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NAVAJO COUNTY

SEPTIC SYSTEM PROTOCOLS

AND

GUIDANCE MANUAL

FOR

UNDERSTANDING SEPTIC

SYSTEMS

Reviewed 12/2008

NOTE TO THE APPLICANT: Installation and regulation of onsite wastewater systems are very technically oriented. This publication is intended to give a brief overview in less technical terms that hopefully will provide easy to understand diagrams and text for the applicant interested in gaining knowledge to empower them to make informed decisions. This overview is not intended to encompass all design features that are available to the general public through ADEQ rules. It is usually best practice to retain an experienced soil testing licensed contractor to evaluate the soil and a licensed contractor to install an onsite wastewater system (Septic System).

1. The applicant shall hire a qualified soils testing firm. The firm's representative shall contact the Public Works Department for inspection of each percolation test hole, soils observation hole, or soils analysis trenches. **NOTE:** It is the applicant's or testing firm's responsibility to notify the Department 24 hours prior to the soils evaluation regarding the time of the test. Failure to do this may require another percolation or soil evaluation test(s) being performed.

    - A $50.00 inspection fee shall be paid to the Navajo County Building Dept. by check or money order whether the test passed or failed. Cancellations will be taken no less than 30 minutes prior to the time of the test.

2. The applicant shall submit to the Public Works Dept. the Site Suitability and Soils Suitability Evaluations with all necessary percolation test and soil evaluation result forms(s), as per Aquifer Protections Permit (APP), with the appropriate seal of the Arizona registered/geologist who is qualified to do Soils evaluation and percolation tests, or an Arizona registered sanitarian for percolation tests, State of Arizona. Also, the applicant will then submit a final plot plan showing proper septic tank size, length, width and depth of disposal trenches; and properly sized reserve area with all the proper setbacks requirements, per the Aquifer Protection Permit rules (see Example 1), along with a completed permit application.

3. The Public Works Dept. will review all submittals for proper adherence to ADEQ APP rules within 10 days, and when complete, an Approval to Construct (Septic System Permit) will be issued (Provisional Notice of Verification). If the submitted documents are not in order, the applicant will be required to resubmit PERC, soils, missing data reports, etc., in accordance with the APP rules and Navajo County Septic System Ordinance.

4. The septic system permit is $225.00, which includes the $50.00 inspection fee which is generally paid during the percolation test process. However, if the application, report, site-layout, etc. is submitted within 6 months of the soils testing date, the septic system permit is $175.00 which includes the $50.00 inspection fee already paid. (In other words, the applicant will receive a $50.00 discount for starting the permit process within 6 months of the percolation test/soils analysis date.)

INDIVIDUAL SEWAGE DISPOSAL SYSTEM: SITE PLAN CHECKLIST

FOR REVIEW PROVIDE THE FOLLOWING INFORMATION

1. Use sufficient scale for lot size that shows details.

2. Property dimensions and all easements on property.

3. Contour lines across leach field (slope 0-5% provide 2-foot contour lines, 5%-10% slope provide 5 foot contour lines and slope greater than 10% provide 10 foot contour lines).

4. Location and depth of all soil profile and/or percolation test holes.

5. Length and slope of building sewer line (maximum length is 100').

6. Location of 2-way cleanouts: 1 between dwelling to tank; 1 every 50' and 1 at 45 degree or greater angles in tank's effluent sewer line.

7. Septic Tank size material and name of manufacture (Must be ADEQ approved).

8. Length and slope of outlet line to tank (min. length: 10 ft with max 4 inch drop)

9. Indicate effluent distribution method: a). Distribution Box b.) No tee connections allowed.

10. Length and number of leach lines.

11. Distance between trenches (undisturbed soil) 2 x effective depth, but no less than 5'.

12. 100% reserve area for leach field. Unless plated before 1974 then a Special Feature Form is required as signed by the design engineer and homeowner.

13. Provide a cross-section of the end of a leach trench showing inspection pipe, effective area, and total trench depth.

14. Setbacks from: property lines, buildings, dry washes, wells, underground water tanks, water lines, surfaced waters, watersheds, and cuts in sloping terrain. **Note:** If individual wells are common on surrounding lots, then all parts of the septic system must be at least 50'from property lines and 100' from any wells.

15. Provide design criteria, and calculations. Include all percolation test results or soils analysis data, trench design (ft), number of bedrooms, etc. by completing calculation sheets with adjusted SAR based on TSS and BOD as appropriate.

16. No step down piping in a single trench, trench step down or serial loading of trench. Engineer may provide other methods of parallel distribution, i.e. use of D-boxes to support even dispersal. Adequate observation pipes are to be provided for each trench segment. A 5-foot earthen damn must separate each trench segment, per no. 11 above.

***NOTE: DEVIATIONS FROM THE APPROVED PLOT PLAN DURING CONSTRUCTION MUST BE PRE-APPROVED. AS BUILT DRAWINGS DEPICTING CHANGES MUST BE PROVIDED PRIOR TO THE FINAL INSPECTION.**

APPROVAL TO CONSTRUCT APPLICATION CONTENT:

Applications to construct an on- site septic disposal system shall include:

1. Legal description and County Assessor's parcel number of the property on which construction, alteration or extension is proposed.

2. Two copies of a plot plan drawn to scale which shows the following items (a sample plot plan is given in figure 1).

   a. A site location map providing sufficient details to locate the property. These details may include road or street names, distances from road crossings, mile post or other identifiable landmarks.
   b. Direction of North clearly marked.
   c. Location and distances to other sewage system, sewer lines, water lines and political boundaries. If none, make a statement to indicate same.
   d. Location of driveways, public water and sewer utilities, houses, swimming pools, tennis courts, car ports, water features and retention ponds within 5 ft of the property lines.
   e. The distance(s) within 100 feet of the proposed on-site disposal system to any live streams, dry washes, road-cuts and wells indicated. If none, you must make a statement to indicate same. (See set back requirements sheet)
   f. The location of the percolation test hole(s), soils evaluations and soils observation trenches test hole(s), by dimensions to property lines.
   g. All individual disposal system components including reserve area properly marked and located at specified distances.
   h. Location of proposed structures on the property.
   i. A sketch identifying the number of bedrooms if construction a residence.
   j. A topographic map of the proposed site. The contour interval shall clearly identify any wash, watercourse, rock outcropping, road cuts, or other significant topographical features. The maximum contour interval shall be:

GRADE (%)	CONTOUR INTERVAL (FEET)
0 – 5	2
5 – 10	5
GREATER THAN 10	10

Design Specifications for the on-site disposal system.

3. Soil boring logs, depth to high seasonal groundwater table and bedrock soil evaluations and percolation test results in accordance with APP rules.

4. If a public sewer is available within 400 feet of the nearest property line the applicant must hook up to it. The applicant can get an engineer's construction cost estimate of an installed on-site septic system versus an installed connection to the public. If the cost is $6000.00 or greater then connection to public sewer is not required.

MINIMUM SET BACK REQUIREMENTS

FOR SEPTIC TANK SYSTEMS IN FEET

	SEPTIC TANK	DISPOSAL TRENCH
Buildings & Dwellings	10	10
Structures & Appurtenances (gg)	10	10
Property Lines & Easements (aa)	5	5
Wells (Public Water Supplies)	100	100
Wells (Private)	100	100
Live or Intermittent streams (dd)	100	100
Lake or Reservoir (ee)	100	100
Water Supply Watershed	200	200
Dry Wash (ff)	50	50
Water Lines	10	10
Cuts on Sloping Terrain	25	25
Driveway	5	5
Swimming Pool	5	5

aa. A common drinking water system is a system that currently serves or is under legal obligation to serve the property and may include a drinking water utility, a well sharing agreement, or other viable water supply agreement. A setback may be reduced to a minimum of five feet from the property line if:

1. The owners of any affected undeveloped adjacent properties agree by an appropriate written document to limit the location of any new well on their property to at least 100 feet from the proposed septic tank and primary and reserve disposal field areas; and
2. The arrangement and documentation are approved by the department.

dd. As measured from the line which defines the limit of the 10-year frequency flood.

ee. As measured from the high-water line.

ff. As measured from the edged of the watercourse or drainage easement.

gg. Includes fuel storage tanks of any type, deck piers, etc.

CONVENTIONAL SEPTIC TANK SYSTEM DESIGN AND CONSTRUCTION

1. After December 31, 1989, all new septic tanks must have a minimum of two compartments. The inlet compartment of any septic shall be at least two-thirds (2/3) of the total capacity of the tank. An outlet filter must be installed in the outlet baffle of septic tanks installed after January 1, 2001.

2. The minimum liquid capacity of the septic tank shall be 1000 gallons or 2.1 times the daily design flow (see Table 1), whichever is greater. Minimum septic tank capacity for single family dwellings shall be:

Bedroom served	**Minimum tank liquid capacity (gallons)**	**Max Fixture Count**
1-3	1000	18
4	1250	25
5	1500	32
6	2000	39
7	2000	42

Dens, Garages, family rooms and similar areas that can be converted to bedrooms may be included at the discretion of the Navajo County Planning & Zoning Dept. For more than 6 bedrooms use 2.1 x 150 x number of bedrooms for minimum tank capacity in gallons.

Residential Fixture Type	**Fixture Units**	**Residential Fixture Type**	**Fixture units**
Bathtub	2	Sink, bar	1
Bidet	2	Sink, service	3
Clothes Washer	2	Lavatory, single	1
Dishwasher Service	2	Lavatory Double in Master BD	1
Utility Tub or sink	2	Water closet, #1.6 gal/flush	3
Shower, single stall	2	Water closet > 1.6 to #3.2 gpf	4
Sink, Kitchen	2	Water close, greater than 3.2 gpf	6

1. The maximum size for a septic tank is 20,000 gallons. Systems in excess of this design capacity should be designed using secondary treatment technology (See APP Rule).

2. Only on (1) septic permit per assessor's parcel number.

   a. Unless a special use permit is obtained or;

   b. the original parcel is surveyed by an official surveyor to show size of each proposed split.

SOIL SUITABILITY REQUIRMENTS

Minimum Vertical Separation

- 5 Feet from septic system disposal trench bottom to high or seasonal water table.
- Rock or impervious strata not less than 5 feet below septic system disposal trench bottom.

***USE FOR UNIFORM SOILS. IF NOT UNIFORM SOIL SEE APP**

Soil logs for Uniform Soils

- Depth of soil observation hole, 10 ft (min) or to refusal (not on soil log).
- Describe and record soil texture of each layer to bottom of hole.

Requirements for Uniform Soils

- 3 Soils observation holes/trenches to 10 feet depth.
- 2 trenches in Primary Area, 1 in Reserve Area (one trench in each area shall be tested). The third trench shall show uniformity of the soil layers. If different then soils test is Required in the 3rd trench.
- Submit form showing strata levels and soil type(s).
- Submit hole locations on map of property.

Soils Evaluation (Morphology) for Test Holes/Trenches

- Remove smear from spots for taking samples
- Select test locations that will give credible information and is indicative of the entire primary and reserve area.
- Test must show the capability of the soil for primary and reserve area from the surface of the trench bottom. Vertical separation of 5 feet in unsaturated flow conditions below the drain-field must be shown.
- A log of soil formations for each test location with information on soil type, texture, classification, percentage of rock, structure, consistency, mottles, etc.
- Water absorption characteristics of the soil per the soil absorption rate and disposal field sizing table found in APP R 18-9-A312 (D) (2) and the adjusted soil absorption rate equation.
- SARa = $(((6.15 / TSS + BOD)_{.3}) - 1.01)$ SAR $_{1.28}+1)$ SAR

Percolation Tests for Uniform Soils

- 3 holes for testing at different bottom depths (Example 3ft, 5ft, 7ft, or if deep trench go lower, but PERC side, bottom and 2ft below designed trench bottom.
- 2 trenches in Primary Area. 1 in Reserve Area.
- Hand dig a 12" square or 15" Diameter round hole, 12" deep. Remove loose material and add two inches of fine gravel to bottom. Follow all presoak requirements (specifically 4 hours initial presoak and then the test is performed between 16 to 24 hours after the completion of the presoak).
- Arrange with Public Works 24 hrs prior to actual percolation test so we can inspect.
- Repeat percolation test procedure in each test hole until at least 3 rates are within 10% of each reading show this on test form(s). 120 MPT is the limiting condition.
- Submit form(s) with all information above, for each percolation test hole. If rock content is greater than 35% then a soils evaluation is required.

Determine Trench Length for Uniform Soils

- Use criteria of slowest SAR if percolation rate is less than or equal to 120 minutes per inch (min/inch).
- Then the system can be designed, the site drawn-up and submitted by the owner or his representative.

Final Plot Plan

- Submit final plot plan, trench design and engineer/sanitarian/geologist sealed Site Suitability and Soil Suitability Report (Report to included soils analysis, percolation calculation/time, pre soak time, etc.)

SITE SUITABILITY

The site evaluation shall include consideration of related geological, hydrological, topographic climatic and soil analysis factors to effectively determine site suitability of all on-site disposal systems. If the whole evaluation focuses on percolation tests alone, when

inconsistencies exist if the site regarding soils, the evaluation may be faulty and lead to unnecessary greater pollution potential.

1. **SITE SUITABILITY**

Before considering the percolation test or soil evaluation, the site should be considered from a broad and comprehensive perspective.

a. Developments must be within acceptable density limits of on-site systems, and within the capacity of the soil and aquifer to accept wastewater discharges. This includes meeting minimum vertical separation requirements, and maximizing distances to well(s) both on and off the property.
b. Subsurface disposal systems shall not be installed near deep support structures, banks and retaining walls unless supported by an engineer's design report.
c. High seasonal groundwater levels shall be determined to assure minimum vertical separation requirements are met.
d. Soil borings should be logged as necessary to locate impervious barriers, solution channels, or other factors which may affect design.
e. The operation of existing systems at similar sites within the area should be evaluated.
f. Where site evaluations indicate conventional system are not likely to be acceptable, alternative on-site disposal systems and connections to a sanitary sewer, if available, may be considered.
g. The number of percolation tests and soil analysis trenches required will be determined by the uniformity or dissimilarity of various parts of the site.

The percolation test or soils evaluation program should be conducted only after the above factors have been considered. Then the number and location of such tests is based, in part, on the results of the complete site evaluation. Thus, enough tests are made to confirm data from soil evaluation site studies and an unnecessarily large number of tests are avoided, but enough sites have to be tested in order to properly evaluate the site.

2. The site evaluation is required prior to sizing and designing a facility to determine the specific soil suitability.

3. The site evaluation shall be done by or under the supervision of an Arizona Registered Professional Engineer, or Geologist. An Arizona Registered Sanitarian can perform a percolation test of the soils.

ARTICLE 1. AQUIFER PROTECTION PERMITS – GENERAL PROVISIONS

R18-9-101. Definitions

In addition to the definitions established in A.R.S. 49-201, the following terms apply to Articles 1, 2, 3 and 4 of this Chapter.

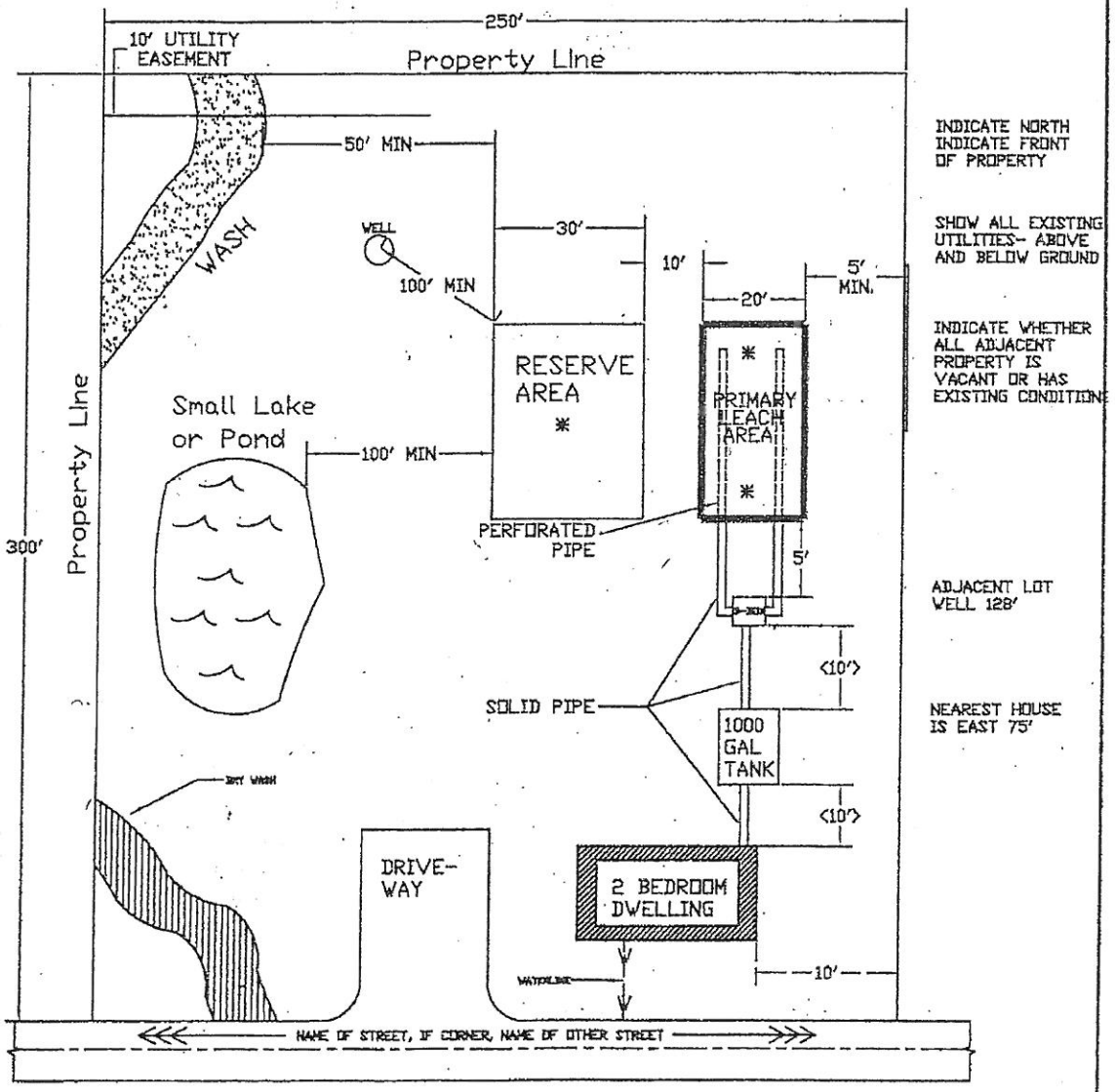
1. "Aggregate" means a clean graded hard rock, volcanic rock, or gravel of uniform size, between ¾ inch and 2 ½ inches in diameter, offering 30 percent or more void space, washed or prepared to be free of fine materials that will impair absorption surface performance, and has a hardness value of three or greater on the Moh's Scale of Hardness (can scratch a copper penny).
2. "Alert level" means a value or criterion established in an individual permit that serves as an early warning indicating a potential violation of a permit condition related to BADCT or the discharge of a pollutant to groundwater.
3. "AQL" means an aquifer quality limit and is a permit limitation set for aquifer water quality measured at the point of compliance that either represents an

Aquifer Water Quality Standard or, if an Aquifer Water Quality Standard for a pollutant is exceeded in an aquifer at the time of permit issuance, represents the ambient water quality for that pollutant.

4. "Aquifer Protection Permit" means an individual permit or a general permit issued under A.R.S. 49-203, 49-241 through 49-252, and Articles 1, 2, and 3 of this Chapter.
5. "Aquifer Water Quality Standard" means a standard established under A.R.S. 49-221 and 49-223.
6. "AZPDES" means the Arizona Pollutant Discharge Elimination System, which is the state program for issuing, modifying, revoking, reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment and biosolids requirements under A.R.S. Title 49, Chapter 2, Article 3.1 and 18 A.A.C. 9, Articles 9 and 10.
7. "BADCT" means the best available demonstrated control technology, process, operating method, or other alternative to achieve the greatest degree of discharge reduction determined for a facility by the Director under A.R.S. 49-243.
8. "Bedroom" means, for the purpose of determining design flow for an on-site wastewater treatment facility for a dwelling, any room that has:
    a. A floor space of at least 70 square feet in area, excluding closets;
    b. A ceiling height of at least 7 feet;
    c. Electrical service and ventilation;
    d. A closet or an area where a closet could be constructed;
    e. At least one window capable of being opened and used for emergence egress; and
    f. A method of entry and exit to the room that allows the room to be considered distinct from other rooms in the dwelling and to afford a level of privacy customarily expected for such a room.
9. "Book net worth" means the net difference between total assets and total liabilities.
10. "Chamber technology" means a method for dispersing treated wastewater into soil from an on-site wastewater treatment facility by one or more manufactured leaching chambers with an open bottom and louvered, load-bearing sidewalls that substitute for an aggregate-filled trench described in R18-9-E302.

EXAMPLE 1
REQUIRED PRELIMINARY SEPTIC SYSTEM PLOT PLAN

DATE:_____ OWNERS NAME:_____PARCEL NO:_____



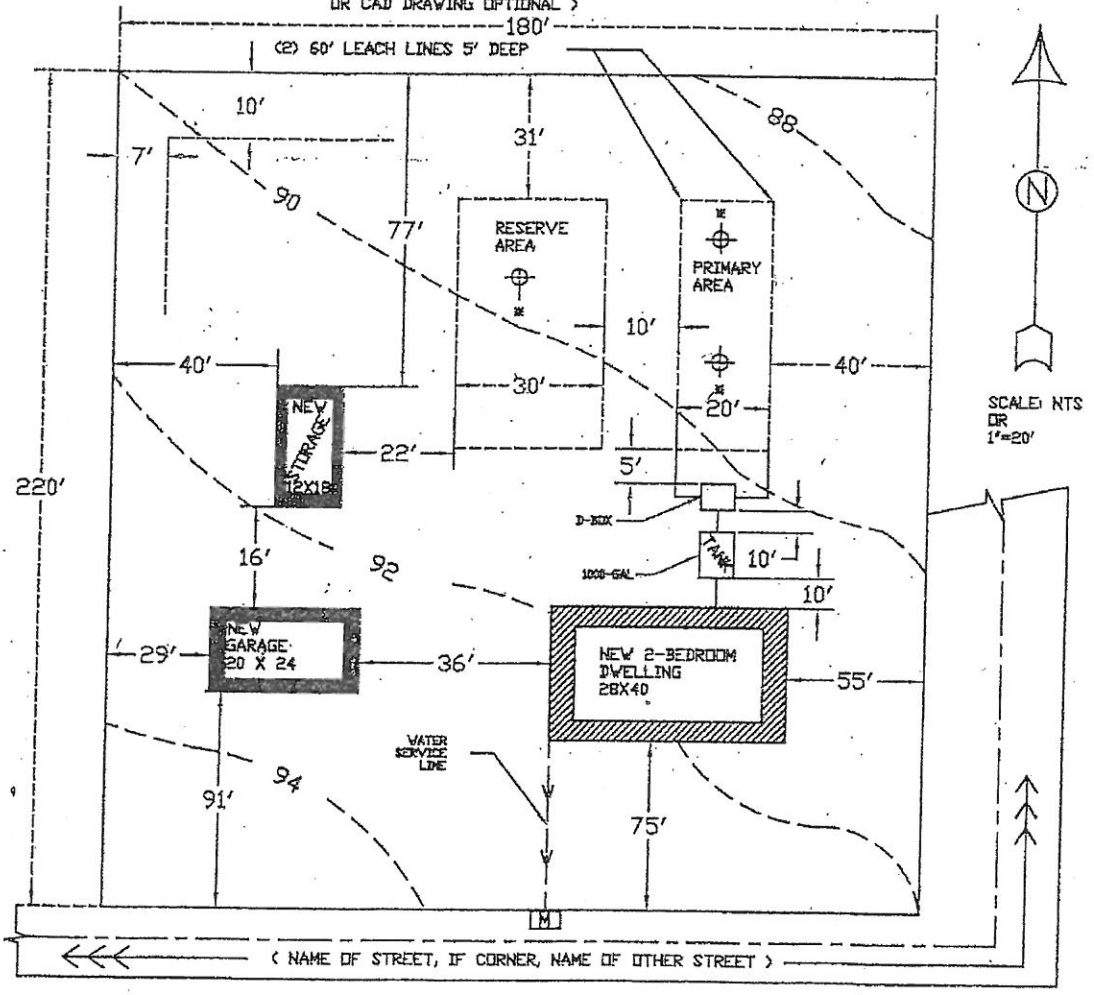
ALL PLOT PLANS MUST SHOW THE FOLLOWING:

1 - ALL PROPERTY LINES AND THEIR MEASUREMENTS, (SHAPE OF LOT)
2 - ALL BUILDINGS AND DISTANCES TO SEPTIC SYSTEM
3 - ALL WATER WELLS ON PROPERTY AND ALL WELLS WITHIN 200' OF PROPERTY LINE
4 - ALL SURFACE WATER AND DRY WASHES
5 - ALL DRIVEWAYS AND WATER LINES
6 - ALL WELLS OR SURFACE WATER WITHIN 500 FEET FROM THE SEPTIC SYSTEM MUST BE SHOWN

* INDICATES PROPOSED SOIL OBSERVATION HOLE AND PERCOLATION HOLES

EXAMPLE 2
FINAL PLOT PLAN

(MUST BE NEATLY HAND DRAWN, DETAILED & REPRODUCIBLE
OR CAD DRAWING OPTIONAL)



(SAMPLE LANGUAGE)
NO WELLS, DRY WASHES, ROAD CUTS ARE WITHIN 100' OF SEPTIC SYSTEM. NO SEWAGE SYSTEM, SEWER LINES ARE IN THE AREA. NEAREST PUBLIC SEWER IS 3 MILES AWAY

LEGEND
⊕ SOIL OBSERVATION HOLE
※ PERCOLATION HOLE

DATE _____ OWNER'S SIGNATURE_____ PARCEL NUMBER : XXX-XX-XXX