

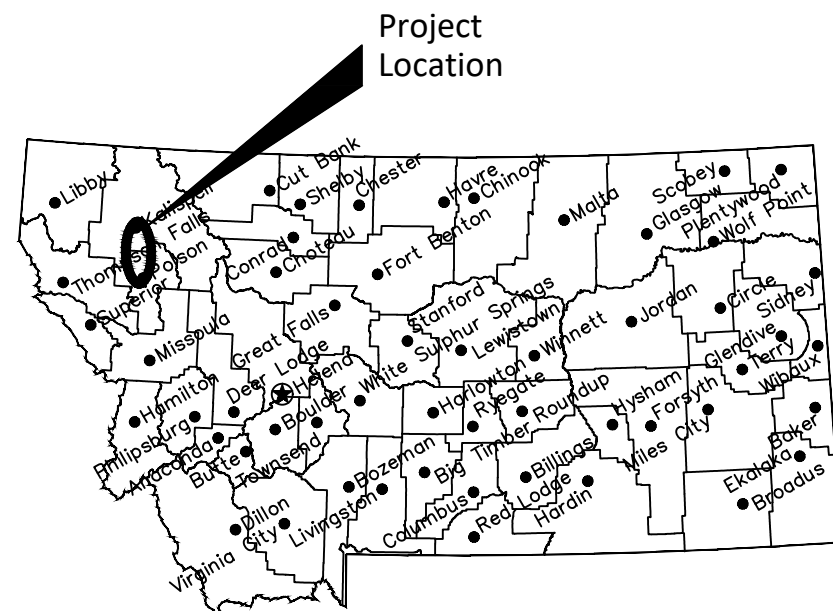
MONTANA FISH, WILDLIFE & PARKS

Flathead Lake State Park

Bird and Cedar Island Composting Toilets

Flathead Lake (Near Polson), Montana

FWP # 7216611



Location Map

No Scale

General Notes:

1. Utility locations shown on the 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. 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.
3. It is the contractor's responsibility to verify that all necessary permits and approvals are in place prior to beginning work.
4. Costs & coordination of testing constructed improvements are contractor's responsibility. Contact A2Z for specifics.
5. 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.
6. The following plans provide details for the design, construction and erection of the Trail Master Phoenix Composting Toilet facility or engineer approved equivalent. The supplied facility shall satisfy all specifications with no exceptions. If an equivalent is proposed it must be approved by the engineer of record prior to being used in a bid package. This approval is required before the bid date and the submittal of the equivalent specifications is required two weeks prior to the bid date to allow the engineer to review and approve the equivalent specifications.

North



Vicinity Map

No Scale

MONTANA FISH, WILDLIFE AND PARKS
DESIGN AND CONSTRUCTION

MAILING ADDRESS: PO BOX 200701
HELENA, MT 59620-0701
TEL 406.841.4000
FAX 406.841.4004
fwp.mt.gov/Doing Business/Design&Construction

A2Z ENGINEERING, PLLC

MAILING ADDRESS: 138 EAST CENTER STREET, SUITE A
KALISPELL, MONTANA 59901
TEL 406.755.7888
FAX 406.755.7880
a2z-engineering.com

DRAWING INDEX

Sheet 1 of 9.....Cover Sheet	Sheet 9 of 9.....Composting and Field Notes/Details
Sheet 2 of 9.....Overall Layout	
Sheet 3 of 9.....Cedar Layout	
Sheet 4 of 9.....Cedar Detailed Layout	
Sheet 5 of 9.....Bird Layout	
Sheet 6 of 9.....Bird Detailed Layout	
Sheet 7 of 9.....Composting Toilet Details	
Sheet 8 of 9.....Composting Toilet Details	



MDN	11-9-2022
DRAWN BY:	DATE:
RS	11-9-2022
CHECKED BY:	DATE:

APPROVED BY:	DATE:
APPROVED BY:	DATE:

APPROVED BY:	DATE:
APPROVED BY:	DATE:



Cover Sheet
Bird and Cedar Island Composting Toilets

SHEET: 01
of
09



West Shore State Park
(Launch Access Point - Best for Early Spring depending on Lake Levels)

Cedar Island location of Composting Toilet Install

Wildhorse Island location existing Composting Toilet that matches proposed facilities on Bird and Cedar

Big Arm State Park
(Launch Access Location - not functional until Lake is at Full Pool)

Bird Island location of Composting Toilet Install
(Island Closed From March 1 to July 15 for Bird Nesting so construction/site visits cannot occur in this period)

Finley Point State Park
(Possible Launch Access Point)

MDN 11-9-2022
DRAWN BY: DATE:
RS 11-9-2022
CHECKED BY: DATE:

REVISED BY: DATE:
APPROVED BY: DATE:

APPROVED BY: DATE:
APPROVED BY: DATE:

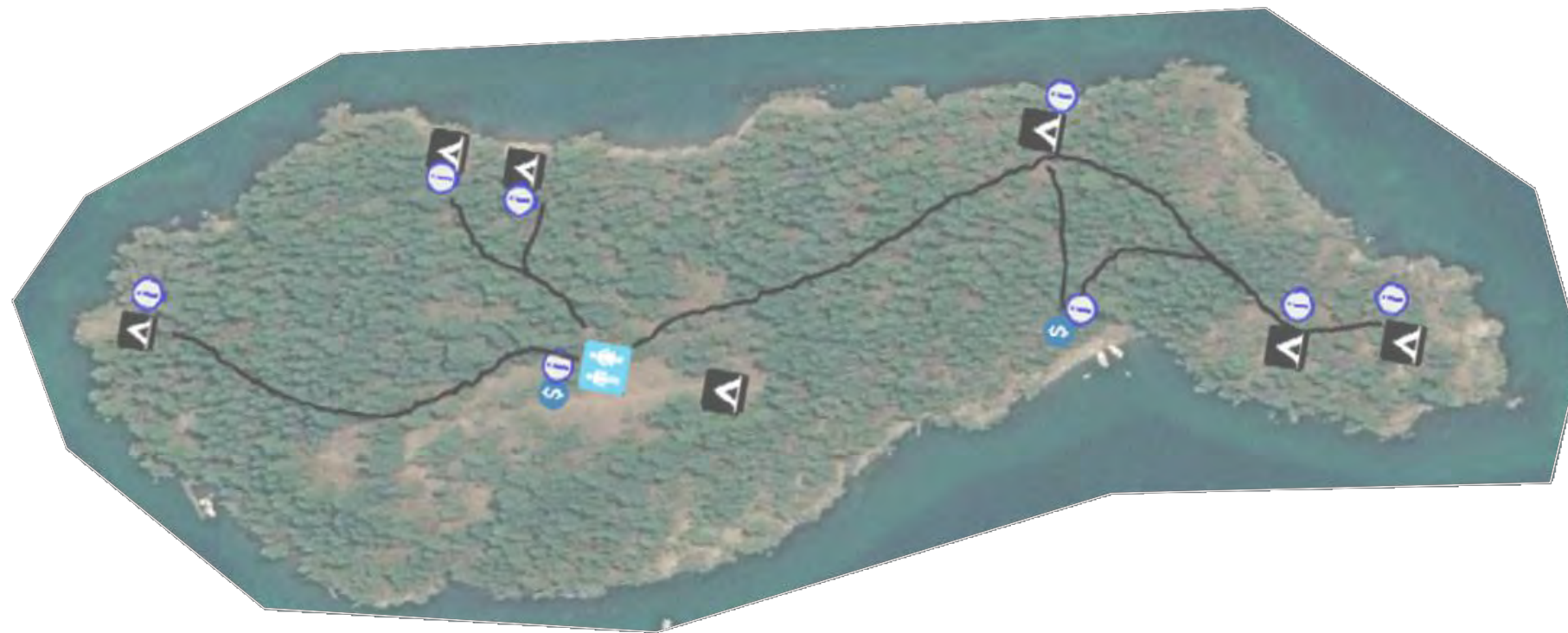
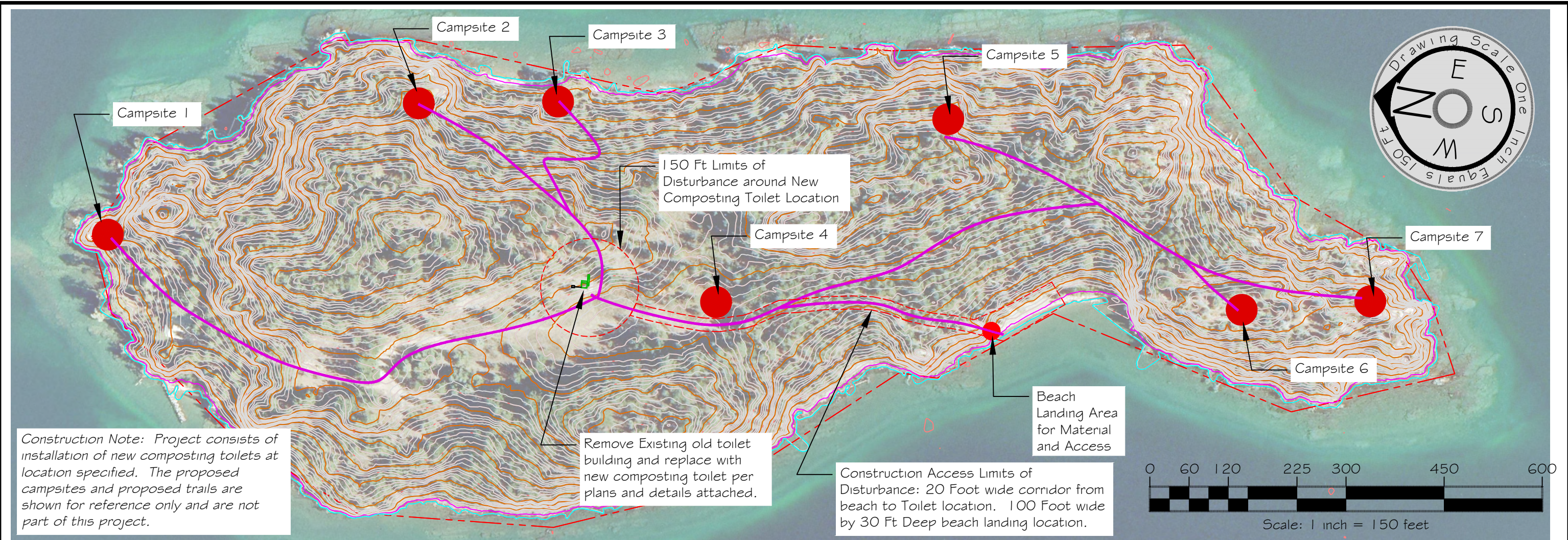


Montana Fish, Wildlife & Parks

Overall Layout

Bird and Cedar Island Composting Toilets

SHEET: 02 of 09



MDN	11-9-2022
DRAWN BY:	DATE:
RS	11-9-2022
CHECKED BY:	DATE:

REVISED BY:	DATE:
APPROVED BY:	DATE:

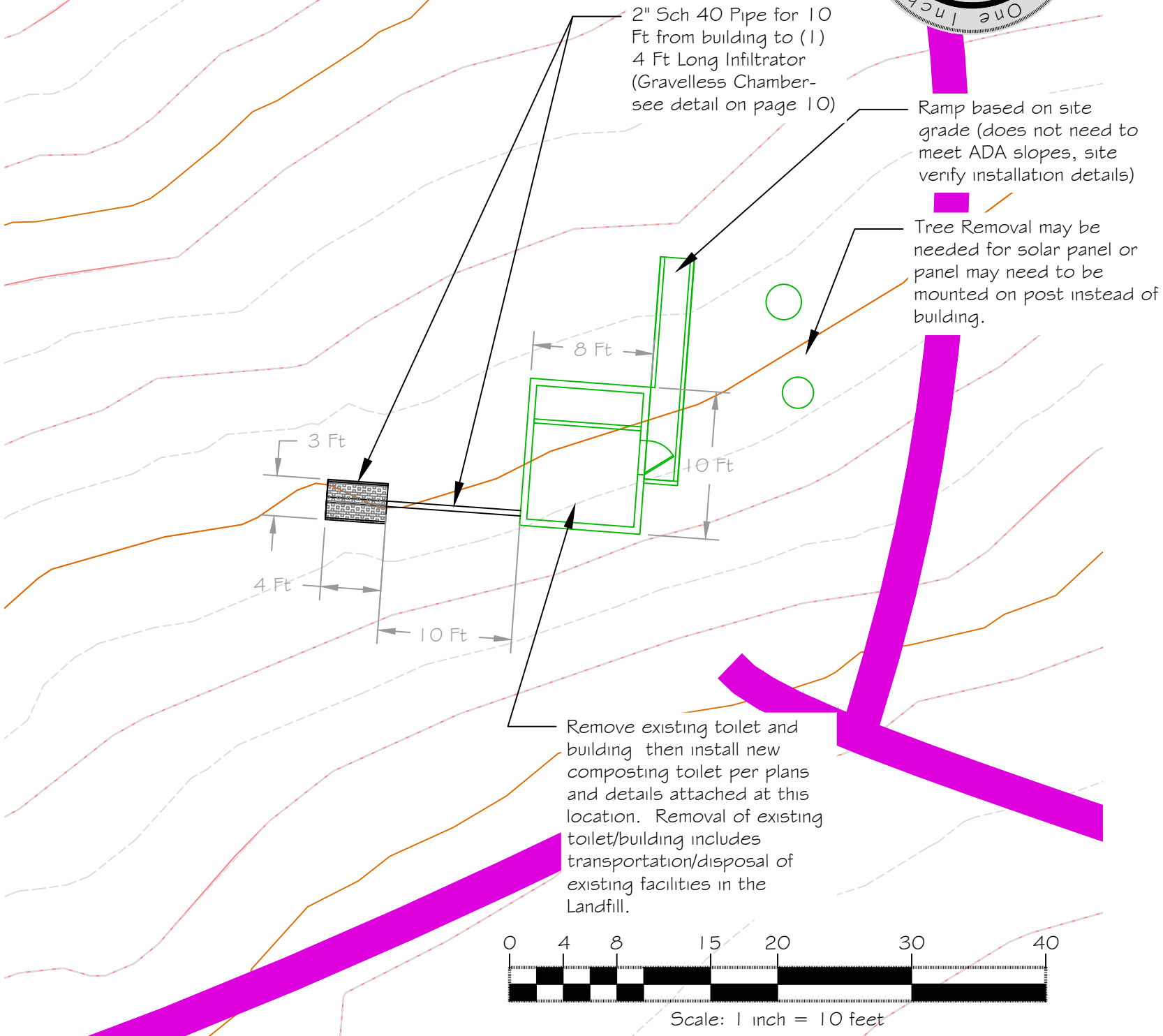
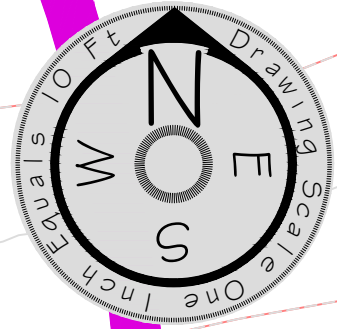
APPROVED BY:	DATE:
APPROVED BY:	DATE:



Montana Fish, Wildlife & Parks Cedar Island Layout
 Bird and Cedar Island Composting Toilets

SHEET: 03 of 09

Construction Note: Project consists of installation of new composting toilets at location specified. The proposed campsites and proposed trails are shown for reference only and are not part of this project.



Installation Site Photos (New Building shall replace existing building)



MDN 11-9-2022
 DRAWN BY: DATE:
 RS 11-9-2022
 CHECKED BY: DATE:

REVISED BY: DATE:
 APPROVED BY: DATE:

APPROVED BY: DATE:
 APPROVED BY: DATE:



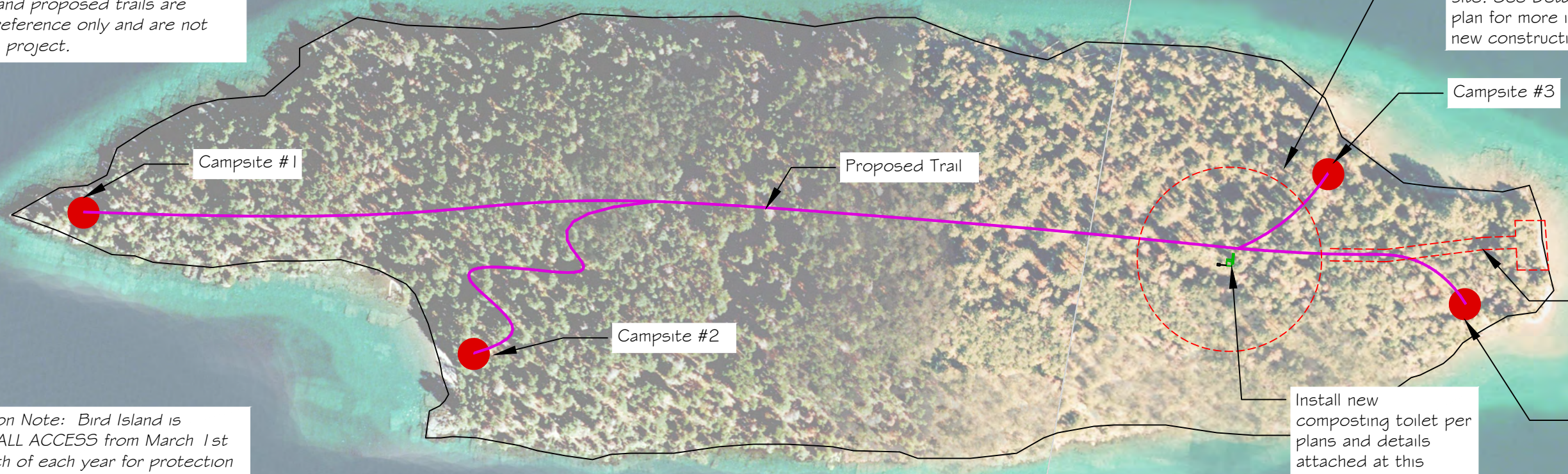
Montana Fish, Wildlife & Parks

Cedar Island Detailed Layout
 Bird and Cedar Island Composting Toilets

SHEET: 04 of 09

Construction Note: Project consists of installation of new composting toilets at location specified. The proposed campsites and proposed trails are shown for reference only and are not part of this project.

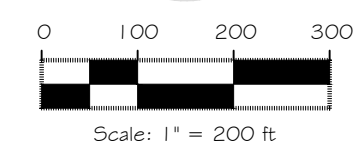
150 Ft Diameter limits of disturbance area circle around composting toilet site. See Detailed composting toilet site plan for more information on demo and new construction details.



Construction Note: Bird Island is closed to ALL ACCESS from March 1st to July 15th of each year for protection of the bird breeding areas on the island.

Install new composting toilet per plans and details attached at this location.

Contractors Access Area Limits of Disturbance: 45' x 80' Beach Landing Area with 20' wide trail access area



MDN	11-9-2022				
DRAWN BY:	DATE:	REVISED BY:	DATE:	APPROVED BY:	DATE:
RS	11-9-2022				
CHECKED BY:	DATE:	APPROVED BY:	DATE:	APPROVED BY:	DATE:



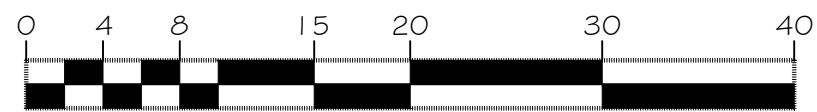
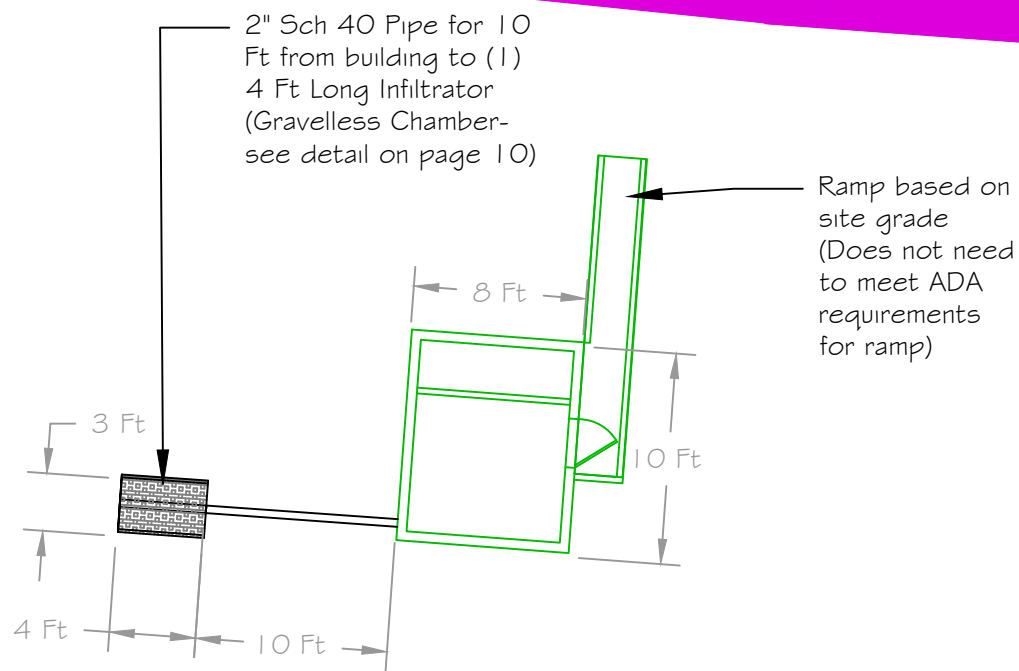
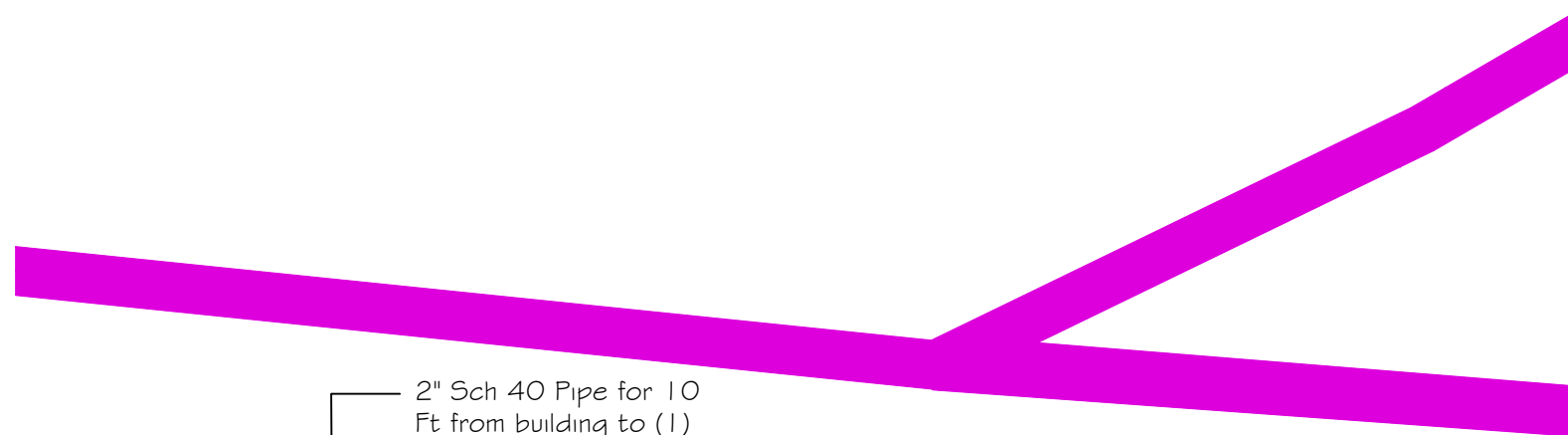
Bird Island Layout

Bird and Cedar Island Composting Toilets

Construction Note: Project consists of installation of new composting toilets at location specified. The proposed campsites and proposed trails are shown for reference only and are not part of this project.



Installation Site Photos



Scale: 1 inch = 10 feet

MDN 11-9-2022
 DRAWN BY: DATE:
 RS 11-9-2022
 CHECKED BY: DATE:

REVISED BY: DATE:
 APPROVED BY: DATE:

APPROVED BY: DATE:
 APPROVED BY: DATE:



Montana Fish, Wildlife & Parks

Bird Island Detailed Layout
 Bird and Cedar Island Composting Toilets

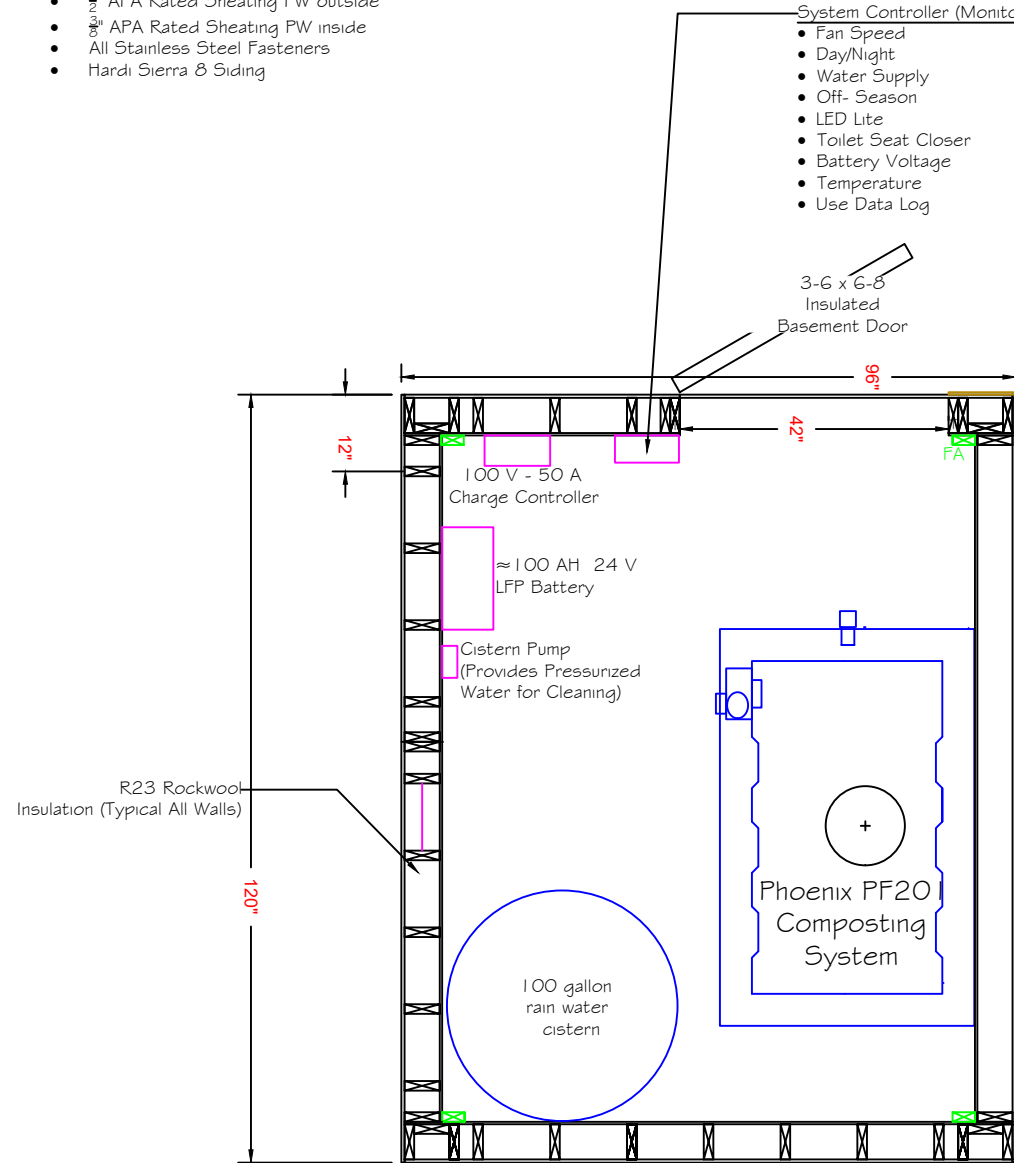
SHEET: 06 of 09

Foundation Wall Framing:

- 2x6 MSR 2100 psi Fb Studs at 1' OC
- .31 CA-C Pressure Treated
- 1/2" APA Rated Sheathing PW outside
- 5/8" APA Rated Sheathing PW inside
- All Stainless Steel Fasteners
- Hardi Sierra 8 Siding

System Controller (Monitors and Controls):

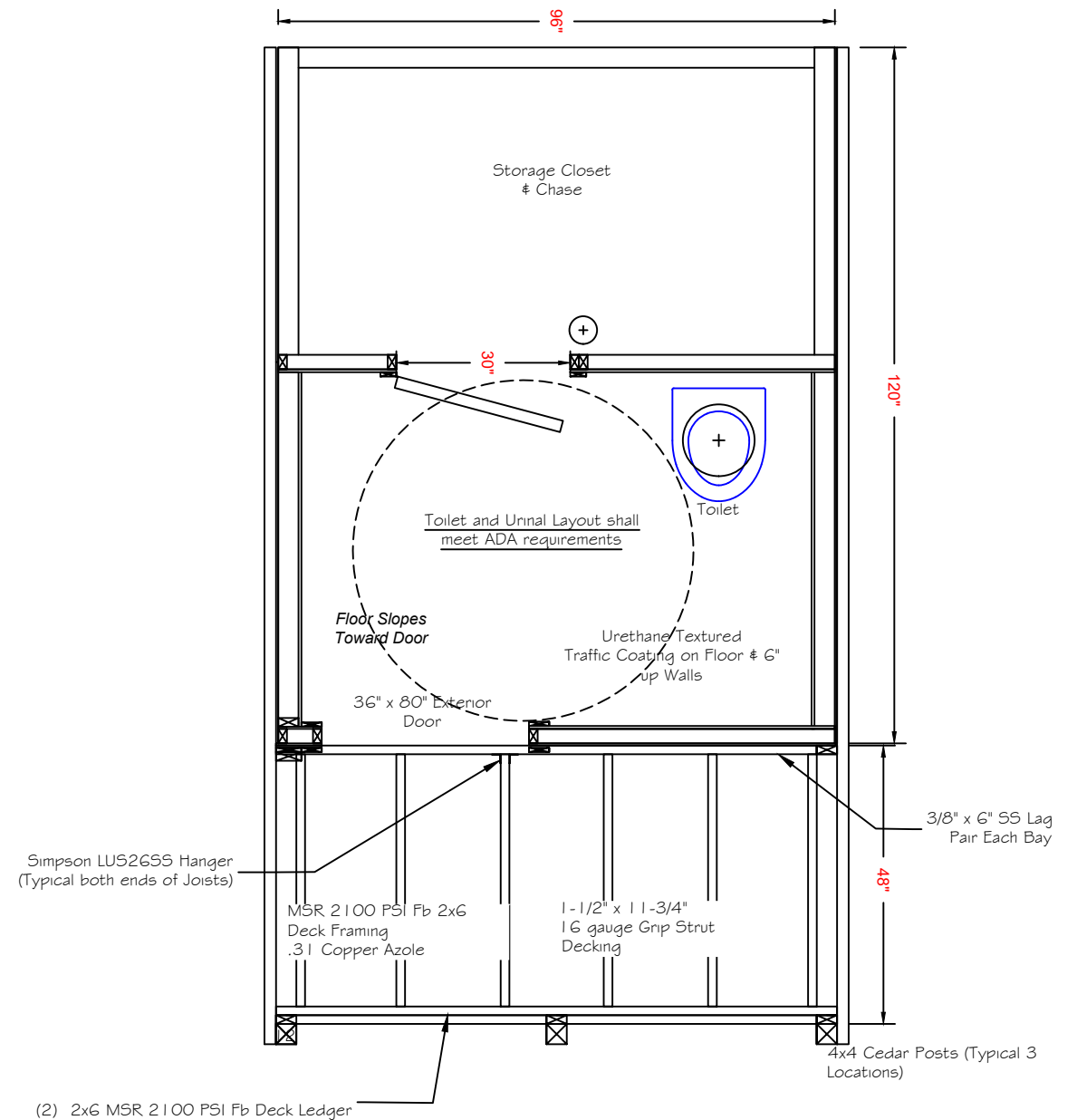
- Fan Speed
- Day/Night
- Water Supply
- Off-Season
- LED Lite
- Toilet Seat Closer
- Battery Voltage
- Temperature
- Use Data Log



Phoenix Building GCIFITH
Basement Plan View

Upper Level Exterior

- Wall Framing: 2x4 MSR 2100 psi Fb Studs at 1' OC
- 1/2" APA Rated Sheathing PW outside, 5/8" APA Rated Sheathing PW inside
- Hardi Sierra 8 Siding



Phoenix Building GCIFITH
Main Floor Plan View

MDN 9-22-2022
DRAWN BY: DATE:
RS 9-22-2022
CHECKED BY: DATE:

REVISED BY: DATE:
APPROVED BY: DATE:

APPROVED BY: DATE:
APPROVED BY: DATE:



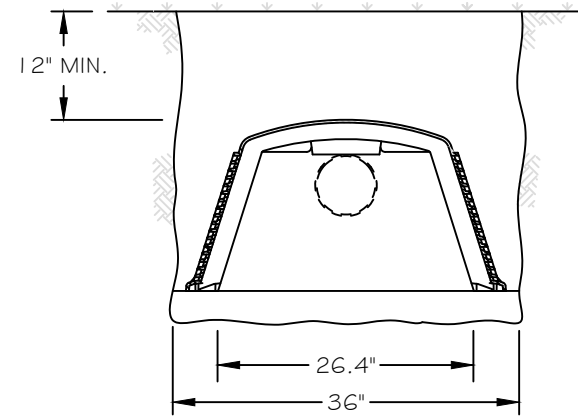
Montana Fish,
Wildlife & Parks

Composting Unit Details
Bird and Cedar Island Composting Toilets

SHEET: 08
of 09

PHOENIX OR EQUIVALENT COMPOSTING TOILET SPECIFICATIONS

- General - The Phoenix Public Facility Package shall be supplied as a complete system except for the exterior vent pipe and wood shavings starter bed. The package shall contain all of the components, hardware and instructions necessary for assembling, installing, and operating the system.
- The Phoenix Composting Tank shall be manufactured with a 1/4" thick rotationally molded, polyethylene exterior shell and a chemically bonded, 5/8" thick foamed polyethylene internal insulation layer. An internally overlapping, gasketed flange shall assure a leak proof joint between tank sections. The system design, dimensions and geometry shall assure that: the entire top of the compost pile is accessible for maintenance; compost travels through the tank in a First-In-First-Out path; all of the oldest material beneath the bottom tines can be removed with a conventional shovel without contamination with fresh waste.
- Access Doors shall have a pultruded fiberglass frame, polyethylene interior and exterior faces sandwiching 1" insulation and an anodized aluminum handle. The Access Doors shall fit into extruded aluminum frames sealed to the Phoenix Tank and shall be totally removable to facilitate maintenance.
- Baffles shall be located along the interior of both sides of the Phoenix Tank to provide aeration of the compost pile while and not interfering with compost movement.
- A Porous Floor located above the bottom of the Phoenix Tank shall separate leachate from compost. A stable, aerated medium located beneath this floor shall provide secondary treatment for liquid before it drains from the tank.
- Rotatable tines shall assist in mixing the top of the compost pile and control the movement of finished compost to the access area during compost removal. Tine shafts installed in the tank bottom and midsection shall be perforated to provide additional aeration to the interior of the compost pile. An optional air injection system shall control pressurized air delivery to the tine shafts based on toilet use. All components of the tine shaft and bearing assembly shall be innately corrosion proof, fiberglass, UHMW polyethylene, and 316 stainless steel.
- The Vent system shall consist of a fan assembly; 5' of wire-reinforced, flexible, vinyl interior vent hose; neoprene flashing to fit roof pitches from flat to 12/12; stainless steel screened vent cap and all fasteners required for installation.
- The Fan assembly shall contain a 5-watt, 12 or 24-volt dc, brushless fan, encapsulated for corrosion resistance so that it will run under water, and a temperature sensor and condensate drain. The fan shall be capable of being powered with a plug-in 120-volt ac power supply or an optional photovoltaic system. To conserve electricity and heat, an optional fan speed controller shall control the ventilation rate based on the time of day, occupancy and battery state of charge.
- A Liquid spray system shall periodically spray water or leachate on the compost pile to inoculate fresh material with organisms that promote the decomposition process, and to keep the entire compost pile moist.
- The Toilet shall be manufactured from white cross-linked polyethylene and ABS. It shall be 14" tall (barrier free, 18" tall) and include a black tapered polyethylene liner, 3' of 12" diameter polyethylene chute, tank connector and toilet seat which seals when shut.
- All Fasteners shall be corrosion proof stainless steel, nylon, or fiberglass.
- Maintenance tools shall include a rake capable of reaching to the back of the tank, a tray for collecting finished compost, a reacher for removing trash and a door opening counter to tally uses.
- Installation shall be performed by an ACS trained installer and certified by an authorized representative of Advanced Composting Systems to assure proper installation and to validate the warranty.
- Substitution of an "or equal" system shall require that an independent engineering firm verify, through scientifically documented engineering analyses, demonstrations and tests, to the satisfaction of the customer, that the substituted system is equal to the Phoenix in the following specific areas: Composting tank material longevity, strength, service temperature, corrosion resistance and tank wall thermal conductivity; Tine shaft and bearing material strength, wear resistance and corrosion resistance; First-in, First-out compost movement, ease of compost removal and tank volume and utilization factor; compost aeration root-mean-square path length; mean liquid path length and retention time; ventilation rate, fan speed control and energy consumption; ventilation fan corrosion resistance and longevity; vent system corrosion resistance and leak resistance.



GRAVELLESS CHAMBER CROSS-SECTION

Not to scale

1. Excavate trenches to proper width and depth.
2. Smooth irregularities in the excavation. A level flat surface is necessary.
3. Assemble gravelless chambers in trenches.
4. Punch out the pipe hole openings in the end plates as needed and connect inlet pipes.
5. Fill sidewall area to top chambers with native soil. No clay, silt or debris shall be used.
6. "Walk In" fill to compact soil along sides of chamber. Failure to compact side soil will make chamber susceptible to collapse.
7. Cover gravelless chambers to a minimum of 12" after consolidation. Avoid debris, large rocks or other unsuitable material in cover soil.
8. Gravelless Chambers shall be Infiltrator brand or equivalent. The chambers shall be designed for wastewater applications and for the burial depth and dimensions shown.

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 be 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. Follow all of directions for startup procedures on the composting toilet unit, it is likely bulking material may be necessary.
2. Routine Monitoring and Maintenance is required per manufacturers directions on unit.
3. Verify all alarms are operational and in a visible location. Verify battery status and electrical system function. Battery may need to be removed during winter months depending on function of toilet during winter months and battery type.

GENERAL OPERATION & MAINTENANCE OF THE COMPOSTING TOILET SYSTEM

1. Inspect and perform maintenance at least once every 2 weeks during peak use season. Follow all directions and procedures as outlined by composting toilet manufacturer.
2. Visual inspect mechanical & electrical components
3. Observe & calibrate float switches if necessary for pump operation and tank draw down
4. Observe and confirm discharge into bed

MDN 11-9-2022
DRAWN BY: DATE:
RS 11-9-2022
CHECKED BY: DATE:

REVISED BY: DATE:
APPROVED BY: DATE:

APPROVED BY: DATE:
APPROVED BY: DATE:



**Montana Fish,
Wildlife & Parks**

Composting Unit Building Details
Bird and Cedar Island Composting Toilets

SHEET: 09
of
09