VILLAGE OF MINOOKA

Construction Standards and Specifications
For Sanitary Sewer System
And Wastewater Pump Stations

General Provisions

The sanitary sewer system shall be constructed in accordance with the requirements of Federal and State statute or regulations; Illinois Environmental Protection Agency Regulations; Standards Specifications for Sewer Main Construction in Illinois (Fifth Edition May 1996); and Subdivision Regulations for the Village of Minooka; in addition, the following specifications shall apply:

IL EPA Construction Permit

- An approved Illinois Environmental Protection Agency Permit to construct new Public Sanitary Sewer System must by submitted to the IL EPA. The Superintendent of Public Works must receive the permit authorizing construction of the sanitary sewer system before construction begins.

General

- All materials shall be manufactured in the United States of America. A letter of Certification of the Country of origin will be provided if requested by the Village.
- All sanitary sewers shall be plugged to the existing system until accepted to the Village.
- The sanitary sewers shall be free from points of entry from stormwater at the end of each day, an internal or external sewer plug shall be installed, frames and lids set, etc.

Pipe Material

- PVC SDR 26
- Forcemain shall be AWWA C-900 (PVC Class 150). Fittings shall be ductile iron mechanical joint with restrainer glands.

Air Relief Valves for Forcemain

- Cla-Val 36WW cast iron body or approved equal.

Air Relief Vaults for Forcemain

- Follow same requirements as manhole specifications.

Manholes

- All manholes shall be precast reinforced concrete only, with an eccentric cone section.

- All manholes shall have no more than two adjusting rings with minimum of four inches (4") and a maximum of twelve inches (12") of adjusting rings.

- Rubber adjusting rings are required for any rings that are less than two inches (2") in thickness or less.

- All manholes shall have internal or external sealing systems to prevent ground water from infiltrating the manhole. Acceptable products shall be the following:

    1. Canusa Wrapid Seal
    2. Cretex Chimney Seal; internal/external seal
    3. Adaptor, Inc.: internal/external seal

- If external chimney seals are used, a visual inspection shall be performed by an authorized Village representative prior to backfilling.

- All manholes shall be set on a six inch (6") crushed CA-7 cushion.

- All lifting holes, joints between precast reinforced concrete sections shall be tuckpointed with hydraulic cement.

- Bitumastic material shall be placed between precast reinforced concrete sections and between frames.

- All structures shall have flexible gasketed couplings A-LOK or equal.

- All structures shall have precast fillets.

- All structures shall have neoprene or fiberglass coated steps.

- All steps shall be aligned.

Manhole Frames & Covers

- Shall be Neenah R-1550-A with type "B" lid, gasketed self sealing lid, concealed pick holes with SANITARY cast on cover, or East Jordan 1050 with a heavy duty gasketed self sealing closed lid with SANITARY cast on cover.

Service Laterals

- To be brought within seven feet (7') of top of curb.

- Shall be plugged with a factory cap or plug.

- Shall be identified both by a four by four placed at the end of the lateral which extends four feet (4') above finished grade painted green, and by an "S" stamped on the curb.

- Each single-family lot shall have one six-inch (6") service.

- Each duplex lot shall have two six-inch (6") service lines, which is one line for each dwelling unit.

- Single-family attached and detached dwellings shall have an individual six-inch (6") service line for each dwelling unit.

Testing

- All pipes including forcemain shall be air tested or exfiltration tested.

- All flexible thermoplastic pipes shall be deflection tested.

- Manhole vacuum testing is required.

- All test forms are enclosed.

- All pipes shall be televised (CD-ROM format) in color within a written report on the televising.

- Televising shall be conducted one year after installation.

- Two copies of all test results shall be provided to the Village.

Inspection During Construction

- Full time inspection may be required by the Village, which would be performed by the Village or an authorized representative during the installation of sanitary sewer main and related appurtenances including sewer service laterals.

- The developer shall pay for the cost of inspection services by an authorized representative.

Construction Standards and Specifications
For Wastewater Pump Stations

The wastewater pump station shall be constructed in accordance with the requirements of the Standard Specifications for Water and Sewer Main Construction in Illinois, latest edition and the Illinois Design Standards for Sewage Works, latest version. In addition, the following specifications shall apply:

General

- If a generator is not provided for a lift station at the request of the Village, then the developer shall pay the Village the pro rata share of a generator prior to the Village releasing the final plat.

Site

- The pump station shall be located in such a manner that it is accessible by means of a paved street. The pump station should be visible to the residents of the Village but also screened with trees, shrubs and/or wooden fencing.

- The site and access shall be graded to provide suitable drainage away from the lift station. The site must be at least two feet above the 100-year flood elevation, and accessible during the 100-year event.

- All pump stations designated as local by the Village shall be provided with either a portable diesel generator or permanent natural gas generator (in a vandal-resistant, weatherproof enclosure) as selected by the Village.

Duplex Concrete Lift Station with Valve Vault

- General: Furnish and install a Duplex Pumping Station as manufactured by Barnes or Flygt, or equal. System shall include two submersible pumps, discharge elbow, upper and lower guide rail supports, carrier assembly, pump lifting chains with hooks, access covers with safety hatch, wiring bracket, NEMA-3R free standing weatherproof traffic enclosure with a NEMA 1 control panel enclosure, level transducer and back-up floats. Orient placement of structure in accordance with dimensions as shown on the drawings.

- Wet Well and Valve Vault: A concrete wet well basin and external concrete valve vault shall be provided. The wet well basin shall have a minimum inside diameter of 7 feet 0 inches. The valve vault shall have a minimum inside diameter of 7 feet 0 inches and a minimum inside height of 6 feet 6 inches. It shall also have a 18@ diameter x 18@ deep sump pit with a steel grate sump pump, and GFI outlet for use with the sump pump. The access frame and hinged covers shall be cast into each basin top. The pump discharge elbows shall be bolted to the basin bottom 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 should be provided at both the wet well and valve vault.

- Piping and Valves: Piping shall be CL-52 ductile iron pipe. The valve vault shall include two (2) non clog, full body design with external lever and weight operator and removable cover check valves and two eccentric plug valves with resilient sear and external square nut operators. One of the plug valves shall be a 3-way valve for use with a by-pass for portable pump connection.

- Pump Lifting System and Mounting Bases A slide away coupling shall be provided for each pump to allow the pump to be installed or removed without requiring personnel to enter the wet well. The coupling shall consist of a discharge elbow securely fastened to the floor of the wet well, a sliding bracket that bolts to the pump volute, a pump discharge flange which mates with the discharge elbow, and a guiding system to guide the pump from the discharge elbow to the access cover at the top of the wet well. Mating of the pump to the discharge elbow shall be accomplished by a linear downward motion. Sealing of the pump to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the discharge interface with a diaphragm,

  O-ring or profile gasket will not be acceptable. No portion of the pump shall bear directly on the sump floor. A hook shall be provided at the top of the lift station wet well to attach the nylon line to when not in use. The working load of the lifting system shall be 50% greater than the pump unit weight.

- Guide System: Each pump shall be guided by no less than two 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 15 feet deep. The use of guide cable shall not be acceptable or equal.

- Access Frame and Cover: Two aluminum access covers with a minimum live load of 300 lbs./sq. ft. shall be provided by the pump manufacturer. Deflection shall not exceed $1/150^{th}$ of the span. The access hatch shall be the size as recommended by the pump manufacturer. All fasteners and hardware shall be 316 stainless steel. Each door shall be equipped with a grade 316 stainless steel hold open arm with a vinyl grip handle. The doors shall lock open in the 90 degree position. The angle frame shall be 3 extruded aluminum, with a continuous 1-1/2 anchor flange. Hinges shall be of heavy duty design and shall be grade 316 stainless steel.

  Each hatch shall be supplied with an aluminum lift handle and a locking hasp. The doors shall be flush to the frame when in the down and locked position. The wet well access cover shall incorporate an aluminum safety grate designed to combine covering of 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 p.s.i. and a minimum yield strength of 35,000 p.s.i., as per A.S.T.M. B221. The grate design shall use safety factors as defined in the Specifications for Aluminum Structures, by the Aluminum Association, Inc., 5^{th} addition, Dec. 1986 for Bridge Type Structures. 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 pounds per square foot or the weight of each pump (*which ever is greater*). Deflection shall not exceed $1/150^{th}$ of the span. Each aluminum grate shall be provided with a permanent grade 316 stainless steel hinging system, which will lock the grate in the 90 degree position once opened. Each grate shall have an opening arm, with a red vinyl grip handle, which will allow opening of the

grate, while providing the 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 (lock provided by others). This locking device will prevent unauthorized entry to the confined space. The grating system will allow anyone to make visual inspection and probe/float adjustments without entering the confined space. DESIGN OF SYSTEM MUST ASSURE FALL THROUGH PROTECTION IS IN PLACE AFTER THE DOOR HAS BEEN CLOSED, THEREBY PROTECTING THE NEXT OPERATOR. Grate shall be painted with O.S.H.A. type safety orange paint. Manufacturer shall provide a written guarantee against defects in materials or workmanship for a period of ten (10) years.

- Sump Pump: A sump pump shall be provided for dewatering the valve vault back to the wet well. The pump discharge shall include a check valve.

- Electrical Control Panel: *A main circuit breaker disconnect switch shall be provided*. Control panel shall have a NEMA 1 enclosure and shall be dead front with separate removable inside sub panel to protect electrical equipment. A lock hasp shall be provided on outside door. A circuit breaker shall be provided for each pump, as well as for the sump pump, and a magnetic starter with 3 leg overload protection shall be supplied for each pump. 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 trip on one 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 panel. The panel shall include intrinsically safe relays, and a GFI convenience outlet. The panel shall include a programmable Logic Controller (PLC). The PLC 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
  - (2) Modbus serial ports (one for modem communications and one for operator terminal).
  - Provide a RACO VSSC16 Auto Dialer;
  - Provide a Hayes compatible telephone modem and phone service line, connected to the PLC;
  - Provide telephone lightning protector for the modem; and
  - Modem shall be battery backed for a minimum of (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.*

The control panel shall also contain a Motor Protection Module, and Level Management System as described below.

- Motor Protection Module: A microprocessor-based motor protection module, shall be included to protect each motor. The Motor Protection Module shall consist of an enclosure, logic circuit board, connection terminal strips, LCD readout and four operator selection keys. The readout shall show configuration values, fault codes and motor running status.

  The Motor Protection Module shall be connected to external run, power, starter coil and protective circuits, shall be compatible with normal motor starting circuits, and shall have run required input terminals for each motor. The Motor Protection Module shall also monitor the power provided to the motor starter circuits, as connected to input terminals. After an external run circuit request that a motor be started, the Motor Protection Module shall perform tests and impose time delays, as programmed, and then, if all is satisfactory, shall allow the requested motor to start. In the event that one of the monitored controlling inputs falls out of the programmed operating range, while the motor is running, the motor shall be stopped, an error message displayed, and a fault relay contact shall be closed.

  Provide a 100 amp externally mounted reverse service generator receptacle compatible to the equipment used by the Village. Provide a 100 watt condensation heater and thermoswitch. Provide an interlocked dual circuit breaker manual transfer switch rated for 100 amp for switching power between generator and commercial power.

  The motor protection module shall monitor, display, and isolate each motor for the following conditions and faults:

  - Ground fault, for each motor;
  - Under voltage on L1, L2 & L3;
  - Over voltage on L1, L2 & L3;
  - High potential fault, for each motor;
  - Phase rotation fault, for service connection;
  - Phase loss fault, for service connection; and
  - Over temperature fault, for each motor.

- Level Management System: The transducer shall be a submersible solid state instrument designed to continuously translate sensed level to an electric signal for system control. The sensing element shall be of the strain gauge type using a piezoresistive silicon chip with an integral wheatstone bridge circuit. The unit shall be housed in a sealed 316 stainless steel housing. Transducer shall be vented to account for barometric changes and shall meet or exceed the following requirements:

Accuracy:	+-1% (of full transducer span)
Temperature drift:	+-3% (of full transducer span)
Operating temp. Range:	-54c to +121c

- Traffic Enclosure: The control panel and all above mentioned equipment shall be mounted in a free standing, lockable, traffic type, NEMA-3R module. In addition to the control panel, the traffic box shall include either an automatic or manual transfer switch (depends on whether or not a stand-by or portable generator is being used), a dual 120 volt AC GFI convenience outlet accessible without opening the NEMA 1 pump control panel

- Level Transducer (Primary Control): Primary control system shall include:

  - A Programmable Logic Controller (PLC) shall be used for normal automatic control.
  - The level of the wet well shall be monitored through a submersible level transmitter and used for normal control.
  - A low level float switch shall be used for redundant stopping of both pumps.
  - Pump alternation shall be provided through a selector switch mounted on the control panel door and shall provide "Pump 1 Lead, Alternate Pumps, or Pump 2 Lead" selection.
  - "Hand-Off-Auto" selector switches shall be provided on the control panel door for automatic or manual control.
  - Pumps shall be interlocked to start the lag pump in the event there is a "Pump Fail to Run" due to high pump temperature, starter overload, or H-O-A switch in "Manual".
  - Pump Fail alarms shall interlock the pump off and require manual "Reset" through a pushbutton on the door.
  - Pumps shall include "On-Delay" timers to start pumps sequentially upon power failure restart or generator run condition.

- Float Switch (Back-up System): Sealed float type mercury switches shall be supplied to back-up the level transducer in the event of a failure. The mercury tube switches shall be sealed in a solid polyurethane float for corrosion and shock resistance. The support wire shall have heavy neoprene jacket and a weight shall be attached to cord above the float to hold switch in place in sump. Weight shall be above the float to prevent sharp bends in the cord when the float operates under water. The float switches shall hang in the sump supported by a stainless steel chain suspended from an anchor easily reached from the access hatch. Four (4) float switches shall be used to control level. One for pump turn-on and high water alarm, and one for pump turn-off, and one for both pumps turn-on. Float switches shall be Model No. ENM-10.

- Operation of System: On sump level rise, the pressure shall energize and start lead pump. With lead pump operating sump level shall lower until the off level is reached, thereby de-energizing the lead pump. Alternating relay shall index on stopping of pump so that lag pump will start on next operation. If sump level continues to rise when lead pump is operating, the lag pump shall start upon reaching the override. Both lead and lag pump shall operate together until the off level is reached. If level continues to rise when both pumps are operating, and the high level is reached, the high level alarm shall be activated. If one pump should fail for any reason, the second pump shall operate on the override control. All levels shall be adjustable, through the Level Management System located in the control panel.

- Alarms: A caged alarm light shall be mounted on the traffic box. The alarm light shall glow dim at all times except under alarm conditions, then light shall glow bright and flash. Alarm light shall have rest button. In case of power failure, alarm light shall be powered by a gel-cell battery.

  Alarms shall be created in the PLC and capable of communicating to a central SCADA system through a Hayes compatible telephone modem and RACO VSSC16 Auto Dialer. The PLC modem and dialer must be battery backed at 24VDC during a power failure.

  Alarms shall be:

  - High wet well level based on float switch or level transmitter. Alarm shall be latched and require manual "Reset" through a pushbutton on the door.
  - Low wet well level based on float switch or level transmitter.
  - Pump Failures.
  - Pump Seal Failures.
  - Pump Over Temperatures.
  - Power Failure.
  - Generator Run.
  - Generator Fail to Run.

Other data created in the PLC and sent to the central SCADA system shall include:

- Pump Elapsed Run times for the day and month.
- Number of starts per pump for the day and month.

- Wiring Bracket: A stainless steel wiring bracket shall provide cord grip holders for the pump cords and the control cords. All cords shall extend from bracket through conduit to control box. No splices shall be made in the wiring. Continuous cords must be used from control panel to pumps and controls. Wiring bracket shall be fastened to access frame.

- Shop Drawings: The contractor shall submit a minimum of six (6) copies of all drawings to the design engineer for approval. Of these, five (5) copies will be submitted to the Village with appropriate action taken. Of these, two copies will be returned to the contractor with appropriate action taken and one will be returned to the design engineer. Receipt of less than the minimum required number of copies will be cause for withholding the shop drawings from being checked until receipt of the necessary additional copies.

  Each set of shop drawings shall include, but not necessarily be limited to:

  Drawings showing dimensions of all equipment. Control details and electrical schematic diagrams. Performance data including pump curves and motor data.

  All other information necessary to enable the engineer to determine whether the proposed equipment meets the requirements.

- Installation and Operating Instructions: Four (4) copies of a manual, containing installation instructions, operating instructions, wiring diagrams, parts list, and, where applicable, test data and curves shall be provided.

  The contractor shall provide the services of factory-trained representative for a maximum period of one (1) day to start up the station and to instruct the village's operating personnel in the operation and maintenance of the equipment provided.

- Warranty: For the period defined below, a Commercial Warranty to the original End Purchaser against defects in workmanship and material covering Parts and Labor on its pumps when used in permanent installations shall be provided.

  Pumps shall be Warranted for a minimum of 5 years. Warranty shall begin on the date of start-up. The pump manufacturer shall pay for the following costs of replacement parts and labor provided the Pump, with Cable attached, is returned prepaid to an Authorized Service Facility for repairs.

TIME AFTER START-UP

Months:	0-18	19-39	40-60
Hours:	0-3000	3000-6500	6500-10,000
Warranty:	100%	50%	25%

Start-up report and electrical System Schematics (including Bills of Material) are required. The 5 year (or 10,000 hour) Warranty shall apply to the following Accessories if originally purchased with the pumps: Discharge Connection, Access Cover, HDL Valve, Guide Bar Bracket(s), Starting Control & Power Cable(s).

Stand-By Generator

- General: The stand-by generator system shall be prototype tested, factory built, production tested, site tested, and incorporate the latest feature in commercial design. The equipment supplied shall meet the requirements of the National Electric Code, along with all applicable local codes and regulations. The stand-by generator will be sized accordingly when the pump station is being designed.

- Equipment: The Contractor shall furnish a stand-by generator set, Model _____ as manufactured by Kohler Power Systems. The unit shall consist of the components listed below, new and current production, all assembled and tested as a complete unit by the set manufacturer. The unit shall be rated ___ KW continuous, ___ KW/___KVA standby and output shall be _____ volts connected for __ phase, _ wire, 60 hertz, at .8 power factor. The generator will be placed outside on a concrete pad.

- Fuel: The fuel shall be natural gas.

- Engine: The engine shall be ___ cylinder, 4 cycle, liquid cooled with v-belt driven water pump circulating 50% glycol, 50% water coolant through a radiator with pusher fan system, and shall develop ___ hp at 1800 rpm, under full load. Engine shall be equipped with remote-controlled positive engaging electric starter system. Positive pressure oiling lubrication system with oil filter, injectors, or carburetor for specified fuel, ____ amp battery recharging alternator with automatic static voltage regulator, cooling thermostat; a mechanical speed governor with maximum droop not to exceed 5% at full load. In addition, engine will be equipped with high temperature, low oil pressure, low coolant and overspeed safety shutdowns latch off until manually reset. A dry type air cleaner shall be furnished.

- Exhaust: The exhaust system shall include a critical type muffler sized so that back pressure does not exceed the engine manufacturer's recommendation when installed.

- Generator: There shall be provided a salient-pole, revolving field, open drip-proof, synchronous, alternating current generator with brushless exciter and static automatic silicon controlled rectifier voltage regulator, with minimum adjustment rate of 5%. Unit shall be of single bearing construction, directly connected to the engine by a semi-flexible steel drive disc. The stator and the armature shall be laminated silicon steel, and all windings shall be vacuum impregnated with class h insulating varnish and baked.

  The units shall have a centrifugal blower to force air through the generator which is to operate at 105 degrees centigrade continuous rated temperature rise. Insulation shall be Class H. Temperature rise shall not exceed NEMA MGI-22.40 at the standby rating.

  Generator unit shall be of the three phase, 12 lead broad range re-connectable and shall have a transient overload capacity of 300% of rated KVA at low power factor for motor starting. Voltage change shall not exceed 12% on application or removal of full load with two cycle recovery. Maximum voltage variation shall not exceed plus or minus 2%.

- Unit Mounting & Accessories: The entire unit shall be assembled and mounted on a steel frame base of rigid construction. The base shall include a unit mounted battery rack, complete with _____ battery(ies) for 12 volts operation rated at ____ cca. A unit mounted vibration isolated control box including equipment for voltage regulation and engine control, field exitation protection; over-cranking protection; terminal board for remote control connections; oil pressure gauge; coolant temperature gauge; static regulated battery charging alternator with battery charging ammeter; safety shutdown for low oil pressure and high coolant temperature, low coolant level, over-speed with failure indicators; an output junction box for power connections; voltmeter; ammeter and meter transfer switch, frequency meter, hour meter and a local/off remote switch shall be furnished. In addition, the unit manufactured shall provide properly sized vibration isolators for placement between the base and engine/generator.

  In addition to the above operation specifications, the system shall be equipped with the following accessories:

A. Automatic cycle cranking to allow 3 fifteen second cranking cycles with fifteen second rest periods between cranking attempts. Cranking shall lock out and light an indicator after 3 attempts. It shall reset automatically if engine starts or manually if engine does not start after 3 attempts. No thermal devices will be permitted.

B. Exerciser timer with load/no load switch with minimum operation of 30 minutes once per week.

C. Regulated constant voltage static temperature compensated battery charger rated 10 amps minimum D.C., charging ammeter and voltmeter; battery charger shall taper to trickle for fully charged battery, and shall be automatically disconnected from the battery during cranking.

D. Breaker.

- Controller: A set-mounted controller capable of facing right, left, or rear shall be vibration isolated on the generator enclosure. The controller shall be capable of being remote mounted. The micro-processor control board shall be moisture proof and capable of operation from -40 degr. C to 85 degr. C. Relays will only be acceptable in high-current circuits.

  Circuitry shall be capable of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller performance without operating the engine. The controller shall include:

  Fused DC circuit

  Complete two-wire start/stop control which shall operate on closure of a remote contact.

  Speed sensing and a second independent starter motor disengagement systems shall protect against starter engagement with a moving flywheel. Battery charging alternator voltage will not be acceptable for this purpose.

  The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then re-engage the starter.

  Cranking cycler with 15 second ON and OFF cranking periods.

  Over-crank protection designed to open the cranking circuit after 75 seconds if the engine fails to start.

  Circuitry to shut down the engine when signals for high coolant temperature, low coolant level, low oil pressure, or over-speed are received.
  Engine cooldown timer factory set at 5 minutes to permit unloaded running of the standby set after transfer of the load to normal.

Three (3) position (Automatic - OFF - TEST) selector switch. In the TEST position, the engine shall start and run regardless of the position of the remote starting contact. In the Automatic position, the engine shall start when contacts in the remote control circuit close and stop 5 minutes after those contacts open. In the OFF position, the engine shall not start even though the remote start contacts close. This position shall also provide for immediate shutdown in case of an emergency. Reset of any faults shall also be accomplished by putting the switch to the OFF position.

Indicating lights to signal:

Not-in-Auto
Overcrank
Emergency
High Engine Temperature
Overspeed
Low Oil Pressure
Air Damper
Battery Charger Malfunction
Low Battery Voltage
Low Fuel
Auxiliary Prealarm
Auxiliary Fault
System Ready

Test button for indicating lights.

Alarm Horn with silencer switch per NFPA 110.

Terminals shall be provided for each signal (see above), plus terminals for common fault and common prealarm.

- Instrument Panel: An instrument panel shall include:

  Dual range voltmeter 3-1/2" inch, +/- 2% accuracy

  Dual range ammeter 3-1/2" inch, +/- 2% accuracy

  Voltmeter- ammeter phase selector switch.

  Lights to indicate high or low meter scale.

  Direct reading pointer-type frequency meter 3-1/2", 0.5% accuracy, 45 to 65 Hz scale.

Panel illuminating lights.

Battery charging voltmeter.

Coolant temperature gauge.

Oil pressure gauge.

Running time meter.

Voltage adjust rheostat.

- Installed Accessories Shall Include:

  _X_ Housing: __ Weather Protective _X_ Weather Proof

  _X_ Silencer: __ Industrial __ Residential _X_ Critical (loose)

  _X_ Tail Pipe & Rain Cap (loose)

  _X_ Flexible Exhaust (loose; not required for outdoor installation)

  _X_ Duct Adapter Flange (not required for outdoor installation)

  _X_ Block Heater

  _X_ Flex Fuel Lines

  __ Fuel System: __ Solenoid Valve __ Strainer (Diesel Only)

  _X_ Electronic Governor

  __ Fuel Tank: __ Day Tank __ Subbase Tank

  _X_ Breaker: __ Safeguard _X_ Molded Case Line

  _X_ Common Failure Relay

  _X_ Battery & Rack

  _X_ Battery Charger

  _X_ Oil Drain Extension

  _X_ 5 year warranty

_X_ Louver Control Relay (not required for outdoor installation)

__ Trailer

_X_ Fuel Regulator __ Primary _X_ Secondary

__ Automatic Fuel Changeover

__ Emergency Stop

_X_ Automatic Transfer Switch Kohler NEMA-1-___ amp

- Testing: Prior to shipment, the generator set manufacturer shall set up and test the generator and shall certify that the unit has performed satisfactorily at full rated load at .8 power factor. After installation system shall be tested with maximum available site load.

- Equipment Responsibility: The equipment supplier shall have responsibility for the complete and proper operation of the new equipment as specified and furnished. The system supplier shall furnish 24 hour service for the complete system, and shall stock all parts used of the installation. Start-up services shall be included, and shall include operating instruction to the operators.

- Shop Drawings: The contractor shall submit a minimum of six (6) copies of all drawings to the design engineer for approval. Of these, five (5) copies will be submitted to the Village with appropriate action taken. Of these, two copies will be returned to the contractor with appropriate action taken and one will be returned to the design engineer. Receipt of less than the minimum required number of copies will be cause for withholding the shop drawings from being checked until receipt of the necessary additional copies.

  Each set of shop drawings shall include, but not necessarily be limited to:

  Drawings showing dimensions of all equipment. Control details and electrical schematic diagrams.

  All other information necessary to enable the engineer to determine whether the proposed equipment meets the requirements.

- Installation and Operating Instructions:

  Two (2) copies of a manual, containing installation instructions, operating instructions, wiring diagrams, parts list, and, where applicable, test data shall be provided.

  The contractor shall provide the services of factory-trained representative for a maximum period of one (1) day to start up the station and to instruct the owner's operating personnel in the operation and maintenance of the equipment provided.

- Warranty: The manufacturer shall warrant his product to be free from defects in workmanship for a period of five (5) years or 3,000 hours which ever comes first.

  Warranties and guarantees by the suppliers of various components in lieu of a single source responsibility by the contractor shall not be accepted. The contractor shall be solely responsible for the warranty.

  In the event a component failure to perform as specified or is proven defective in service during the warranty period, excluding items of supply normally expended during operation, the manufacturer shall provide a replacement part without cost to the owner.

  This warranty shall be valid only if the product is installed, serviced, and operated under normal conditions, in accordance with the manufacturer instructions.

- Equipment Manufacturer: In order to establish a standard of quality and to insure a uniform basis of bidding, pump station equipment shall be supplied by the pump supplier or a written approval equal.

  To be considered an approved equal, complete details and shop drawings must be submitted to the engineer no later than ten (10) days prior to the bid date. Sufficient data must be submitted so that the engineer has the required information available to determine that the alternate station meets the required specifications.

  The contractor shall prepare his bid on the basis of the specific equipment and materials specified for purposed of determining the low bid.

  After the execution of the contract, substitution of non-specified equipment will be considered, if the substitution is, in the opinion of the engineer, equal in quality to that named. If such substitution is approved by the engineer, all savings affected by the contractor in the purchase of the substituted equipment shall be passed on to the owner by reducing the contract price. In submitting for substitution, the contractor shall provide certified copies of equipment proposals from the named manufacturer.

Pump Performance Specifications

- Requirements: Furnish and install ____ submersible non-clog wastewater pump(s). Each pump shall be equipped with a ____ HP, submersible electric motor connected for operation on 480 volts, three phase, 60 hertz, ____ wire service with ____ feet of submersible cable suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval. The pump shall be supplied with a mating cast iron ____ inch discharge connection and be capable of delivering ____ GPM at ____ TDH. An additional point on the same curve shall be ____ GPM at ____ feet total head. Shut off head shall be ____ feet (minimum). Each pump shall be fitted with ____ feet of ____ lifting chain or stainless steel cable. The working load of the lifting system shall be 50% greater than the pump unit weight.

- Pump Design: The pump(s) shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet-well. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. **Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable.** No portion of the pump shall bear directly on the sump floor.

- Pump Construction: Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be AISI type 304 stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

  Sealing design shall incorporate **metal-to-metal contact** between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

  Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

- Cooling System: Each unit shall be provided with an adequately designed cooling system. The water jacket shall encircle the stator housing; thus, providing heat dissipation for the motor regardless of the type of installation. Impeller back vanes shall provide the necessary circulation of the cooling liquid through the water jacket. The cooling media channels and ports shall be non-clogging by virtue of their dimensions. Provisions for external cooling and seal flushing shall also be provided. The cooling system shall provide for continuous pump operation in liquid temperature of up to **104 DEGREES F.** Restrictions below this temperature are not acceptable.

- Cable Entry Seal: The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal. **The cable entry junction chamber and motor shall be separated by a terminal board, which shall isolate the interior from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.**

- Motor: The pump motor shall be induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber, NEMA B type. The stator windings and stator leads shall be insulated with moisture resistant Class F insulation rated for 155 degrees C (311 degrees F). The stator shall be dipped and baked three times in Class F varnish and shall be heat-shrink fitted into the stator housing. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media

of 40 degrees C (104 degrees F) and capable of up to 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125 degrees C (260 degrees F) shall be embedded in the stator lead coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer o-ring seal. Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board. Wire nuts or crimping type connection devices are not acceptable. The motor and pump shall be designed and assembled by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40 degrees C (104 degrees F) ambient and with a temperature rise not to exceed 80 degrees C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chloroprene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

- Bearings: The pump shaft shall rotate on two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single roller bearing. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces. **Single row lower bearings are not acceptable.**

- Mechanical Seal: Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating **tungsten-carbide** ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary **tungsten-carbide** seal ring and one positively driven rotating **tungsten-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor **depend on direction of rotation for sealing.** For special applications, other seal face materials shall be available.

  The following seal types shall not be considered acceptable nor equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and

lower seal faces. Cartridge type systems will not be acceptable. No system requiring a pressure differential to offset pressure and to effect sealing shall be used.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. **The motor shall be able to operate dry without damage while pumping under load.**

Seal lubricant shall be FDA Approved, nontoxic.

- Pump Shaft: Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The pump shaft shall be of carbon steel C1035 and shall be completely isolated from the pumped liquid.

- Impeller: The impeller(s) shall be of gray cast iron, Class 35B, dynamically balanced, double shrouded non-clogging design having a long throughlet without acute turns. The impeller(s) shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater. Whenever possible, a full vaned, not vortex, impeller shall be used for maximum hydraulic efficiency; thus, reducing operating costs. Mass moment of inertia calculations shall be provided by the pump manufacturer upon request. Impeller(s) shall be keyed to the shaft, retained with an expansion ring and shall be capable of passing a minimum ____ inch diameter solid. All impellers shall be coated with an acrylic dispersion zinc phosphate primer.

- Wear Rings: A wear ring system shall be used to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be equipped with a brass, or nitrile rubber coated steel ring insert that is drive fitted to the volute inlet.

  This pump shall also have a stainless steel impeller wear ring heat-shrink fitted onto the suction inlet of the impeller.

- Volute: Pump volute(s) shall be single-piece grey cast iron, Class 35B, non-concentric design with smooth passages large enough to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified.

- Protection: All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. At 125 degrees C (260 degrees F) the thermal switches shall open, stop the motor and activate an alarm.

  A leakage sensor shall be available as an option to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. **Use of voltage sensitive solid state sensors and trip temperature above 125 degrees C (260 degrees F) shall not be allowed.**

The thermal switches, and FLS shall be connected to a Mini CAS (Control and Status) monitoring unit. The Mini CAS shall be designed to be mounted in any control panel.

- Modifications:
  1. Explosion-proof Pumps (X).
  2. Dry Pit Installations (CT).
  3. Stainless Steel Pumps (SS).

  Refer to the General Guide Specifications for additional information.

General Pump Guide Specifications

- Quality Assurance: The pump(s) shall be heavy duty, electric submersible, centrifugal non-clog units designed for handling raw, unscreened sewage and wastewater and shall be fully guaranteed for this use. The pumps provided shall be capable of operating in an ambient liquid temperature of **104 DEGREES F.** Since the high temperature of **104 DEGREES F** is specified by the National Electrical Manufacturers Association (NEMA) and Factory Mutual (FM), motors with a maximum ambient temperature rating below **104 DEGREES F** shall not be acceptable.

  The pump and motor unit shall be suitable for continuous operation at full nameplate load while the motor is completely submerged, partially submerged or totally non-submerged, partially submerged or totally non-submerged. The use of shower systems, secondary pumps or cooling fans to cool the motor shall not be acceptable.

  The pump, mechanical seals and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

- Submittals: Submittal data shall be provided to show compliance with these specifications, plans or other specifications that will influence the proper operation of the pump(s).

  Standard submittal data for approval must consist of:
  A. Pump Performance Curves.
  B. Pump Outline Drawing.
  C. Station Drawing for Accessories.
  D. Electric Motor Data.
  E. Control Drawing and Data.
  F. Access Frame Drawing.
  G. Typical Installation Guides.
  H. Technical Manuals.
  I. Parts List.
  J. Printed Warranty.
  K. Manufacturers Equipment Storage Recommendations.
  L. Manufacturers Standard Recommended Start-Up Report Form.

  Lack of the above requested submittal data is cause for rejection.

- Testing: Testing performed upon each pump shall include the following inspections:

  a. Impeller, motor rating and electrical connections shall be checked for compliance with this specification.

  b. Prior to submergence, each pump shall be run dry to establish correct rotation.

  c. Each pump shall be run submerged in water.

  d. Motor and cable insulation shall be tested for moisture content or insulation defects.

  Upon request, a written quality assurance record confirming the above testing/inspections shall be supplied with each pump at the time of shipment.

  Each pump (when specified) shall be tested in accordance with the latest test code of the Hydraulic Institute (H.I.) at the manufacturer to determine head vs. capacity and kilowatt draw required. Witness tests shall be available at the factory upon request.

  The pump(s) shall be rejected if the above requirements are not satisfied.

- Start-Up Service: The equipment manufacturer shall furnish the services of a qualified factory trained field service engineer for ____ 8-hour working day(s) at the site to inspect the installation and instruct the owner's personnel on the operation and maintenance of the pumping units. After the pumps have been completely installed and wired, the contractor shall have the manufacturer do the following:

  a. Megger stator and power cables.
  b. Check seal lubrication.
  c. Check for proper rotation.
  d. Check power supply voltage.
  e. Measure motor operating load and no load current.
  f. Check level control operation and sequence.

  During this initial inspection, the manufacturer's service representative shall review recommended operation and maintenance procedures with the owner's personnel.

- Factory Service: Factory-Approved service facilities with qualified factory-trained mechanics shall be available for prompt emergency and routine service.

- Guarantee: In addition to the general guarantee required elsewhere in these specifications, the pump manufacturer shall furnish the Owner with a written warranty to cover the pump(s) and motor(s) against defects in workmanship and material for a period of five (5) years of 10,000 hours of operation under normal use and service. The pump manufacturer will pay the following portion of the cost of **all replacement parts and repair labor** from the date of shipment of the pump unit. Pumps repaired under warranty will be returned to the owner freight prepaid.

Months:	0 - 18	19 - 39	40 - 60
Hours:	0 - 3,000	3,000 - 6,500	6,500 - 10,000
Warranty:	100%	50%	25%

The warranty shall be in printed form and previously published as the manufacturers standard warranty for all
similar units manufactured.

- Experience: The pump manufacturer shall have a minimum of 10,000 heavy-duty submersible wastewater pumps installed and operating for no less than 5 years in the United States.

- Manufacturers:

  a. The pump, mechanical seals and motor shall be from the same manufacturer.

  b. The pump, mechanical seals and motor manufacturer shall be ITT Flygt.

- Modifications:

  a. **EXPLOSION-PROOF PUMPS (X) -** The pump system including the pump, motor, and power cable shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class I, Div. 1, Group C and D service as determined and approved by a U.S. nationally recognized testing laboratory (U.L., FM, CSA) at the time of the bidding of the project. As required by Factory Mutual (FM) the motor shall be capable of operating in pumped media up to **104 DEGREES F.** Motor thermal switches shall monitor and protect the motor from excessive temperature. An internal Float Switch shall be available, as an option, in the motor chamber. Service of explosion-proof submersible units shall be performed by qualified FM experienced personnel. **The pump manufacturer must provide training schools to qualify personnel in the proper service and repair of explosion-proof pumps.**

  b. **DRY PIT INSTALLATION (CT) -** Motor cooling shall be sufficient for continuous operation under full nameplate load in a dry environment. The pump(s) shall be capable of handling pumped media up to **104 DEGREES F.**

  OIL FILLED MOTORS - Since the complete motor requires total oil immersion for adequate heat dissipation, **oil filled motors shall not be considered for dry pit installations.**

  DRY TYPE - EXTERNAL FAN COOLED MOTORS - When external fan cooling is required, two **SEPARATE** motors are required one for the pump and one for the fan. This results in higher input power, increased operating costs and possible fan motor failure. A submersible pump is used for dry pit installation because of the high possibility of flooding. If the fan motor is operating when submerged, the down thrust developed will damage the fan motor. A pump motor of about **200 HP DEPENDS** on the performance of a **3 HP** fan motor. **Thus, air cooled fans shall not be considered for dry pit installations.**

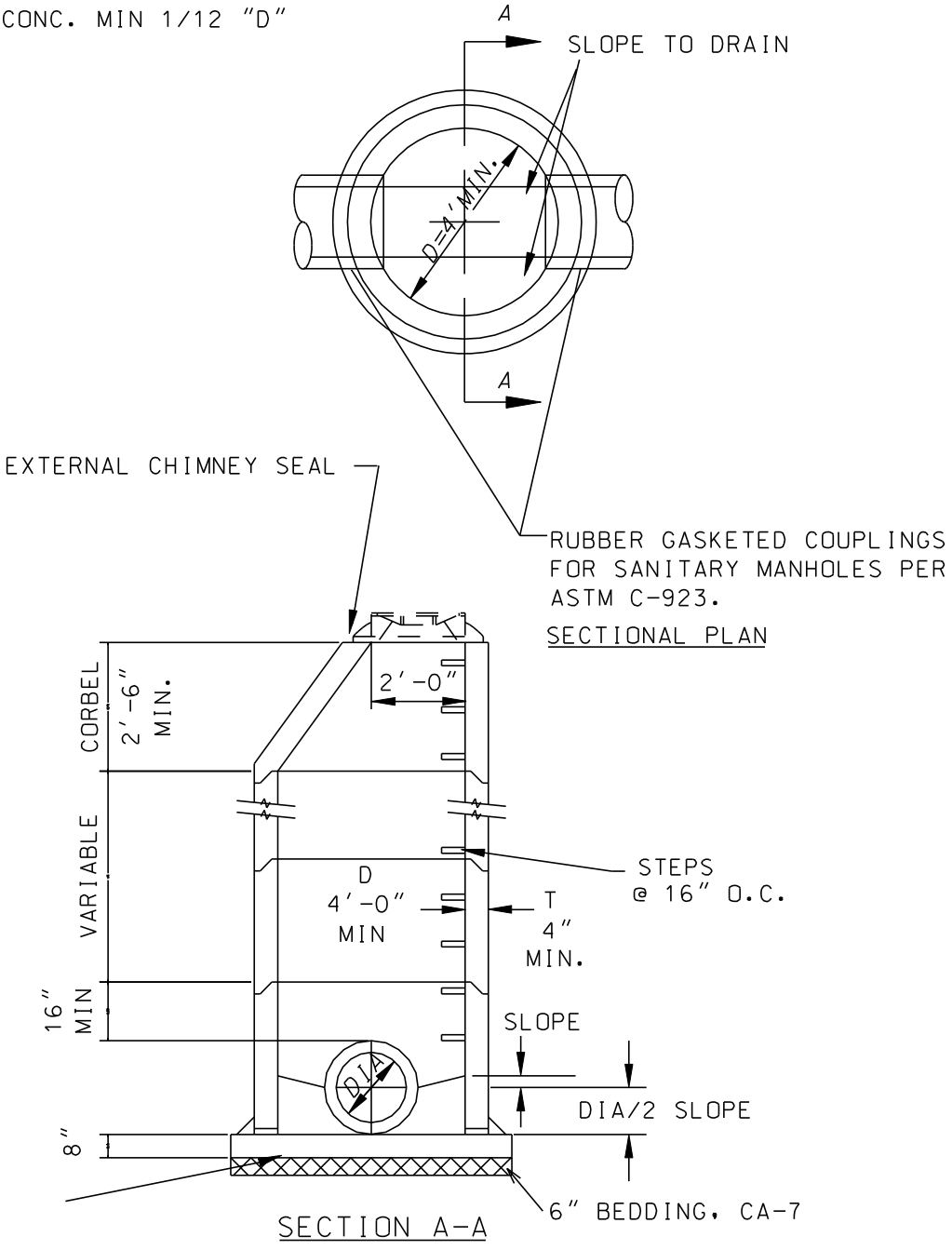
c. **WARM LIQUID APPLICATION (WL) -** Higher temperature units shall be available for pumped media temperatures of 140 degrees F, 160 degrees F, and 195 degrees F. Alternative cable, O-rings, seal materials, etc. may be used for the higher temperature applications. On certain pump models and some higher temperatures, an external source of cooling water may be required.

d. **STAINLESS STEEL PUMPS (SS) -** Complete pump models shall be available in stainless steel. In addition, pump portions including impeller, volute, hydraulic end and motor shall be available in stainless steel. The pump models shall be capable of handling pumped media up to **104 DEGREES F.**

e. **ALUMINUM BRONZE PUMPS (B) -** Complete pump models shall be available in aluminum bronze. For adequate motor cooling, there shall be a water jacket with all aluminum bronze models. The pump models shall be capable of handling pumped media up to **104 DEGREES F.**

SANITARY MANHOLE TYPE A

MATERIAL WALL THICKNESS (T)
PRECAST CONC. MIN 1/12 "D"

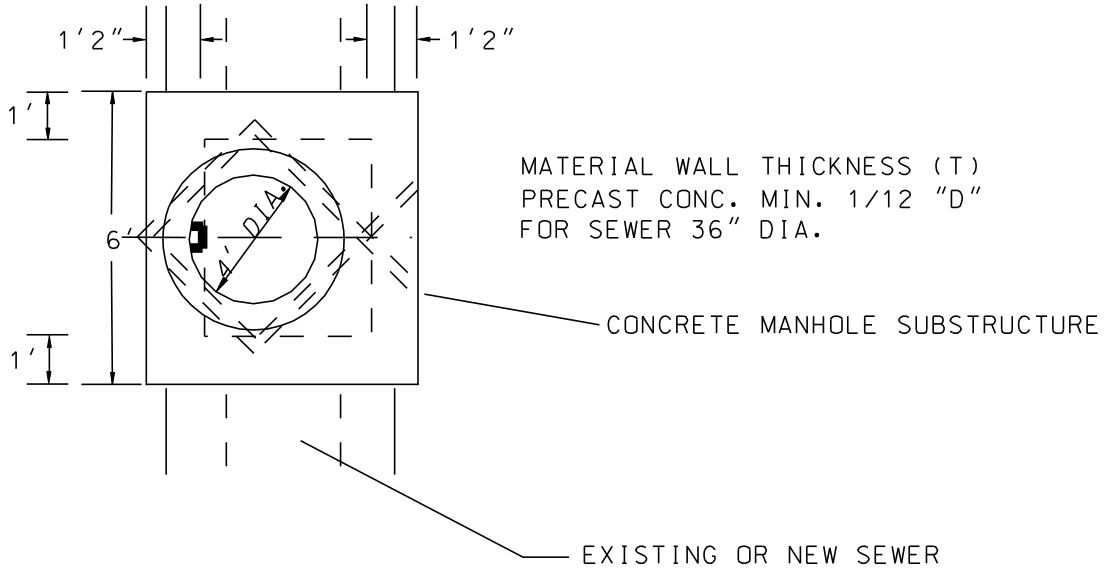


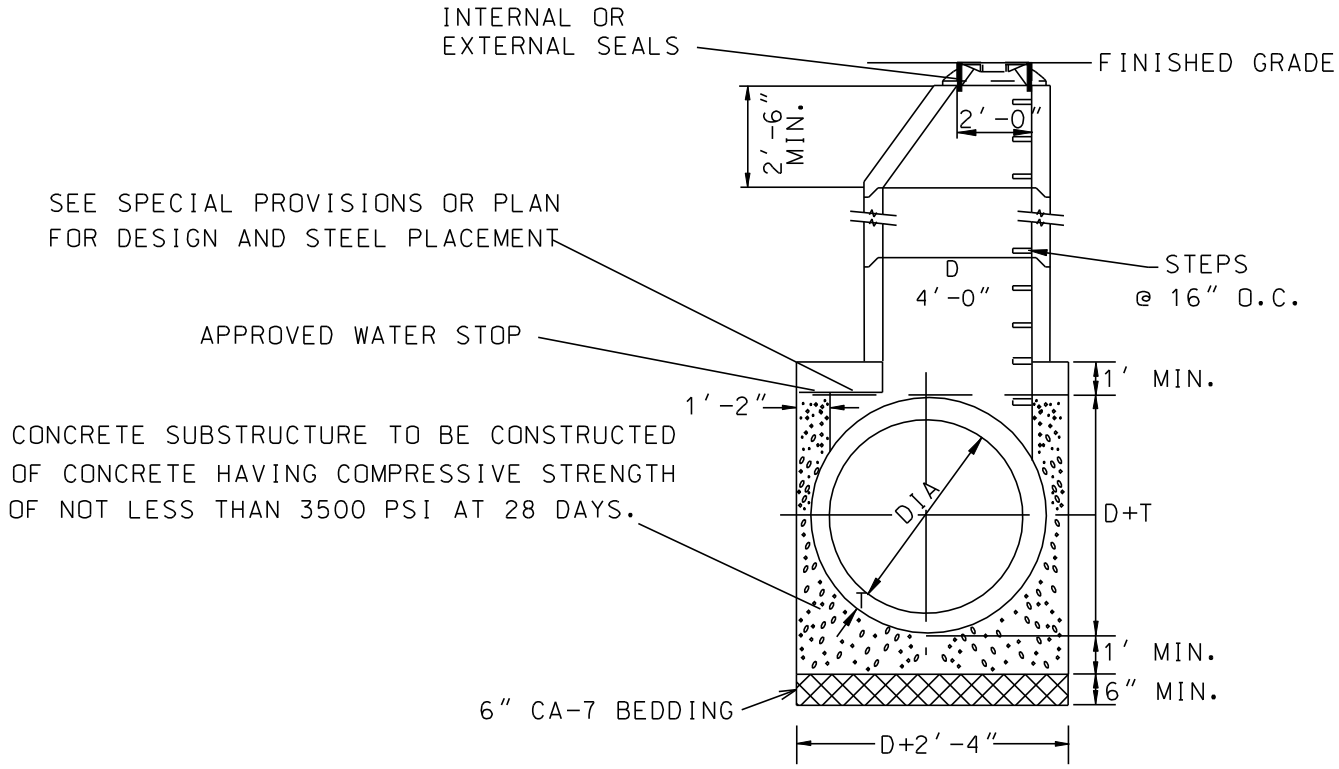
BOTTOM SLAB: 3500 PSI CONCRETE OR PRECAST REINFORCED CONCRETE SLAB ON 6" CA-7 BOTTOM, MAY BE PRECAST MONOLITHIC WITH MANHOLE WALL SECTION.

MINOOKA STANDARD

VERSION 1.0

SANITARY MANHOLE TYPE B



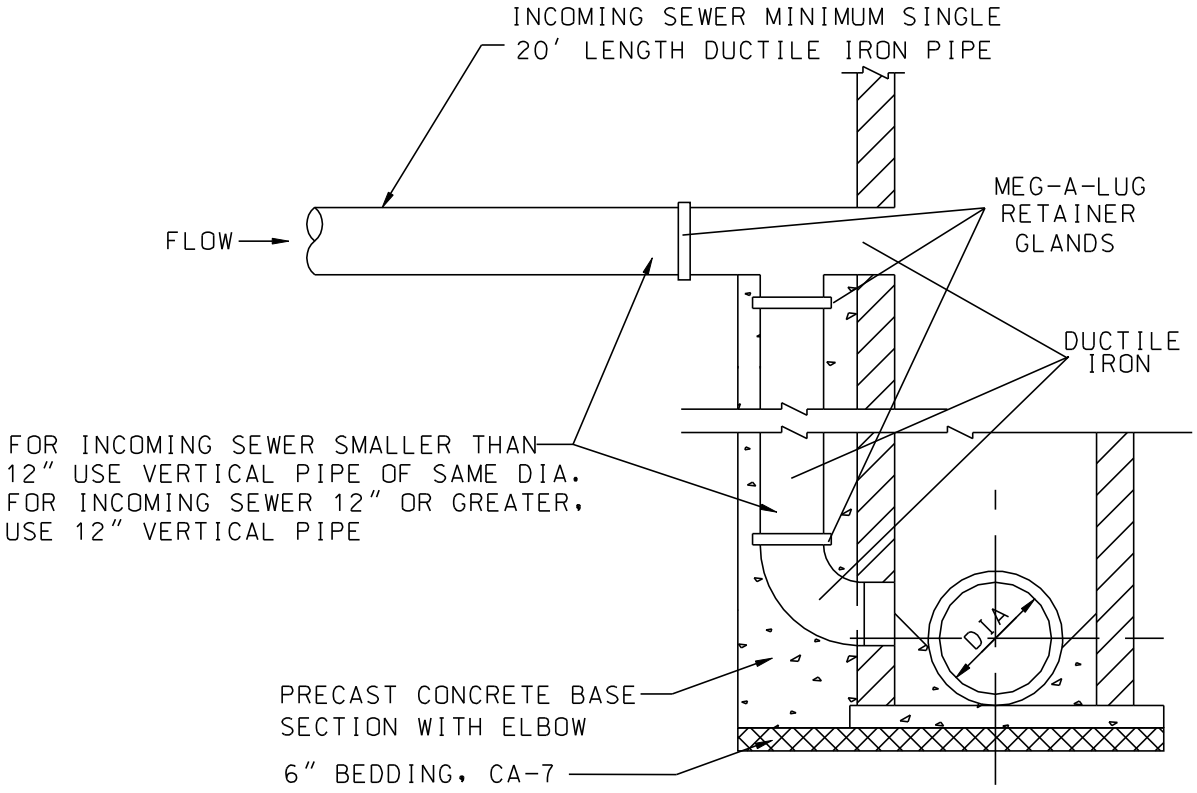


NOTE: CANNOT BE PLACED IN DRIVEWAYS OR SIDEWALKS

MINOOKA STANDARD

VERSION 1.0

EXTERIOR DROP MANHOLE

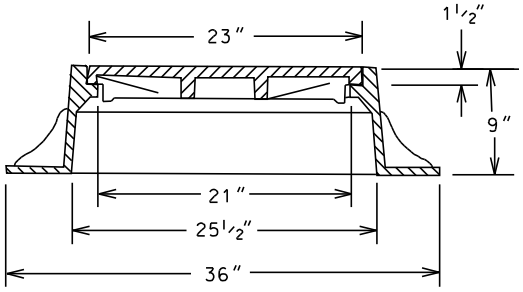


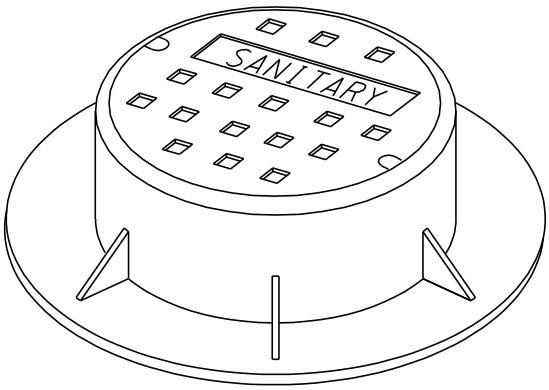
NOTE:
THIS DETAIL APPLIES TO INCOMING SEWERS OF 18" DIAMETER OR LESS.

MINOOKA STANDARD

VERSION 1.0

SANITARY MANHOLE FRAME WITH CLOSED LID



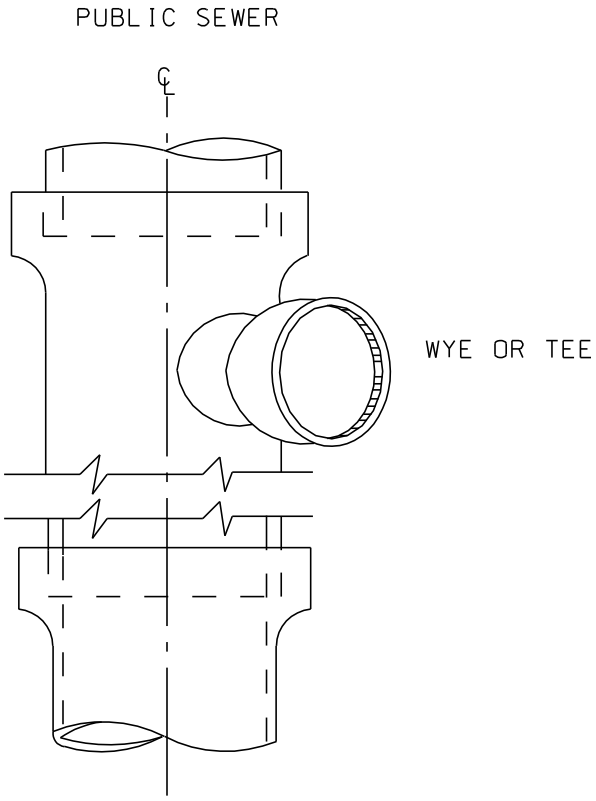


The frame and lid shall be Neenah R-1550-A type B, or East Jordan 1050 with SANITARY cast on cover with concealed pick holes and gasketed self sealing lid.

MINOOKA STANDARD

VERSION 1.0

TYPICAL HOUSE INLET



PLAN OF SEWER AT HOUSE INLET

WHERE TEES AND WYES ARE NOT PROVIDED DIRECT TAPS WILL BE REQUIRED. AXIS OF OUTLET PLACED AT 45° SLOPE WITH HORIZONTAL OUTLET TO BE PROVIDED WITH STOPPER.

AIR TEST TABLE

SPECIFICATION TIME (min:sec) REQUIRED FOR PRESSURE DROP
FROM 3½ TO 2½ PSIG (24kPag - 17 kPag)
WHEN TESTING ONE PIPE DIAMETER ONLY
PIPE DIAMETER, INCHES (MILIMETERS)

Length of Sewer Pipe In Feet (Meters)		4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	15 (380)	18 (450)	21 (525)	24 (600)
25	(7.62)	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38
50	(15.24)	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	(22.87)	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	(30.50)	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	(38.10)	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	(45.70)	0:26	0:59	1:46	2:45	3:58	6:11	8:30		
175	(53.35)	0:31	1:09	2:03	3:13	4:37	7:05			
200	(61.00)	0:35	1:19	2:21	3:40	5:17				12:06
225	(68.60)	0:40	1:29	2:38	4:08	5:40			10:25	13:36
250	(76.20)	0:44	1:39	2:56	4:35			8:31	11:35	15:07
275	(83.84)	0:48	1:49	3:14	4:43			9:21	12:44	16:38
300	(91.50)	0:53	1:59	3:31				10:12	13:53	18:09
350	(106.70)	1:02	2:19	3:47			8:16	11:54	16:12	21:10
400	(122.00)	1:10	2:38			6:03	9:27	13:36	18:31	24:12
450	(137.20)	1:19	2:50			6:48	10:38	15:19	20:50	27:13
500	(152.50)	1:28			5:14	7:34	11:49	17:01	23:09	30:14

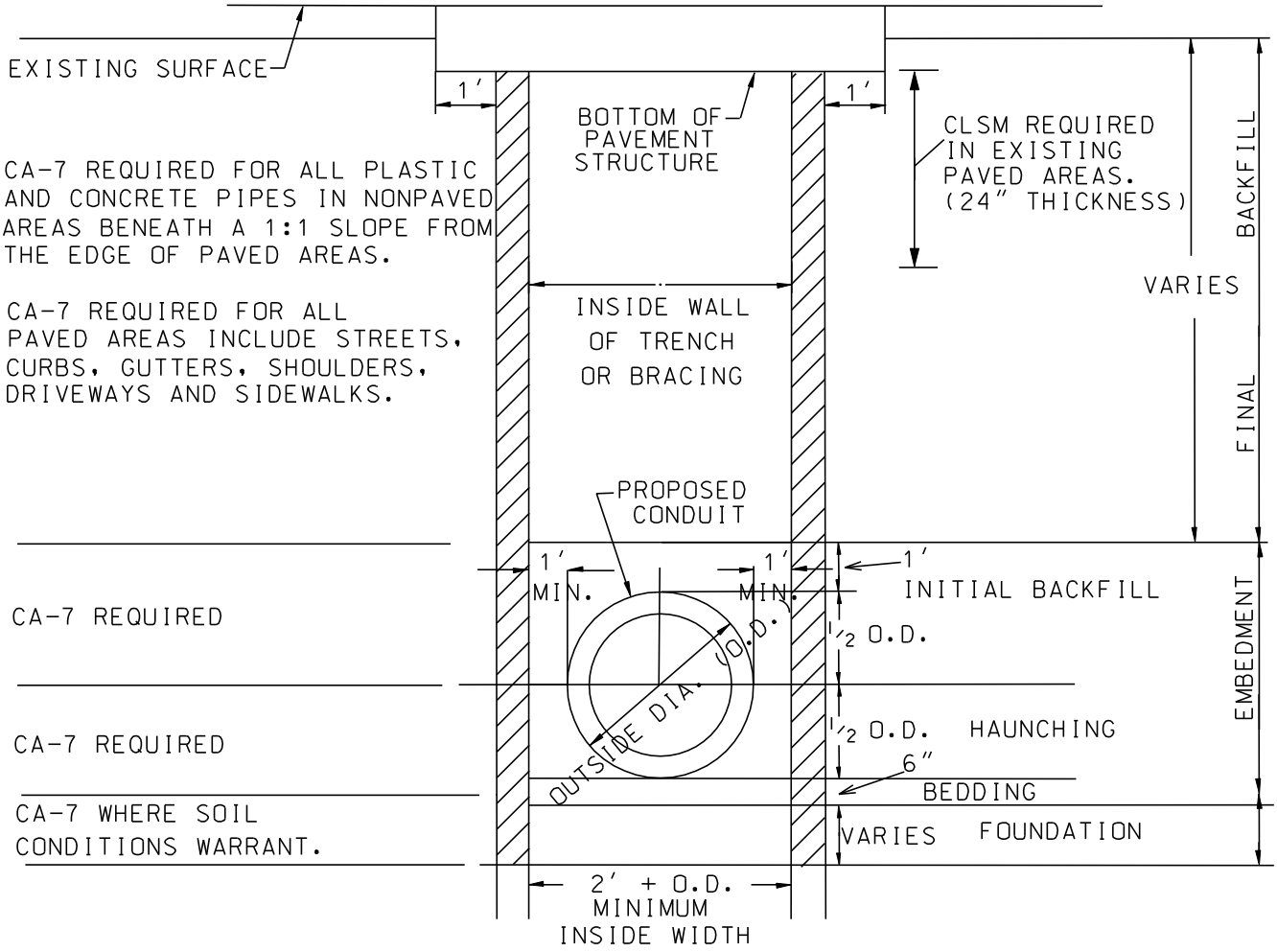
MINOOKA STANDARD

VERSION 1.0

SANITARY SEWER TRENCH

IDENTIFICATION OF WHERE SELECT GRANULAR MATERIAL IS REQUIRED.

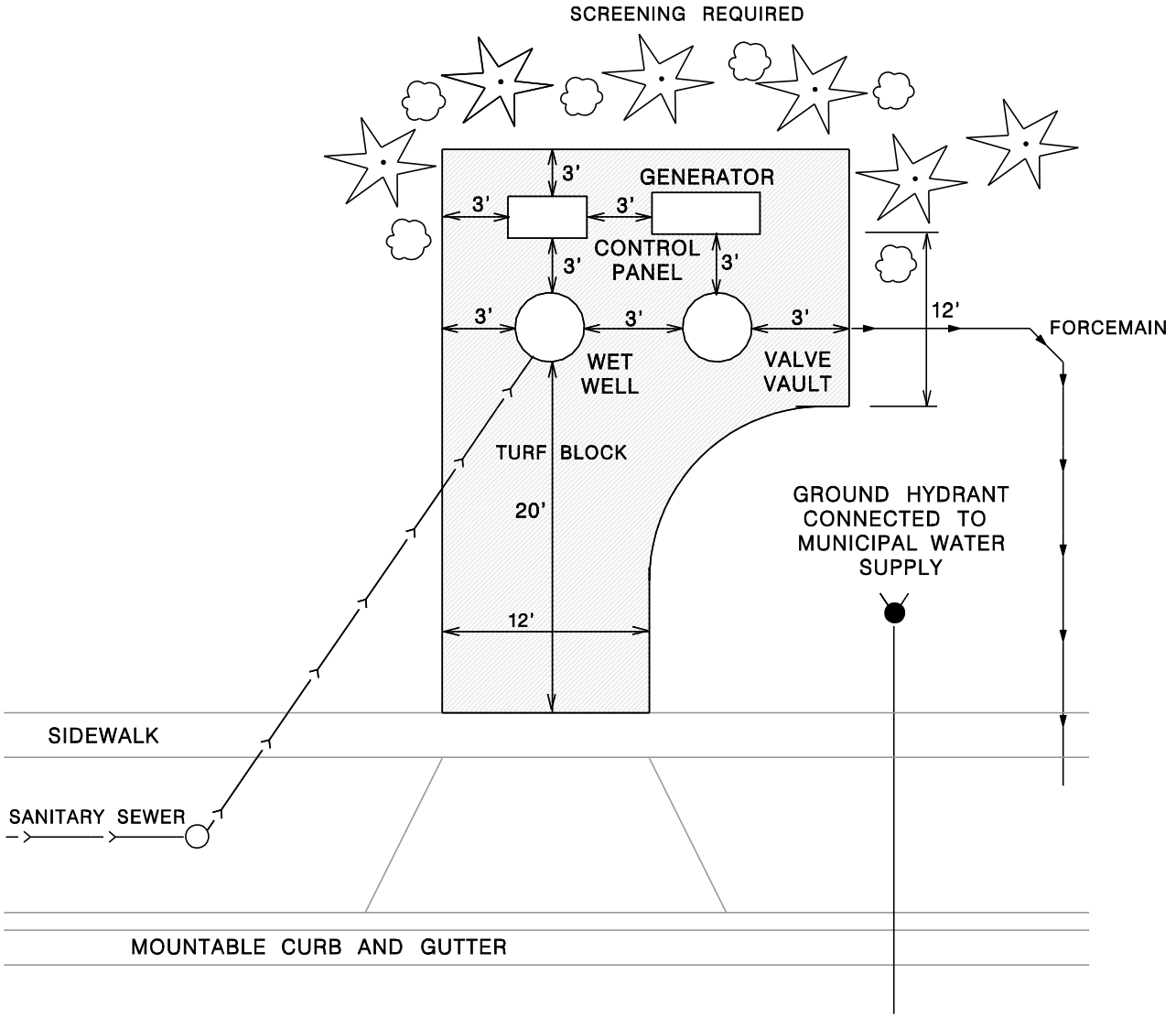
TERMINOLOGY, DIMENSIONS AND TYPE OF SELECT MATERIAL, WHEN REQUIRED.



MINOOKA STANDARD

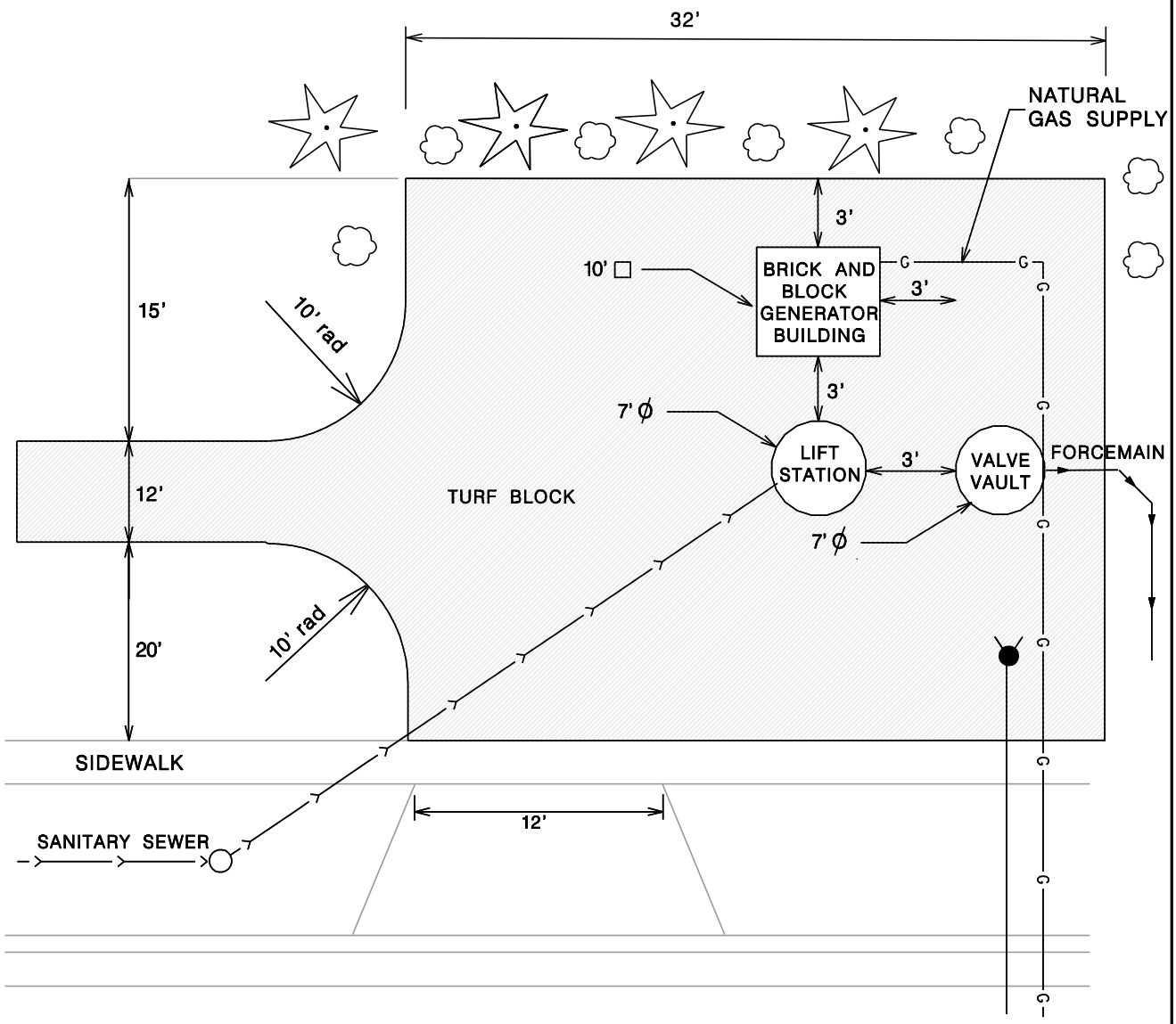
VERSION 1.0

NEIGHBORHOOD LIFT STATION SITE PLAN



1.) PROVIDE PROPOSED ELEVATIONS ON AND NEAR LIFT STATION.
2.) ALL DIMENSIONS SHOWN ARE MINIMUM DIMENSTIONS.
3.) THE VILLAGE SHALL DETERMINE WHEN EITHER A REGIONAL OR NEIGHBORHOOD LIFT STATION IS SPECIFIED.

REGIONAL LIFT STATION SITE PLAN



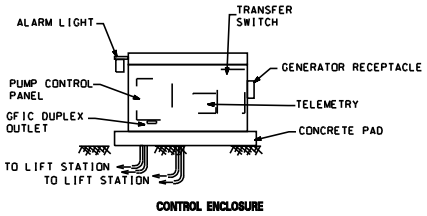
GROUND HYDRANT TO CONNECTED MUNICIIPAL WATER SUPPLY

1.) PROVIDE PROPOSED ELEVATIONS ON AND NEAR LIFT STATION.
2.) CONTROL PANEL TO BE LOCATED IN BRICK AND BLOCK BUILDING.
3.) ALL DIMENSIONS SHOWN ARE MINIMUM DIMENSIONS.
4.) THE VILLAGE SHALL DETERMINE WHEN EITHER A REGIONAL OR NEIGHBORHOOD LIFT STATION IS SPECIFIED.

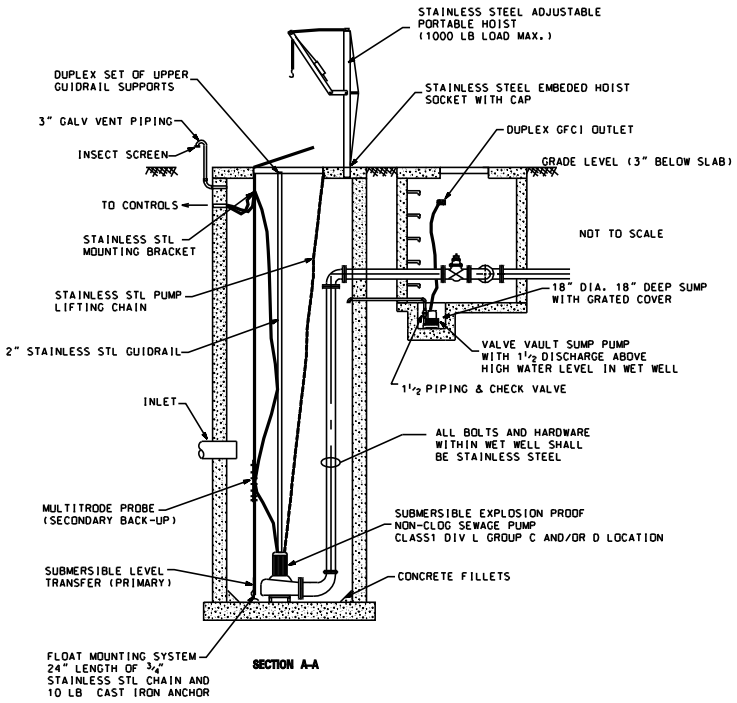
MINOOKA STANDARD

VERSION 1.0

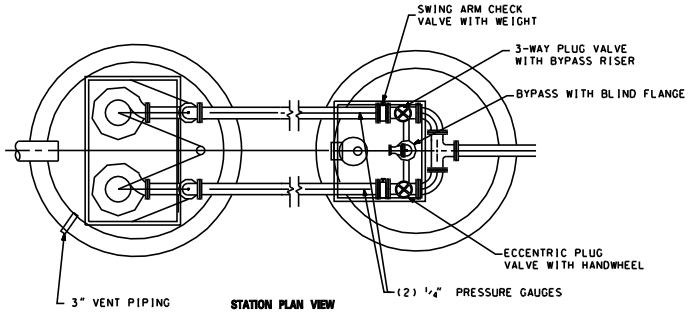
TYPICAL LIFT STATION COMPONENTS



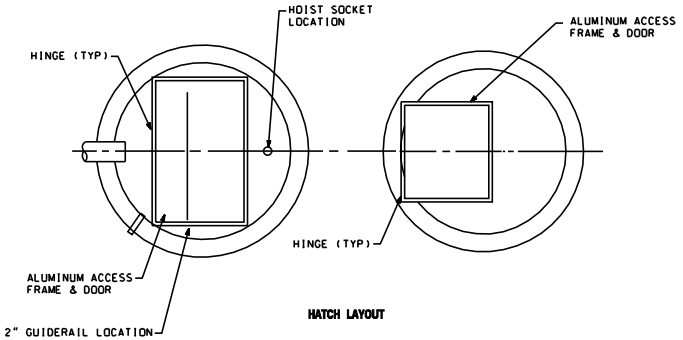
CONTROL ENCLOSURE



SECTION A-A



STATION PLAN VIEW

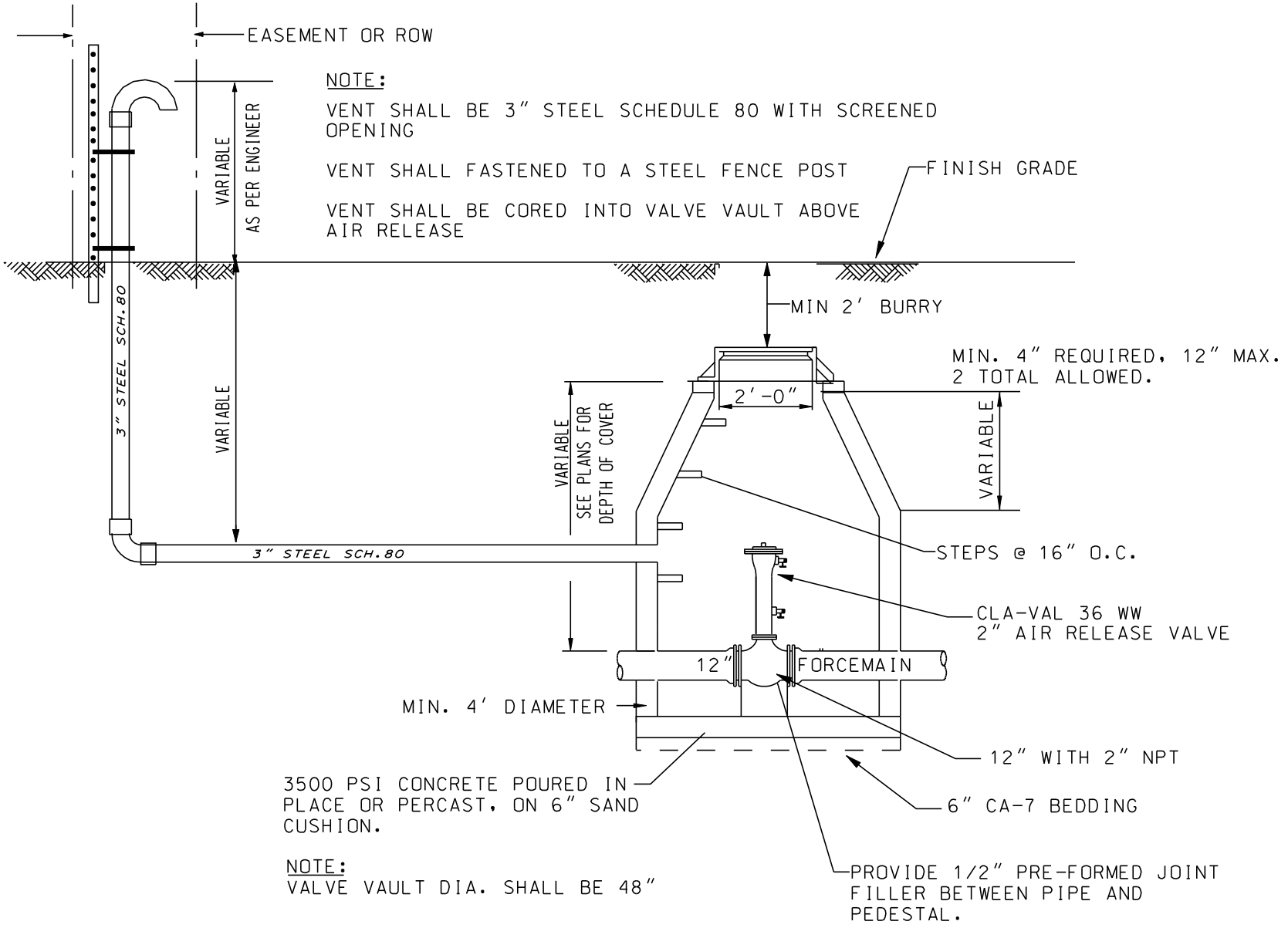


HATCH LAYOUT

MINOOKA STANDARD

VERSION 1.0

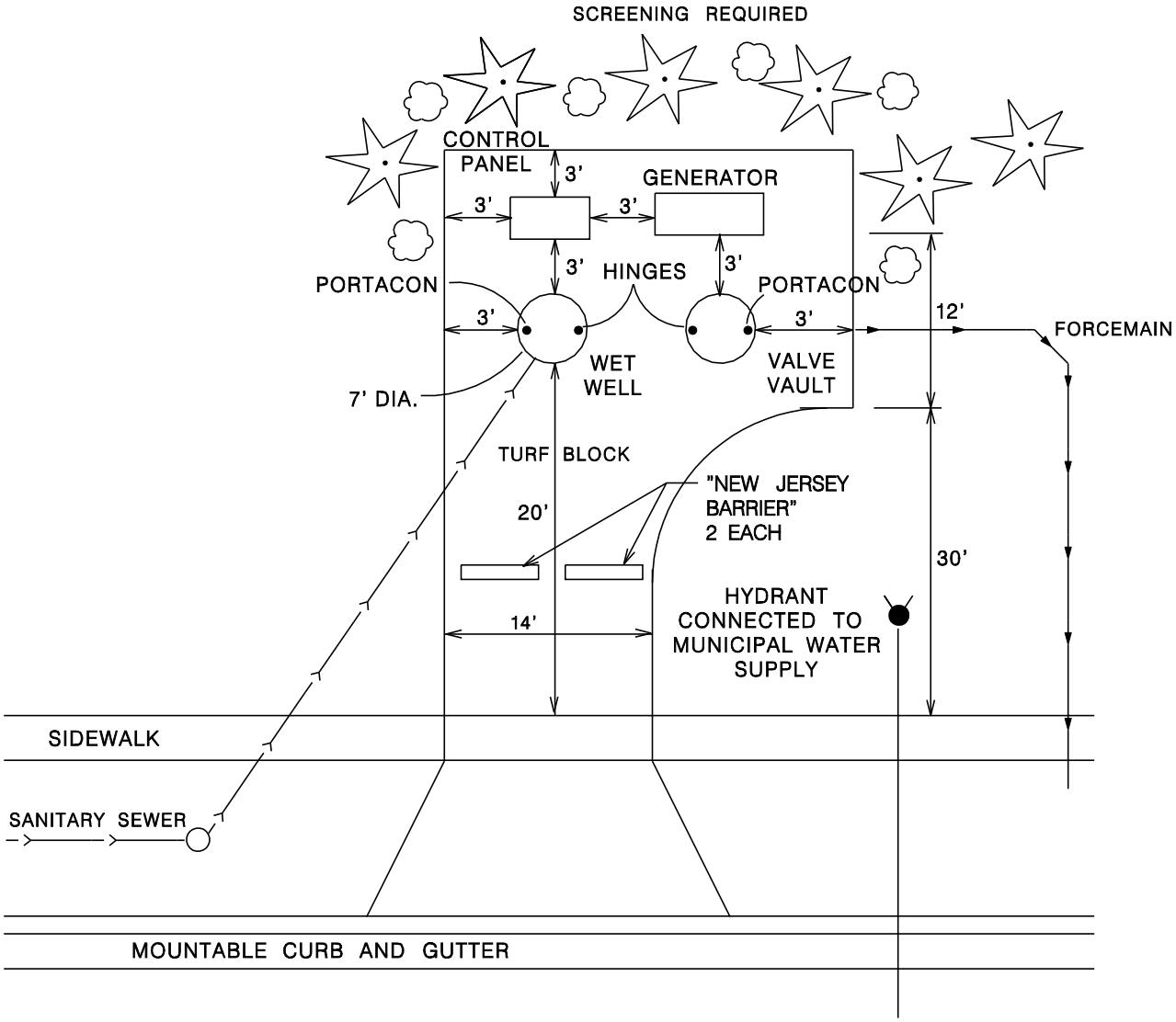
PROPOSED AIR RELEASE VAULT WITH VENT SPECIAL



MINOOKA STANDARD

VERSION 1.0

LOCAL LIFT STATION SITE PLAN

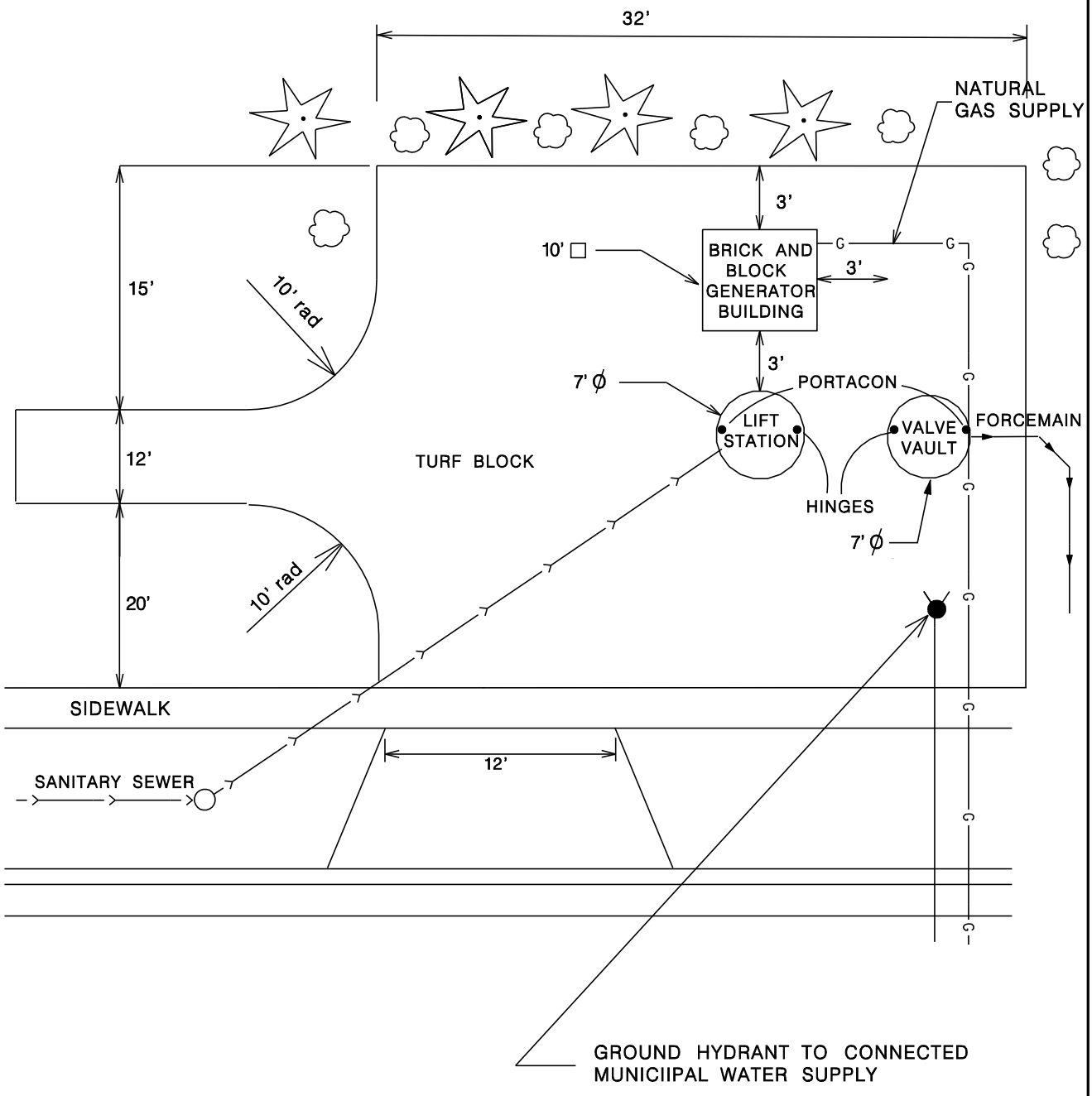


1.) PROVIDE PROPOSED ELEVATIONS ON AND NEAR LIFT STATION.
2.) ALL DIMENSIONS SHOWN ARE MINIMUM DIMENSTIONS.
3.) THE VILLAGE SHALL DETERMINE WHEN EITHER A REGIONAL OR NEIGHBORHOOD LIFT STATION IS SPECIFIED.
4.) LANDSCAPING REQUIRED.

MINOOKA WASTEWATER PUMP STATION STANDARD

VERSION 1.0

REGIONAL LIFT STATION SITE PLAN

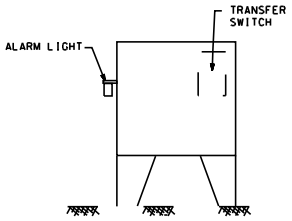


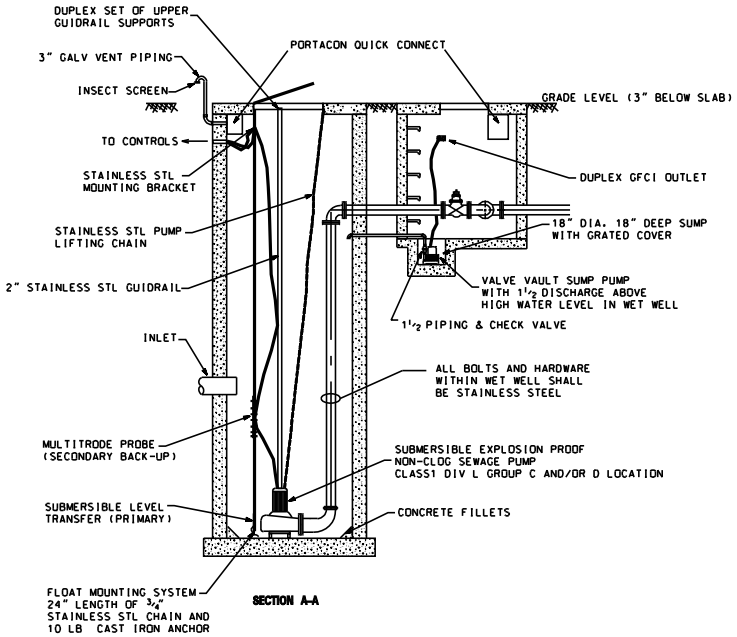
1.) PROVIDE PROPOSED ELEVATIONS ON AND NEAR LIFT STATION.
2.) CONTROL PANEL TO BE LOCATED IN BRICK AND BLOCK BUILDING.
3.) ALL DIMENSIONS SHOWN ARE MINIMUM DIMENSIONS.
4.) LANDSCAPING REQUIRED.

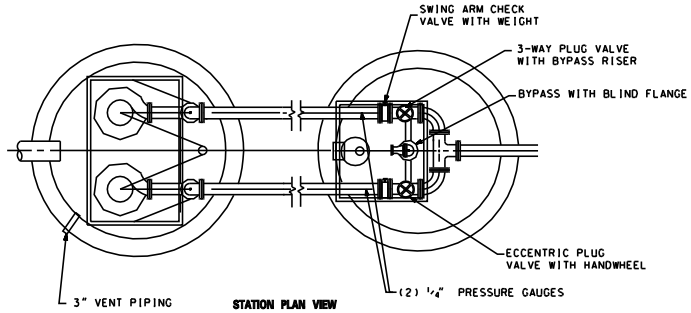
MINOOKA WASTEWATER PUMP STATION STANDARD

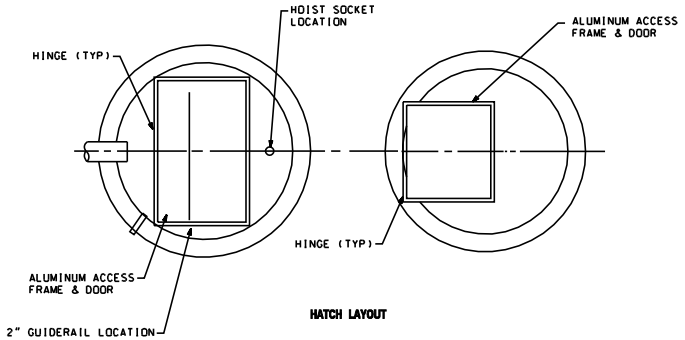
VERSION 1.0

TYPICAL LIFT STATION COMPONENTS









MINOOKA WASTEWATER PUMP STATION STANDARDS

VERSION 1.0