New Septic System - Artisan Center Subdivision Lot #3

a project located within the boundaries of

Lake County, Montana

Project Design Information:

1. Employees = 24
2. Use = 13 GPD / employee
3. Daily Flowrate = 312 GPD
4. Application Rate = 0.60 GPD/SF

Project Construction Information:

- Tanks
  - Material = PreCast Concrete
  - Tank Design = Combined Septic & Pump Chamber
  - Septic Tank = 1500 Gallons
  - Pump Chamber = 500 Gallons
- Effluent Pump
  - Pump = Ashland EP45
  - Number of Pumps = 1
- Effluent Force Main
  - Material = Sch. 40 PVC pipe
  - Size = 2"Ø
  - Length = ±33 feet
- Effluent Manifold Pipe
  - Manifold Type = Center
  - Material = Sch. 40 PVC pipe
  - Size = 2"Ø
  - Length = ±11 feet
- Drainfield Configuration
  - Type = Std. Gravel Trenches
  - Number of Trenches = 3
  - Trench Width = 36"
  - Trench Spacing = 7 feet on-center
  - Trench Length = 60 feet
- Lateral Pipes
  - Material = Sch. 40 PVC pipe
  - Lateral Spacing = 7 feet on-center
  - Size = 2"Ø
  - Length = 60 feet
  - Orifice Size = 3/16"Ø
  - Orifice Spacing = 4 feet on-center
  - Orifices Per Lateral Pipe = 45

PRE-INSTALLATION TASKS

1. Locate all existing drain fields, septic tanks, and gravity lines. Note location and provide to engineer of record.
2. Locate all existing dry and wet utilities.
3. Completely remove or crush and completely fill all existing septic tanks.

INSTALLATION SEQUENCE

The following installation sequence and sign offs shall be followed during the construction:

1. Call local utility location service 3 business days prior to beginning.
2. Excavate for new system; install tanks and pumps.
3. Install bed piping and force mains.
4. Test float operation by filling tanks and pump chambers with clear water for one pump cycle.
5. Squirt test system (engineer and county sanitarian must observe and certify).
6. Disable Pump power and test alarm function.
7. Finalize bed piping and cover.

MATERIAL SPECIFICATIONS

1. Pipe and fittings from the dwelling or structure to the septic tank and from the septic tank to the drainfield shall conform to or exceed ASTM D 1785 (schedule 40 or 80) and must be joined by an integral bell-and-spigot joint with rubber elastomeric gasket or solvent cement. PVC pipe shall have a minimum Standard Dimension Ratio of SDR 35, and the compound type shall meet or exceed ASTM D1784.
2. Drain rock must be washed and a maximum of 2.5 inches in diameter, and must contain no more than 2 percent passing the #8 sieve. The material must be of sufficient competency to resist slaking or dissolution. Gravels of shale, sandstone,or limestone may degrade and may not be used.

SEPTIC TANK INSTALLATION:

1. Where the top of the septic tank is located more than 18 inches below the finished grade of the ground surface, manhole risers shall be installed, extending to within eight inches of the finished grade, to facilitate inspection and cleaning of each compartment in the tank. The riser pipe shall be of sufficient size to provide access to each compartment for inspection and sludge removal.
2. Sealing material shall be placed around any pipe where it enters or exits the tank to assure that no leakage occurs. Hydraulic grout is preferred however oakum and tar, tar strips, or similar materials are acceptable if used properly.
3. The septic tank must be installed level and on a flat bedding material free of an organic material, debris, rocks, cobbles, stones or gravel greater than 1" in diameter.

SEPTIC TANK TESTING (to be done if directed by county sanitarian):

1. All tanks must be watertight. Water tightness testing for a concrete tank maybe conducted using a water test. Water tightness testing for a polyethylene tank may be conducted using a water test, a vacuum test, or a pressure test.
2. Water testing must be conducted by sealing the outlets, filling the septic tank to its operational level, and allowing the tank to stand for at least 8 hours. If there is a measurable loss (2 inches or more), refill the tank and let stand for another 8 hours. If there is again a measurable loss, the tank most he rejected.
3. Vacuum testing must be conducted by sealing all inlets, outlets, and accesses, then introducing a vacuum of 4 inches of mercury. If the vacuum drops in the first 5 minutes, it must be brought back to 4 inches of mercury. If the vacuum drops in the first 5 minutes, the tank must he rejected.

SEPTIC TANK TESTING (continued):

4. For pressure testing a tank, all inlets, outlets, and access ports most be sealed and adequately secured. The tank must be charged with 3 PSIG, Allow tank pressure to stabilize. Disconnect the air supply. If there is any noticeable pressure drop in 1 hour, the tank must be rejected or repaired. Repeat the test after repair release air carefully through an appropriate mechanism.

PIPE INSTALLATION

All pipes shall be bedded six (6) inches above and below the pipe in pipe bedding sand or other fine grained soil free of gravel over one (1) inch in size. Debris, frozen material, large clods, stones (greater than 8 inches in diameter), organic material or other unsuitable materials shall not he used for back fill within 24 inches of the top of the pipe. Compaction under and around the pipe shall be sufficient to prevent movement of the pipe due to settlement.

ABSORPTION TRENCH INSTALLATION:

1. When Trenches have been excavated the sides and bottom must be raked to scarify any smeared soil surfaces. Construction equipment not needed to construct the system should be kept off the area to be utilized for the absorption trench system to prevent undesirable compaction of soils. Construction must not be initiated when the soil moisture content is high.
2. The bottom of the drainfield trenches must be at least 12 inches and no more than 36 inches below the natural ground surface. There must be a minimum of 12 inches of fill or soil material above the drain rock. When the bottom of the trench is less than 24 inches below ground, a cap above the natural ground surface is required. The cap must be tapered from the edge of the outermost trench wall with a 3 horizontal to 1 vertical or flatter slope. The cap must be sloped to provide positive drainage away from the center of the drainfield.
3. Cleanouts must be provided at the end of each lateral. The cleanouts must be within 6 inches of finished grade and should be made with either a long sweep elbow or two 45 degree bends. A metal location marker must be provided for each clean-out.

SYSTEM START UP PROCEDURE

The following start up procedure shall be followed.

1. Fill septic tank with clear water.
2. Check pump ready status.
3. Verify all alarms are operational and in a visible location.
4. Begin use.

GENERAL OPERATION & MAINTENANCE OF THE SEPTIC TANK

1. Inspect and wash (spray off) filter every 6 months; clean and replace as needed.
2. Pump septic tank every 3 years:
   - 2.1. Confirm baffles are in place
   - 2.2. Visual inspect mechanical & electrical components
   - 2.3. Observe & calibrate float switches if necessary for pump operation and tank draw down
   - 2.4. Observe and confirm discharge into bed

Location Map:
Not to Scale

Design Engineer:

Robert Smith, Montana PE #12592
A2Z Engineering, 138 E. Center St., Ste A, Kalispell, MT 59901
Phone: 406.755.7888 Email: rsmith@a2z-engineering.com

General Notes:

1. Utility locations shown on A2Z's plans are for informational purposes only. It is contractor's responsibility, under state law, to verify the presence, location and depth of all existing utilities. Contractor shall call 811 to notify utility location service of any possible excavation work more than 2 business days before commencing.
2. Any survey monuments (including property pins) disturbed by the contractor shall be replaced by a State licensed surveyor at contractor's expense.
3. Trenching and excavation are hazardous. Contractor shall take all necessary precautions to protect workers and comply with the Occupational Safety & Health Administration's established standards for such work, found in 29 CFR Part 1926 subpart P.
4. It is the contractor's responsibility to verify that all necessary permits and approvals are in place prior to beginning work.
5. Costs & coordination of testing constructed improvements are contractor's responsibility. Contact A2Z for specifics.
6. All public improvements shall be constructed and tested in accordance with the latest edition of the Montana Public Works Standard Specifications and State law. The construction plans are intended to work in conjunction with the above mentioned standards.

Project Sheet Index:

Sheet C1 .....Cover Sheet
Sheet C2.....Site Layout Sheet
Sheet C3.....System Layout Sheet
Sheet C4.....Tank Details
Sheet C5.....Drainfield Details

A2Z Engineering PLLC
Kalispell, Montana
138 E. Center St., Ste A
Kalispell, MT 59901
Phone 406.755.7888
A2Z-Engineering.com

MONTANA
ROBERT SMITH
12592 PE
LICENSED PROFESSIONAL ENGINEER

04-22-2021

REVISIONS:

DRAWN BY: R Smith
CHECKED BY: R Smith

CALL BEFORE YOU DIG! CALL 811 CALL BEFORE YOU DIG!

Artisan Center Subdivision Lot #3
New Septic System
Cover Sheet
Lake County, Montana

Plan Sheet Number:

C1

Keyed Notes for Siteplan:

A. Existing property line
B. Existing Highway MT83
C. Existing wellhead
D. Existing 100 ft well control zone
E. Existing well access easement
F. Existing water line

G. Proposed building
H. Proposed gravel driveway
I. Proposed water line

J. Proposed 4"Ø PVC sewer lateral line
K. Proposed septic tank / pump chamber
L. Proposed 2"Ø sewer pumping effluent line
M. Proposed drainfield
N. Future drainfield replacement area

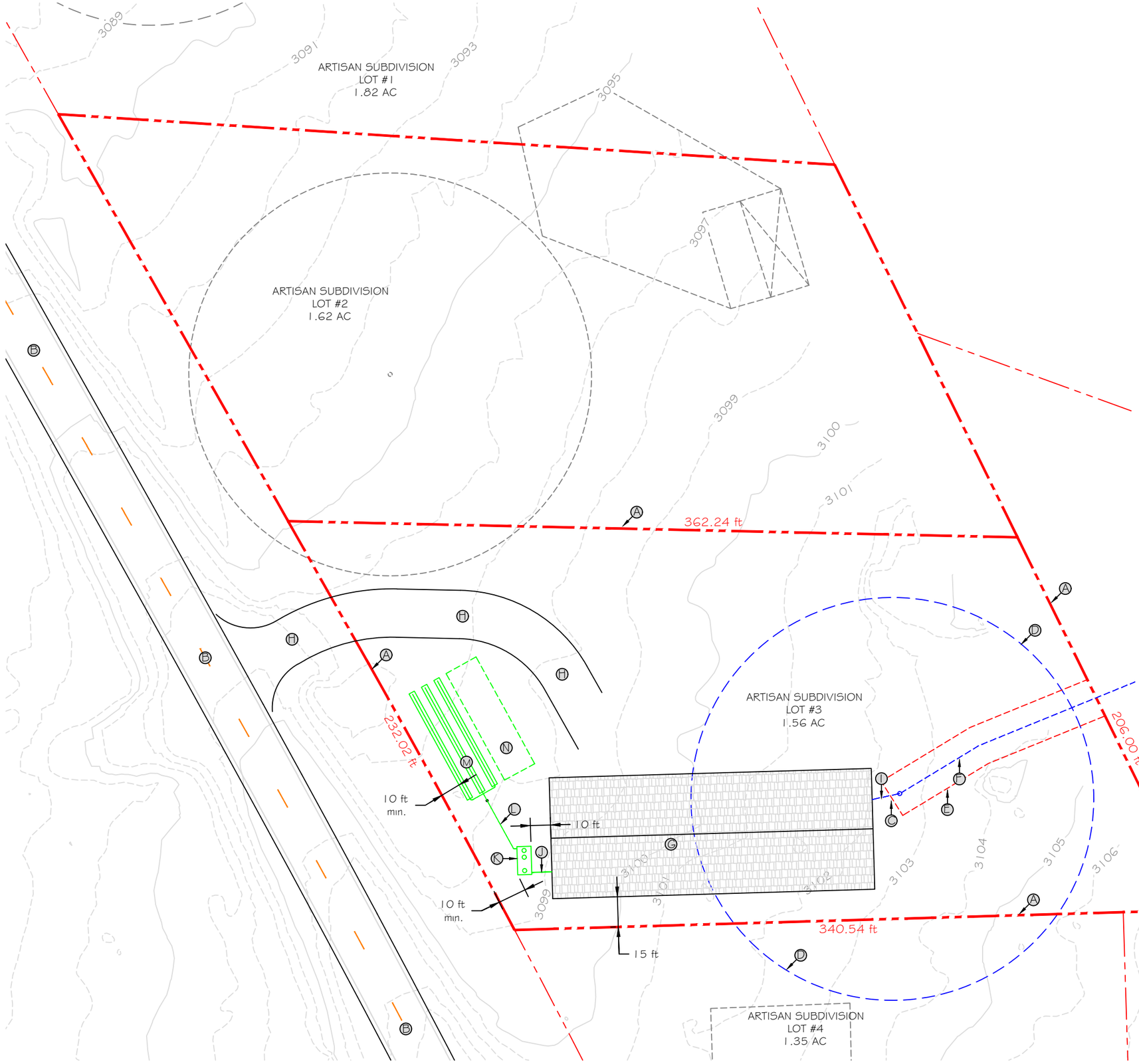
Septic Effluent Pumping Line: The whole length of this line shall be sloped to drain toward the drainfield. The line shall be buried at least 5 feet deep. Where the line passes under the driveway contractor shall install at least 2" of blueboard insulation over the line to stop frost penetration from driveway traffic.

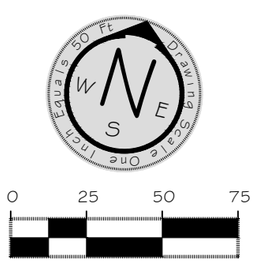
Septic Tank Orientation: Septic tank may be rotated or moved a small distance to better fit the site and household plumbing. Tanks shall be placed a minimum of:

- 10 feet away from any foundation
- 10 feet away from any property lines
- 50 feet way from any wellhead

Property Line Setback Note: No part of the drainfield shall be built less than 10 feet away from the property boundary line.

Water Wellhead Note: Owner and contractor shall be responsible to ensure that no portion of the drainfield is constructed within 100 feet of any existing or proposed wellhead. Owner and contractor shall also be responsible to ensure that no other component of the septic system (such as tanks or lines) is constructed within 50 feet of any existing or proposed wellhead.





0 25 50 75

Scale: 1" = 50 ft

A2Z Engineering DLLC
Kalispell, Montana

138 E. Center St., Ste A
Kalispell, MT 59901
Phone 406.755.7888
A2Z-Engineering.com

MONTANA
ROBERT SMITH
LICENSED PROFESSIONAL ENGINEER

04-22-2021

REVISIONS:

DRAWN BY: R Smith
CHECKED BY: R Smith

CALL BEFORE YOU DIG! Call 811 CALL BEFORE YOU DIG!

Artisan Center Subdivision Lot #3
New Septic System
Site Layout Sheet
Lake County, Montana

Plan Sheet Number:

C2

Keyed Notes for Siteplan:

A. Existing property line
B. Proposed building
C. Proposed driveway
D. Proposed 4"Ø sch 40 PVC sewer service
E. Proposed septic tank / pump chamber
F. Proposed 2"Ø sewer pumping effluent line
G. Proposed 45° fitting
H. Two proposed 90° fittings and riser pipe
I. Proposed 2"x2"x2"x2" cross fitting
J. Proposed 2"Ø manifold line
K. Proposed 90° fitting
L. Proposed 3 ft x 60 ft gravel trench
M. Proposed 60 ft 2"Ø lateral line (3 total)
N. Future drainfield replacement area

Septic Effluent Pumping Line: The whole length of this line shall be sloped to drain toward the drainfield. The line shall be buried at least 5 feet deep. Where the line passes under the driveway contractor shall install at least 2" of blueboard insulation over the line to stop frost penetration from driveway traffic.

Manifold Line: One 2"Ø pipe ±11 feet long with one cross 2"x2"x2"x2" at center and two 90° bends at either end.

Gravel Trenches: Three gravel trenches each one 36" wide by 60 ft long.

Lateral Lines: Three 2"Ø pipes each 60 feet long.

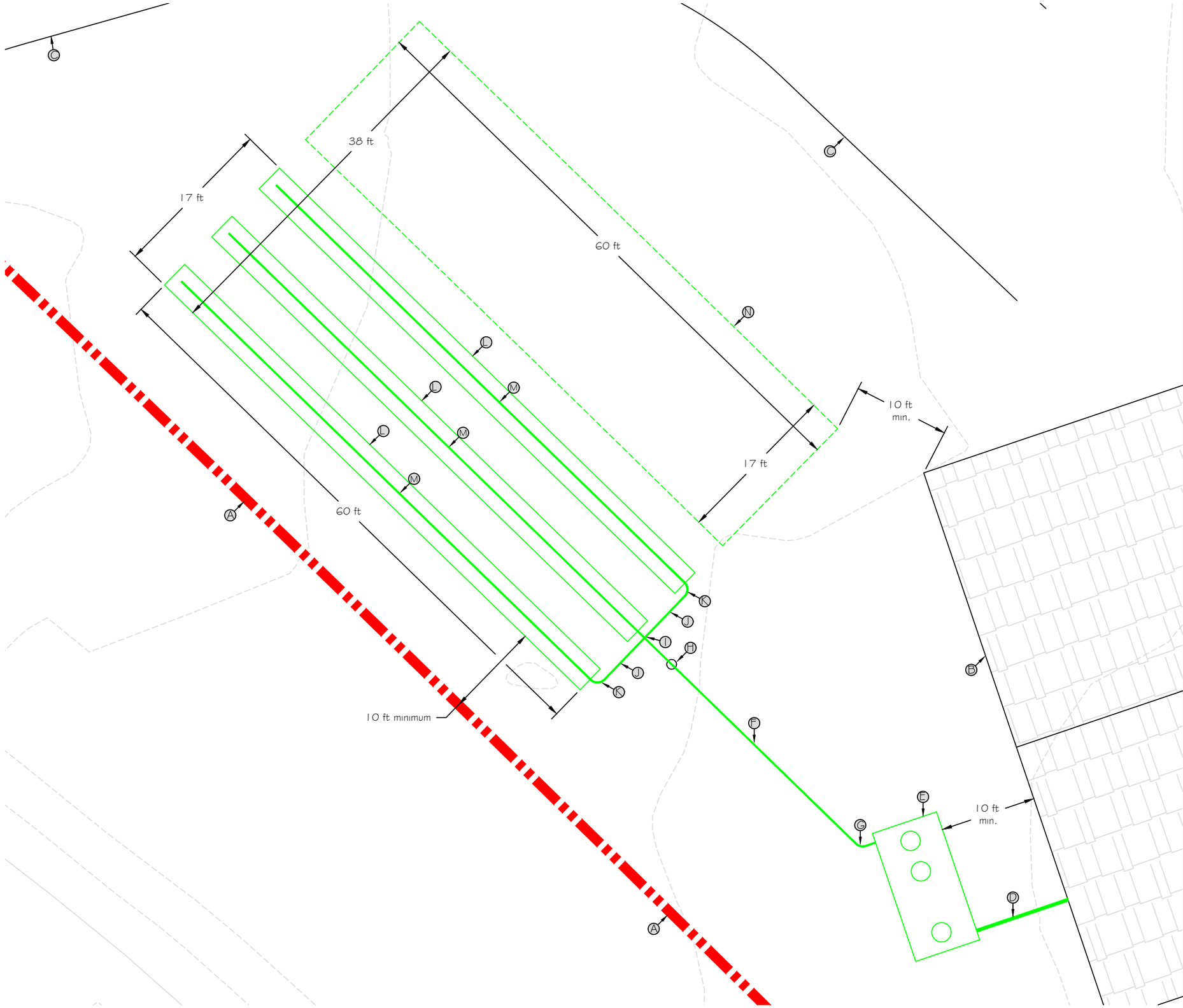
Lateral Line Orifices: Each lateral line shall have 3/16"Ø orifices drilled at 4 feet on center.

Septic Tank Orientation: Septic tank may be rotated or moved a small distance to better fit the site and household plumbing. Tanks shall be placed a minimum of:

- 10 feet away from any foundation
- 10 feet away from any property lines
- 50 feet way from any wellhead

Property Line Setback Note: No part of the drainfield shall be built less than 10 feet away from the property boundary line.

Water Wellhead Note: Owner and contractor shall be responsible to ensure that no portion of the drainfield is constructed within 100 feet of any existing or proposed wellhead. Owner and contractor shall also be responsible to ensure that no other component of the septic system (such as tanks or lines) is constructed within 50 feet of any existing or proposed wellhead.



0 5 10 15

Scale: 1" = 10 ft

A2Z Engineering PLLC
Kalispell, Montana
138 E. Center St., Ste A
Kalispell, MT 59901
Phone 406.755.7888
A2Z-Engineering.com

MONTANA
ROBERT SMITH
12382 PE/PLS
LICENSED PROFESSIONAL ENGINEER

04-22-2021

REVISIONS:

DRAWN BY: R Smith
CHECKED BY: R Smith

CALL BEFORE YOU DIG! 811 CALL BEFORE YOU DIG!

Artisan Center Subdivision Lot #3
New Septic System
Drainfield Layout Sheet
Lake County, Montana

Plan Sheet Number:

C3

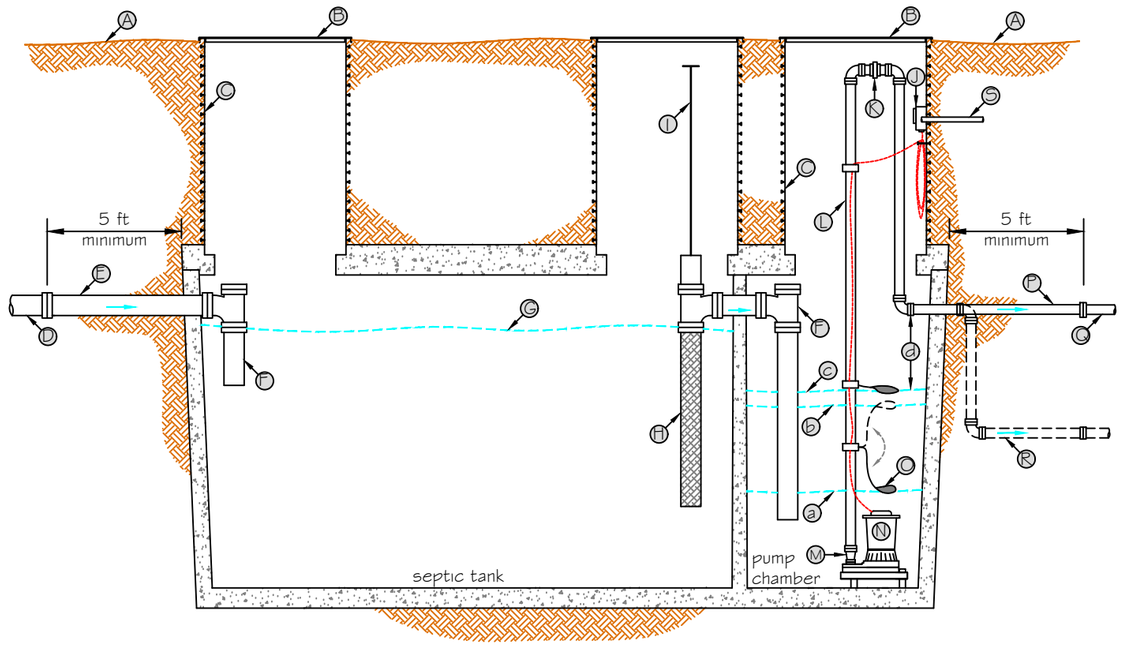
Keyed Notes:

A. Finished grade
B. Typical access lid
C. Typical access riser
D. 4"Ø sch. 40 septic lateral to structure
E. 5 ft 4"Ø sch. 80 pipe
F. Typical 4"Ø baffle
G. Typical septic water level
H. Typical 4"Ø septic filter
I. Filter handle extension
J. Explosion proof electrical junction box
K. 2"Ø sch. 80 PVC union fitting
L. 2"Ø sch. 80 PVC pipe & fittings
M. Reducer fitting, install if necessary
N. Typical effluent pump
O. Typical float switch
P. 2"Ø sch. 80 PVC piping
Q. 2"Ø sch. 40 PVC piping out to drainfield
R. Alternative piping layout, as necessary to achieve 6 ft bury depth
S. Electrical conduit

Pump and Pump Chabmer Specific Notes:

Selected Pump: Contractor shall install an Ashland EP45 or approved equal.

Pump Off Level, located at least 12" above floor to fully submerge pump
Pump On Level, located 37" above Pump Off level
Alarm Level, located 6" above Pump On level
Emergency Depth, located above alarm level and below tank's piping penetrations



Septic Tank & Pump Chamber Detail
Not to Scale

Septic Tank & Pump Chamber Notes:

- The tank section shown on this page may not be representative of the actual size or dimensions of the pump chamber. This detail is intended to provide plumbing & wiring schematics and float switch elevations only.
- Both the septic tank and pump chamber shall be approved manufactured pre-cast concrete type, meeting all MDEQ State Circular 4 and county regulations.
- Tank size and pump model are specified in other details within this planset. The pump chamber is typically a separate chamber attached to the main septic tank, unless otherwise specified.
- All piping inside and within five (5) feet of the septic tank shall be schedule 80 PVC pipe.
- Access to the pump shall be sufficient for maintenance. Risers are recommended on all tanks, and required if the tank top is more than four (4) inches below the finished ground surface.
- The riser / access lid over the filter shall be set at the finished ground surface. Contractor should take care to fasten lids down at all times that work is not being performed.
- Tanks, risers and access lids located in areas with vehicle traffic shall be engineered for standard vehicular loads. A2Z Engineering suggests the use of physical barriers (i.e. landscape boulders, fencing, etc) to protect access lids in non-vehicular areas to prevent accidental vehicle damage.
- Septic tanks / pump chambers should be carefully located so that there is an access route available to pumper trucks / maintenance vehicles.

A-2-Z Engineering PLLC
Kalispell, Montana
138 E. Center St., Ste A
Kalispell, MT 59901
Phone 406.755.7888
A2Z-Engineering.com

MONTANA
ROBERT SMITH
12332 PE
LICENSED PROFESSIONAL ENGINEER

04-22-2021

REVISIONS:

DRAWN BY: R Smith
CHECKED BY: R Smith

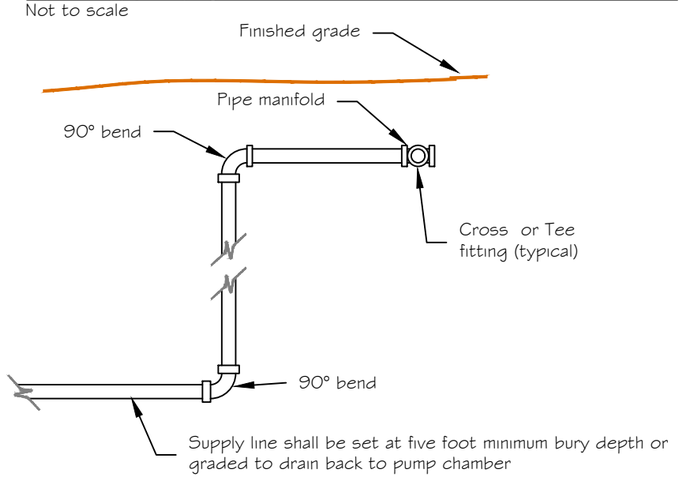
CALL BEFORE YOU DIG!
811
CALL BEFORE YOU DIG!

Artisan Center Subdivision Lot #3
New Septic System
Tank Details Sheet
Lake County, Montana

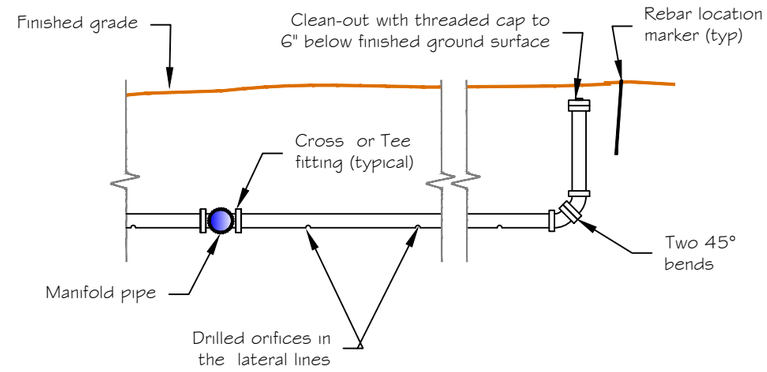
Plan Sheet Number:

C4

Typical Supply Pumping Line Connection to Drainfield Manifold Detail
Not to scale

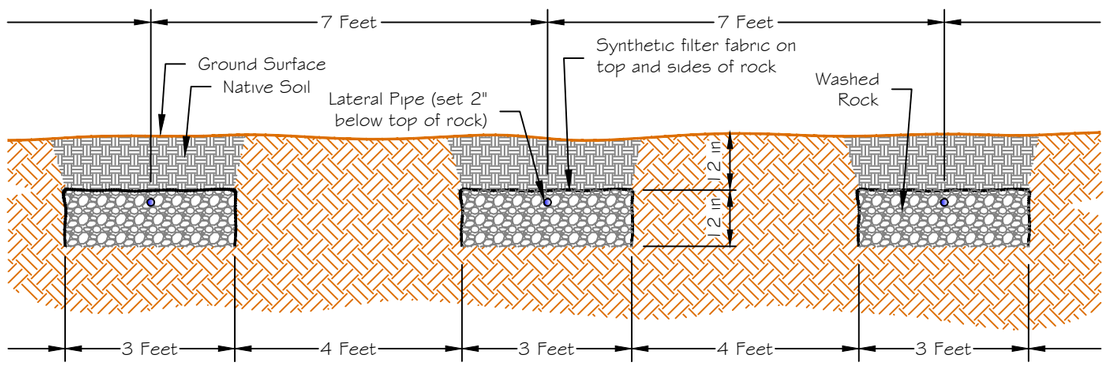


Typical Detail of Lateral Line
Not to scale



Standard Trench Installation Notes:

1. Excavate and level installation areas.
2. Scarify surface to remove any smearing caused during excavation.
3. Place washed drain rock per county's standard details.
4. Install universal end cap and secure in place with backfill. Place washed drain rock per county's standard details.
5. Using a light tracked machine, cover trenches to a minimum of 12 inches after consolidation for H-10 applications and with 18 inches minimum cover after consolidation for H-20 applications. Avoid large rocks or debris in cover material. A well graded, crushed gravel and careful compaction is recommended for H-20 installations.
6. See product specifications.
7. Filter fabric SHALL NOT be placed under drain rock.



Note: Adjust cross-section accordingly for sloping installations per site plan.

Typical Drainfield Cross Section
Not to scale

A2Z Engineering PLLC
Kalispell, Montana
138 E. Center St., Ste A
Kalispell, MT 59901
Phone 406.755.7888
A2Z-Engineering.com

MONTANA
ROBERT SMITH
LICENSED PROFESSIONAL ENGINEER

04-22-2021

REVISIONS:

DRAWN BY: R Smith
CHECKED BY: R Smith

CALL BEFORE YOU DIG!
Call 811
CALL BEFORE YOU DIG!

Artisan Center Subdivision Lot #3
New Septic System
Drainfield Details Sheet
Lake County, Montana

Plan Sheet Number:

C5