



Sanitary Sewer System and Lift Stations Construction Standards and Specifications

General Provisions for Sanitary Sewers and Lift Stations

The sanitary sewer system and lift stations within the corporate limits or under the jurisdiction of the Village of Tinley Park shall be constructed in accordance with latest edition of the provisions listed below and provided to serve each property in the subdivision or development, and if possible, to drain towards a primary interceptor sewer.

The design of all sanitary sewer systems shall meet the following criteria:

- Current Federal and State Codes and Regulations
- Illinois Design Standards for Sewage Works
- Illinois Environmental Protection Agency Regulations (IEPA)
- Metropolitan Water Reclamation District of Greater Chicago (MWRD), Frankfort Sanitary District, and/or Illinois American Water
- Standard Specifications for Water and Sewer Main Construction in Illinois
- Village of Tinley Park Subdivision and Development Regulations
- Village of Tinley Park Design Standards and Village Code of Ordinances.

In addition, the following specifications and standards shall apply.

Permit Requirements

An IEPA permit as well as a MWRD, Illinois American Water, or Frankfort Sanitary District (see Exhibit A for proper permitting district) shall be prepared and submitted for review to the Village Engineer and signed off by the Village (where applicable) and submitted by the Design Engineer to the appropriate agencies. The Design Engineer will be issued permit(s) by the permit authorities authorizing the construction of the sanitary sewers and sewer services in the Village before construction begins. A copy of each of the approved permits shall be provided to the Village prior to the issuance of a building permit.

Submittal Requirements

All required submittal requirements entail:

- Plats
- Permits
- Easement Requests
- Licensing Agreements, etc.
- Other Agencies (ACOE, MWRD, IEPA, County, Frankfort Sanitary District, Illinois American Water, etc...)

All of these finalized, signed and approved items must be submitted to the Village Engineer to allow for review within two (2) weeks of construction. Any initial review requirements by the Village Engineer shall be submitted during the preliminary stages of the project allowing sufficient time for comments, revisions and final approval.

Coordination and Staging

All sanitary sewer and lift station work by the Contractor must be approved by the Village Board then coordinated with the Village, County, State, MWRD and other authorities having jurisdiction. Owner/Contractor is responsible for maintenance of improvements for one (1) year following acceptance by the Village.

Sanitary sewer coordination shall be done through the Public Works Department. Construction shall be staged to service adjacent properties. Temporary bypass pumping shall be of short duration with a minimum of forty-eight (48) hour notice to the Village Engineer and Public Works Department so the residents affected by this process can be notified and able to arrange their schedules accordingly. An Erosion Control Plan shall be submitted specific to this Work (if not covered by the overall Erosion Control Plan for the project).

All newly constructed sanitary sewers that have not yet been accepted by the Village shall be plugged at the end of each working day and kept clean.

Sanitary Sewer Material and Fittings

Sanitary Sewer shall be constructed of PVC plastic pipe with tracer wire conforming to:

RIM to Invert up to thirty (30') feet

- Pipe conforming to ASTM D-3034 (SDR 26)
- Elastomeric seals conforming to ASTM D-3212

RIM to Invert greater than thirty (30') feet

- Pipe conforming to ASTM D-2241 (SDR 21)
- Elastomeric seals conforming to ASTM D-3139

- Fittings shall be PVC SDR 26 heavy wall or C-905 as applicable
- Also acceptable are C-900 (DR 18) for 12" pipe and C-905 (DR 25) for 15"-18" sewers
- Force main shall be constructed of PVC plastic pipe conforming to DR-18 AWWA C-900 with joints conforming to ASTM D-3139
- A minimum of 150 psi pressure class shall be provided for the fittings.

Steel Plate Requirements for Roadway Excavations

- The use of steel plates is required for all projects requiring the cutting of roadway pavement. These standards ensure that the Village pavements are left in the same, if not better, condition than they were found before the project. This will reduce congestion and roadway hazards, as well as increase safety in and out of the construction limits.
- The use of steel plates by Contractors and Utility Companies as a temporary cover over an excavated area in the roadway can present safety hazards and other problems if allowed to remain in place for extended periods and not properly secured or maintained.

- When backfill operations of an excavated area in the traveled way cannot be properly completed within a work day, steel plate bridging will be required.
- See Construction Standards for Roadway section for more detail.

Sanitary Sewer Main

- Sanitary sewers shall be installed and sized to serve all properties in the subdivision or development.
- Sanitary sewers shall be installed a minimum of ten (10') feet horizontal and eighteen (18") inches vertical from any other proposed or existing water main or water service. Sewers to be designed and installed to drain towards a primary interceptor sewer.
- All sanitary sewer mainlines shall be located a minimum of ten (10') feet from any building.
- Sanitary and storm sewer systems shall not be combined.
- Sewers may only be placed in public Right of Way or public/private utility easements. No sewers shall be constructed in rear yard easements, unless approved otherwise.
- Sanitary sewers shall be constructed in straight lines between manholes with at least one (1) manhole every three hundred (300') feet, unless approved otherwise.
- Sewer mains and service stubs to each lot shall be constructed prior to the construction of street pavements.
- Rubber boots/seals must be used where pipes enter manholes. The internal connection shall be tuck-pointed with non-shrink hydraulic cement.

Casing Pipes

- All steel casing pipe shall be bituminous coated.
- A minimum of 30 mils thick, inside and out
- Leak proof constructed and capable of withstanding the anticipated loadings
- Minimum yield strength of 35,000 psi
- Required wall thicknesses shall be as follows:

<u>Steel Casing Diameter</u>	<u>Minimum Wall Thickness</u>
24" and Under	3/8"
24"-36"	1/2"
36"	5/8"
Over 36"	As approved by Engineer

Sewer Services

- Service stubs shall be installed to serve all properties in a subdivision or development.
- Services shall be located at the center line of each lot and shall extend to within one (1') foot of the front lot line and connect to main with no shear couplings.
- All service laterals shall be installed to a point eight (8') feet beyond the outside back of curb, plugged and identified by a two by four (2"x4") placed at the plug, painted green.

- Service stubs shall be a minimum of six (6") inches (PVC SDR-26) and located by dimensions provided from the nearest downstream manhole on the As-Built drawings.
- Services larger than six (6") inches, materials shall be in accordance with ASTM standards listed under Materials and Fitting sections above.
- Sewer services are considered private from the sewer main to the building/structure.
- Individual services must be constructed with the most current Village Ordinances and Standard Details.
- Clay tile sewer services shall be replaced with PVC SDR-26 pipe and abandoned at the main or structurally lined with a product approved by the Public Works Department. Pre and Post line televising is required.
- New residential sewer services require a clean-out to be installed within five (5') feet of the foundation and shall be constructed with PVC SDR-26.

Manholes

- Manholes are required where there any change of direction exists or a connection of two (2) or more sewers.
- Manholes shall be a minimum of four (4') diameter, precast concrete sections conforming to ASTM C-478 with a continuous layer of non-hardening, preformed bituminous mastic material or O-Ring Gasket placed at each joint to prevent inflow.
- Membranes shall be provided on the seams and the eccentric cone shall line up with the steel reinforced plastic steps.
- Manhole steps shall be sixteen (16") inches on center and securely anchored in place. Steps shall be copolymer polypropylene reinforced with ½" Grade 60 steel reinforcement meeting OSHA standards.
- All manholes shall have an external chimney seal.
- All manholes shall have a maximum of twelve (12") inches of adjusting rings.
- Watertight flexible connectors shall conform to ASTM C-443 and C-923 with stainless steel bands which shall be provided for connections with the manhole
- All manholes located in floodplain, drainage ditches or other wet locations are required to have bolt down frame and lids – East Jordan Iron Works 1040 ZPT or approved equal. RIM elevations shall be a minimum of twelve (12") inches above base flood elevation. Frames are to be bolted to the cone and cover bolted to frame with stainless steel anchor bolts.
- Lifting holes, concrete section joints, pipe gaps and any other structure joints or openings shall be tuck-pointed with hydraulic cement.
- All connections for pipes shall include rubber gaskets.
- Manholes shall not be located in driveways, sidewalks or roadway crosswalks unless approved by the Village Engineer. Structures located in concrete shall be boxed out per the Standard Details.
- Sanitary connections downstream of a grease trap shall be made via manholes and not direct tap into a sanitary main.

Frame and Lids

- Frames shall be Heavy Duty - East Jordan Iron Works (EJIW) 1020 or approved equal.
- Lids shall be Type A Solid Cover with closed pick holes
- SANITARY and VILLAGE OF TINLEY PARK shall be cast on the lid

- Frames shall be set on a mastic material to prevent inflow as well.

Inspection, Testing and Approval

- A Pre-Construction Meeting shall be scheduled with the Public Works and/or Building Department to discuss the following:
 - Project Contacts
 - Start and Completion Dates
 - Project Timeline (i.e. Village Holidays)
 - Required access for local residents, school buses, garbage trucks, etc...
 - Potential Detour Routes
 - Material Storage Locations
 - Traffic Control and Protection
- Full time inspection may be required by the Village/Consultants while the sanitary sewer system, services and lift stations are being constructed. It is the Developer's responsibility to cover the cost of the inspection services.
- All manholes and sewers shall be thoroughly cleaned and sealed prior to final inspection or acceptance.
- All manholes shall pass a vacuum test. A vacuum of ten (10") inches of Hg shall be placed on the manhole and the following time must expire before more than one (1) inch of Hg dropped. The test time is based on the size of the manhole:

Manhole Diameter (Inches)	Minimum Hold Time
48	1 min
60	1 min 15 sec
72	1 min 30 sec
84	1 min 45 sec

- All manholes that fail shall be sealed and re-tested until acceptable.
 - Frame and adjusting rings shall be in place prior to testing
- All sewer shall pass a mandrel test.
- All sewer shall be televised after installation and a copy of the video and a written report shall be submitted on a flash/zip drive, reviewed and approved by the Village before final approval.
- Televised sewer report shall include the following:
 - Size of sewer mains
 - Service and stub connections
 - Sewer lengths between manholes
 - Vertical view up into each manhole
 - Any and all variances and defects

Lift Stations

- Generators shall be provided for all lift stations. It shall be either a permanent, diesel generator or a natural gas generator located in a permanent vandal and weather resistant enclosure.

- Lift station shall be located on or with a paved roadway or access that is sized to allow the Village's vehicles/equipment during times of maintenance. Landscaping shall also be included to screen the station from the public.
- Drainage for the lift station shall provide positive slopes away from the station. The top of foundation for the station shall be a minimum of two (2') feet above the 100 year flood elevation and allow access during a 100 year storm.
- Piping and valve shall be Class 52 Ductile Iron Pipe (DIP) or approved water main-quality pipe.
- Valve Vault shall include:
 - A two (2) non-clog, full body design with an external lever
 - Weight Operator
 - Removable cover check valves
 - Two (2) eccentric plug valves with resilient seat and external square nut operators
 - A plug valve with a 3-way valve to be used with a by-pass for a portable pump connection
- Slide away couplings shall be provided for each of the pumps to allow the pump to be installed and removed without requiring entering the wet well.
- The coupling shall consist of
 - A discharge elbow fastened to the floor of the wet well.
 - A sliding bracket that bolts to the pump volute.
 - A pump discharge flange that collects with the discharge elbow.
 - A guiding system to direct the pump from the discharge elbow to the access cover at the top of the wet well.
 - Connecting the pump to the discharge elbow shall be accomplished by a linear downward motion.
 - Sealing the pump to the discharge connection shall be accomplished by a machined metal water-tight contact.
 - A hook shall be provided at the top of the wet well to attach the nylon line to when not being used.
 - The working load of the system shall be 50% greater than the unit weight of the pump.
 - Sealing of the discharge interface with a diaphragm, O-ring or profile gasket is not acceptable.
 - No portion of the pump shall sit on the floor.
- Each pump shall be guided by a minimum of two (2) stainless steel guide bars extending from the top of the station to the discharge connection.
- A stainless steel upper guide rail bracket shall position the upper end of the guide rails while the discharge connection shall position the lower end of the guide rails.
- Stainless steel intermediate guide rail supports shall be used if the station depth is greater than fifteen (15) feet deep.
- The use of guide cable is not acceptable.

- A sump pump shall be provided for dewatering the valve vault into the wet well. The pump discharge shall include a check valve.
- The access frame and cover shall include the following:
 - Two (2) aluminum access covers.
 - A minimum live load of 300 lbs. /sq. ft. from the pump manufacturer.
 - Deflection shall not exceed 1/150th of the span.
 - All hardware and fasteners shall be 316 stainless steel.
 - Door Standards:
 - Equipped with a grade 316 stainless steel hold open arm with a vinyl grip handle.
 - Locks open in a ninety degree position.
 - Hinges shall be a heavy duty design and shall be grade 316 stainless steel.
 - Door frame shall be aluminum with a continuous 1-1/2 anchor flange.
 - Hatch Requirements:
 - Aluminum lift handles and a locking hasp
 - When hatch doors are locked and closed, they shall be flush to the frame.
 - An aluminum safety grate shall be part of the wet well access cover. It shall be designed to cover the hole per OSHA Standard 1910.23 and include fall through protection and controlled confine space entry.
 - The safety grate shall be made of 6061-T6 aluminum with a minimum ultimate strength of 38,000 psi and a minimum yield strength of 35,000 psi as per ASTM B221.
 - The grate design shall be as per the latest edition of the Specifications for Aluminum Structures by the Aluminum Association, Inc.
 - Welding shall be in accordance with ANSI/AWS D1 .2-90 Structural Welding Code for Aluminum.
 - Aluminum grating shall be designed to withstand a minimum live load of 300 lbs. /sq. ft. or the weight of each pump whichever is greater.
 - Deflection shall not exceed 1/150th of the span.
 - Each aluminum grate shall be provided with a permanent grade 316 stainless steel hinging system which will lock the grate in a ninety degree position when opened.
 - Each grate shall have an opening arm with a red vinyl grip handle which will allow opening of the grate while providing grate as a barrier between the operator and the pit.
 - The opening arm shall also be equipped with a controlled confined space entry locking device which will prevent unauthorized entry to the confined space.
 - Grating system shall allow visual inspection to be made without entering the confined space.
 - System design shall assure fall through protection is in place after the door has been closed; therefore protecting the next operator.
 - Grate shall be painted with OSHA type safety orange paint.
 - A ten (10) year written guarantee from the manufacturer shall be provided against defects in materials and workmanship.

➤ Duplex Concrete Lift Station with Valve Vault

- Furnish and install a Duplex Pumping Station as manufactured by:
 - Flygt
 - Approved equal by the Public Works Department
- System to include:
 - Two (2) pumps (minimum)
 - Discharge elbow
 - Upper and lower guide rail supports
 - Carrier assembly
 - Stainless steel pump lifting chains with stainless steel hooks
 - Access covers with safety hatch
 - Wiring bracket
 - NEMA-3R free standing weatherproof traffic enclosure with a NEMA 1 control panel enclosure
 - Level transducer
 - Back-up floats
- Placement and orientation of structure to be in accordance with dimensions on the drawings.
- Concrete wet well basin and external concrete valve vault shall be provided.
 - Wet well basin:
 - Minimum 7' internal diameter
 - Valve vault:
 - Minimum 7' internal diameter
 - Minimum height of 6'6"
 - 18" diameter x 18" deep sump pit with a steel grate sump pump
 - GFI outlet to use with the sump pump
- Access frame and hinged covers shall be cast into each basin top.
- Pump discharge elbows shall be bolted to the basin floor with stainless steel bolts.
- All hardware and fasteners in the wet well shall be stainless steel.
- Discharge piping from the pump bases shall be mounted in the basin and extend through the basin wall.
- A THERN hoist and base 524 WGAL shall be provided at the wet well.
- A Porta-Con emergency bypass pump coupling system shall be provided at both the wet well and valve vault.
- Interior of the wet well shall be epoxy-lined.

➤ Electrical Control Panel

- Main circuit breaker disconnect switch shall be provided.
- Control Panel shall have a NEMA 3R enclosure:
 - Public Lift Stations shall connect at the Village's SCADA system
 - Include a power generator
 - Dead front with a separate removable inside sub panel to protect the electrical equipment.
- Programming shall be at the cost of the Developer.
- Lock hasp shall be provided on outside door.

- Each pump shall have an individual circuit breaker and a magnetic starter with 3 leg overload protection
- An alternating relay shall be provided to alternate pumps on each successive cycle of operation.
- Starters shall have auxiliary contacts to operate both pumps on override condition.
- An interlock relay shall be provided to automatically reconnect the control circuit in case of circuit breaker trips on a pump.
- H-O-A switches and run lights shall be supplied for each pump.
- Terminal strip shall be provided for connecting pump and control wires.
- Elapsed Time Meters shall be furnished for each pump and installed in the panel.
- The panel shall include intrinsically safe relays and a GFI convenience outlet.
- The panel shall include a Programmable Logic Controller (PLC). It shall include Industry standard Modbus/Aschii communications protocol:
 - 16 - Digital inputs
 - 12 - Digital outputs
 - 4 – Analog inputs (Model CPU612)
 - 2 – Analog outputs (Model CPU612)
 - Non-volatile EEPROM memory
 - A RACO VSSC16 auto Dialer
 - A Hayes compatible telephone
 - Modem and phone service line connected to PLC
 - A telephone lighting protector for the modem meeting all NEC grounding requirements.
 - Modem shall be battery backed for a minimum of four (4) hours
- A battery back-up system and battery charger shall be incorporated to maintain alarm indication during power outages. All devices shall be labeled with plastic laminated name plates describing the service for which they are intended.