodlands, Texas 77380 (1.281.367.8866) or approved equal, as required by the Sanitary Engineer. Internal chimney seals must be installed in a watertight manner. The chimney seal shall start at the frame including all adjusting rings down to the first ring wall.
GRAVITY MAIN LINE AND SERVICE LATERAL SEWER PIPE (Continued)

MANHOLES (Continued)

**Manhole Infiltration Test.** The manhole from invert to top of casting, with chimney seal in place, shall be field tested for infiltration using a vacuum test at ten inches (10") of mercury for sixty (60) seconds, with less than a one inch (1") reduction.

**Backfill Material And Installation.** Pipe backfill material over sewer pipe bedding and around manholes within a forty-five (45) degree plane of influence of gravel or paved driveways and within influence of private and public roads shall at a minimum consist of ODOT 304 limestone installed in eighteen inch (18") lifts and mechanically compacted to ninety-five percent (95%) modified proctor. In areas of public roads, the backfill shall meet the requirements of the appropriate public official whom maintains the paved road.

PUMP STATIONS

PUBLIC SUBMERSIBLE PUMP STATIONS

General requirements of typical wastewater pump station includes, but is not limited to, the following: Duplex submersible pumps with controls as manufactured by Hydromatic, Vaughn chopper pumps for high clogging conditions or equal, in a concrete wet well with a separate valve vault. The wet well and valve vault shall be at a minimum eight feet (8’) diameter to a maximum of twelve feet (12’) diameter, Class A (4,000 psi) reinforced concrete designed for H-20 highway loadings, with sufficient size top hatches to remove all pumps, valves and equipment, with hatches made of aluminum (safe Hatch from Flyght or equal), hinged and padlocked, designed to same water tight specifications as sanitary manholes and shall include steps. Wet well shall have a hopper shaped bottom with all interior concrete surfaces field coated with Aromatic Polyurea Spray for Concrete as manufactured by Elastomer Specialties, Inc., 10908 S. 264th East Ave.,
PUMP STATIONS

PUBLIC SUBMERSIBLE PUMP STATIONS (Continued)
Broken Arrow, OK 74014 (1.800.786.4244) including a five (5) year warranty against H2S corrosion or equal. Hydromatic Pumps with flanged assembly for break away fittings are preferred with one spare pump provided. Victaulic D.I.P. shall be provided in the valve vault. In the wet well provide stainless or fiberglass guide rails to remove the pumps. Provide one (1) spare Hydromatic Pump with motor.

Size the vault for expansion to handle the ultimate service area design flow. Electric controls shall include circuit breaker system, level controls, alternating pump controls, lighting, HOA for motor starters, soft start and stop (future condition) for all motors larger than 25HP motor starters.

All electric controls in stainless steel NEMA 4X weatherproof enclosures. Four (4) wire contacts shall be provided and left open and labeled in the control panel for connection of an auxiliary portable generator to provide power during a station primary power outage.

Pump Stations shall include as a minimum the following items:

a. Use duplex PC boards. Hydromatic Duplex Q with duplex PC boards. High level and seal failure boards for alarms only.
b. Control panel shall have an internal Plexiglas door inside the box with control switches, gauges, etc., on the inside door and external door shall be lockable.
c. All electrical panels shall be located a distance of four feet (4’) from wet well on a separate concrete pad on a non-corrosive mounting frame of sufficient size to support both a telemetry panel and a stainless steel electrical service panel. Mounting surface shall consist of aluminum or stainless steel posts with stainless steel unistrut system with stainless steel fasteners.
d. Three (3) stainless steel NEMA 4X terminal boxes shall be provided; one (1) for tip floats and one (1) for pumps to be located with control panel mounting frame.
e. Check valves shall have external weighted swings.
f. Minimum one-quarter inch (1/4”) stainless steel lift chains for lifting pump and motor. Pumps shall have stainless steel lifting bail.
g. Stainless steel bracket for hanging tip floats.
h. Isolation valves shall be short bodied quarter turn plug valves.
i. Dresser couplings shall be installed in forcemain pipes between wet well and valve vault.
j. A four inch (4”) quick disconnect compression type connection shall be provided in the valve vault piping to connect a portable pump hose, used for emergency bypassing the pumps or wet well.
WASTEWATER COLLECTION MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

PUMP STATIONS

PUBLIC SUBMERSIBLE PUMP STATIONS (Continued)

k. The pump station alarm system shall include a cellular RTU compatible with alarm website and connected to local phone line installed complete to call out alarms listed above.

l. Conduit shall be PVC underground to terminal box, aluminum afterward with gas seals before entering control panel or telemetry panel.

m. Provide exterior area lighting.

n. Provide a GFI 120 volt receptacle in the control panel.

o. All control panels shall be grounded to a six feet (6’) grounding rod and grounding cable in a conduit to protect against corrosion.

p. Valve vault shall drain to wet well through a red valve check valve, series 39 or approved equal located in a sump in valve vault with vault floor sloped to sump.

q. Provide two (2) complete copies of O&M Manuals for all pumps, motors and controls.

r. A one year warranty shall be provided from the manufacturer(s) of the pumps, controls, valves, piping with fittings and all structures beginning from the time of successful completion, startup and submittal of O&M Manuals, covering the cost of all material and labor defects.

s. Level controls will consist of a submersible transducer for VFD motors and/or mercury float type for low level alarm, pumps off, lead pump on, lag pump on and high level alarm plus one spare (total of six)

t. No spare parts for pumps are necessary except as listed above.

Developers or their agents shall own and maintain the pump station, including paying for all utilities until an equivalence of a minimum of five (5) single family homes are connected to and contributing wastewater flow to the new pump station at which time Erie County will inspect the station one last time and if in acceptable condition will accept for ownership, operation and maintenance the new pump station.
WASTEWATER COLLECTION MATERIAL
MINIMUM REQUIRED SPECIFICATIONS
AND INSTALLATION STANDARDS

REVISION DATES: 06/15/1999, 01/14/2000, 12/01/2000, 6/11/01, 7/01/02, 7/01/03, 7/01/04, 7/01/06, 7/01/07,
7/01/2008, 7/07/10, 7/01/11
LAST REVISION DATE: 7/01/13

PUMP STATIONS

GRINDER PUMP STATIONS
Grinder pump stations may be used in homes and/or businesses where the public sewer does not
meet the required depth to serve the customer by gravity as described in the Service Lateral
section of these standards. It is recommended to use a submersible positive displacement type
grinder pump that is designed to pump against varying heads as manufactured by Environmental
One and represented by The Craun-Liebing Co. of Cleveland, Ohio (1.800.221.1251). A single
submersible grinder pump with spare pump is recommended for a single-family home installation.
Multiple home installations connecting to a shared grinder pump station or businesses using a
submersible grinder pump station shall require a duplex (2 pumps) submersible grinder pump
station, designed by a Professional Engineer, EPA Permit-to-Install, and an agreement as to
ownership, use, operation and maintenance, recorded with the property deed of all customers
utilizing the pump station. Grinder pump stations shall be the responsibility of the private
sewer customer(s) to own, maintain and operate.

WARRANTY
All new public water lines, sanitary sewer lines and appurtenances installed shall have a one year
warranty against any manufacturer defects, installation defects, workmanship or failures of the
system. Trench backfill and pavement installed as part of a public water or sewer project shall
have a two year warranty against settlement, cracking, raveling, deterioration or shrinking of joint
seal products, etc. Term of the warranties shall commence upon County written acceptance of the
public lines and appurtenances.
APPENDIX D

Preliminary Cost Estimate
<table>
<thead>
<tr>
<th>REF NO</th>
<th>QTD. ITEM</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>UNIT</th>
<th>UNIT COST</th>
<th>TOTAL UNIT COST</th>
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**ROADWAY - REMOVE AND REPLACE**

**WATER WORKS - IN STREET ROW (PUBLIC)**

**DRAINAGE**

**SANITARY SEWER**

**EROSION CONTROL**

**MISCELLANEOUS**

<table>
<thead>
<tr>
<th>REF NO</th>
<th>QTD. ITEM</th>
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<th>TOTAL UNIT COST</th>
</tr>
</thead>
</table>

|        | 638       | 8" PVC WATER MAIN AND FITTINGS | 2950     | LF   | $75.00    | $221,250.00     |
|        | 639       | 6" PVC WATER MAIN AND FITTINGS | 1900     | LF   | $60.00    | $114,000.00     |
| 3      | 638       | 6" GATE VALVE AND VALVE BOX | 19       | EACH | $1,000.00 | $19,000.00      |
| 4      | 638       | 6" GATE VALVE AND VALVE BOX | 6        | EACH | $750.00   | $4,500.00       |
| 5      | 638       | 1" COPPER SERVICE BRANCH (ASSUME 10' PER HOME) | 950      | LF   | $25.00    | $23,750.00      |
| 6      | 638       | METER W/ METER PIT | 48       | EACH | $750.00   | $36,000.00      |
| 7      | 638       | TAPPING SLEEVE, CURB STOP, AND VALVE BOX | 95       | EACH | $750.00   | $71,250.00      |
| 8      | SPEC      | COUNTY TAP FEES | 48       | EACH | $2,000.00 | $96,000.00      |
| 9      | 638       | 6" FIRE HYDRANT ASSEMBLY | 8        | EACH | $4,000.00 | $32,000.00      |

**TOTAL** $195,086.25

**DRAINAGE**

**TOTAL** $617,750.00

**SANITARY SEWER**

**TOTAL** $224,000.00

**EROSION CONTROL**

**TOTAL** $604,491.25

**MISCELLANEOUS**

**TOTAL** $6,500.00

**SUBTOTAL** $2,248,807.50
EXHIBITS