2020 - SECTION 61

SANITARY SEWER SYSTEM

61.1 GENERAL

The construction of all sanitary sewer mains and related sewerage structures shall be in accordance with these specifications and all other relevant specifications.

Sewer mains shall refer to the supply and installation of pipe, manholes, bedding, including, but not limited to the cleaning and testing of sewer pipe in accordance with these specifications.

Sewer force mains shall refer to the supply and installation of pipe, manholes, bedding, valves, air releases, pigg ports, including, but not limited to the cleaning and testing of force main pipe in accordance with these specifications.

61.2 MATERIALS

61.2.1 PIPE

a) Poly vinyl Chloride (PVC) pipe

- Conforming to CSA B182.2-M1983 and ASTM D 3034.
- Standard Dimension Ratio (SDR) shall be 35. For sanitary mains in larger than 1050 mm SDR 41 may be used, subject to the written approval of Aquatera. Approvals for SDR 41 shall be based on considerations such as depth, soil conditions and groundwater elevations.
- Jointing shall be bell and spigot type with rubber gaskets conforming to ASTM D 3212.

b) Concrete pipe (may be used with approval from Aquatera)

- Non-reinforced concrete pipe conforming to the Standard Specification ASTM C-14 Class III.
- Reinforced concrete pipe in accordance with ASTM C-76, or Reinforced Concrete D-load pipe conforming to ASTM C-655.
- All concrete pipe to be manufactured with sulphate resistant (SR) cement Type V.
- Gasketed joints or confined O-rings as per ASTM C-443 requirements.

c) Force Main

- Poly Vinyl Chloride (PVC) pipe
    - Conforming to CSA B137.3 (series 160)
    - Dimension Ratio (DR) shall be 26.

- Jointing shall be Bell and Spigot type with rubber gaskets conforming to the above standards or fused as per the manufacturer's specifications conforming to ASTM D 2152.
- To facilitate location of force mains a tracing wire or approved equivalent shall be placed along all forcemains at the time of installation.

- High Density Polyethylene pipe (HDPE)
  - Conforming to AWWA C901 or AWWA C906
  - DR11 for pipe less than 150mm
  - DR 17 for pipe 150mm and larger
  - Heat fusion or insert with pack joint fitting conforming to CSA B137.1 for fittings less than 100 mm and conforming to AWWA C906 for fittings larger than 100 mm.
  - Jointing of polyethylene pressure pipe greater than 100 mm shall be by thermal butt fusion process. Procedures recommended by the pipe manufacturer shall be followed.
  - Jointing of polyethylene pressure pipe smaller than 100 mm shall be joined with heat fusion or insert or compression fittings recommended by the manufacture and conforming to Aquatera standards, and that prevent pull out and resist creep deformation at full test pressure.
  - To facilitate location of force mains a tracing wire or approved equivalent shall be placed along all forcemains, low pressure sewer at the time of installation.

Any proposed alternate materials must be approved in writing by Aquatera.

61.2.2 INSULATION FOR SANITARY SEWERS

Insulation used shall be a minimum of 50 mm thick and be composed of rigid polyurethane foam which is formed onto the pipe. The insulation shall have a thermal conductivity of 0.161 - 0.174 kcal/cm/h/m^2/°C and have a minimum service temperature of -45°C. As an alternative a frost box can be installed using 50 mm foam panels as per the Typical Detail Drawing (see 61-07).

61.2.3 MANHOLES/CHAMBERS

a) Body

Pre-cast reinforced sulphate resistant concrete barrel(s) and conical top with minimum 1200 mm inside diameter unless otherwise specified, conforming to ASTM C478. Slab tops are only allowed upon prior written approval by Aquatera.

b) Bases

Bases shall be manufactured as per the Concrete Specifications with ASTM type V (Sulphate Resistant) concrete with a minimum 28 day compressive strength of 25 MPA.

Booted connections between the manholes and pipes are not allowed within Aquatera's service area.

Manhole connections shall be either A Lok gaskets or approved equivalent.

c) Frame and Cover

(refer to section 300 – document - Alberta specification for cast iron products)

Manhole frame and cover shall be cast iron conforming to ASTM A48. The cover shall contain the logo "Aquatera Utilities Inc. - Sanitary Sewer" and contain only one vent hole. The vent hole shall be 25 mm, +/- 2 mm, in diameter.

F-39 manhole covers shall be used unless specified otherwise by the municipality.

Sealed frames and covers shall be used in all ponding areas.

Floating F-80 manhole covers may be used as an alternative to the F-39, where manholes are located in paved areas.

Floating F-90 with gasket sealed manhole covers shall be used on sanitary manholes located in sag/ponding areas in asphalt or concrete pavement. F-90 manhole covers shall have no vent holes.

d) Grade Rings

Grade rings shall be concrete. Bricks, shims, concrete blocks and steel riser rings and excessive amounts of rubberneck shall not be used to adjust manhole frames and covers.

Concrete grade rings shall be manufactured as per the Concrete Specifications with ASTM type V (Sulphate Resistant) concrete with a minimum 28 day compressive strength of 25 MPA.

Manholes that are located in the carriage way shall adhere to the applicable municipal construction standards and Aquatera standards for grade rings.

e) Rungs

Manhole safety rungs shall be 20mm ø ribbed extruded aluminum or hot dipped galvanized.

f) Concrete

All cement to be ASTM TYPE V (Sulphate resistant) 28 day strength of 25 MPa.

g) O-Ring Confined Gaskets conforming to ASTM C - 443

h) Bituminous Gasket-Type Sealant conforming to ASTM C - 990

i) Each manhole/chamber joint and grade rings shall be sealed with an external rubber wrapping similar to the Infi-Shield Gator Wrap or Aquatera approved equivalent. Ground conditions may require manholes to be completely wrapped.

j) Insulation

In cases where manholes are shallower than 2.75 meters, manhole bases, barrels and cones shall be insulated with 50mm thick and be composed of rigid polyurethane foam which is formed onto the barrels and cone. The insulation shall have a thermal conductivity of 0.161 - 0.174 kcal/cm/h/m^2/°C and have a minimum service temperature of -45°C. (see Manhole details).

Chambers/vaults shall be insulated regardless off depth. All chambers/vaults require a minimum exterior insulation of 50mm (see detail 61-15 to 61-18)

All chambers/vaults require a frost cover. Frost covers shall be pre-manufactured PVC a minimum of 75mm or Aquatera approved equivalent.

k) Chamber Isolation Valves

All chambers shall have isolation gate valves placed outside the chambers within 2 to 3 meter of the chambers on each line. No services shall be located within 4 meters of the chambers.

l) Pipes entering Chambers shall be a minimum of 300mm from the bottom of the pipe and the interior chamber floor.

m) In the event of infiltration, attempts shall be made to seal leaks on exterior of manhole joints via injection within the manhole/chamber using poly urethane grout.

61.2.4 BEDDING

a) Specified

Granular bedding (B1) shall have an even gradation falling within the following limits:

Screen Size (microns)	Allowable Passing (percent)
20,000	95 to 100
12,500	75 to 95
5,000	40 to 60
2,000	25 to 45
400	10 to 25
80	2 to 10

b) Optional Granular

i) Sand

Sand bedding shall have an even gradation falling within the following limits:

Sieve Size (microns)	Allowable Passing (percent)
5,000	100
2,000	70 to 95
400	30 to 65
160	10 to 25
80	2 to 10

ii) Select Native Material

Shall be well graded soil selected by the Contractor from the excavated trench material. It shall contain no particles larger than 32 mm in its largest dimension. It shall contain no frozen soil, roots or other objectionable material in quantities that might cause pipe damage, excessive settlement or inadequate compaction. The moisture content shall be such as to allow proper placing and compaction.

iii) Concrete

Shall be sulphate resistant, with a compressive strength of 25 MPa at 28 days, and a slump of 25-75 mm.

61.2.5 CONCRETE, GROUT, AND MORTAR

Concrete grout and mortar used for patching, filling and repairing holes, cracks in concrete manholes shall be a pre-mixed, non-shrink, cement-based patching material consisting of sulphate resistant hydraulic cement, graded silica aggregates, special plasticising and accelerating agents, which have been formulated for vertical or overhead use. It shall not contain chlorides, gypsum's, plasters, iron particles, aluminium powder, or gas forming agents or promote the corrosion of steel it may come into contact with. Set time shall be less than 30 minutes. One-hour compressive strength shall be a minimum of 1.5 MPa and the ultimate compressive strength shall be a minimum of 35 MPa. Bond strengths shall be a minimum of 12 MPa." Repair material shall be applied as per manufactures specifications. Infiltration through barrel, cone or grade ring joints shall not be mortared. In the event of infiltration, attempts shall be made to seal leaks on exterior of manhole joints via injection within the manhole/chamber using poly urethane grout. The consultant & contractor shall submit repair method to Aquatera prior to any repair. Any crack or damaged barrel, cone or grade ring exceeding

61.2.6 AIR RELEASE VALVES

Air release valves shall be installed at locations approved by the engineer.

Air release valves shall be non-corrosive single acting type.

Each air release valve shall be installed in a chamber or manhole and be provided with an isolation valve between the air release valve and the main. All air release valves in rural areas shall be marked with standard signs as shown below. The proof is available upon request.

61.2.7 TRACER WIRE

All underground sanitary non-metallic pressure pipe systems shall be installed with a continuous tracer wire. For open trench, tracer wire shall be a minimum 12 gauge, solid copper wire with plastic coating, attached to the piping system every 3 m with PVC tape.

The wire shall terminate above ground at every valve box and air release valve. The wire shall be of sufficient length to allow the wire to be uncoiled and extended 0.3 m above ground.

For augured pipe and directional drilling, a minimum of 12 gauge copper cladded high strength steel wire shall be used.

Where spliced-in connections occur, a manufacturer approved water-tight direct bury connector shall be used to provide electrical continuity.

61.3 INSTALLATION

61.3.1 PIPE

a) Placement

i) All pipe laying and connecting shall be in strict accordance with the manufacturer's recommended practice unless otherwise specified by the Engineer.

Pipe shall be laid at the depth and location shown in the Detailed Engineering Drawings or as specified by the Engineer.

Aquatera must be notified prior to backfill if the minimum pipe depth cannot be achieved. If 2.75m cover cannot be achieved, pre-insulated pipe shall be installed. Alternative methods are available upon written approval from Aquatera. (Ex. 61-07 pipe insulation frost box)

ii) The Contractor shall remove all water from the trench or tunnel prior to and during the installation of sewer mains and sewerage structures.

All foreign material shall be kept out of the pipe before, during and after installation. When pipe laying is not in progress the pipe shall be temporarily plugged to prevent entry of water or other foreign material.

iii) Bell and spigot pipe shall be laid with the spigot end pointing downstream.

iv) The length of incoming pipe that cannot be bedded and supported by undisturbed soil shall be set in an approved concrete cradle. (see Detail 61-02)

v) All insulated pipes shall be installed as per manufacturer's guidelines unless otherwise directed by the Engineer.

vi) It is the Contractors responsibility to locate and protect all other utilities in the vicinity of the work.

b) Open Cut Installation

Refers to pipe installation in an open trench. Designed trench widths must be maintained to reflect appropriate loading on the pipe.

c) Augured Installation

Augured Installation refers to the installation of pipe into an uncased tunnel or hole. Refer to Section 13 – Auguring of Aquatera's Construction Specifications for detailed requirements.

61.3.2 MANHOLES/CHAMBERS

Manholes shall be constructed in strict accordance with the manufacturers' recommended practice unless otherwise specified in the Detailed Engineering Drawings or these Specifications. Chambers are structures for closed systems.

Upon request the consultant shall supply Aquatera with shop drawings for unique manholes prior to installation.

Manhole barrels showing signs of repair shall be rejected unless the repair has been completed by the manufacturer and approved by the Engineer. The repair shall be sound, properly finished and cured.

Manhole barrels shall be substantially free of fractures and shall be rejected for the following:

- Damage to the manhole barrel during the transportation and installation stages of construction. The damaged manhole may be repaired as noted above
- Bell and spigots that are broken for more than 5% of the external circumference

a) Placement/Body

i) The Body shall be pre cast sulphate resistant reinforced concrete. All manholes shall be plumb with no leaning permitted.

ii) For tee-risers or perched manholes a maximum of one precast concrete manhole riser or barrel section shall be placed on a freshly poured concrete bases and no further work shall be done for a minimum of 12 hours allowing time for the concrete base to set sufficiently.

iii) The inside manhole wall shall be finished to a smooth surface. No voids or jagged edges of binding mortar at the joints will be permitted. Riser rings shall not be finished with mortar unless directed by Aquatera.

iv) The joints for precast concrete manholes are to be of the confined o-ring type conforming to ASTM C443 or current version thereof. Conical tops, flat tops and grade rings which come without gasket are to be fully sealed to ensure the manhole will be completely water-tight. The contractor shall use an approved flexible bituminous gasket- type sealant. This shall be placed between all the grade

rings and between the frame and the top grade ring. The sealant between the cone and the first grade ring and all other grade rings shall be 25mm. The joint seals shall be installed as per manufacturer's specified guidelines. Each manhole, all grade rings and barrel joints shall be sealed with an external rubber wrapping similar to the Infi-Shield Gator Wrap or approved equivalent. In the event of infiltration at the joints, all joints shall be sealed on exterior of manhole via injection within the chamber using poly urethane grouting.

v) Stubs for future extensions shall be a minimum of 1.5m from the outside wall of the manhole, unless otherwise directed by Aquatera. All stubs shall be plugged to prevent the entry of water or other foreign material. The stub shall have positive grade toward the manhole, matching the grade of the future extension of the line. Stubs that grade toward the plug (future downstream manhole) shall be plugged at both ends of the section of pipe installed.

vi) The incoming and outgoing pipes at a manhole shall be supported by an approved concrete cradle of an appropriate length to properly support the pipe. The cradle will be constructed in such a manner that will not hinder the future extension of the main. (see Detail 61-02)

When tying into existing stubs, the Engineer and Contractor shall field verify that the grade of the existing stub is not back graded. In the event that the stub is back graded, the Developer will be responsible to correct the grade of the stub, before tying into the existing stub. Any costs associated with the re-grading of a stubbed sewer line shall be borne by the Developer.

vii) Drop manholes shall be installed on all drops where the space available between the inlet and outlet is suitable for the fittings required. If a suitable amount of space is not available, the grade of the incoming pipe is to be increased or the entire profile lowered to eliminate any drops. Where the inlet and outlet pipes are of similar diameter, the desirable drop across manholes is 3 cm and 6 cm where a change of direction occurs. Where the pipes are of dissimilar diameters, the crowns of the pipes are to be the same elevation.

Internal drop structures shall be outfitted with Reliner inside drop components. The bowl size shall be determined by incoming pipe size and flow rates. The bowl shall be installed as per manufacturer's instructions using stainless steel fasteners. The appropriately sized drop pipe of SDR 35 PVC shall be securely attached to the manhole wall using stainless steel Reliner adjustable clamping brackets and stainless steel fasteners. Bracket interval shall be 1.2m maximum (minimum of 2 brackets). The connection of drop bowl to drop pipe shall be by flexible external pipe coupler (Fernco or approved equivalent). The turn-out at the base end of the drop pipe shall be accomplished with an appropriately angled PVC pipe elbow (45 degree recommended).

b) Concrete Base

i) Pour in Place

The concrete base shall be poured on level undisturbed soil. The concrete base shall have a minimum thickness of 150mm. A maximum of one barrel section shall be placed on a freshly poured concrete base and no further work shall be done for a minimum of 12 hours allowing time for the concrete base to set sufficiently. The benching of the manhole outside the channel shall be smooth and slope toward the channel with not less than 2% grade. All channels shall be trowelled smooth.

Chamber bases will have a flat surfaces with a minimum 2% grade away from the side of the ladder rungs.

ii) Precast

All bases shall be sulphate resistant reinforced concrete. The precast base shall be set on 150 mm of compacted 20 mm gravel sub-base extending 150 mm beyond the perimeter of the precast base. The sub-base shall be constructed on level and undisturbed soil. The benching of the manhole outside the channel shall be smooth and slope toward the channel with not less than 2% grade. All channels shall be trowelled smooth.

Chamber bases will have a flat surfaces with a minimum 2% grade away from the side of the ladder rungs.

c) Frame and Cover

Frames and covers shall be installed as per the manufacturer's recommendations. The elevation of the frame after installation shall be as per the Detailed Engineering Drawings or as indicated by the Developer's Engineer. Where the frame elevation is not specified, they shall be set level to the existing ground or as directed by the Engineer. When the frame and cover are in a landscaped area there shall be positive grade sloping away from the manhole. (see detail 61-02)

d) Ladder

For manholes the ladder rungs to be installed so that they align with the opening in the conical or flat top. The first rung should be within 750 mm of the manhole cover and continued with a 400mm O/C spacing all the way to the benching. All sharp edges on the ladder shall be smoothed to prevent injury. Ladder rungs shall not be installed over the inlet or outlet of the manhole wherever possible. It is preferable that where manholes are located within roadways that the ladder rungs are positioned such that when entering the manhole they face oncoming traffic where traffic is in one direction on the roadway. Where the roadway has two-way traffic the ladder rungs should be positioned perpendicular to the flow of traffic. No ladder rungs shall be installed within the grade rings.

e) Pipe Junction

The edge formed between the intersection of the pipe and the inside of the manhole wall shall be flush with the inside of the manhole wall and channel, and be well-rounded and mortared to form a water tight seal. Any spaces and gaps shall be mortared, and the top half of the pipe will be trimmed flush to the manhole wall. Where sewer mains pass through or enter manholes, the invert channel shall be trowelled smooth and semi-circular in cross-section. It may be formed directly in the concrete of the manhole base, or may be constructed by laying sewer mains continuously through the manhole, and then removing the top exposed section of pipe after the surrounding concrete has hardened, and neatly trimming the edges.

Manhole suppliers normally offer a precast concrete base manhole with a gasket outlet to accommodate smooth-walled Ring-Tite and Enviro-Tite PVC pipe. (IPEX Centurion's ODs must be specified prior to order.) The installer must simply specify the appropriate outside diameter of the pipe to ensure a properly sized gasket will be cast into the manhole. The Ring-Tite and Enviro-Tite pipe should be chamfered and lubricated before insertion.

HDPE pipe is not to be used at pipe junctions through manhole/chamber walls for pressure systems. Manhole/chambers are to have stainless steel pups (short piece of pipe) running through manhole walls with link seals to create a water tight seal.

Grout Adapters - These fittings are manufactured from a stub of Ring-Tite, Enviro-Tite and Centurion pipe that has been coated externally with a sand, epoxy, cement-mortar mixture. A watertight connection can be made by placing the adapter into a manhole outlet followed by filling the annular space around the adapter with a non-shrink grout. The special coating is required because grout will not form a watertight bond with the PVC.

Where the pipe enters the manhole, the pipe shall be made flush with the inside manhole barrel and openings shall be mortared flush with the pipe and inside manhole wall.

When placing a manhole over an existing PVC line, the existing PVC main shall be adequately prepared (primed) and coated with sand, epoxy, cement mortar mixture where connections are to be made to the concrete manhole barrel.

Grout adapter stubs shall not be manufactured on site when approved materials are available.

f) Change of Flow Direction

Changes of direction of flow within manholes shall be made with a smooth curve with as long a radius as possible.

g) Elevation Adjustment

A minimum of 100 mm and a maximum of 300 mm with a quantity range of 1 - 3 precast various thickness grade rings shall be used to support the manhole frame unless otherwise specified by Aquatera. Manhole covers are to be set accurately to grade as given in the Detailed Engineering Drawings. Where the frame and cover are in a landscaped area there shall be positive grade away from the manhole. Where the cover elevation is not specified, they shall be set level to the existing ground. The minimum thickness of concrete grade ring used in the construction of manholes is 75mm.

h) Backfill

The excavated cavity surrounding the completed manhole shall be backfilled as per the Trenching and Backfill specifications applicable to the pipe entering and/or exiting the manhole, whichever is more stringent.

i) Link seals

When installing the link seal, the bolt heads shall be installed inside the manhole, so they are accessible for adjustments after installation is complete.

The Link seal manufacturer shall be contacted to ensure proper sizing.

Double link seals shall be avoided.

In the event of infiltration, attempts shall be made to seal leaks on exterior of manhole via injection within the chamber using poly urethane grout.

Link seals are not to be used on HDPE pipe through the chambers walls.

j) Pipes entering Chambers shall be a minimum of 300mm from the bottom of the pipe and the interior chamber floor.

61.3.3 BEDDING

a) Placement

i) Bedding shall refer to and include all Material placed from the bottom of the trench to 300mm above the pipe. Unless otherwise specified, bedding shall be placed by hand up to 300 mm above the crown of the pipe. This material shall be well tamped, in uniform 150 mm lifts, with hand tools along both sides of the pipe and compacted to 98% Standard Proctor Density unless otherwise specified. A minimum of 1 test per trench is required and shall be continued in 75 lineal metre intervals, which includes sanitary mains and services. Aquatera reserves the right to extend the maintenance period if inadequate testing is provided.

ii) No bedding shall be laid in water or frozen ground or in any condition considered

unsuitable by the Engineer.

iii) The bedding shall be shaped so as to provide a uniform and continuous support for the pipe and fittings. Proper allowance shall be made for bells and couplings such that the coupling does not bear directly on the bedding or support the weight of the pipe.

iv) Where granular bedding is specified (B1), a sand approved by Aquatera may be used as a substitute provided the pipe diameter is less than or equal to 375 mm and the pipe has water tight joints.

v) Concrete bedding shall be placed only to the spring line of the pipe. When using concrete bedding the contractor shall wait 12 hours prior to backfilling.

vi) Specifications for the various classes of bedding are illustrated in the Typical Detail Drawings at the end of this Section.

61.3.4 CONNECTIONS TO EXISTING SEWER SYSTEMS

a) Construction Bulkheads

Prior to extending an existing sanitary sewer, the Contractor shall notify Aquatera 48 hours in advance and, install a watertight bulkhead or seal, in the existing sewer immediately downstream of the point of connection, or the most practical location as determined by Aquatera. This location is to be identified on the approved for construction drawings. This bulkhead or seal shall remain in place until the sanitary sewer has been cleaned of all accumulated water and debris and has been accepted by Aquatera. For pipes up to or equal to 375 mm in diameter the contractor shall contact Aquatera at least 48 hours in advance at inspection@aquatera.ca or (780) 538-0348 to install a plug or seal. For sanitary lines greater than 375 mm the contractor shall install a water tight bulkhead or seal. These shall remain in place until issuance of a construction completion certificate and/or the roadworks or other grading work has been completed. After issuance of a CCC Aquatera will remove the plug or seal, or the contractor will be notified to remove the bulkhead.

During all work stoppages in construction of the sanitary sewer, the open face of the last pipe installed shall be plugged with a watertight seal to prevent sand, water, earth, or other materials from entering the pipe.

The consultant shall indicate on the testing plan which manholes shall have bulk heads. Construction debris shall be hydrovacced out by contractors prior to CCTV. After visual inspection by Aquatera, bulkheads will be removed at CCTV stage.

b) Tie-In to Existing System

The work under this item shall consist of removing existing plugs and making the connection as required to existing pipes or manhole stubs and shall include all trenching, bedding, laying and jointing of pipe, fittings, adapters, backfilling and clean-

up, and other items necessary to complete the work as specified. Any damages during this work shall be repaired to the satisfaction of Aquatera.

c) Break-in to Existing Sewer Main or Manhole

The work under this item shall consist of breaking into existing manholes or sewer mains and connecting the new sewerage structure to the existing manhole or main. Break-in shall include all trenching, bedding, laying and jointing of pipe, fittings, adapters, backfilling and clean-up, and other items necessary to complete the work as specified. Any damages during this work shall be repaired to the satisfaction of Aquatera.

61.3.5 CROSSING OTHER PIPELINES OR UTILITIES

Where the sewer main being installed crosses another pipeline or utility, the minimum clearance shall be 500 mm. The void between the two lines shall be completely filled with a minimum of 500 mm of granular or sand material compacted to 98% Standard Proctor unless otherwise approved by Aquatera. When crossing under an existing AC water main, a section of that water main (minimum 4m) shall be removed and replaced with PVC.

When crossing water mains, water services, sanitary sewer mains and sanitary sewer service lines by Auguring refer to Section 13 of Aquatera's Construction Manual.

61.3.6 CLEANING

The Contractor shall clean all sewerage structures of sand, dirt, gravel, asphalt and other debris, and shall flush them clean before the maintenance period begins.

61.3.7 OFFSITE MARKER POSTS

Steel marker posts shall be required on all sanitary appurtenances located off site. The marker post shall be a 63mm diameter x 2600mm steel post painted green and embedded between 900mm and 1200mm below finished ground level. The marker post shall be installed 1m away from the sanitary appurtenance.

61.4 TESTING REQUIREMENTS OF THE CONTRACTOR

61.4.1 PRE-INSTALLATION

a) Materials

If pipe loading is within 10% of recommended pipe strength capacity and/or the soil conditions are highly variable in terms of moisture content, making design trench width difficult to maintain; Aquatera may require additional pipe loading calculations which take into consideration the trench width.

The contractor shall be responsible to inspect all materials delivered to site for condition, damage, roundness of pipes and conformance with these standards.

b) System

The Contractor shall undertake whatever testing is necessary to safeguard and protect existing utilities and structures.

61.4.2 INSTALLATION

a) Materials

The Contractor shall, upon request by Aquatera, provide documentation that material being delivered to or constructed at the site is consistent with the material specified.

b) System

No testing required.

61.4.3 POST INSTALLATION

a) Material

No testing required.

b) Deflection Testing

Deflection testing may be required by Aquatera either during construction and/or following construction. This may be done on any section of installed sewer main prior to final acceptance. The allowable deflection in PVC pipe is 7.5% of the base diameter as measured not less than 30 days following completion of construction. The base diameter is to be calculated in accordance with ASTM D3034.

c) Closed Circuit Television Inspection

All sewer mains shall be tested in accordance to Section 25 (Closed Circuit Television Inspection of Sewer lines)

d) Leakage Test

Where deemed necessary by Aquatera, an exfiltration and/or infiltration test shall be conducted. These tests shall not be required if video inspections are done immediately after sewer construction and no deficiencies are observed. Any deficiencies shall be corrected by the Contractor and those portions of sewer affected shall be subject to an additional video inspection.

Infiltration or exfiltration shall not exceed following limits in litres per hour per 100m of pipe, including service connections. (see section 300 external documents - IPEX part 33 – PVC sewer pipe installation guide - Infiltration & Exfiltration testing)

e) Pressure Testing

It is recommended that, no mains shall be charged and no pressure tests shall be permitted between October 15th to April 15th inclusive. If pressure testing occurs during these months, Aquatera reserves the right to request re-testing when temperatures are above zero.

Aquatera shall be contacted by the Contractor to schedule the meter cart installation, and operation of the boundary valve. Under no circumstances shall the boundary valve be operated by anyone other than Aquatera in accordance with City of Grande Prairie By-law C-1139 Section 8.06 and Schedule "D" Subsection 11.01.

The Consulting Engineer/contractor shall co-ordinate all turbidity & pressure tests with Aquatera Utilities Engineering Services Department at inspection@aquatera.ca.

Filling of all sanitary forcemains or low pressure sewers require an air gap between any water system.

Prior to testing low pressure and forcemains the system shall be flushed until the discharge drops below 10 NTU.

Pressure testing of HDPE low pressure and forcemains shall be in accordance with the latest version of ASTM F2164. The test pressure shall be 1.0 times the rating of the pipe, but not to exceed the pressure rating of the lowest rated component in the test section, unless these components can be isolated. An Aquatera representative shall be contacted to schedule to witness the test. When testing to a pressure lower than 1.0 times the pipe rating, the specifications for the lowest rated component shall be provided with the test results.

Pressure testing of PVC low pressure and forcemains shall be in accordance with AWWA C605-13. Please see Section 91.4.3 b) ii) of the Aquatera Construction Manual for reference.

The contractor shall supply all necessary labour, materials, equipment, tools and incidentals to complete the tests in accordance with these specifications.

After pressure test is complete for low pressure and forcemains the contractor shall leave pressure on the system of approx. 25-50 PSI.

f) Tracer Wire

The contractor/consultant shall provide a tracer wire report to Aquatera confirming lines were able to be located with locating equipment. (see form in section 91)

Tracer wire installation shall be considered complete and acceptable when Aquatera can locate the underground infrastructure using locating equipment.

61.5 PAYMENT

61.5.1 PIPE

Payment for sanitary sewer mains shall be at the unit prices per lineal metre (L.M.) of pipe, including couplers, shown in the Tender for the various pipe sizes and bedding classes. Measurement shall be made along a straight line between centre line of the upstream manhole and centre line of the downstream manhole.

61.5.2 MANHOLES (Including drop-manholes)

Payment for manholes shall be at the unit price per vertical meter (V.M.) shown in the Tender Form measured to the nearest centimetre. The measurement for payment will be from the lowest invert to the top of the manhole frame. The items included shall be the supply of all materials, the construction of the complete manholes, including base, stubs and plugs, steps, frame and cover, excavation, backfill and clean-up, and all incidentals necessary to complete the work in accordance with these specifications.

61.5.3 BEDDING

Bedding is considered incidental to pipe installation, and unless specified otherwise, shall be included in the pipe unit price.

61.5.4 CONNECTIONS TO EXISTING SEWER SYSTEMS

Payment for tying into an existing system will be at the unit price per tie shown in the Tender Form. Such payment will be full compensation for all materials, fittings, adapters, labour, equipment, supervision and all work incidentals necessary to complete the work in accordance with these specifications.

61.5.5 CROSSING OTHER PIPELINES OR UTILITIES

Payment for crossing other pipelines or utilities will be at the unit price shown in the Tender Form. Such payment will be full compensation for all materials, fittings, adapters, labour, equipment, supervision and all work incidentals necessary to complete the work in accordance with these specifications.

61.5.6 CLEANING

Cleaning is considered incidental to the Work. There shall be no separate payment for cleaning.

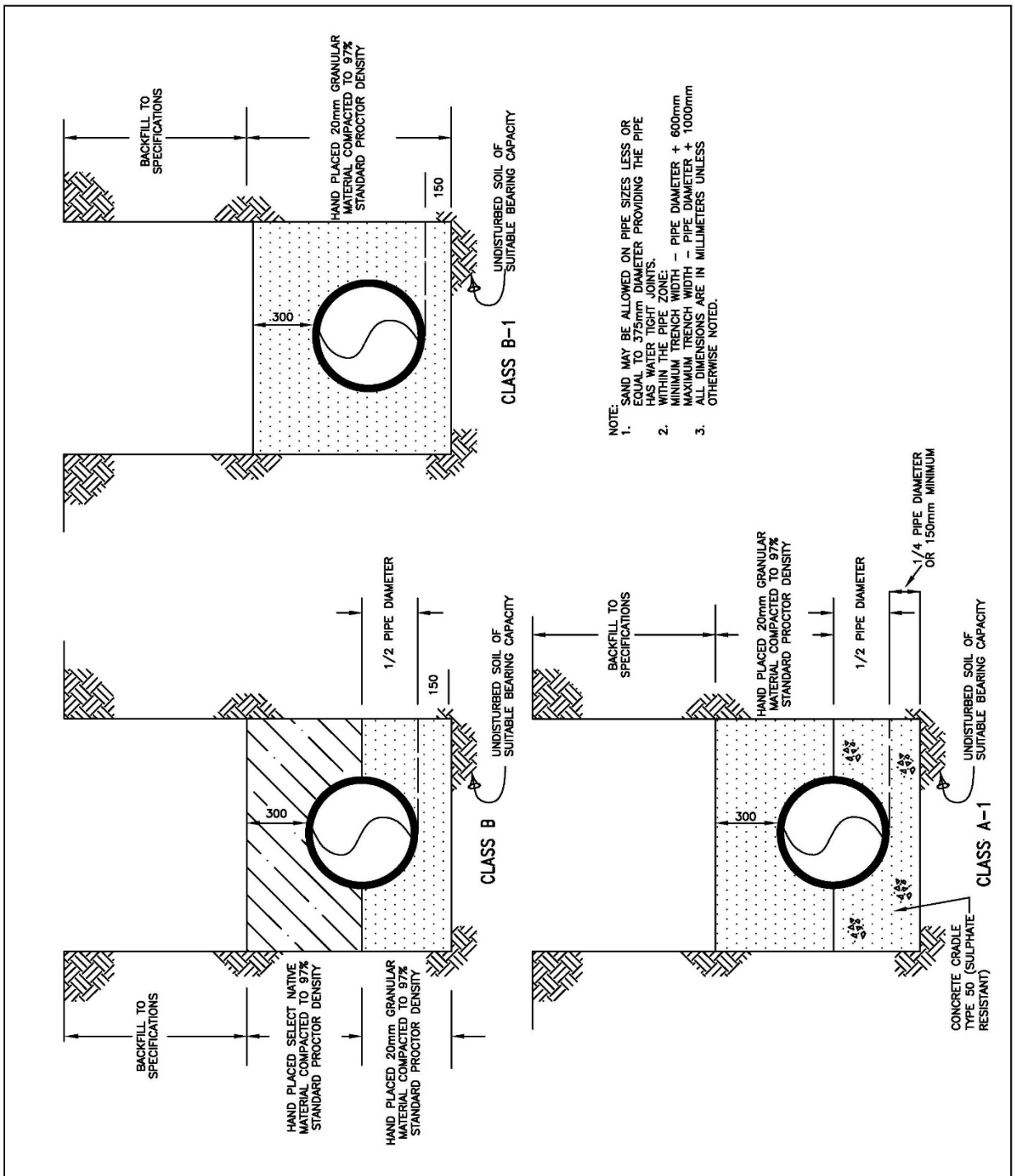
61.5.7 TESTING REQUIREMENTS OF THE CONTRACTOR

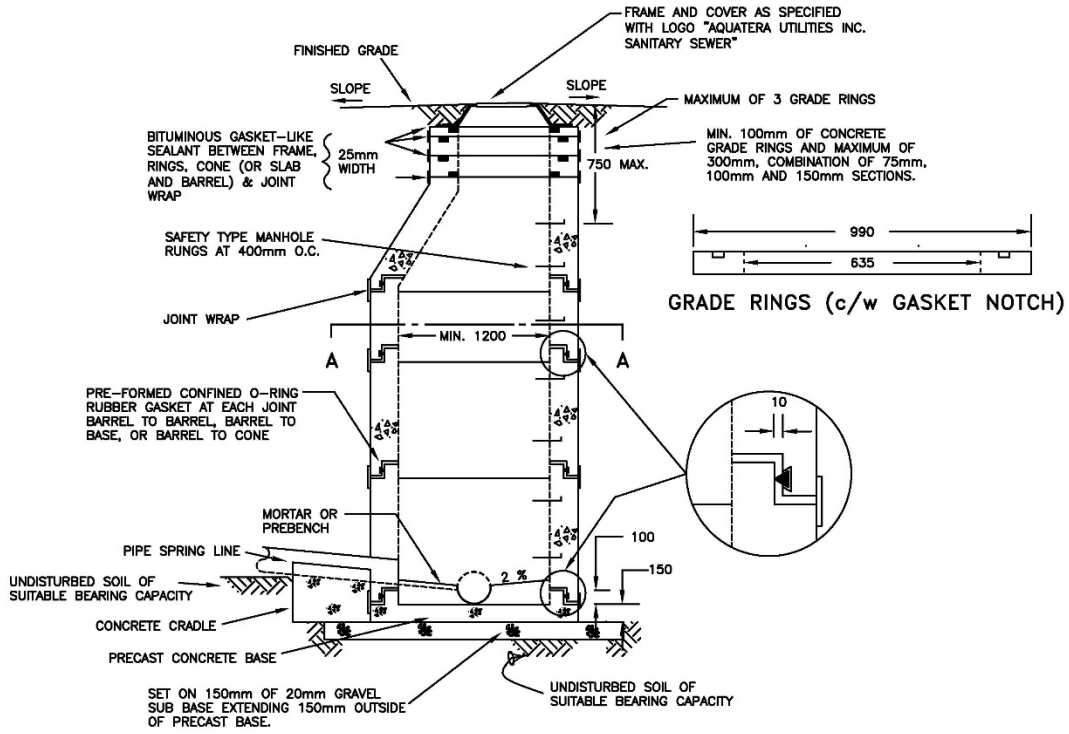
a) Video Inspection

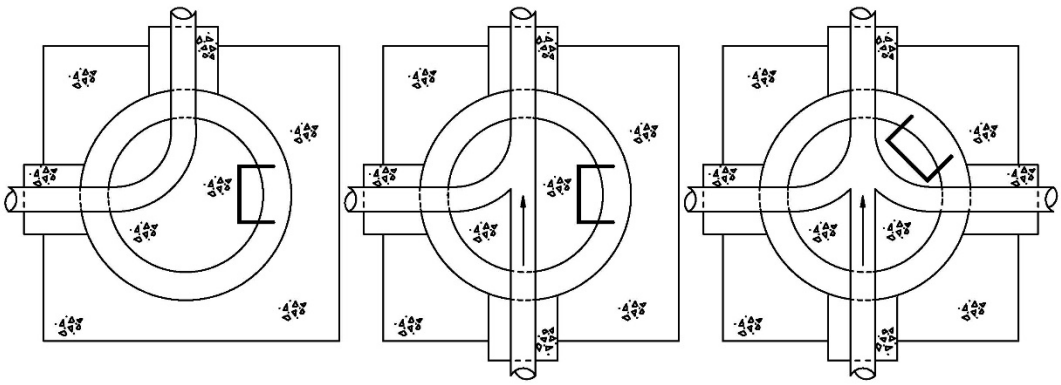
Video inspection of sewers shall be measured in lineal metres (L.M.) from the centre to centre of manholes. Payment for television inspection of sewers shall be at the tender price. Only one payment will be made and any subsequent inspections required by Aquatera will be at the Contractor's cost.

b) Other Testing

There shall be no payment for any other testing required to be undertaken by the Contractor.


BACKFILL TO SPECIFICATIONS
HAND PLACED 20mm GRANULAR MATERIAL COMPACTED TO 97% STANDARD PROCTOR DENSITY
150
300
UNDISTURBED SOIL OF SUITABLE BEARING CAPACITY
CLASS B-1
NOTE:
1. SAND MAY BE ALLOWED ON PIPE SIZES LESS OR EQUAL TO 375mm DIAMETER PROVIDING THE PIPE HAS WATER TIGHT JOINTS.
2. WITHIN THE PIPE ZONE:
MINIMUM TRENCH WIDTH = PIPE DIAMETER + 600mm
MAXIMUM TRENCH WIDTH = PIPE DIAMETER + 1000mm
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
1/2 PIPE DIAMETER
150
300
UNDISTURBED SOIL OF SUITABLE BEARING CAPACITY
CLASS B
BACKFILL TO SPECIFICATIONS
HAND PLACED SELECT NATIVE MATERIAL COMPACTED TO 97% STANDARD PROCTOR DENSITY
HAND PLACED 20mm GRANULAR MATERIAL COMPACTED TO 97% STANDARD PROCTOR DENSITY
BACKFILL TO SPECIFICATIONS
HAND PLACED 20mm GRANULAR MATERIAL COMPACTED TO 97% STANDARD PROCTOR DENSITY
1/2 PIPE DIAMETER
1/4 PIPE DIAMETER OR 150mm MINIMUM
300
UNDISTURBED SOIL OF SUITABLE BEARING CAPACITY
CLASS A-1
CONCRETE CRADLE TYPE 50 (SULPHATE RESISTANT)
Revisions
Date
Details
10/15/15
REMOVE CITY FILE #
AQUATERA
BEDDING DETAILS
Approved by
Timothy Lau P.Eng.
Authorized Signature
12/07/12
Checked by
Brad Vail C.E.T.
Scale
N.T.S.
Drawn by
Scott Walls
Permit Number
P09242
Standard Detail
61-01
File Number





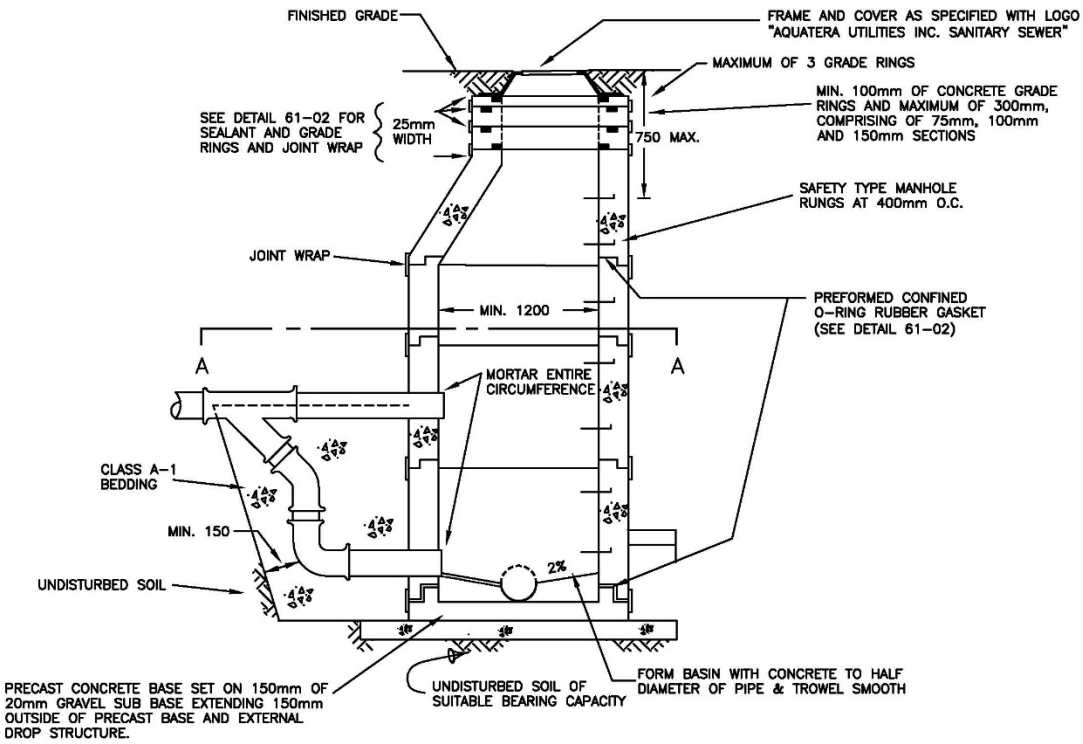
OPTIONAL 90° LONG SWEEP | SECTION A-A | OPTIONAL CROSS TEE

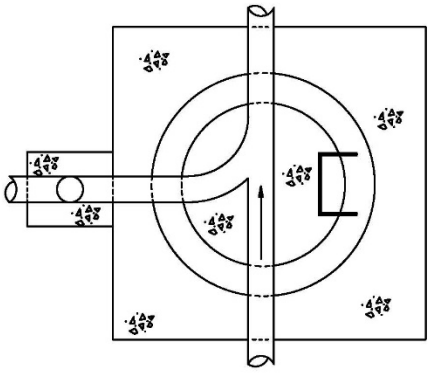
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. MANHOLES SHALL HAVE POSITIVE GRADE AWAY FROM FRAMES.

Revisions	
Date	Details
11/14/13	ADDED OPTIONAL MANHOLE CHANNELS
11/14/13	ADDED MAX. OF 3 GRADE RINGS
11/28/13	REMOVED 13mm WIDTH GASKET FOR GRADE RING
11/28/13	CHANGED MAXIMUM GRADE RING DEPTH TO 300mm
10/14/15	ADDED CONC. CRADLE & JOINT WRAP TO GRADE RING, CHANGE 50mm G.RING TO 75mm, REMOVE CITY FILE #
11/20/17	ADDED SLOPE TO GRADE AND NOTE 2 TS

PRECAST CONCRETE MANHOLE

Approved by Timothy Lau P.Eng.	Date 12/05/12	Standard Detail 61-02
Checked by Brad Vall C.E.T.	Scale N.T.S.	
Drawn by Scott Walls	Permit Number P09242	File Number





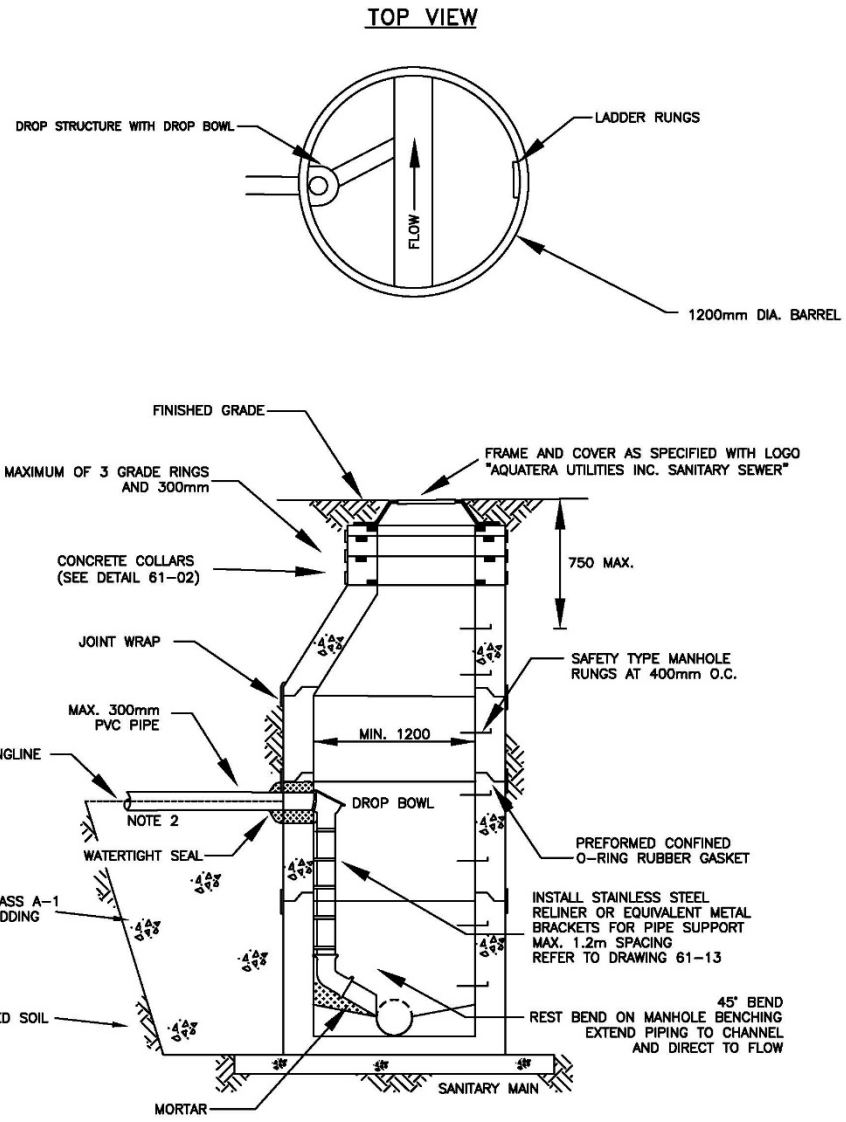
SECTION A-A

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

Revisions	
Date	Details
12/06/12	CHANGED BENCHING GRADE FROM 16% to 2%
2/27/13	ADDED JOINT WRAP TO MANHOLE BARRELS
11/28/13	IMPROVED GRADE RINGS
11/28/13	ADDED MAX. OF THE 3 GRADE RINGS
11/16/15	ADDED JOINT WRAP TO GRADE RINGS, ADD UNDISTUR. SOIL, CHANGED 50mm G.RING TO 75mm, REMOVE CITY FILE #, REMOVED TRIM CHANNEL PIPE NOTE

PRECAST EXTERNAL DROP MANHOLE

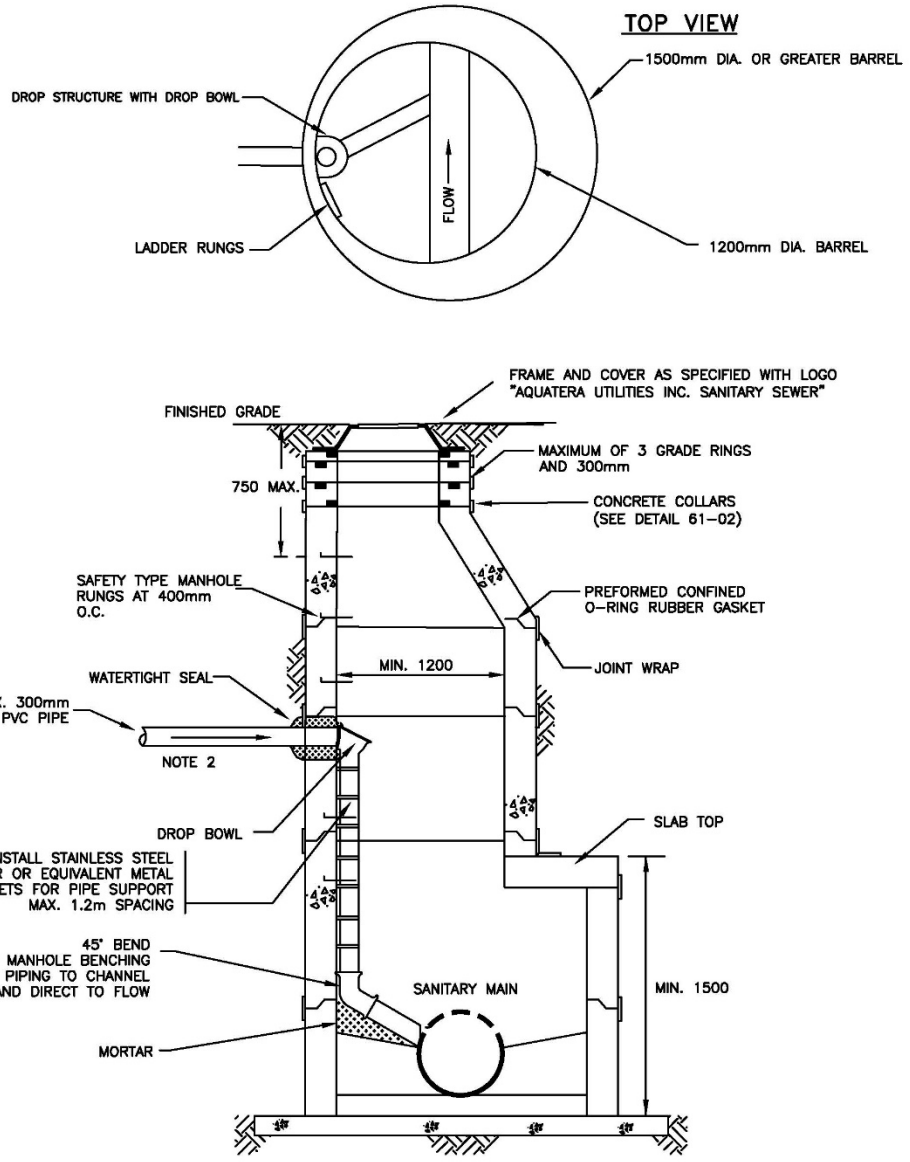
Approved by Timothy Lau P.Eng.	Date 12/06/12	Standard Detail 61-03
Checked by Brad Vail C.E.T.	Scale N.T.S.	
Drawn by Scott Walls	Permit Number P09242	File Number



NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. All SANITARY PIPE SHALL BE SUPPORTED INTO UNDISTURBED SOIL OR EQUIVALENT SUPPORT APPROVED BY AQUATERA.

Revisions	
Date	Details
11/14/13	IMPROVED GRADE RINGS
11/14/13	ADDED TOP VIEW TO MANHOLE
11/14/13	ADDED MAX. OF 3 GRADE RINGS
10/14/15	ADD JOINT WRAP TO G.RINGS AND CONE, ADD NOTE 2, ADD DIRECT BENCH PIPE TO FLOW, REMOVE CITY FILE #.
11/23/15	ADD SPRING LINE AND CLASS A-1 BEDDING, CHANGE DETAIL 61-06 TO 61-04, MATCH 45 TO 61-05

PRECAST INTERNAL DROP MANHOLE		Standard Detail 61-04
Approved by Timothy Lau P.Eng.	Date 12/06/12	
Checked by Brad Vail C.E.T.	Scale N.T.S.	
Drawn by Scott Walls	Permit Number P09242	File Number



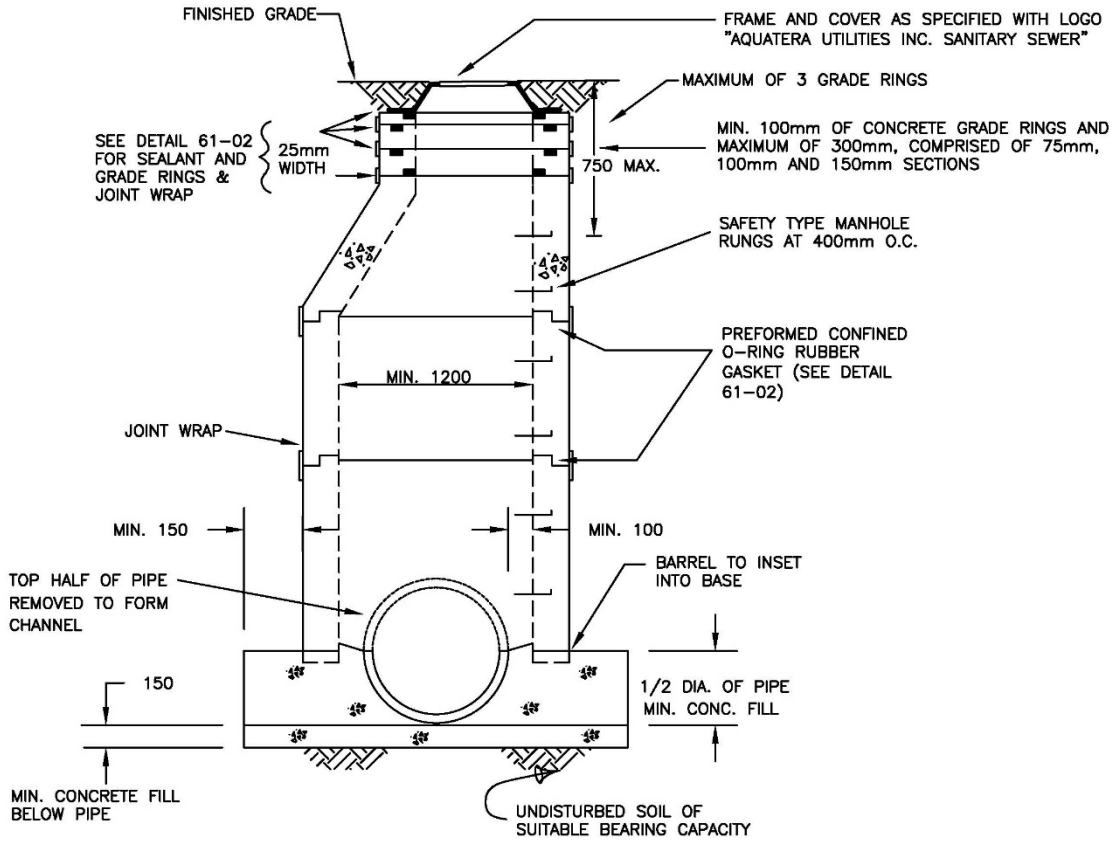
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. All SANITARY PIPE SHALL BE SUPPORTED INTO UNDISTURBED SOIL OR EQUIVALENT SUPPORT APPROVED BY AQUATERA.

Revisions	
Date	Details
12/06/12	CHANGED 90° BEND TO 45°
2/27/13	ADDED JOINT WRAP TO MANHOLE BARRELS
11/25/13	IMPROVED GRADE RINGS
11/25/13	IMPROVED DROP STRUCTURE DETAIL
11/25/13	IMPROVED BOTTOM CHAMBER CLARITY
12/16/15	ADDED JOINT WRAP ON GRADE RINGS, ADD NOTE 2, REMOVED CITY FILE #, CHANGE 61-11 TO 61-05

PRECAST VARYING DIAMETER INTERNAL DROP MANHOLE

Approved by Timothy Lau P.Eng.	Date 12/06/12
Checked by Brad Vail C.E.T.	Scale N.T.S.
Drawn by Scott Walls	Permit Number P09242

Standard Detail
61-05
File Number



NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

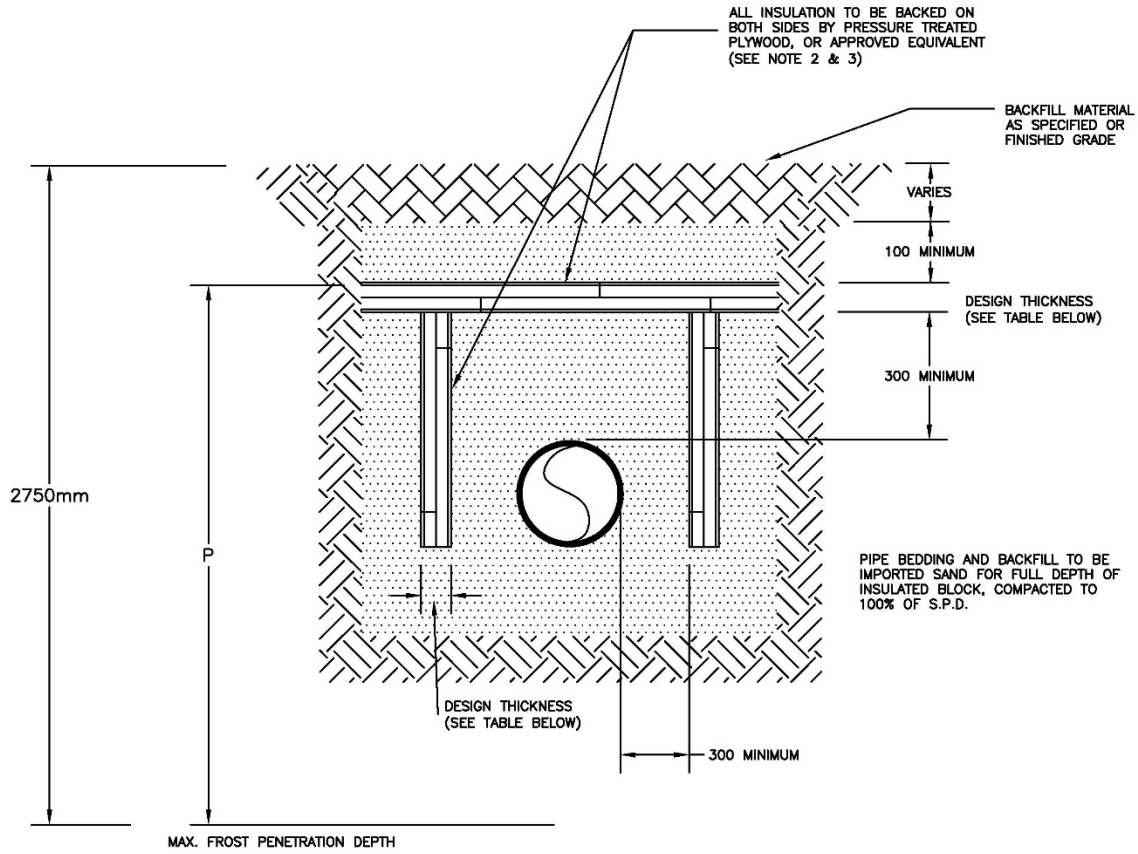
Revisions	
Date	Details
11/14/13	ADDED MAX. OF 3 GRADE RINGS
10/14/15	ADDED JOINT WRAP TO GRADE RINGS, MODIFY G.RINGS 50 to 75mm, REMOVED CITY FILE #
11/23/15	CHANGE DETAIL FROM 61-04 TO 61-06
12/16/15	CHANGE TITLE TO PERCHED MH EXT. MAIN
3/10/16	MOVE ARROW TO POINT AT RUBBER GASKET, ADD NOTES FOR BOTTOM CONCRETE CON.

AQUATERA

PERCHED MANHOLE FOR EXISTING MAIN

Approved by Timothy Lau P.Eng.	Date 12/06/12
Checked by Brad Vall C.E.T.	Scale N.T.S.
Drawn by Scott Walls	Permit Number P09242

Standard Detail
61-06
File Number



MINIMUM THICKNESS GUIDE			
SANDY SOIL		CLAY SOIL	
P	THICKNESS	P	THICKNESS
1600	100		
2100	150	1500	175
2400	200	2400	225

"R" VALUE IS 5 PER 25mm

"P" IS THE DISTANCE FROM THE MAX FROST PENETRATION DEPTH TO THE TOP OF THE INSULATION.
EX) IF "P" IS 2400 IT MEANS YOUR PIPE IS AS CLOSE TO THE ROAD SURFACE AS POSSIBLE AND THICKER INSULATION IS REQUIRED.
EX) IF "P" IS 1600 IT MEANS YOUR PIPE IS FURTHER AWAY FROM THE SURFACE AND THINNER INSULATION IS REQUIRED.

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. INSULATION TO BE MINIMUM 100mm THICKNESS.
3. PLYWOOD TO BE MINIMUM 10mm THICKNESS.
4. BACKFILLING TO BE DONE CAREFULLY TO PREVENT BREAKING OR CRUSHING THE INSULATION. CRUSHED SHEETS SHALL BE REMOVED AND REPLACED.

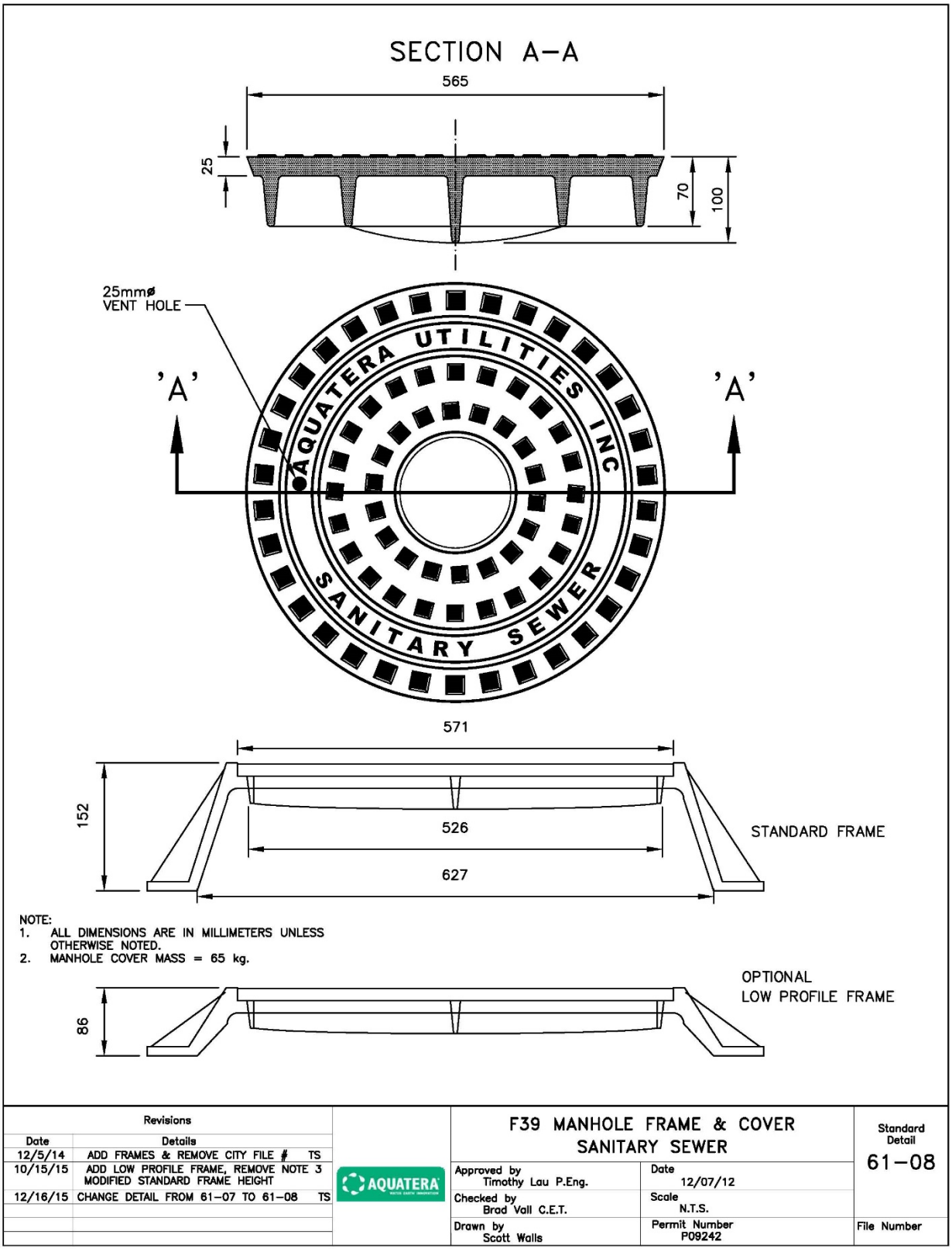
Revisions	
Date	Details
11/14/13	CHANGED DEPTH OF FILL ABOVE INSULATION
10/15/15	ADD PLYWOOD SIZE, REMOVE CITY FILE #
11/23/15	CHANGE DETAIL FROM 61-05 TO 61-07
03/21/16	ADD NOTES BELOW CHART FOR CLARIFICATION
11/31/16	ADD DEPTH OF FROST, CHANGE TITLE

FROST BOX PIPE INSULATION DETAIL

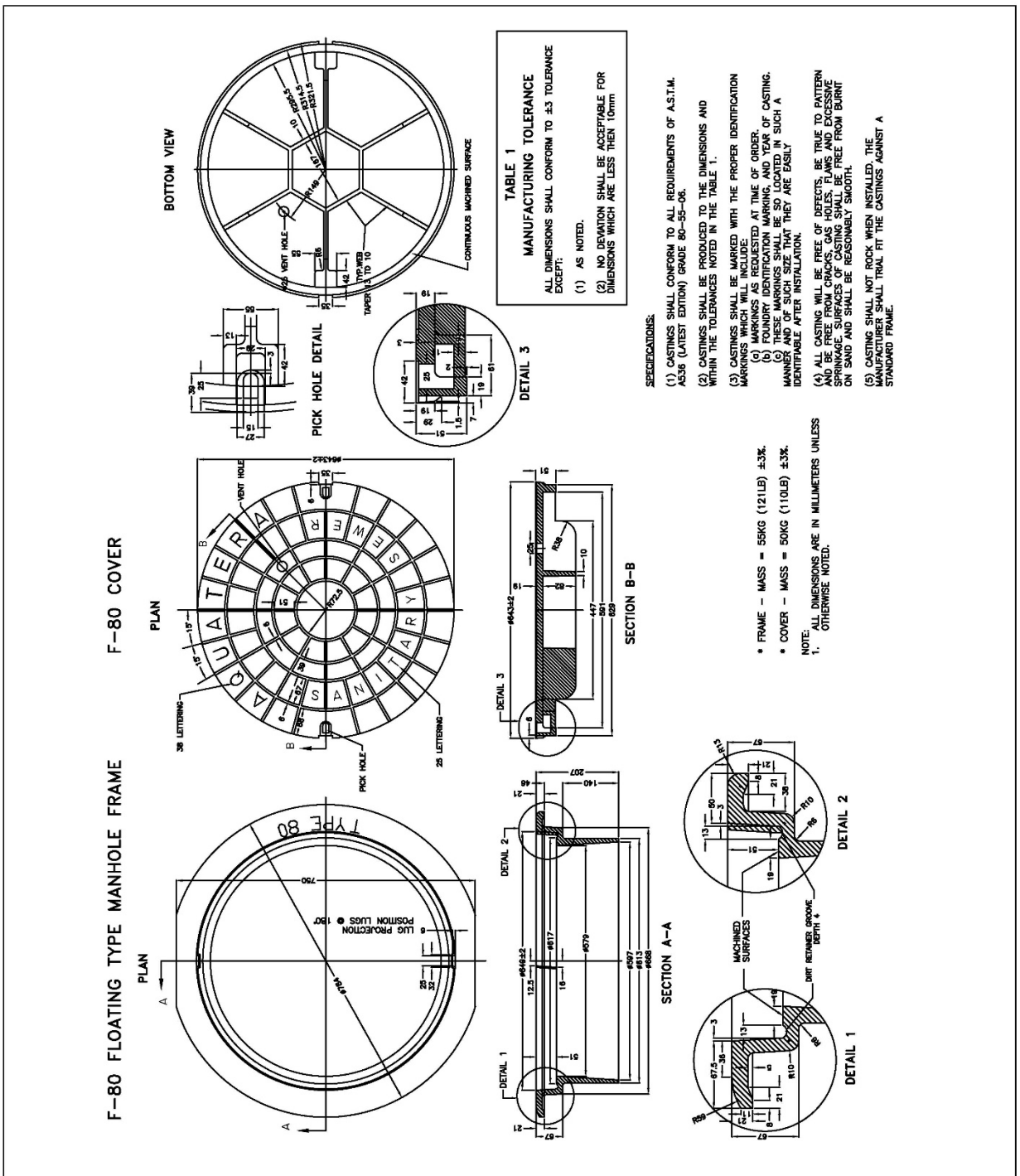
Approved by Timothy Lau P.Eng.	Date 12/07/12
Checked by Brad Vail C.E.T.	Scale N.T.S.
Drawn by Scott Walls	Permit Number P09242

Standard Detail
61-07

File Number



Revisions			F39 MANHOLE FRAME & COVER SANITARY SEWER		Standard Detail 61–08
Date	Details		Approved by Timothy Lau P.Eng.	Date 12/07/12	
12/5/14	ADD FRAMES & REMOVE CITY FILE # TS		Checked by Brad Vail C.E.T.	Scale N.T.S.	
10/15/15	ADD LOW PROFILE FRAME, REMOVE NOTE 3 MODIFIED STANDARD FRAME HEIGHT		Drawn by Scott Walls	Permit Number P09242	File Number
12/16/15	CHANGE DETAIL FROM 61–07 TO 61–08 TS				

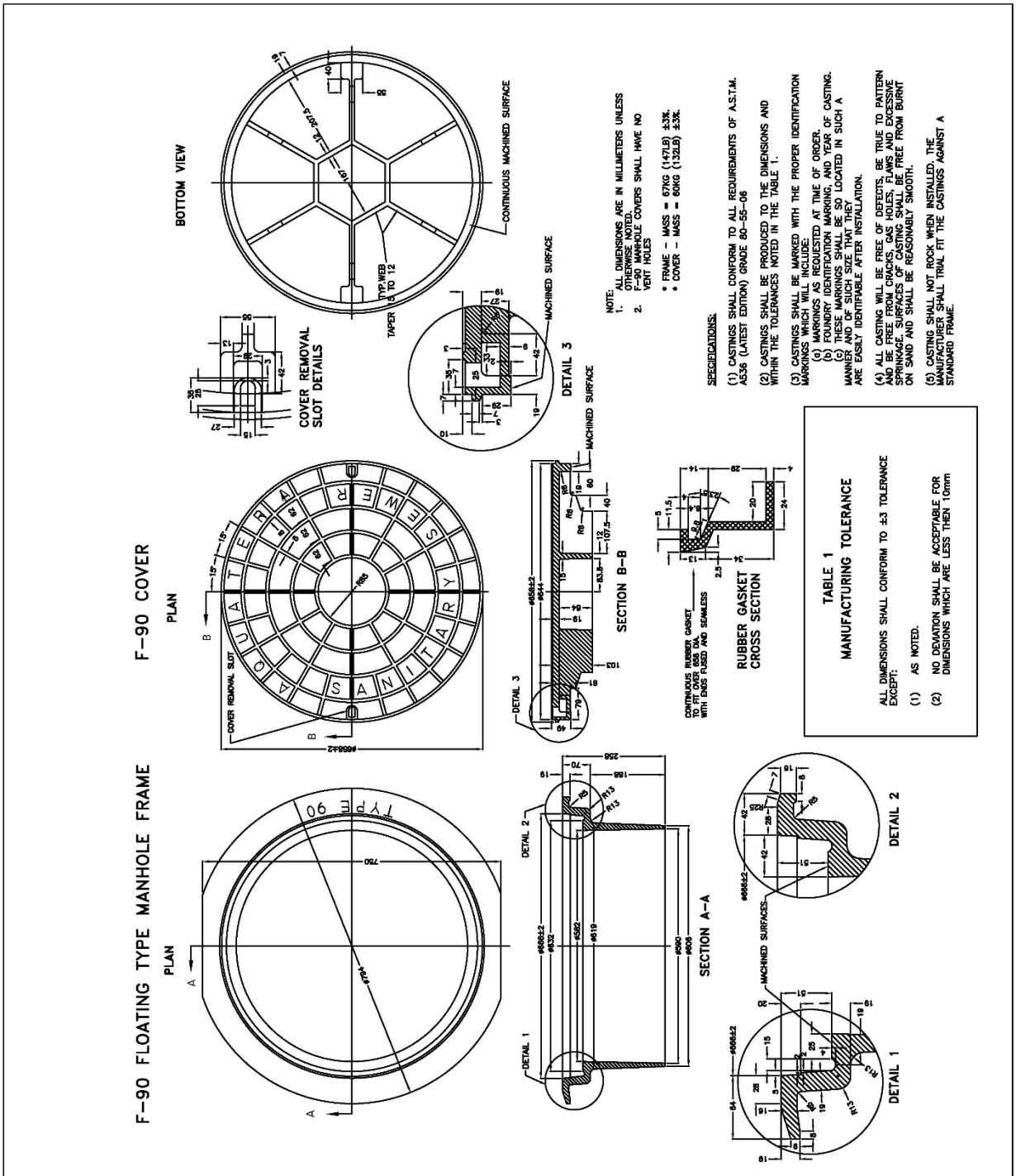


Revisions	
Date	Details
10/14/15	REMOVE CITY FILE #
12/16/15	CHANGE DETAIL 61-08 TO 61-09

F-80 FLOATING TYPE MANHOLE FRAME AND COVER

Standard Detail 61-09

Approved by Timothy Lau P.Eng.	Date 02/05/13
Checked by Brad Vall C.E.T.	Scale N.T.S.
Drawn by Scott Walls	Permit Number P09242
	File Number



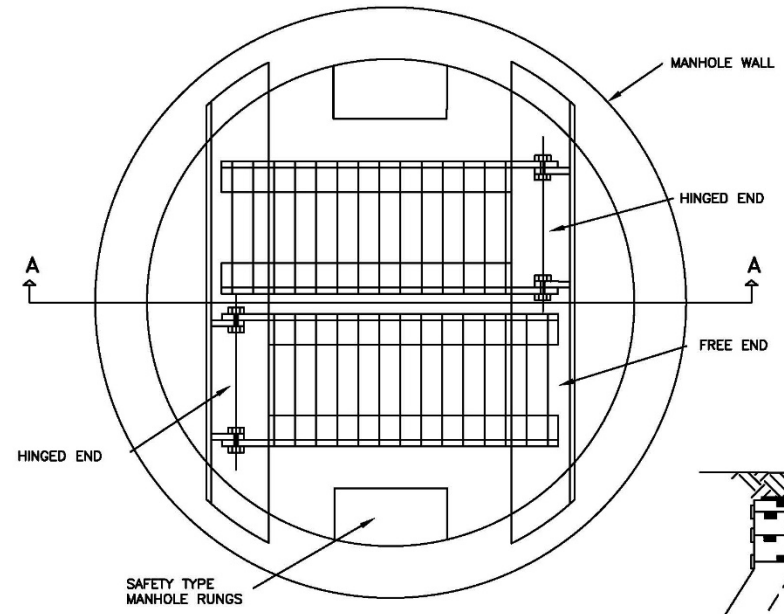
Revisions	
Date	Details
11/14/13	ADDED NOTE 2
10/14/15	REMOVE CITY FILE #
12/17/15	CHANGE DETAIL 61-09 TO 61-10

AQUATERA

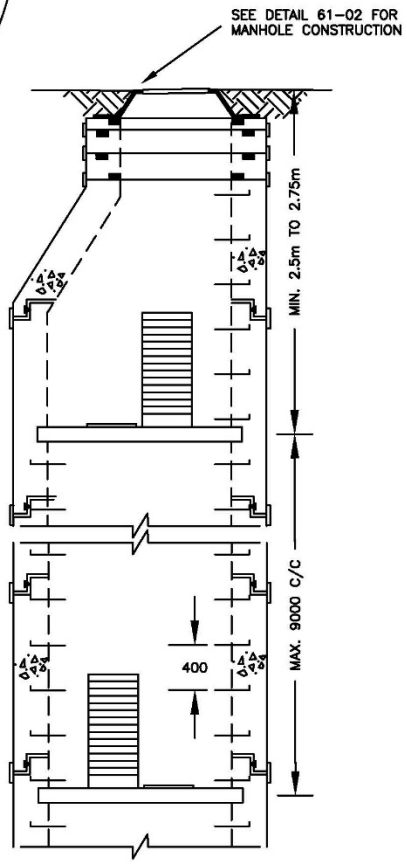
F-90 FLOATING TYPE MANHOLE FRAME AND COVER

Standard Detail 61-10

Approved by Timothy Lau P.Eng.	Date 02/05/13
Checked by Brad Vail C.E.T.	Scale N.T.S.
Drawn by Scott Walls	Permit Number P09242
	File Number

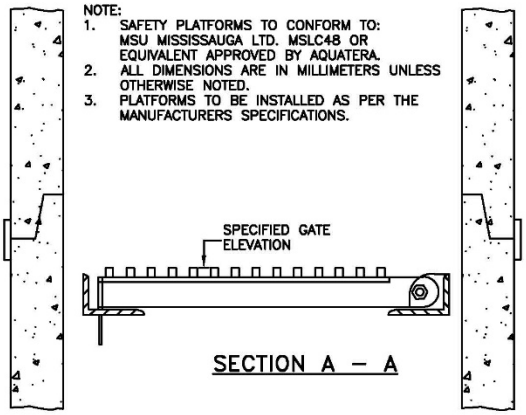


TOP VIEW



ELEVATION

NOTE:
1. SAFETY PLATFORMS TO CONFORM TO: MSU MISSISSAUGA LTD. MSLC48 OR EQUIVALENT APPROVED BY AQUATERA.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. PLATFORMS TO BE INSTALLED AS PER THE MANUFACTURERS SPECIFICATIONS.



SECTION A – A

* ALTERNATIVELY, RUNGS MAY BE KEPT ON THE SAME SIDE FOR THE ENTIRE DEPTH OF THE MANHOLE.

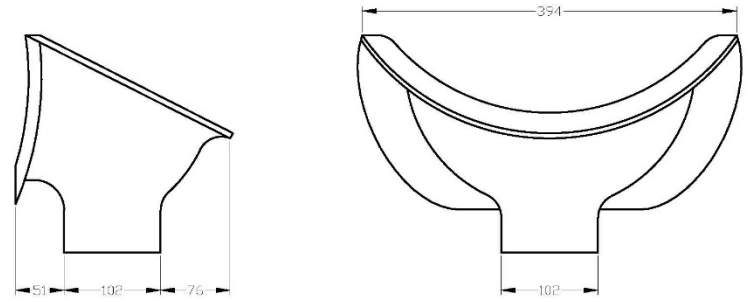
Revisions	
Date	Details
12/06/12	CHANGED MAX 6000 SPACING TO 9000
2/27/13	ADDED JOINT WRAP TO MANHOLE BARRELS
10/14/15	ADD SPACING FROM SURFACE TO PLATFORM, REMOVE CITY FILE #
2/27/13	CHANGED DETAIL 61-10 TO 61-11

MANHOLE SAFETY PLATFORM

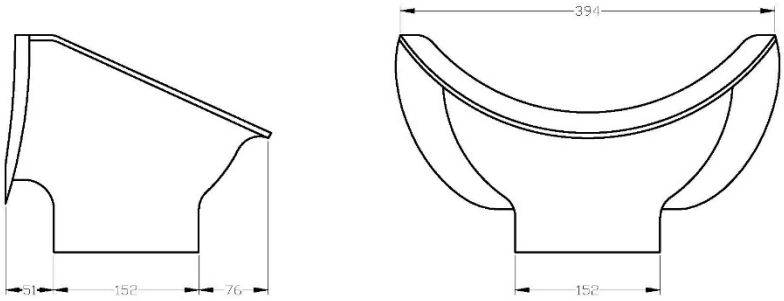
Approved by Timothy Lau P.Eng.	Date 12/06/12
Checked by Brad Vail C.E.T.	Scale N.T.S.
Drawn by Scott Walls	Permit Number P09242

Standard Detail
61-11

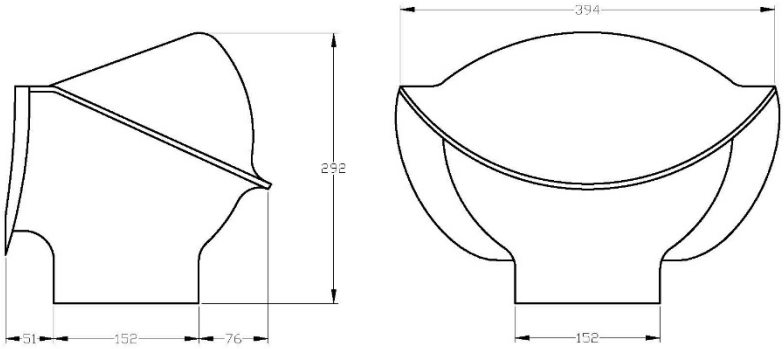
File Number



"A–4" DROP BOWL



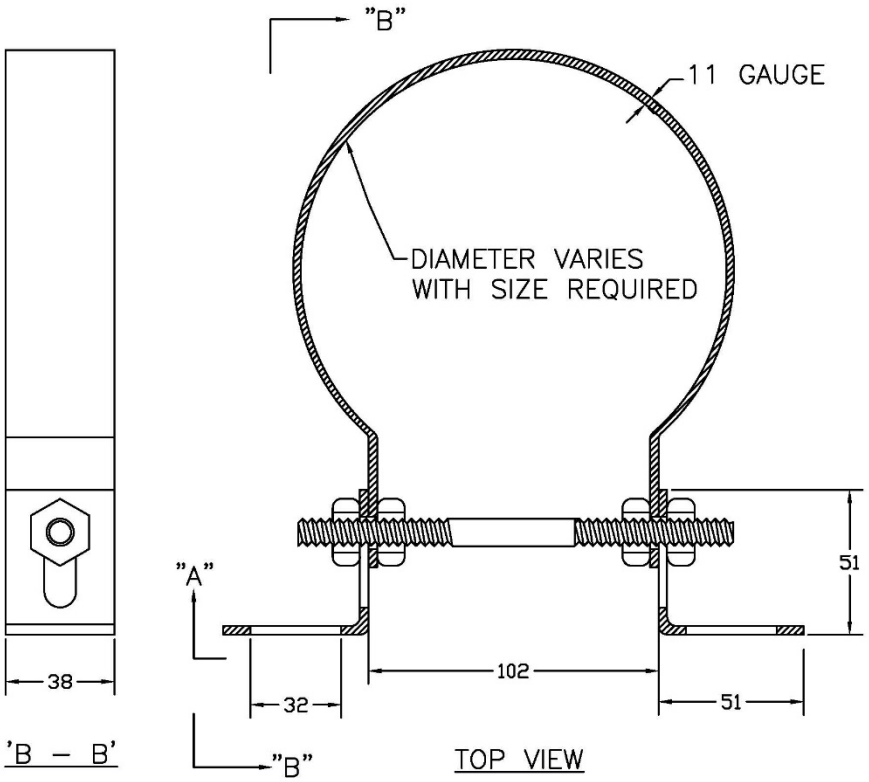
"A–6" DROP BOWL



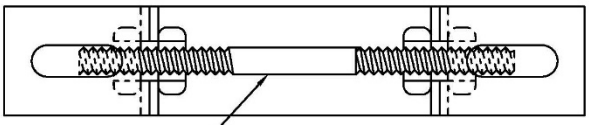
"A–6" DROP BOWL WITH OPTIONAL FORCE LINE HOOD
(ATTACHES WITH 4 S.S. BOLTS, FITS A–4 & A–6)

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

Revisions					
Date	Details		DROP BOWLS		Standard Detail
10/14/15	REMOVE CITY FILE #				61–12
			Approved by Timothy Lau P.Eng.	Date 12/06/12	
			Checked by Brad Vail C.E.T.	Scale N.T.S.	
			Drawn by Scott Walls	Permit Number P09242	File Number



NOTE:
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

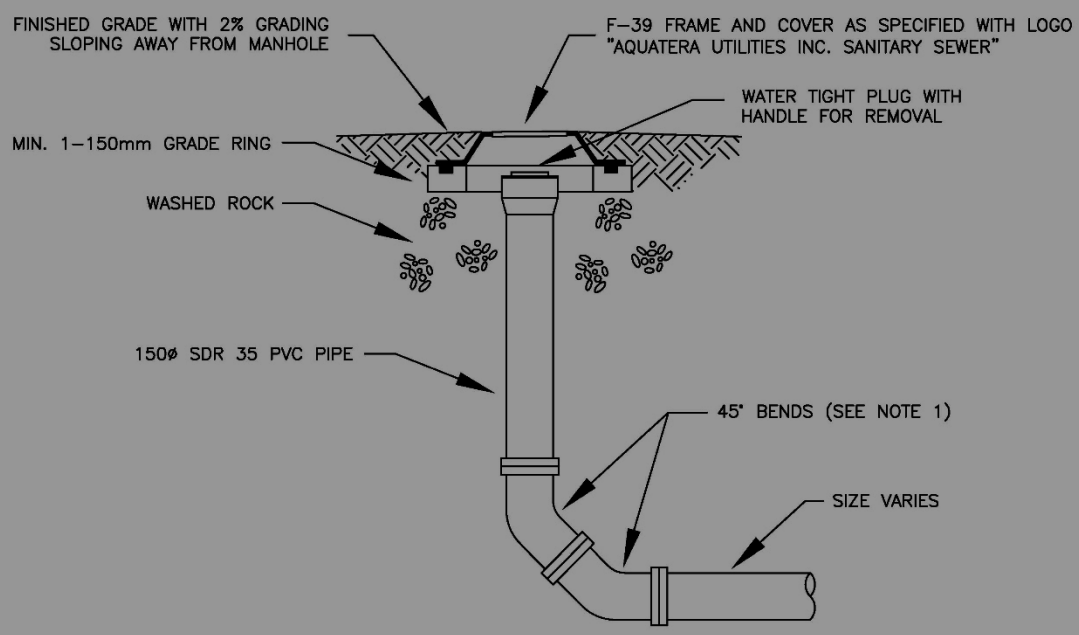


3/8" DIAMETER STAINLESS STEEL PINCH BOLT

'A – A'

SPECIFICATIONS:
1) CLAMP AND BRACKETS IS TYPE 304 STAINLESS STEEL, 11 GAUGE
2) 3/8" ø PINCH BOLT AND NUTS IS TYPE 18–8 STAINLESS STEEL.

Revisions			STAINLESS STEEL CLAMPING BRACKETS FOR DROP STRUCTURE		Standard Detail 61–13
Date	Details				
10/14/15	REMOVE CITY FILE #		Approved by Timothy Lau P.Eng.	Date 12/06/12	
			Checked by Brad Vail C.E.T.	Scale N.T.S.	
			Drawn by Scott Walls	Permit Number P09242	File Number

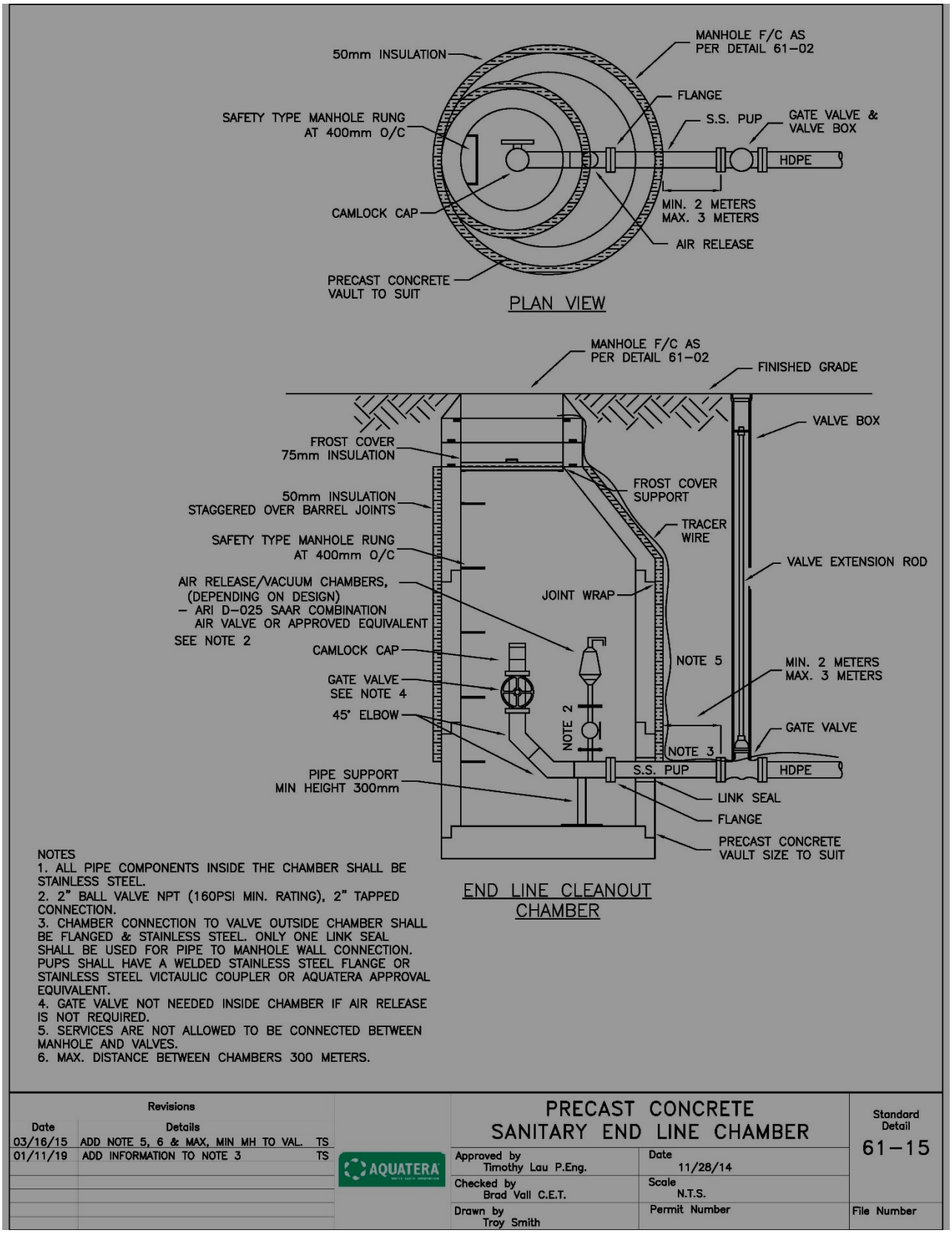


NOTE:
1. ALTERNATIVELY A 90° LONG SWEEP MAY BE USED IN PLACE OF THE (2) 45° FITTINGS

Revisions		
Date	Details	
NOV 28/19	ADDED WASHED ROCK	TS

SANITARY MAIN CLEANOUT

Approved by Timothy Lau P.Eng.	Date 6/23/14	Standard Detail 61-14
Checked by Brad Vail C.E.T.	Scale N.T.S.	
Drawn by Scott Walls	Permit Number	File Number



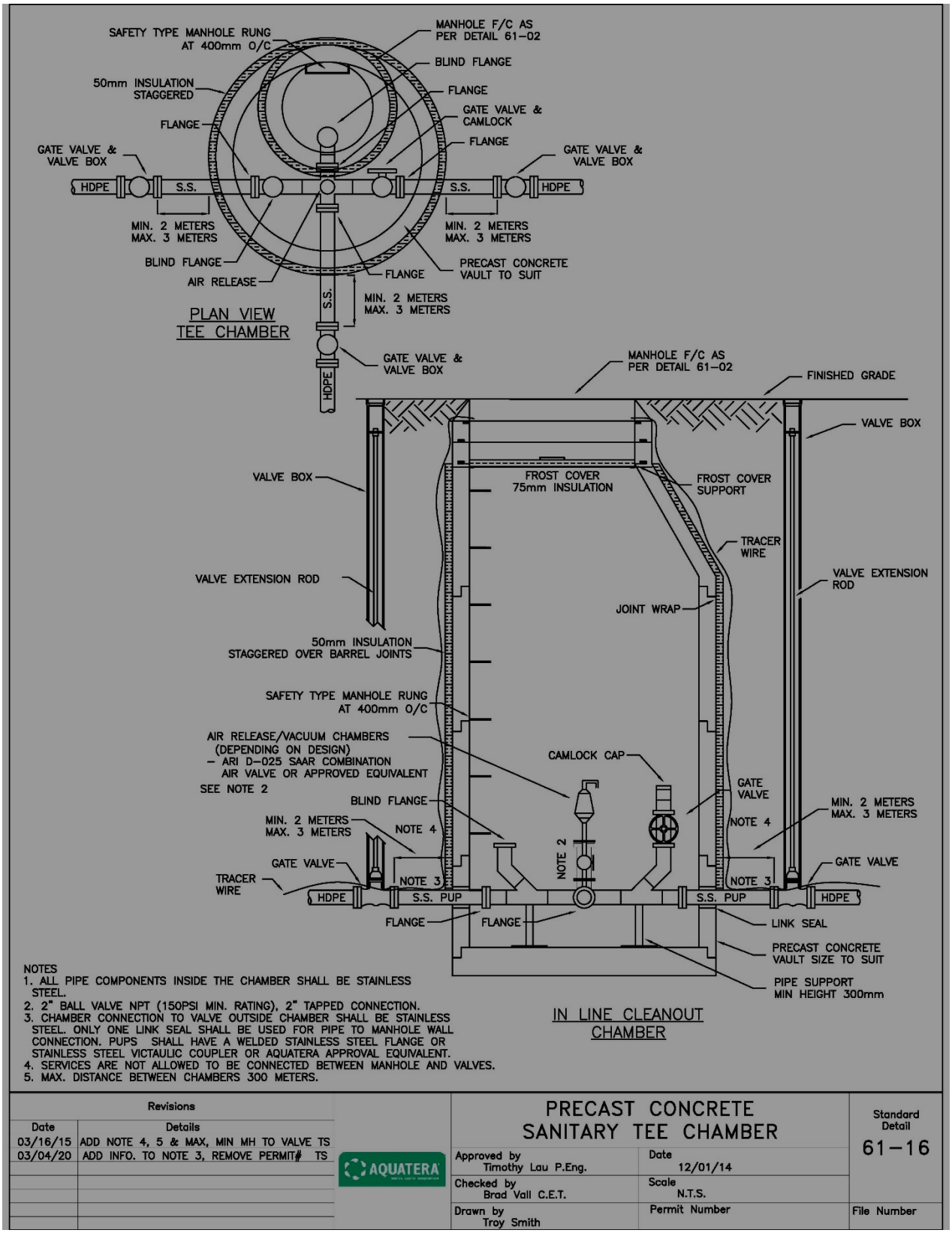
NOTES
1. ALL PIPE COMPONENTS INSIDE THE CHAMBER SHALL BE STAINLESS STEEL.
2. 2" BALL VALVE NPT (160PSI MIN. RATING), 2" TAPPED CONNECTION.
3. CHAMBER CONNECTION TO VALVE OUTSIDE CHAMBER SHALL BE FLANGED & STAINLESS STEEL. ONLY ONE LINK SEAL SHALL BE USED FOR PIPE TO MANHOLE WALL CONNECTION. PUPS SHALL HAVE A WELDED STAINLESS STEEL FLANGE OR STAINLESS STEEL VICTAULIC COUPLER OR AQUATERA APPROVAL EQUIVALENT.
4. GATE VALVE NOT NEEDED INSIDE CHAMBER IF AIR RELEASE IS NOT REQUIRED.
5. SERVICES ARE NOT ALLOWED TO BE CONNECTED BETWEEN MANHOLE AND VALVES.
6. MAX. DISTANCE BETWEEN CHAMBERS 300 METERS.

Revisions		
Date	Details	
03/16/15	ADD NOTE 5, 6 & MAX, MIN MH TO VAL.	TS
01/11/19	ADD INFORMATION TO NOTE 3	TS

PRECAST CONCRETE SANITARY END LINE CHAMBER

Standard Detail 61-15

Approved by Timothy Lau P.Eng.	Date 11/28/14
Checked by Brad Vall C.E.T.	Scale N.T.S.
Drawn by Troy Smith	Permit Number / File Number



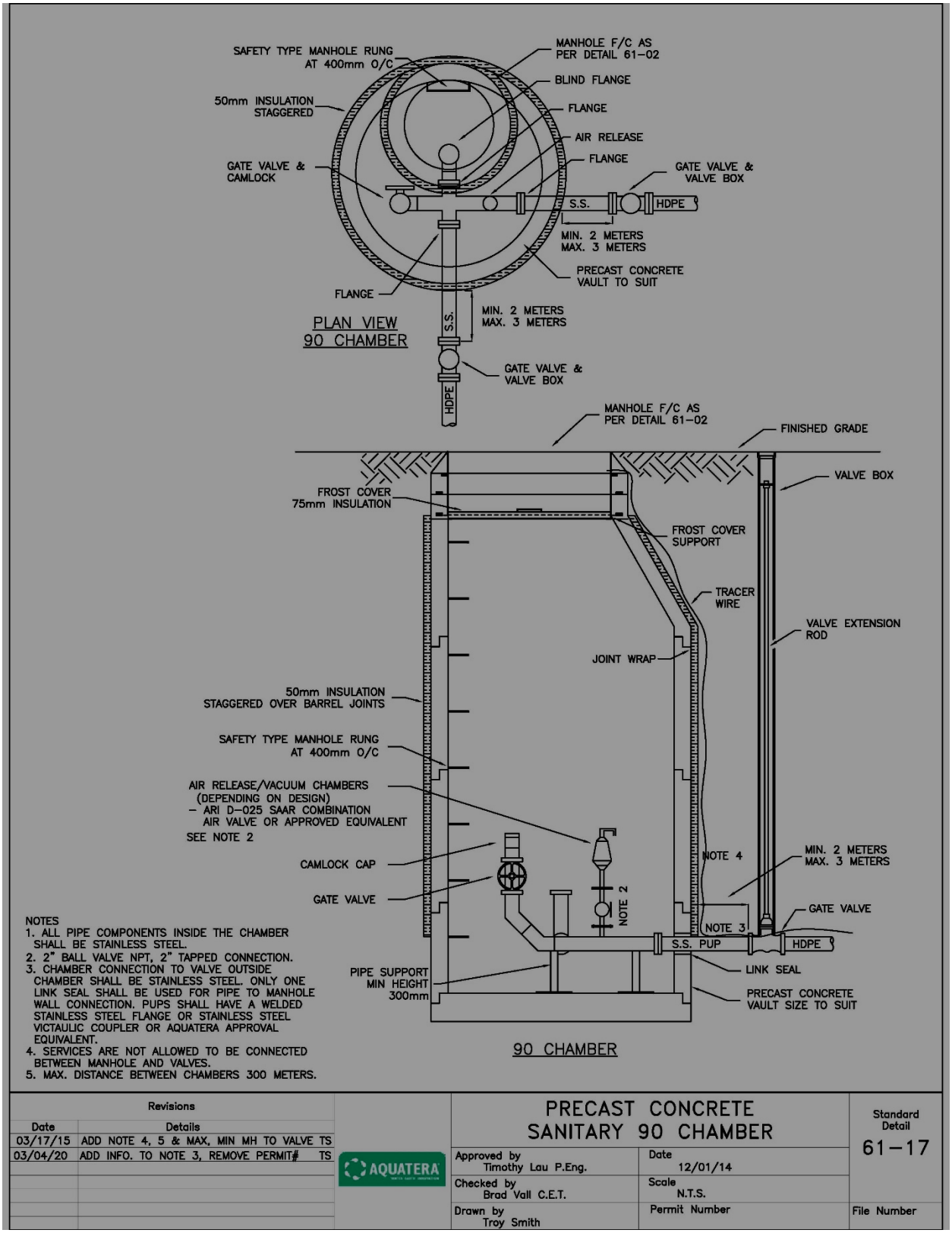
NOTES
1. ALL PIPE COMPONENTS INSIDE THE CHAMBER SHALL BE STAINLESS STEEL.
2. 2" BALL VALVE NPT (150PSI MIN. RATING), 2" TAPPED CONNECTION.
3. CHAMBER CONNECTION TO VALVE OUTSIDE CHAMBER SHALL BE STAINLESS STEEL. ONLY ONE LINK SEAL SHALL BE USED FOR PIPE TO MANHOLE WALL CONNECTION. PUPS SHALL HAVE A WELDED STAINLESS STEEL FLANGE OR STAINLESS STEEL VICTAULIC COUPLER OR AQUATERA APPROVAL EQUIVALENT.
4. SERVICES ARE NOT ALLOWED TO BE CONNECTED BETWEEN MANHOLE AND VALVES.
5. MAX. DISTANCE BETWEEN CHAMBERS 300 METERS.

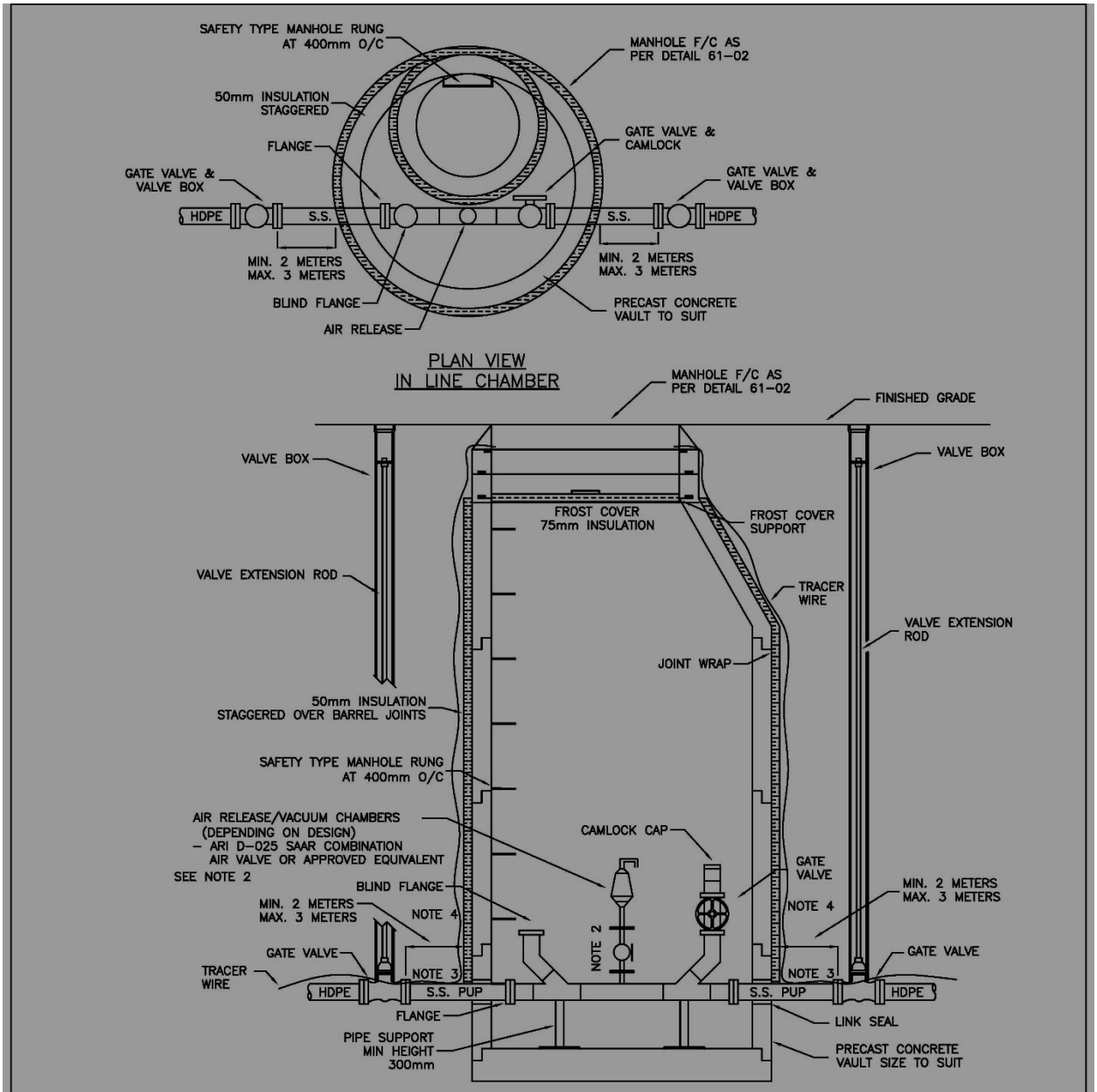
Revisions	
Date	Details
03/16/15	ADD NOTE 4, 5 & MAX, MIN MH TO VALVE TS
03/04/20	ADD INFO. TO NOTE 3, REMOVE PERMIT# TS

PRECAST CONCRETE SANITARY TEE CHAMBER

Standard Detail 61-16

Approved by Timothy Lau P.Eng.	Date 12/01/14
Checked by Brad Vall C.E.T.	Scale N.T.S.
Drawn by Troy Smith	Permit Number / File Number


SAFETY TYPE MANHOLE RUNG AT 400mm O/C
MANHOLE F/C AS PER DETAIL 61-02
BLIND FLANGE
50mm INSULATION STAGGERED
FLANGE
AIR RELEASE
GATE VALVE & CAMLOCK
FLANGE
GATE VALVE & VALVE BOX
S.S.
HDPE
MIN. 2 METERS MAX. 3 METERS
PRECAST CONCRETE VAULT TO SUIT
FLANGE
S.S.
MIN. 2 METERS MAX. 3 METERS
PLAN VIEW 90 CHAMBER
GATE VALVE & VALVE BOX
HDPE
MANHOLE F/C AS PER DETAIL 61-02
FINISHED GRADE
VALVE BOX
FROST COVER 75mm INSULATION
FROST COVER SUPPORT
TRACER WIRE
VALVE EXTENSION ROD
JOINT WRAP
50mm INSULATION STAGGERED OVER BARREL JOINTS
SAFETY TYPE MANHOLE RUNG AT 400mm O/C
AIR RELEASE/VACUUM CHAMBERS (DEPENDING ON DESIGN) - ARI D-025 SAAR COMBINATION AIR VALVE OR APPROVED EQUIVALENT SEE NOTE 2
CAMLOCK CAP
GATE VALVE
NOTE 2
NOTE 4
MIN. 2 METERS MAX. 3 METERS
GATE VALVE
NOTE 3
S.S. PUP
HDPE
LINK SEAL
PIPE SUPPORT MIN HEIGHT 300mm
PRECAST CONCRETE VAULT SIZE TO SUIT
90 CHAMBER
NOTES
1. ALL PIPE COMPONENTS INSIDE THE CHAMBER SHALL BE STAINLESS STEEL.
2. 2" BALL VALVE NPT, 2" TAPPED CONNECTION.
3. CHAMBER CONNECTION TO VALVE OUTSIDE CHAMBER SHALL BE STAINLESS STEEL. ONLY ONE LINK SEAL SHALL BE USED FOR PIPE TO MANHOLE WALL CONNECTION. PUPS SHALL HAVE A WELDED STAINLESS STEEL FLANGE OR STAINLESS STEEL VICTAULIC COUPLER OR AQUATERA APPROVAL EQUIVALENT.
4. SERVICES ARE NOT ALLOWED TO BE CONNECTED BETWEEN MANHOLE AND VALVES.
5. MAX. DISTANCE BETWEEN CHAMBERS 300 METERS.
Revisions
Date | Details
03/17/15 | ADD NOTE 4, 5 & MAX, MIN MH TO VALVE TS
03/04/20 | ADD INFO. TO NOTE 3, REMOVE PERMIT# TS
PRECAST CONCRETE SANITARY 90 CHAMBER
Approved by Timothy Lau P.Eng.
Date 12/01/14
Checked by Brad Vall C.E.T.
Scale N.T.S.
Drawn by Troy Smith
Permit Number
Standard Detail 61-17
File Number



NOTES
1. ALL PIPE COMPONENTS INSIDE THE CHAMBER SHALL BE STAINLESS STEEL.
2. 2" BALL VALVE NPT (150PSI MIN. RATING), 2" TAPPED CONNECTION.
3. CHAMBER CONNECTION TO VALVE OUTSIDE CHAMBER SHALL BE STAINLESS STEEL. ONLY ONE LINK SEAL SHALL BE USED FOR PIPE TO MANHOLE WALL CONNECTION. PUPS SHALL HAVE A WELDED STAINLESS STEEL FLANGE OR STAINLESS STEEL VICTAULIC COUPLER OR AQUATERA APPROVAL EQUIVALENT.
4. SERVICES ARE NOT ALLOWED TO BE CONNECTED BETWEEN MANHOLE AND VALVES.
5. MAX. DISTANCE BETWEEN CHAMBERS 300 METERS.

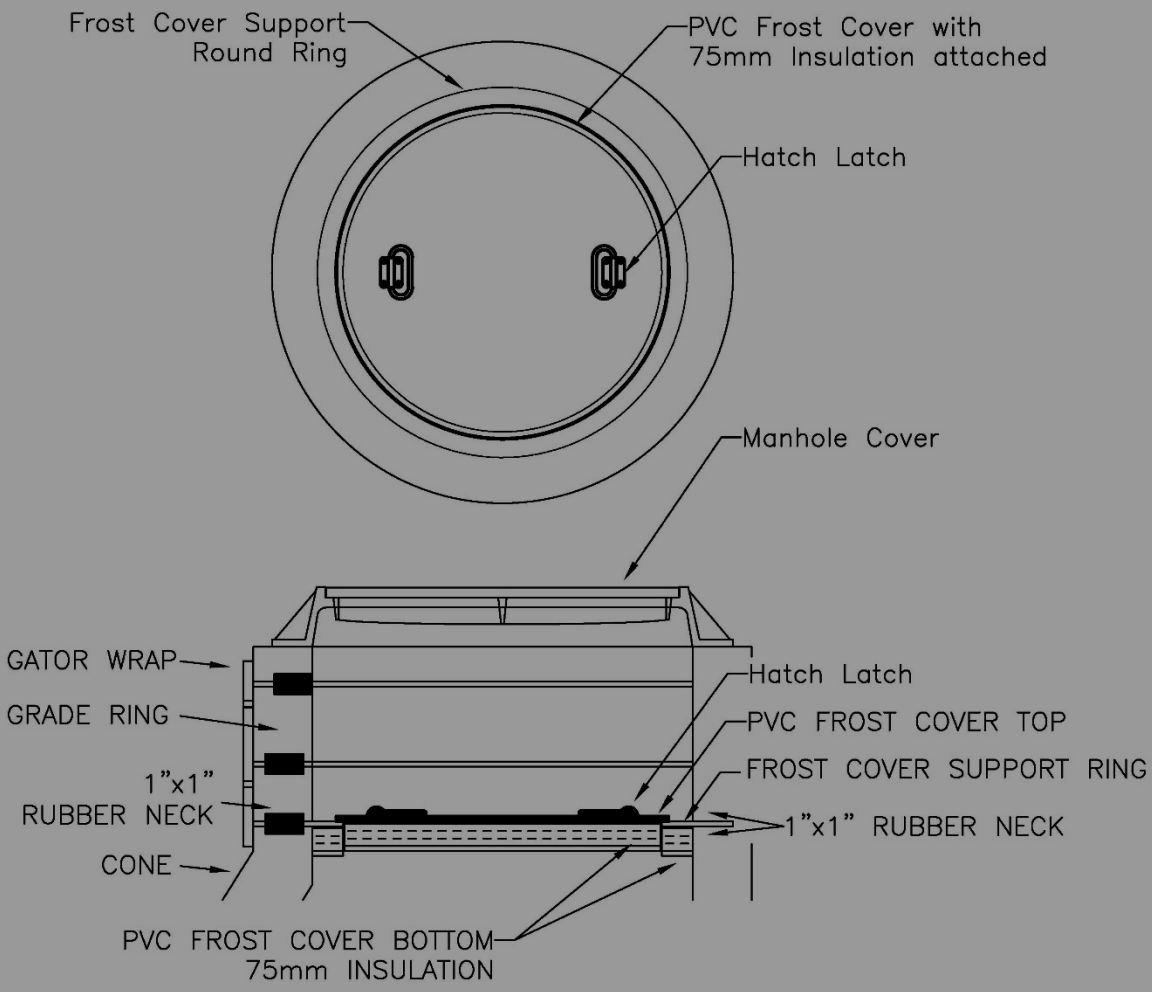
Revisions	
Date	Details
03/16/15	ADD NOTE 4,5 & MAX, MIN MH TO VALVE TS
03/04/20	ADD INFO. TO NOTE 3, REMOVE PERMIT# TS

PRECAST CONCRETE SANITARY IN LINE CHAMBER

Approved by Timothy Lau P.Eng.	Date 12/01/14
Checked by Brad Vall C.E.T.	Scale N.T.S.
Drawn by Troy Smith	Permit Number

Standard Detail 61-18

File Number

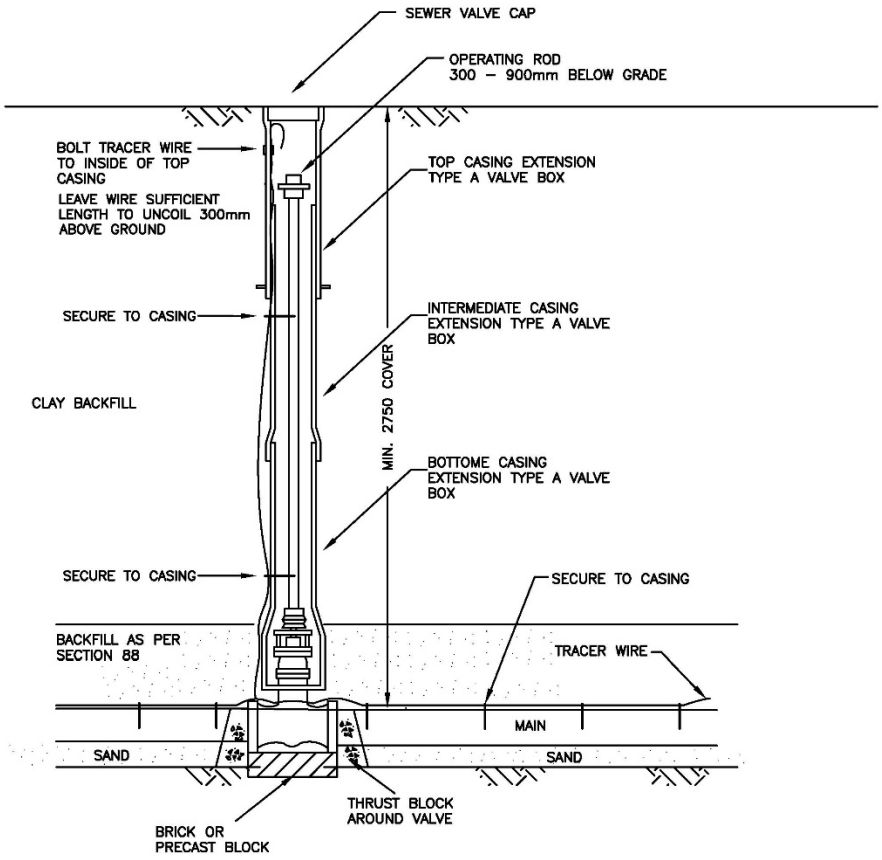


NOTES:
1) WOLSELEY OR APPROVED EQUIVALENT

Revisions		
Date	Details	
03/18/15	CHANGE TITLE	TS
10/15/15	ADD GRADE RINGS AND CONE, ADD NOTE 1 ADD SUPPORT RING INSULTION, REMOVE 2ND SUPPOT RING	
11/17/17	MODIFIED GATOR WRAP	TS
02/26/20	MODIFIED SUPPLIER, REMOVE PERMIT#	TS

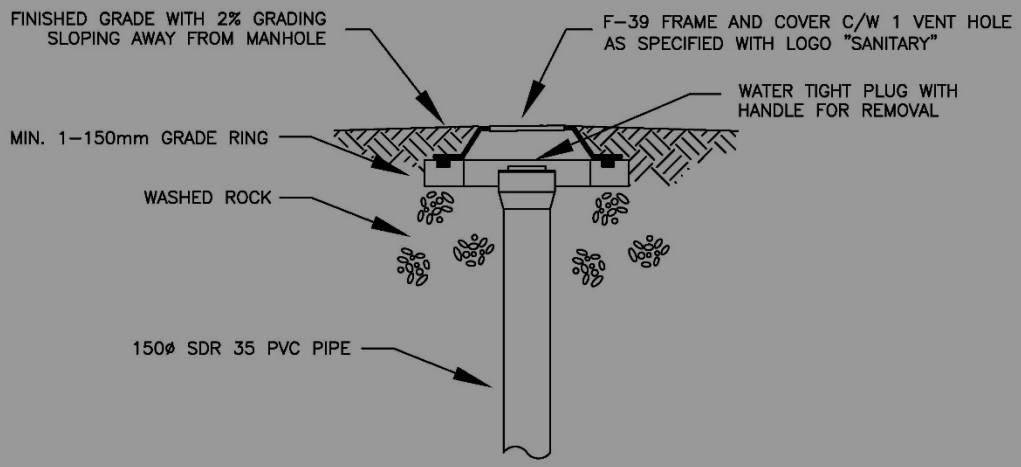
PRE MANUFACTURED
FROST COVER DETAIL

Approved by Timothy Lau P.Eng.	Date 12/12/14	Standard Detail 61–19
Checked by Brad Vail C.E.T.	Scale N.T.S.	
Drawn by Troy Smith	Permit Number	File Number



NOTE:
1. CASINGS SHALL BE PLUM.
2. LONGER INTERMEDIATE CASINGS SHALL BE USED TO AVOID NON–PLUM CASINGS.
3. BOND BREAKER SHALL BE INSTALLED ON ALL COMPONENTS ENCASED IN THRUST BLOCKS.
4. TRACER WIRE IS NOT REQUIRED FOR VALVES IN ROADS OR SIDEWALKS.

Revisions				
Date	Details		TYP. VALVE CASING	Standard Detail 61–20
–	–			
		Approved by Brad Vall C.E.T.	Date 20/11/18	
		Checked by Markus Oeser	Scale N.T.S.	
		Drawn by Troy Smith C.E.T.	Permit Number P09242	File Number



Revisions				
Date	Details	PRIVATE PROPERTY SANITARY CLEANOUT		Standard Detail 61-21
–	–	Approved by Brad Vail C.E.T.	Date 11/28/19	
		Checked by Markus Oeser	Scale N.T.S.	
		Drawn by Troy Smith C.E.T.	Permit Number –	File Number