

Lewis & Clark Caverns State Park Upper Visitor Center Septic Replacement

(FWP Project #7136345)

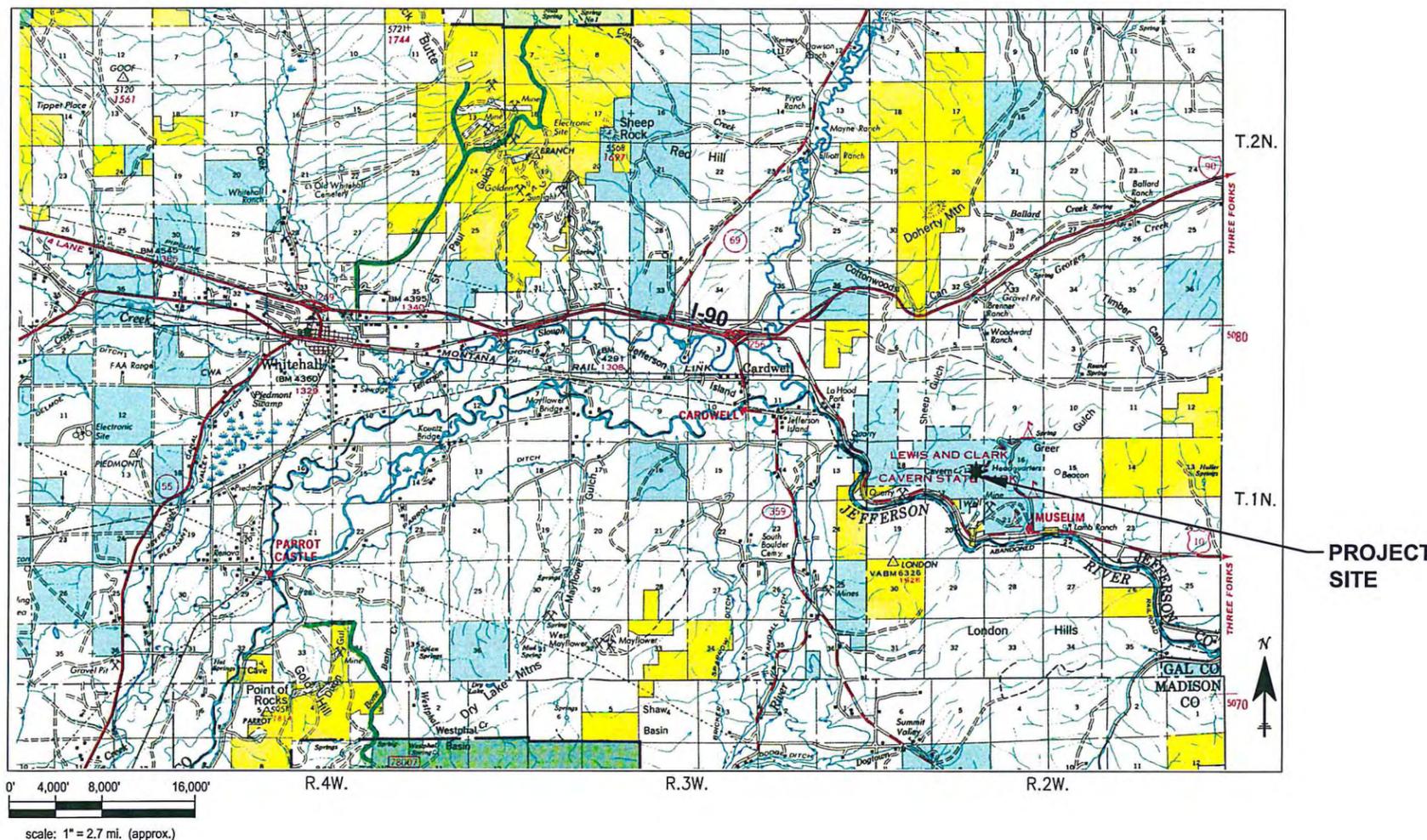
March 3, 2019

-- Bid Document Set --



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PROJECT SITE

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Design Criteria

Design Average Flow	4,000 gpd
Design Peak Day Flow	6,000 gpd
Effluent Pumping (Dose) Flow Rate	600 gpm
New Septic Tank	17,000 nominal (17,652 gal actual; 15,000 gal usable) FRP
Septic Tank Dimensions	10' dia. x 31' OAL
Septic Tank Freeboard (air space)	26 3/8" (15% of liquid capacity)
Septic Tank Effluent Filter	15" dia. x 36"h fabric cartridge w/ 1/16" mesh
New Dosing Tank	6,000 nominal (6,256 gal actual) FRP
Dosing Tank Dimensions	8' dia. x 17.5' OAL
Dosing Tank Reserve Capacity (to Hi-Alarm)	1.5 vf (390 gal, or 130% of drainfield design flow)
Tank Vents – Septic Tank	(2) 6" w/ carbon filters & (2) vented riser lids w/ carbon filters
Tank Vents – Dosing Tank	3" (DN80) ventilating (vacuum relief) valve & vented riser lid w/ carbon filter
Septic Tank Access Hatches	(2) 24" dia. (above inlet & baffle) & (1) 30" dia. above effluent filter
Dosing Tank Access Hatches	42" x 36" hatchway (pump removal) & (1) 24" dia. above inlet
Odor Control (vents & lids)	Orengo [®] carbon filters (replaceable packets)
Dosing Pumps (redundant)	(2) 600 gpm x 13.2' TDH, 2.8 hp submersible, NEC Cl.1, Div.2
Pump Discharge	6" (thru 4" X 6" pump base elbow)
Pump Support	SS slide rails
Power Supply	240V, 1-ph
Pump Power	230V, 3-ph (thru VFD)
Local Elec. Disconnect	NEMA 3R local sub-panel (main breaker)
Pump Control	float switch intrinsically-safe relays ('enable' & 'low shutoff') analog flow signal to VFD adjustable electronic timer relay for dose frequency & duration
Auxiliary Alarms	'high level' IS float switches (septic & dosing tanks) red beacon & horn
Emergency (loss of power) Operation	6" gravity overflow from Dosing Tank to Effluent (pump discharge) Manhole
Flowmeter	6" mag-meter, NEMA 4X (in vault)
Outfall Sewer Replacement	8" Cl. 200 (SDR 21) self-restrained PVC (new)
Minimum Slope & Capacity	6.0% slope; 1,300 gpm
Outfall Sewer Clean-outs (new)	(3) at ~215' separation
Delivery Piping (gravity)	6" Sch. 35 PVC (exist.) – 620 to 680 gpm minimum capacity 6", 10" & 4" Cl. 200 (SDR 21) self-restrained PVC (new)
Flow Distribution	hydraulic flow-splitter 30" dia. manhole w/ 30" dia. energy dissipater manhole upstream
Air/Vacuum Release	2" (DN50) ventilating & bleed (air-vac) valves in vaults
Vaults (valves & appurtenances)	Polycrrete or HDPE handholes
Manholes	ribbed PVC w/ integral floors & insulated lids (conc. ballasted)
Drainfield Application Rate	0.5 gpd/sf
Drainfield Dispensing Rate	147 gpm – Zone 1 153 gpm – Zone 2
Drainfield Zone 1 Lateral Length (total)	1,470 lf
Drainfield Zone 1 Absorptive Surface	4,410 sf
Drainfield Zone 2 Lateral Length (total)	1,540 lf
Drainfield Zone 2 Absorptive Surface	4,620 sf
Infiltration Chamber Dimensions	34"W x 13"H
Infiltration Trench Width	36"
Infiltration Chamber Bury Depth	24"
Drainfield Manifold Piping	4" Cl. 200 (SDR 21) PVC
Manifold Connections	4" x 2" SS saddles
Drainfield Lateral Piping	1½" Cl 200 (SDR 21) PVC
Drainfield Lateral Perforations	0.125" (reamed) at 5'-0" O.C.
Drainfield Lateral Pipe Support	NyLok ties (100# rated)
Drainfield Lateral Lengths (min. to max.)	97 ft to 190 ft
Drainfield Lateral Flow Control	orifice plates (removable)
Lateral Inlet Pressure (min.)	4.2 psi
Residual Pressure at End of Laterals (min.)	3.0 psi
Drainfield Lateral Isolation (& throttling)	1½" PVC 150 psi gate valves
Drainfield Lateral Clean-outs	1½" sweep elbow & riser w/ plug (far ends of each lateral)
Drainfield+Delivery Piping Fill Volume (per zone)	420 to 450 gal
Dosing Pump Run Time	3.5 to 4 minutes (programmable)
Drainfield+Delivery Piping (post-pump) Drain Time	~1.5 minutes
Doses per 24-hr	two (at Avg. Flow) three (at Peak Flow)

Abbreviations

A	amps
ac	acre(s)
ac-ft	acre-feet
AFF	above finished floor
AGS	above ground surface
alum	aluminum
BETA	Beard Environmental & Technical Assistance, LLC (Engineer)
BGS	below ground surface
cfs	cubic feet per second
C	(electrical) conduit
CL	centerline
CI	class
CPLG	coupling
cm	centimeter
cy	cubic yard(s)
DF	(septic) drain field
DIP	ductile iron pipe
DN	diameter nominal (pipe size)
ea	each
EPA	(U.S.) Environmental Protection Agency
FHWA	Federal Highways Administration
FLR	floor
fps	feet per second
FRP	fiberglass-reinforced plastic
ft	feet
FWP	Montana Department of Fish, Wildlife and Parks (Owner)
G	(electrical) ground
GA	gage
gal	gallons
galv	galvanized
gpcd	gallons per capita (per person) per day
gpd	gallons per day
gpd/sf	gallons per day per square foot
gpm	gallons per minute
GW	groundwater
GWPCS	(Montana) Groundwater Pollution Control System (Permit)
HDPE	high density polyethylene
HP	horsepower
hp	horsepower
I/C	instrument and control (or instrumentation cable)
in	inches
IPS	iron pipe size
k	kilo (thousand)
kVA	kilovolt-amps
kW	kilowatt
kWhr	kilowatt hours
lb	pounds
lf	linear foot
L&CC	Lewis & Clark Caverns (State Park)
MDEQ	Montana Department of Environmental Quality
MDT	Montana Department of Transportation
mA	milli-amps
mgd	million gallons per day
mg/l	milligrams per liter
mm	millimeter
MPDES	Montana Pollutant Discharge Elimination System (Permit)
OAL	overall length
O&M	operations and maintenance
OC	on center (spacing)
OHP	overhead power
OSHA	(U.S.) Occupation Safety and Health Administration
P	pole (electrical switch configuration)
pcf	pounds per cubic foot
PLCS	places
ppd	pounds per day
psi	pounds per square inch (pressure)
PVC	polyvinyl chloride (plastic)
PWS	Public Water Supply
ROW	right-of-way
s	seconds
SDR	sidewall/diameter ratio (pipe rating)
sf	square foot (feet)
Sch	schedule
SPD	surge protection device
SS	stainless steel (or Sanitary Sewer)
stl	steel
TDH	total dynamic head
UG(E)	underground (electric)
VFD	variable frequency drive
V	volts
WW	wastewater



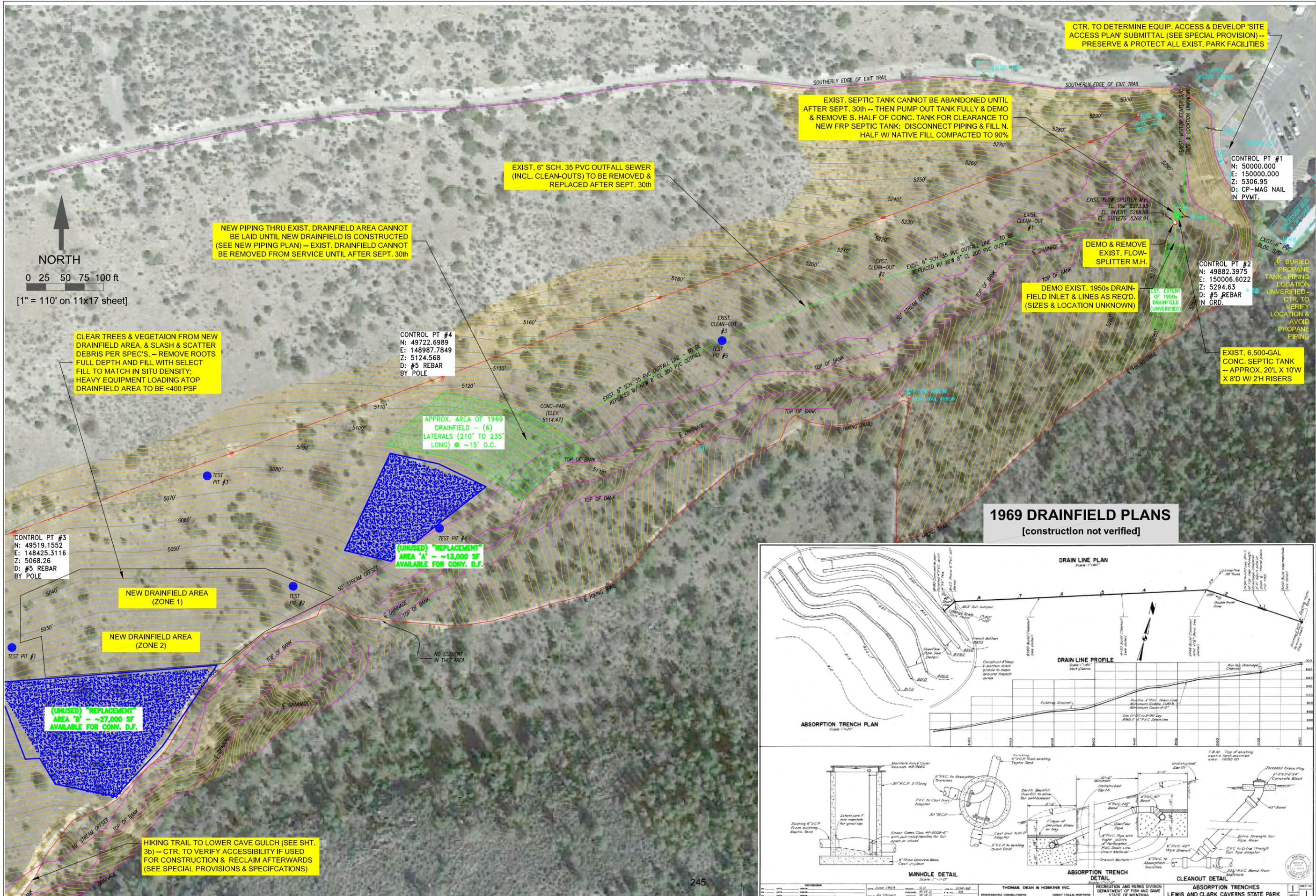
designed: Alden G. Beard, P.E.
date: July 31, 2017
revised: Feb. 19, 2019

**Lewis & Clark Caverns State Park
Upper Visitor Center Septic Replacement
DESIGN CRITERIA & ABBREVIATIONS**



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Lewis & Clark Caverns State Park
Upper Visitor Center Septic Replacement
EXIST. SITE PLAN WITH DEMOLITION & ACCESS



CTR. TO DETERMINE EQUIP. ACCESS & DEVELOP 'SITE ACCESS PLAN' SUBMITTAL (SEE SPECIAL PROVISION) -- PRESERVE & PROTECT ALL EXIST. PARK FACILITIES

EXIST. SEPTIC TANK CANNOT BE ABANDONED UNTIL AFTER SEPT. 30th -- THEN PUMP OUT TANK FULLY & DEMO & REMOVE S. HALF OF CONC. TANK FOR CLEARANCE TO NEW FRP SEPTIC TANK; DISCONNECT PIPING & FILL N. HALF W/ NATIVE FILL COMPACTED TO 90%

EXIST. 6" SCH. 35 PVC OUTFALL SEWER (INCL. CLEAN-OUTS) TO BE REMOVED & REPLACED AFTER SEPT. 30th

NEW PIPING THRU EXIST. DRAINFIELD AREA CANNOT BE LAID UNTIL NEW DRAINFIELD IS CONSTRUCTED (SEE NEW PIPING PLAN) -- EXIST. DRAINFIELD CANNOT BE REMOVED FROM SERVICE UNTIL AFTER SEPT. 30th

CLEAR TREES & VEGETATION FROM NEW DRAINFIELD AREA, & SLASH & SCATTER DEBRIS PER SPEC'S. -- REMOVE ROOTS FULL DEPTH AND FILL WITH SELECT FILL TO MATCH IN SITU DENSITY; HEAVY EQUIPMENT LOADING ATOP DRAINFIELD AREA TO BE <400 PSF

CONTROL PT #4
N: 49722.6989
E: 148987.7849
Z: 5124.568
D: #5 REBAR BY POLE

APPROX. AREA OF 1969 DRAINFIELD - (6) LATERALS (210' TO 235' LONG) @ ~15' O.C.

(UNUSED) "REPLACEMENT" AREA 'A' -- ~13,000 SF AVAILABLE FOR CONV. D.F.

CONTROL PT #3
N: 49519.1552
E: 148425.3116
Z: 5068.26
D: #5 REBAR BY POLE

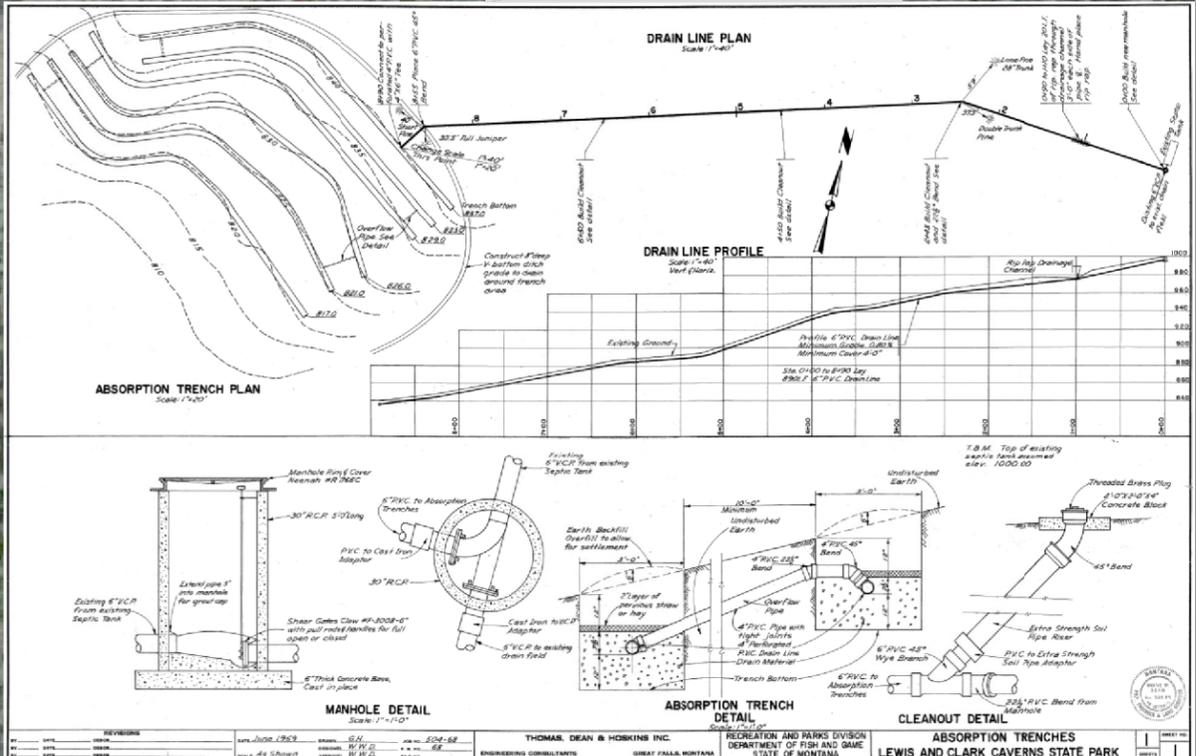
NEW DRAINFIELD AREA (ZONE 1)

NEW DRAINFIELD AREA (ZONE 2)

(UNUSED) "REPLACEMENT" AREA 'B' -- ~27,000 SF AVAILABLE FOR CONV. D.F.

HIKING TRAIL TO LOWER CAVE GULCH (SEE SHT. 3b) -- CTR. TO VERIFY ACCESSIBILITY IF USED FOR CONSTRUCTION & RECLAIM AFTERWARDS (SEE SPECIAL PROVISIONS & SPECIFICATIONS)

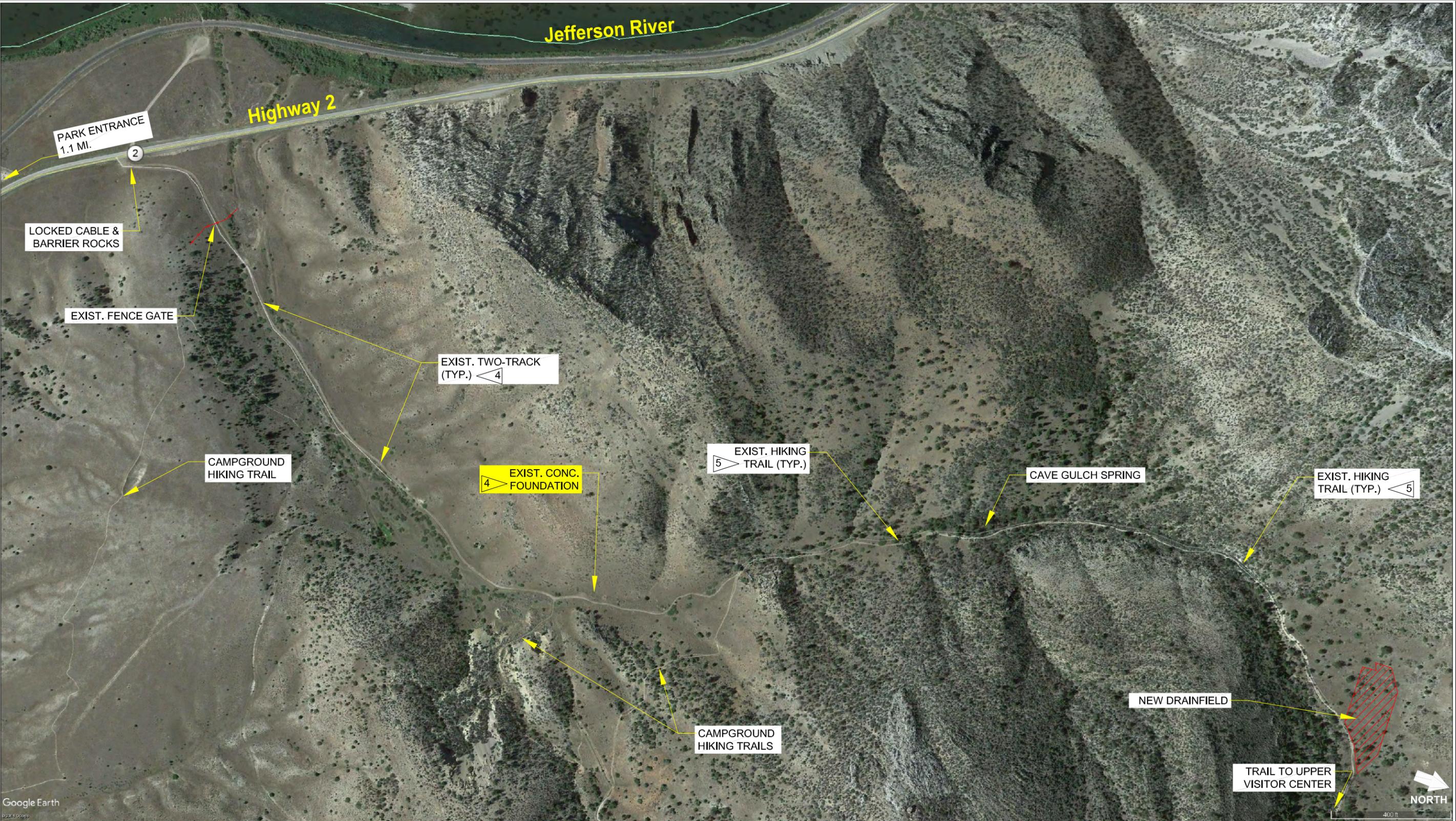
1969 DRAINFIELD PLANS
[construction not verified]





designed: Alden G. Beard, P.E.
date: Feb. 5, 2019
revised: Feb. 19, 2019

**Lewis & Clark Caverns State Park
Upper Visitor Center Septic Replacement
OPTIONAL LWR. CAVE GULCH ACCESS ROUTE**



- NOTES:**
1. USE OF LOWER CAVE GULCH FOR CONSTRUCTION ACCESS IS SOLELY AT CONTRACTOR'S OPTION, SUBJECT TO 'ACCESS PLAN' SUBMITTAL, & S.W.P.P.P. & ALL RESTORATION REQUIREMENTS. ALTERNATE OR ADDITIONAL ACCESS MAY BE AVAILABLE FROM UPPER PARKING LOT, SUBJECT TO SPECIFICATION AND 'ACCESS PLAN' SUBMITTAL REQUIREMENTS.
 2. PARK HIKING TRAIL CLOSURES WILL BE SIGNED BY PARK PERSONNEL. ALL OTHER CONSTRUCTION AND TRAFFIC CONTROL SIGNAGE BY CONTRACTOR.
 3. NO CAMPING ALLOWED OUTSIDE ESTABLISHED PARK CAMPSITES & SUBJECT TO ALL PARK REGULATIONS.
 4. EXIST. TWO-TRACK MAY BE USED BUT NOT ALTERED OR IMPROVED FOR CONSTRUCTION EQUIPMENT AND MATERIALS ACCESS WEST OF EXIST. CONCRETE FOUNDATION.
 5. EXIST. HIKING TRAIL EAST OF EXIST. CONCRETE FOUNDATION MAY BE TEMPORARILY WIDENED PER TYPICAL SECTION SHOWN AT RIGHT, BUT MUST BE RESTORED TO NARROWER CONFIGURATION SHOWN AFTER USE.
 6. CONSTRUCTION DISTURBANCE CANNOT EXCEED 10' EA. SIDE OF EXIST. TWO-TRACK (OR TRAIL) CENTERLINE. ALL DISTURBED AREAS TO BE FINE-GRADED TO $\pm 2"$ SURFACE PROFILE, & BROADCAST-SEEDING & FERTILIZED PER SPECIFICATIONS, INCLUDING FULL LENGTH OF EXIST. TWO-TRACK AFTER CONSTRUCTION USE..
 7. NOTE WEED CONTROL & WILDFIRE PREVENTION REQUIREMENTS IN SPECIAL PROVISIONS.
 8. CAVE GULCH IS AN EPHEMERAL DRAINAGE & MAY BE CONSIDERED STATE SURFACE WATERS.

