First UTILITY DISTRICT OF KNOX COUNTY

Where community comes first.

NEW DEVELOPMENT PACKET

Updated September 2023

First Utility District of Knox County (FUD) welcomes the opportunity to work with you to provide service to new projects. We understand the importance of timely effort in helping meet your project deadlines. To that end, we have prepared this New Development Packet to provide clarity of the plan approval, construction, and closeout processes when working in our service area. FUD requires that all Water or Sewer projects serving more than a single metered customer must be reviewed and approved prior to construction activities. FUD requires review and approval of a project meeting any one of the following criteria:

- Line extensions for new development;
- Fire hydrants or fire sprinkler systems;
- Individual water service connection with 2" meter or larger;
- Water or Sewer relocations in connection with a project.
- Commercial projects requiring cross connection and/or fat, oil, and grease (FOG) control equipment based on FUD's Cross Connection and FOG Policies, respectively.

This packet provides an outline of pertinent contact information, work flow, design criteria, Standard Specifications, FUD Policies, and administrative requirements associated with utility construction for New Development. We are pleased to be a partner and welcome you to contact us for assistance.

FUD Contact Information			
Jonathan Holt	Staff Engineer	865-671-5680	jholt@fudknox.org
Michael Gresham	Project Manager	865-218-3694	mgresham@fudknox.org
Doyle Noe	FOG Equipment & Sewer Service Inspector	865-661-8613	dnoe@fudknox.org
Chris McCarter	Public Line & Fire Line Inspector	865-279-6650	cmccarter@fudknox.org
Mike Pogue	Public Line & Fire Line Inspector	865-740-7802	mpogue@fudknox.org
Kevin Casteel	Cross Connection Manager	865-816-7678	kcasteel@fudknox.org
Edwin Deyton	Engineering Supervisor	865-218-3690	edeyton@fudknox.org

Office Location: 122 Durwood Road
Knoxville TN, 37922
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www.fudknox.org
newdevelopment@fudknox.org

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Contents

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Service Availability Request

- The Applicant shall notify FUD of their development within the District by submitting a Service Availability Request form. The form is available on and submitted through FUD's website. Based on the information submitted, FUD Engineering will verify sufficient Water and Sewer capacities are available to meet the requested demands. Please allow up to two (2) weeks for capacity verification.
    - If service is available, FUD will issue an affirmative response and project tracking number to be used in future correspondence and submittals. The Applicant is thereby clear to move to the Plan Submittal phase. A "will serve" letter can be furnished upon request.
    - If service is not available (Water and/or Sewer), the Applicant may request FUD conduct a feasibility study to identify the scope and cost of necessary improvements to serve the project. Please allow 2-4 weeks for the study to be conducted.
    - FUD Staff shall advise Applicant of Sewer Capacity Reservation Fees, where applicable.
- System mapping requests can be made through FUD's GIS Department. Contact Dustin Baker at dbaker@fudknox.org.

Plan Submittal & Review Process

- New Development projects shall be executed per FUD's Agreement for Proposed Development and the Development Process Flow Chart. A preliminary review meeting with FUD Staff is recommended to streamline the design process.
- Utility design packages shall be prepared per FUD's Standard Specifications, Design Criteria, and applicable Policies. Complete submittals shall be made through FUD's **Plan Submittal Portal**. Incomplete submittals will not be reviewed and will be returned to the Applicant. A complete submittal shall be comprised of:
    - Signed Agreement for Proposed Development
    - Review Fee
        - *FUD reserves the right to re-assess review fees for projects requiring more than two (2) plan revisions*
    - PE-sealed design plans;
    - PE-sealed hydraulic calculations;
    - PE-sealed technical specifications (as applicable)

  (FUD does not require a Developer Agreement for private fire lines or commercial projects not requiring a line extension.)
- Sewer Capacity Reservation Fees are effective in most sewer basins for projects submitted after June 15, 2021, and approved after July 1, 2021. For applicable projects, fifty percent (50%) down payment of fees are required as a condition for plan approval. The remaining fifty percent is due at the sooner of 24 months after plan approval or FUD assuming ownership of the system. The URL's for the Sewer Capacity Reservation Fee and applicable basin maps are provided in the links section at the end of this packet.
- If system capacity improvements were identified in the feasibility study, then additional efforts are required with the Engineering Department. Sewer capacity improvements shall be administered under the requirements set forth in FUD's Sewer Capacity Reservation Fee Policy in FUD's Rate Resolution. Water system improvements are the sole responsibility of the Developer and subject to FUD's concurrence based on acceptable operation of the distribution system.

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- FUD Staff will typically review complete packages within ten (10) business days of complete submittal. Plans will be reviewed for adherence with FUD's Standard Specifications, Design Criteria, and applicable Policies. Plan approval or identified deficiencies will be delivered electronically to the Applicant.
- Plan revisions shall also be submitted through FUD's **Plan Submittal Portal**. Please select "yes" when asked "Are you resubmitting plans?" Including your tracking number is mandatory.
- Note: FUD has TDEC Plan Review Authority per TCA 68-221-706, therefore no separate plan review submittal to TDEC is required.
- Utility ROW Permits shall be required for work in existing Public Rights of Way. The Applicant shall be responsible for any professional services required to obtain Utility ROW Permits.
- Environmental Permits may be required by jurisdictional authorities (TDEC, USACE, TVA, etc.). The Applicant shall be responsible for identifying and securing permits for the project.
- Offsite easements, if required, shall be recorded prior to start of construction activity. Easement compensation shall be negotiated and paid by the Developer. Refer to Easement Criteria in Support Documentation.

Construction Process

- Receipt of approved Plans, required environmental permits, and required offsite easements shall allow the Applicant to move to the Construction Process.
- The Developer shall identify the TN-licensed Municipal Utility (MU) Contractor to FUD. The Contractor shall furnish their current MU license and Small Diameter HDPE Butt Fusion certification (for projects with HDPE). Documentation shall be submitted electronically to newdevelopment@fudknox.org.
- The Contractor shall provide material submittals for all items to be incorporated into the Water and Sewer infrastructure. Materials shall be approved by FUD before starting utility construction. Transmit submittals electronically to newdevelopment@fudknox.org.
- The Contractor shall notify FUD's Public Line Inspector three (3) working days prior to starting utility or fire line construction.
- The Contractor or plumbing subcontractor shall notify FUD's service line inspector three (3) working days prior to starting sewer service line or grinder pump installation.
- The Contractor, plumbing subcontractor, or sprinkler subcontractor shall notify FUD's Cross Connection Supervisor three (3) working days prior to installing backflow prevention equipment on domestic or fire lines.
- All Water mains, Sewer mains, Fire lines, sewer service lines, grease control equipment, and backflow prevention devices shall be installed, inspected, and tested in accordance with FUD's Standard Specifications and governing Policies. FUD Staff will perform bacteriological testing, and all other testing shall be by the Contractor and witnessed by FUD.
- Once pressure and bacteriological testing are complete on water mains, the Contractor may rent a hydrant meter assembly for water during construction.
- FUD will perform a final inspection once all lines are installed and curbs are backfilled. Final inspection shall include:
    - Tracer wire continuity for Water and Low Pressure Sewer;
    - CCTV of gravity sewer mains and services;
    - Manhole integrity;
    - Valve access & operability;
    - Access at finish grade for valves, service boxes, meters, hydrants, manholes, ARV's, etc.

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→ FUD will issue a punchlist identifying necessary corrections.

- FUD will furnish the Contract a "Notice of Completion," upon request, following satisfactory resolution of the punchlist.

Closeout Process

- Contractor has completed construction and addressed punchlist items.
- Developer shall furnish Record Drawings per criteria specified in Agreement for Proposed Development.
- Developer shall provide utility easements for Water and Sewer installed outside of public right-of-way. Easements must be recorded to complete closeout.
    - Easements provided by plat shall provide reference to Instrument #200908100011396 on file at the Knox County Register of Deeds Office.
    - Easements provided by Utility Easement document shall be prepared by FUD's Attorney with Developer-furnished Exhibit Map and Legal Description.
- Fees shall be paid in full for basins with Sewer Capacity Reservation Fees; see Rate Resolution.
- Developer shall furnish a signed Affidavit of Cost confirming work is complete, all parties have been paid, utilities and easements are not encumbered, and utility ownership is transferred to FUD.
- FUD will assume ownership and operation of Water and Sewer infrastructure following completion of this process.
- Begin One Year Warranty Period for Water and Sewer infrastructure.
- <u>After completion of all of the above items, FUD will accept application and payment for water and sewer service</u>.

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Support Documentation

Support Documentation
Service Availability Request Form
Agreement for Proposed Development
Development Process Flow Chart
Plan Review Fee Worksheet
Design Criteria
Easement Requirements
Standard Specifications
Sewer Use Policy
FOG Policy
Cross Connection Control Policy
FUD Rate Resolution & Sewer Capacity Fees

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Service Availability Request Form

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SERVICE AVAILABILITY REQUEST

General Information

Development Name _____

Date of Inquiry _____

Location of Property (Street Address and/or Vicinity Map) _____

Development Type: ◉ Single Family Residential ○ Multi-Family Residential ○ Commercial

Tax Map# _____ Parcel # _____ Area (acres) _____

Total Number of Construction Phases (if applicable) _____

Total Number of Units _____Unit Type (homes, apartments, hotel rooms, etc) _____

and/or

Calculated Demand: _____ gallons/day _____ gpm

Fire Hydrant Flow Requirement: _____ gpm (as determined by local Jurisdictional Authority)

Is a Fire Sprinkler System Required? ○ Yes ◉ No

Sprinkler System Flow & Pressure Requirement: _____ gpm at _____psi

Developer / Owner Information

Company Name _____

Contact Name _____

Street Address _____

City _____ State ____ Zip _____

Phone _____

Email _____

Engineer Information

Company Name _____

Contact Name _____

Street Address _____

City _____ State ____ Zip _____

Phone _____

Email _____

Required Attachments: Vicinity Map, Concept Plan, Fire Demands, # of Units or Expected Demand

Based on the information furnished and the complexity of the assessment, FUD will furnish a response within 15-30 calendar days following receipt of request. The response will indicate ability to serve the development based on FUD's existing infrastructure and the provided information.

Guidelines for Service Line and Meter Capacities

Meter Flows from Badger Meter

Meter Size (in)	Meter Type	Max Flow (gpm)	High Normal Flow (gpm)
3/4	PD	25	15
1	PD	70	50
1.5	PD	120	80
1.5	ultrasonic	100	100
2	PD	170	100
2	ultrasonic	160	160
3	ultrasonic	560	350
4	ultrasonic	1100	630

1. This table shall be used for the purpose of sizing water meters for use in residential, irrigation, commercial, and institutional facilities. The District reserves the right to require the Customer or Engineer / Architect to furnish demand in gallons per minute before sizing water meter and assessing fees.
2. All flows in gallons per minute.
3. Meter flows are based on Badger Meter Recordall (PD) and Badger E-Series (ultrasonic).
4. Consult plumbing code for use in sizing backflow prevention device. FUD requires RP type for high-hazard domestic service and irrigation. Access to be as required by FUD Cross Connection Policy, current version.

Agreement for Proposed Development

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Agreement For Proposed Development

THIS DEVELOPMENT AGREEMENT AND CONTRACT is made and entered into on this_____day of_____, 20___, by and between the FIRST UTILITY DISTRICT OF KNOX COUNTY, TENNESSEE, a utility district incorporated under the laws of the State of Tennessee, with its office and principal place of business in Knox County, Tennessee (hereinafter called "District"), and_____(Developer), a _____ (Corporation, LLC, Gen. Partnership, etc.) whose office and principal place of business is in _____ County, _____ _____(State) (hereinafter called "Developer").

WITNESSETH

WHEREAS, Developer desires to establish a development, within the boundary of the District, known and to be known as_____and, whereas, in order that the development may receive water and/or wastewater service from the District and in order for the water and/or wastewater system(s) installed within that development to be fully integrated into the District and in order for the system(s) to function satisfactorily, the District and the Developer do contract and agree as follows:

Article 1 – System Design

Design of the water and/or wastewater systems within the development shall be done by an Engineer, licensed to practice in the State of Tennessee. The design shall conform to the State of Tennessee design criteria for construction of water and wastewater systems. The specifications for systems installed in the District shall be those of the District, approved by the Tennessee Department of Environment and Conservation. The District shall, to the best of its ability, provide all information about existing water and wastewater lines that interface with the development.

Article 2 – Separation of Utilities

A minimum of three (3) feet horizontal separation shall be maintained between water and wastewater lines and any other underground utility. Other underground utilities may cross water or wastewater lines only at a perpendicular angle or as close to perpendicular as possible. Water and wastewater lines are to be vertically separated by a minimum of (18) eighteen inches. (water shall be on top) or be separated ten (10) feet horizontally if less than eighteen (18) inches.

Article 3 – SCADA Required

All water and wastewater pump stations shall be equipped with telemetry systems as specified by the District.

Article 4 – Review of Plans

When design of the development's water and wastewater system is complete, the Developer shall submit to the District, for review and approval, an electronic (PDF) set of the water and wastewater Design Plans. The District shall review and return the plans as quickly as possible. Charges for the review are as follows:

Fee Schedule for Development

The **Plan review fee** shall be the aggregate of applicable fees as follows:

# of Units*	See respective table, below
Water Review	TDEC Div. of Water Resources "Wastewater Plans Review Fee Worksheet", latest version
Sewer Review	TDEC Div. of Water Resources - Drinking Water Unit "Plans Review Fee Worksheet", latest version

* For commercial, use the number of tenants for the number of lots.
For multifamily residential, use the number of units being served by the project.

Water or Wastewater

0-50 Lots	$100 each subdivision
51-100 Lots	$125 each subdivision
101-500 Lots	$175 each subdivision
Over 500 Lots	$250 each subdivision

Water and Wastewater

0-50 Lots	$150 each subdivision
51-100 Lots	$200 each subdivision
101-500 Lots	$250 each subdivision
Over 500 Lots	$350 each subdivision

Developer shall make any revisions required by the District and resubmit. FUD will return Plans with comments one time for the above review fee. Each submittal thereafter will require a resubmittal fee of 10% of the original or a minimum of $100, whichever is greater. Once the plans are deemed acceptable, the District's Engineering Department will approve the Plans.

Effective July 1, 2021, **Sewer Capacity Reservation Fees** shall be due and payable as specified in the District's Rate Resolution. A 50% initial payment shall be required as a condition for obtaining Plans Approval, with the remainder due at the sooner of 24 months after plan approval or FUD assuming ownership of the system. If a project is funded by loans or grants, and plans approval is required prior to loan closing, the initial payment may be paid within 10 business days of loan closing.

Article 5 – Review of Materials

Before beginning construction, the Developer's Contractor (see Article 6) shall submit to the District, for review and approval, an electronic set (PDF) for all materials to be used in the construction of the water and wastewater systems. The District will return electronic copies of reviewed submittals to the Contractor. Material data approved for use in construction shall be stamped **"Approved**." Material data not approved for use in construction shall be stamped **"Not Approved**."

Article 6-Contractor Approval

The Developer must submit to the District, for review and approval, the Developer's choice of utility contractor. Water and wastewater lines must be installed by a contractor, currently licensed by the State of Tennessee to install municipal utilities. Acceptance of the Contractor, by the District, will be based upon verification of municipal utility license and Contractor's prior performance. For projects incorporating high density polyethylene pipe (HDPE), the Contractor shall be required to furnish current Small Diameter Butt Fusion certification for any employee fusing pipe.

Article 7 – Construction

No construction shall occur until review fees are paid, Design Package (Plans, calculations, etc.) is approved, easement(s) are secured, Contractor is approved, and construction materials are approved. During construction, the District shall provide on-site inspection as the District deems necessary. The District shall present to the Developer and/or Engineer any perceived deviations from the approved practice. If disagreements concerning methods or materials used occur, the District may issue a stop-work order until the disagreements are resolved.

Article 8 – Tests

When construction of the water/wastewater system is complete, tests and observations shall be performed, as follows:

Water - The Contractor shall provide hydrostatic testing as described in the District's Specifications, latest version. This testing shall be witnessed by District personnel. Contractor shall flush lines for a length of time sufficient to remove sediment, mud, trash and other foreign substances and establish a level of chlorine residual satisfactory to District personnel. After proper chlorine residual has been established, the District shall obtain water sample(s) from the new system for the purpose of testing for presence of bacteria. The District shall also test for the continuity of tracer wire. The District will inspect the development to determine the overall conformity of the system installation with the approved Plans and the District's requirements.

Wastewater – The Contractor shall perform testing of all wastewater pipelines, manholes and appurtenances in accordance with the District's Specifications, latest version. Contractor shall pull a sizing mandrel through all gravity piping, and the District shall furnish the mandrel and

witness the pull(s). All testing shall be witnessed by District personnel. For gravity sewer, the District will televise lines to identify necessary corrections, as applicable. For low pressure sewer, the District shall test for the continuity of tracer wire prior to acceptance.

Article 9 – System Warranty

When all tests are successfully completed, the District shall furnish, at Contractor's request, a letter of verification for the tests. The Contractor shall assume responsibility for all defects in material and workmanship of the water/wastewater system for a period of one year beginning on the date the tests are successfully performed. If the Contractor is unable or unwilling to correct defects occurring within that warranty period, the Developer shall assume responsibility for correction.

Article 10 – Plat and Utility Easements

Developer shall provide to the District a copy of the final plat of the subject development that has been recorded with the appropriate county or municipality. Water and wastewater lines shall be depicted on both rights-of-way and within utility easements for the project. All plat maps that are recorded with the corresponding governing county or municipality shall carry the following statement:

> "The Water and Sewer Lines installed in this subdivision and/or as shown hereon shall have a minimum 15-foot wide easement, on center, subject to the restrictions and conditions of record per Instrument #200908100011396 on file at the Knox County Register of Deeds Office."

Alternately, the Developer may furnish exhibit map and legal description prepared by a TN-licensed registered land surveyor (RLS) to the District for use in preparing and recording a utility easement document.

Article 11 – As-Built Drawings

When water/wastewater system is complete, the Developer shall instruct the design engineer to prepare and submit to the District as-built drawings of the water/wastewater system. As-Built Drawings shall consist of Microsoft Windows compatible computer disk formatted in either **AUTOCAD (DWG) or BENTLEY MICROSTATION (DGN**) and portable document format (PDF). As-built drawing requirements are as follows:

Water:

(1) As-built drawings shall show location of mains, blowoffs, reducers, tees, etc.

(2) All valves and blowoffs shall be located by measurements taken from two separate, easily identifiable, stationary points. These points shall not include P.I., P.C., or other similar, minute, not easily found points of reference. Property pins may be used if no other reference point is available. All measurements should be taken from manholes,

power poles, electric vaults, telephone pedestals, buildings, etc. Reference points should not include trees, shrubs, or other living organisms or other objects which are subject to change in size or shape. Any deviation from this concept will result in rejection of as- built drawings unless a variance has been obtained, in writing, from the District's Engineer.

(3) If a main is dead-ended, there should be a blow-off with its location shown by measurement from easily identifiable reference points.

(4) The District **will not** accept as-built maps showing incomplete portions of a development on the same sheet unless the incomplete portions are labeled as such and a separate as-built is submitted at the time that portion is completed.

(5) Lot numbers and block letters **must be** shown.

Wastewater:

(1) Plan and profile of wastewater lines must be shown. Plans should show location of manholes, station number, manhole inverts, and top elevation of manholes.

(2) Wyes or service connections should be drawn on the plan and shall be assigned a station number or be shown as a distance from the nearest downstream manhole. Any service line laid out of a WYE shall be shown and the length of the service line shall be shown. Profile of wastewater mains shall show ground contours manhole locations, station numbers, invert and top elevations of manholes and grade of wastewater mains.

(3) Lot numbers and block letters shall be shown.

The District shall review the as-built drawings for content and perform a final inspection of the development to determine the correctness of the as-built drawings. The District will notify the design engineer and/or Contractor, in writing, of any discrepancies or required changes.

Article 12 – Affidavit of Cost

The Developer shall provide to the District, in a form satisfactory to the District, a sworn statement depicting the total cost of design and construction of the system(s) have been paid in full.

Article 13 – Transfer of Ownership

The Developer shall provide to the District, in a form satisfactory to the District, document(s) transferring title and ownership to the District of all water and/or wastewater lines and appurtenances and easements dedicated to such lines and appurtenances free and clear of any encumbrance or mortgage. It is understood and agreed that any existing encumbrance or mortgage on any easement transferred to the District shall be subordinated to the easement interest of the District.

Article 14 – Service to the Development

It is agreed by the Developer that until all conditions and tests set forth in this Developmental Agreement have been successfully completed and that until all documents referred to in this agreement (e.g. signed Development Agreement, final plat, as-built drawings, affidavit of costs, transfer of ownership) have been delivered to the District, in a form satisfactory to the District, the District shall not set water meters, locate wastewater services, inspect service lines, perform maintenance or otherwise provide any services to the development. The District will not accept payment for installing meters until system ownership has been assumed.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed in multiple originals by persons properly authorized so to do on or as of the day and year first above given.

DISTRICT:

THE FIRST UTILITY DISTRICT
OF KNOX COUNTY,
TENNESSEE

By: _____
Bruce Giles, General Manager

DEVELOPER:

By: _____
Signature

_____
Name (Please Print)

Title: _____

Phone: _____

Email Address: _____

Mailing Address:

_____

_____

_____

Development Process Flow Chart

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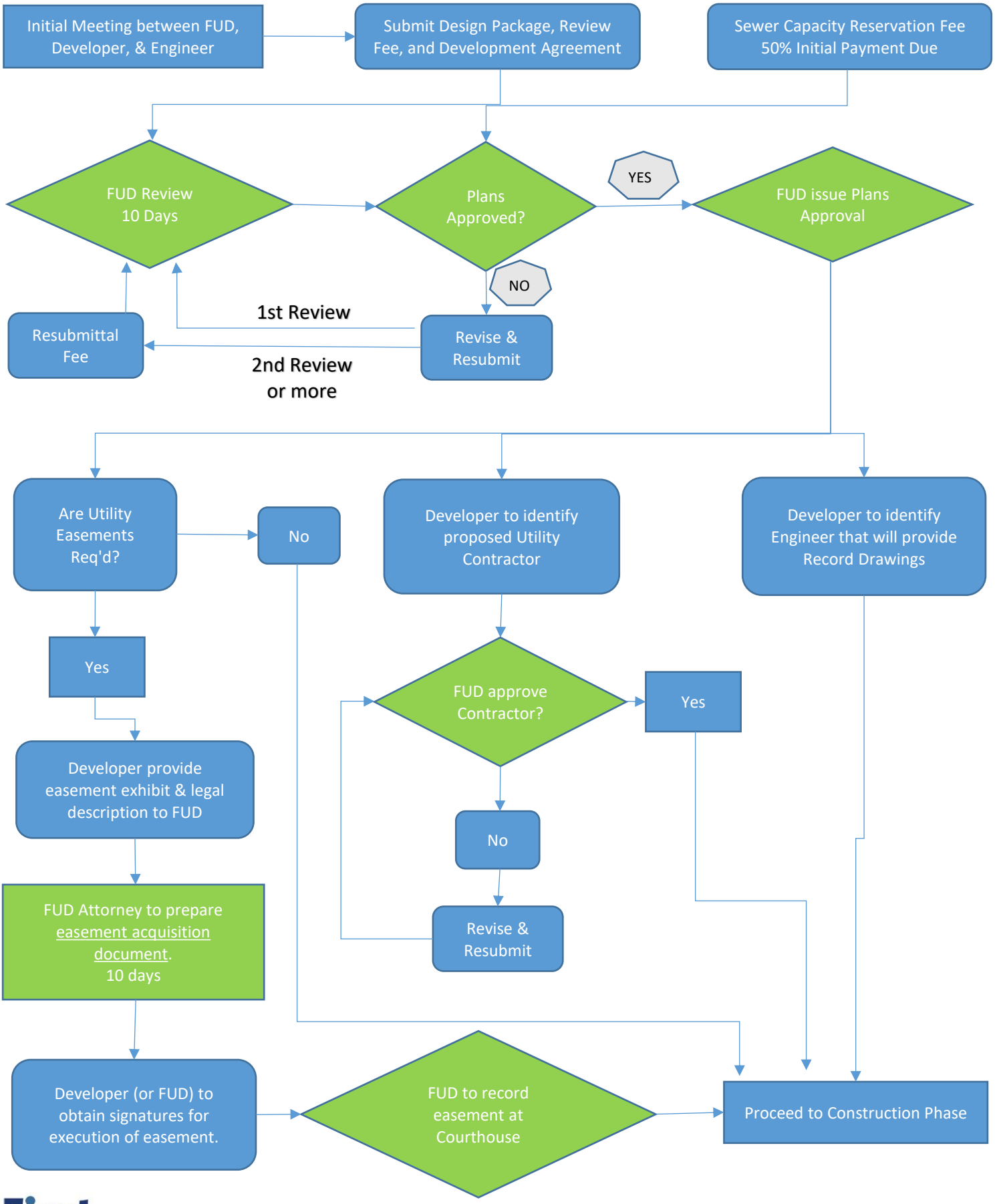
newdevelopment@fudknox.org

First Utility District of Knox County

Development Process



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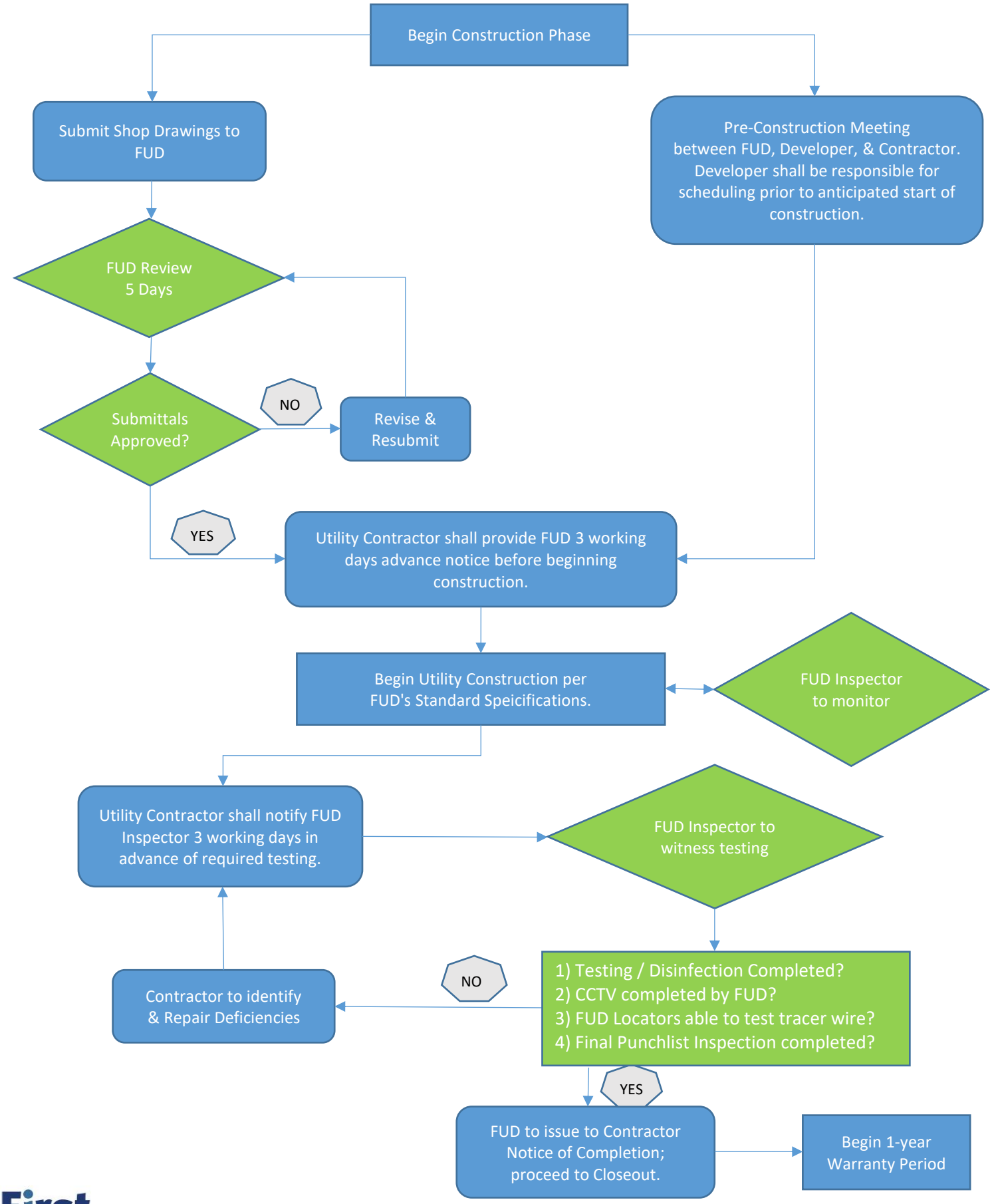
Development Process



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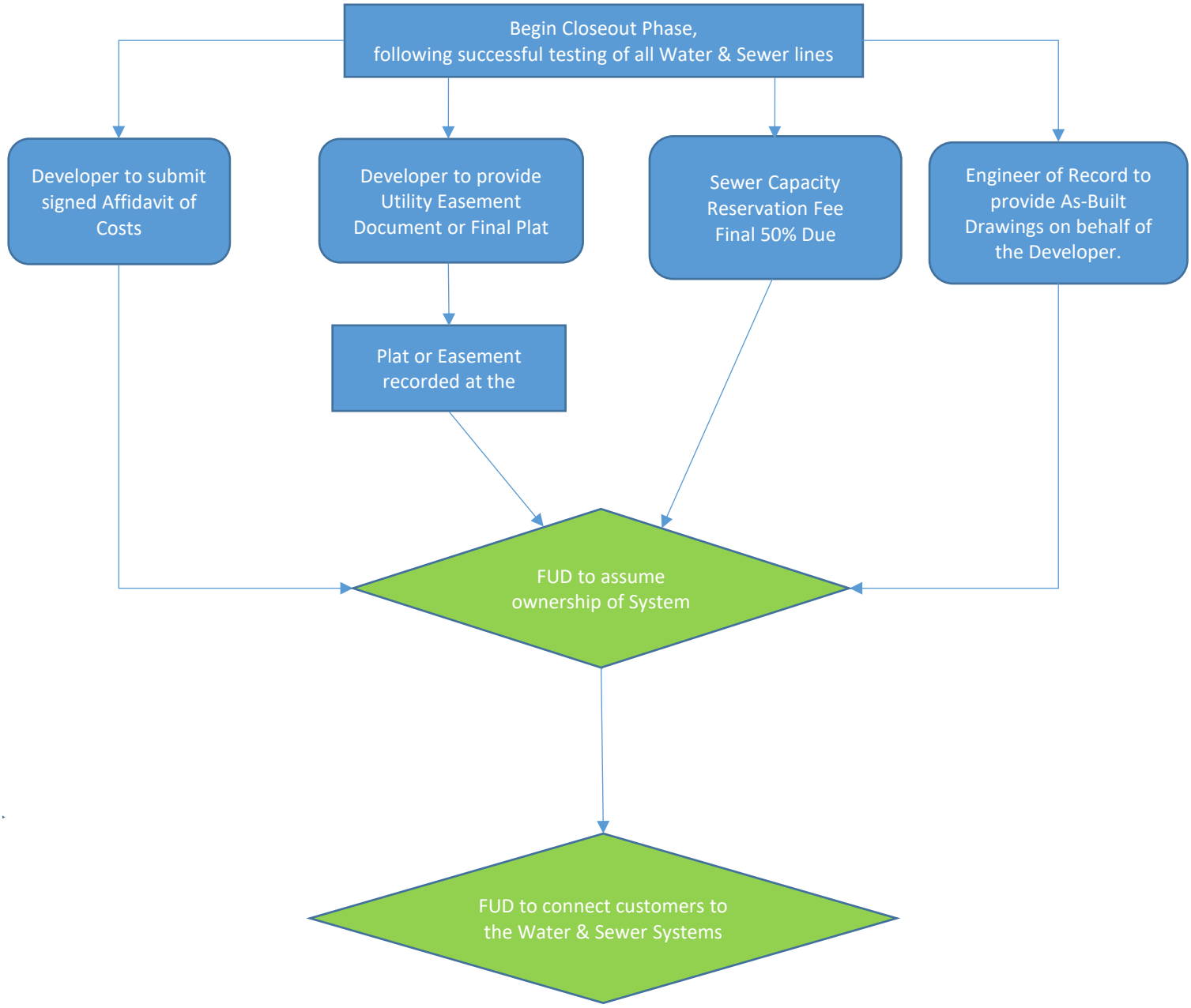
Development Process



Plan Review Fee Worksheet

FUD's Plan Review Fee is prescribed in the Agreement for Proposed Development. Plan Review Fees are calculated as a function of the number of lots, length of water line, and length of sewer line.

To find more details about your review fee, access FUD's Plan Review Fee calculator.

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Design Criteria
Water, Gravity Sewer, Low Pressure Sewer

Sewer Pump Station and Water Booster Station design requirements are maintained internally and made available on an as-needed basis.

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FUD Water Design Criteria & Checklist

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Design Criteria Checklist for Water Distribution Systems

	Design Plans - General Information
	Vicinity Map
	Key Map, for linear or large projects
	Clear depiction of future phases of Development
	Location of Water Lines relative to bridge, structures, and identifiable objects
	Location of proposed valves, hydrants, fittings, and appurtenances
	Location of existing and proposed utilities (water, sewer, gas, power, communication, etc.)
	Profile of proposed Water Main(s), including: existing and proposed Utility and Storm crossings, and existing and proposed ground surfaces.
	Stream Crossing details, including construction methods and materials used.
	Locations of permanent Utility Easement(s) and temporary Construction Easement(s).
	For projects requiring work in State or County Right-of-Ways, provide stamped Traffic Control Plans for FUD's use in making Utility ROW Permit Application.
	Sealed by a TN-Licensed Professional Engineer.
	Design Report
	Summarize population served, domestic demands, fire flow requirements, corresponding pressures and hydraulic grade lines, pumping requirements, etc.
	Identify future phases of development. Verify initial design is adequate to serve future growth.
	<u>Design Calculation Criteria:</u> Per Capita Demands • 2.0 gpm/connection: 1 – 100 residential connections • 1.5 gpm/connection: 101 – 150 residential connections • 1.0 gpm/connection: 151 – 300 residential connections • 0.75 gpm/connection: 301 – 500 residential connections • 0.50 gpm/connection: 501 – 1,000 residential connections Min. Pressure Requirements • Domestic Flow: 20-psi across the property based upon a hydraulic grade line at mid-level elevation of the water storage tank. • Fire Flow: 20-psi at any meter during a fire flow at the most hydraulically remote hydrant. If providing fire protection, Engineer shall provide a stamped set of calculations for fire protection conditions.
	Sealed by a TN-Licensed Professional Engineer.
	Material & Construction Requirements

	Main Line – Size and Material (Specification 33 11 13 and related sections)
	• 6" diameter is minimum size for fire hydrants
	• 2" minimum size; subject to FUD Approval. *2" Water lines will not be approved over 200-ft long or with more than five (5) single family residential homes*.
	• 3" & 4" not allowed
	• Minimum cover, bedding, and backfill per FUD Specifications and TDEC Criteria.
	• Clearance with other underground utilities:
	  • Sewer – 10-ft horizontal, 18-in vertical
	  • Other underground – 3-ft horizontal, 12-in vertical

Design Criteria Checklist for Water Distribution Systems

	Material & Construction Requirements (continued…)
	Line Valves • Spacing at no greater than 1,500-ft apart, or as directed by FUD. • Placed on each main branching from a Tee. • Whenever possible, valves shall be placed outside of pavement. • >2" Gate Valve. Refer to Specification Section 33 12 16. • ≤2" Ball Valve. Refer to Specification Section 33 12 16.
	Service Lines & Meters • Specification Section 33 12 13 for product and execution requirements. All taps shall be made by FUD. • For single-family residential, each Lot shall be provided for by a service line and meter. • Water meters shall be set near the property corners. Where possible, meters shall be double set at a common property corner of two adjacent lots. • 1" and smaller service lines under sidewalks, driveways, or pavement shall be encased in 2" Sch40 PVC. • For multi-family residential, provide a separate meter for each building complex. • For commercial mixed use (ie, strip malls) with five or more tenants, provide a meter gang box per FUD Standard Detail. Vaults in pedestrian areas require an ADA-compliant hatch. Vault shall be furnished and installed by the Project and connected to the system by FUD. Contractor responsible for establishing finished grade. • Set top of meter boxes at four to six inches (4" – 6") above top of curb elevation. • Meter size shall be determined by property owner or Architect / Engineer of Record and subject to FUD Engineering Department approval. Refer to Guidelines for Service Line and Meter Capacities document in the FUD Development Packet.
	End of Line Flushing & Hydrant Spacing • Fire Hydrants are required at the end of 6" or larger lines, min. pressure withstanding. • 2" Flush hydrant are required on the end of 2" lines. • End-of-line blow off (not allowed unless specifically approved by FUD) shall be sized to allow a minimum velocity of 2 ft/sec in the water main.
	Booster Stations
	Public booster stations shall be owned by FUD and located on fee simple property under FUD ownership.
	Booster stations shall be designed and constructed per FUD's Standard Specifications and Drawings.
	FUD reserves right to provide input on booster station capacity.
	Fire Protection
	Provide Static Pressure, Residual Pressure, and Flow Rate for existing hydrant test on Design Plans and Design Report.
	Provide proposed fire flow requirements for hydrant and fire protection systems on Design Plans and Design Report. • NOTE: Proposed System improvements as needed to meet fire flow conditions shall be subject to FUD's review and acceptance.

Design Criteria Checklist for Water Distribution Systems

	Fire Hydrant Spacing & Location • Engineer shall design hydrant spacing starting from the downstream end and working toward the entrance based on allowable spacing. • Additional hydrant spacing as required by local jurisdictional authority.
	Minimum fire flow rate at hydrant shall be 500-gpm.
	Fire Protection Lines are not metered in FUD's distribution system. User will be billed annually in accordance with FUD's Rate Structure, latest version.
	Fire Protection (continued…)
	Fire Protection lines shall be constructed of ductile iron pipe.
	All fire line taps to existing mains shall be made by FUD.
	Fire Protection lines shall be disinfected, tested, and accepted in accordance with FUD Standard Specifications before being placed in service.
	Cross Connection Control
	Refer to Cross Connection Manual, Cross Connection Policy, and FUD Standard Specification 33 14 00.
	Irrigation systems are required to install an RPZ Backflow Preventer.
	Chemical Fire Protection systems require an RPZ Backflow Preventer. Non-Chemical Fire Protection systems will allow a DCDA Backflow Preventer.
	Multifamily residential, commercial, and any non-single family residence are required to install an RPZ Backflow Preventer on "domestic" water lines. These users are required to install two RPZ devices in parallel.
	For private fire protection lines, FUD reserves the right to require an RPZ backflow preventer installed in a heated enclosure at the property line.
	Easements & Property
	15-ft Utility Easement (o.c.) is required for all public water mains. Plans to reference Instrument #200908100011396 at Knox County Register of Deeds Office.
	Property for Water Booster Station shall be deeded to FUD. Depending on location, FUD may require a dedicated 20-ft wide access easement to booster station.
	Utility Easements or subdivision plats must be recorded before the system will be accepted by FUD.

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FUD Gravity Sewer Design Criteria & Checklist

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Design Criteria Checklist for Gravity Sewer Collection Systems

	Design Plans - General Information
	DESIGN NOTE: *Unless explicitly authorized by FUD, Gravity Sewer deeper than eight (8) feet will not be accepted, and Low Pressure Sewer will be required*.
	Vicinity Map
	Key Map, for linear or large projects
	Clear depiction of future phases of Development
	Location of Sewer Lines & manholes relative to bridge, structures, and identifiable objects
	Location of proposed force main lines, valves, air release valves, fittings, and appurtenances
	Location of existing and proposed utilities (water, sewer, gas, power, communication, etc.)
	Plan View shall include: • Horizontal separation with other utilities, particularly Water • Manhole deflection angles for entering and exiting lines • Stub-out location(s) and elevation(s) for future phase(s)
	Profile of proposed Sewer Main(s), including: existing and proposed Utility and Storm crossings, and existing and proposed ground surfaces.
	Profile shall include: • Alignment stationing at manholes. • Invert elevations for incoming and outgoing lines. • Top elevation of manhole cover. • Existing and proposed ground surfaces. • Existing and proposed Utility and Storm crossings, including vertical clearance with Sewer line. (When vertical clearance is less than 18-inches, the lower utility line shall be installed with a stone envelope to the invert of the upper utility line.) • Identification of Stream Crossings, including "normal" and 100-yr Storm (FEMA FIRM or hydraulic modeling, as appropriate) water levels.
	Service Line Information shall include: • Depth of cover at property line • Verification, by Engineer, that the collection system is sufficiently deep to service each proposed lot.
	Garbage Dumpster pads shall be covered to prevent intrusion of rainwater to sewer system.
	Stream Crossing details, including construction methods and materials used.
	Locations of permanent Utility Easement(s) and temporary Construction Easement(s).
	Include Grading Plan indicating existing and proposed contours (2' max interval), including finished floor elevation(s) of structure(s) being served.
	For projects requiring work in State or County Right-of-Ways, provide stamped Traffic Control Plans for FUD's use in making Utility ROW Permit Application.
	Sealed by a TN-Licensed Professional Engineer.
	Design Report
	Summarize population served, average flows, peak flows, corresponding velocities, etc.
	Identify future phases of development. Verify initial design is adequate to serve future growth.
	Design basis for wastewater flow and loadings shall be based on TDEC's *Design Criteria for Sewage Works* – Appendix 2A, peer reviewed literature values, or from comparable regional data. Peaking flow shall be determined based on (1) the hours of operation and (2) peaking

Design Criteria Checklist for Gravity Sewer Collection Systems

	factor based on the population served by the Development, as referenced in TDEC's *Design Criteria for Sewage Works* – Chapter 2.
	Sealed by a TN-Licensed Professional Engineer.
	Environmental / Permitting
	Stream crossings of Gravity or Force Main Sewer shall be permitted and approved by TDEC Division of Water Resources.
	Material & Construction Requirements
	Manholes – Specification 33 05 13 • Public sewer mains shall be terminated with a manhole meeting FUD Specifications. • Max spacing not to exceed 400-ft • Internal drop connections require a 5-ft diameter manhole • Slope >5% require ZLOK gasket and min drop of 0.2-ft. • Manhole slope should generally be the average slope of the lines in and out.

	Gravity Main Line – Size and Material (Specification 33 05 01 and related sections)
	• 8" min. diameter.
	• Bedding, and backfill per FUD Specifications and TDEC Criteria.
	• Clearance with other underground utilities:
	  • Water – 10-ft horizontal, 18-in vertical
	  • Other underground – 3-ft horizontal, 12-in vertical
	• Slope – minimum slope of 0.85%.
	• Cover
	  • Per TDEC *Design Criteria for Sewage Works*, latest version.
	  • Under pavement, lines with less than 4-ft of cover shall be ductile iron with ceramic epoxy coating. Minimum cover under pavement is 30-inches.
	  • Lines with greater than 12-Ft of cover (typically not allowed) shall be ductile iron with ceramic epoxy coating.
	• Aerial sewer crossings are not allowed unless no practical alternative exists. If an aerial crossing is approved by FUD for construction, the Engineer of Record will be responsible for coordinating with TDEC Division of Water Resources to obtain permits, provide hydrologic / hydraulic calculations, and comply with ancillary requirements.

	Service Lines & Cleanouts • Refer to Specification Section 33 05 01.12 for product and execution requirements. • For single-family residential, each Lot shall be provided by a service line and cleanout. • Cleanouts shall typically be set near the center of the front property line. • Set top of cleanout at four to six inches (4" – 6") above top of curb elevation. • For apartments, each building shall be connected to a manhole. • Dumpster pads must be covered if connected to sewer. • Easements are required on service lines that cross private property to service another lot. (This practice will typically not be accepted by FUD.) • Consult with FUD about material requirements if services are made on a DIP main.

Design Criteria Checklist for Gravity Sewer Collection Systems

	Pump Stations
	Public Sewer Pump stations shall be owned by FUD and located on fee simple property under FUD ownership.
	Pump stations shall be designed and constructed per FUD's Standard Specifications and Drawings.
	FUD reserves right to provide input on pump station capacity.

	Easements & Property
	15-ft Utility Easement (o.c.) is required for all public sewer mains. Plans to reference Instrument #200908100011396 at Knox County Register of Deeds Office.
	Property for Sewer Pump Station shall be deeded to FUD. Depending on location, FUD may require a dedicated 20-ft wide access easement to pump station.
	Utility Easements or subdivision plats must be recorded before the system will be accepted by FUD.

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FUD Low Pressure Sewer Design Criteria & Checklist

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Design Criteria Checklist for Low Pressure Sewer (LPS) Collection Systems

	Design Plans - General Information
	DESIGN NOTE: *Unless explicitly authorized by FUD, Gravity Sewer deeper than eight (8) feet will not be accepted, and Low Pressure Sewer will be required*.
	Vicinity Map
	Key Map, for linear or large projects
	Clear depiction of future phases of Development
	Location of Sewer Lines & manholes relative to bridge, structures, and identifiable objects
	Location of proposed force main lines, valves, air release valves, fittings, and appurtenances
	Location of existing and proposed utilities (water, sewer, gas, power, communication, etc.)
	Profile of proposed Sewer Main(s), including: existing and proposed Utility and Storm crossings, and existing and proposed ground surfaces.
	Stream Crossing details, including construction methods and materials used.
	Locations of permanent Utility Easement(s) and temporary Construction Easement(s).
	For projects requiring work in State or County Right-of-Ways, provide stamped Traffic Control Plans for FUD's use in making Utility ROW Permit Application.
	Sealed by a TN-Licensed Professional Engineer.
	Design Report
	Summarize the population served, per capita flows, percentage of units contributing flow at instant in time, design flows, corresponding velocities, minimum and maximum elevations, minimum and maximum pressures, etc. Design calculations shall be prepared using Environment One's (E-One's) *LPS Design Assistant*, latest version. Note: • Clearly depict "zones" used in the E-One Software on the Design Plans. • Verify the line sizes match between calculation and plans. Use HDPE DR11 for calcs. • Use C_{HW} roughness coefficient not greater than 135. • Main shall be sized to be the largest diameter that allows a velocity greater than 2-ft/s and a pump total dynamic head less than 180-ft at both initial and final phases of development. (*For example, Engineer submits a design report depicting a zone with a 2-inch force main carrying a flow of 55-gpm, resulting in a velocity of 6.2-ft/s and pump TDH of 170-ft. FUD calculates the line could be a 3-inch, which would result in a velocity of 2.7-ft/s and significantly reduced pump head. FUD will require design change to provide increased pump life.*) • Submit all *LPS Design Assistant* worksheets with review package.
	When connecting to an existing low pressure sewer system, Engineer shall provide hydraulic calculations that verify (1) both the existing and proposed grinder pumps will be operational and (2) allowable pressures are maintained in the system.
	Design basis for wastewater flow shall be based on E-One's *LPS Design Assistant* software, TDEC's *Design Criteria for Sewage Works* – Appendix 2A, peer reviewed literature values, and/or from comparable regional data.
	Identify future phases of development. Verify initial design is adequate to serve future growth.
	Sealed by a TN-Licensed Professional Engineer.

Design Criteria Checklist for Low Pressure Sewer (LPS) Collection Systems

	Environmental / Permitting
	Stream crossings of Gravity or Force Main Sewer shall be permitted and approved by TDEC Division of Water Resources
	Material & Construction Requirements

	LPS Main Line – Size and Material (Specification 33 33 00 and related sections)
	• 2" min. diameter.
	• Bedding and backfill per FUD Specifications and TDEC Criteria.
	• Clearance with other underground utilities:
	  • Water – 10-ft horizontal, 18-in vertical
	  • Other underground – 3-ft horizontal, 12-in vertical
	• Cover - Per TDEC *Design Criteria for Sewage Works*, latest version.

	Connection to Existing Sewer • To Manhole – Construct "internal drop" tie-in per FUD Standard Drawings. Furnish and install isolation valve approximately 10-ft upstream of the manhole. • Connection to Gravity Sewer requires application of OBIC or Spectrashield coating to connecting manhole and next two downstream manholes. • To Force Main Sewer – Consult with FUD Engineering Dept. during the Design Phase.
	Line Valve Placement & Spacing • Refer to Specification Section 33 33 00. • Spacing at no greater than 1,000-ft apart, or as directed by FUD. • Placed on each main branching from a Tee.
	Service Lines & Cleanouts • Refer to Specification Section 33 33 00 for product requirements. • For single-family residential, each Lot shall be provided a service line and valve box. • Each lot's valve box shall be set near the middle of the property frontage. • Set top of box at four to six inches (4" – 6") above top of curb elevation. • Easements are required on service lines that cross private property to service another lot. (This practice will typically not be accepted by FUD.)
	Grinder Pump for Multi-Family Residential • Simplex, duplex, or quadplex E-One grinder pump stations may be approved for individually metered buildings. Engineer shall be responsible for the basis of design inclusive of average flow, peak flow, emergency storage, and wet well design. Station shall be installed per FUD requirements and standard drawings. (*Other equipment may be allowed but shall not be serviced or maintained by FUD*.) • E-One grinder pump station shall be equipped with Simplex, Duplex, or Quadplex Protect Plus Panel with a manufacturer-supplied generator plug. • Pipe to wet well connection shall be by Link Seal caulking hub.
	Easements & Property
	15-ft Utility Easement (o.c.) is required for all public sewer mains. Plans to reference Instrument #200908100011396 at Knox County Register of Deeds Office.
	Property for Sewer Pump Station shall be deeded to FUD. Depending on location, FUD may require a dedicated 20-ft wide access easement to pump station.
	Utility Easements or subdivision plats must be recorded before the system will be accepted by FUD.

Easement Requirements

FUD's Agreement for Proposed Development requires the developer to record a utility easement for a water and/or sewer line installed outside of public right of way. Easement(s) may be recorded by:

1. Subdivision plat with a mandatory note to prescribe easement rights established by a document on file with the Knox County Register of Deeds Office.

   OR

2. Separate Utility Easement document for each property / parcel. The document shall be prepared by the District's Attorney based on FUD's standard template. The document shall be supported by an Exhibit Map and Legal Description prepared by a TN-licensed Registered Land Surveyor at the Developer's expense.

The easements shall be recorded at the Knox County Register of Deeds Office prior to FUD assuming ownership of the line(s).

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newdevelopment@fudknox.org

For brevity sake, the following document sets are made available by URL links:

Standard Specifications & Details for Water Distribution
https://www.fudknox.org/wp-content/uploads/2022-1230_FUD-Water_Final.pdf

Standard Specifications & Details for Wastewater Collection
https://www.fudknox.org/wp-content/uploads/DWRWPN-23.0456-ENGPLAN-47-20230914-SPECIFICATIONS-77839-0000-FALSE-TRUE-2084.pdf

Sewer Use Policy
https://www.fudknox.org/wp-content/uploads/SUO_2019-11_BoardApproved-1.pdf

Fats Oils and Grease Management Policy
https://www.fudknox.org/wp-content/uploads/FirstUD-FOG-Mgt-Policy_2020-07.pdf

Cross Connection Control Policy
https://www.fudknox.org/wp-content/uploads/2012-0806_CCOrdinance-1.pdf

FUD Rate Resolution & Sewer Capacity Fees
Policy: https://www.fudknox.org/wp-content/uploads/2023-Water-Sewer-Rates-UPDATED-1.pdf
Maps: https://www.fudknox.org/developer-fees/

(END OF DOCUMENT)

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