2015 Overholt Drainage School

March 16-20, Defiance County, Proposed 5-day Program

- Subsurface Drainage: Design, Layout and Installation; Benefits and Impacts
- Drainage Water Management **(*Controlled Drainage*)** Design, Layout, Installation, and Management
- Water Table Management w/Subirrigation: Design Concepts, Operation, Management, Benefits
- Drainage Water Harvesting, Water for Agriculture

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COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

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SUBSURFACE DRAIN DESIGN PROCEDURE

Paul Chester, Mark Seger
USDA-NRCS, ODNR-DSWR

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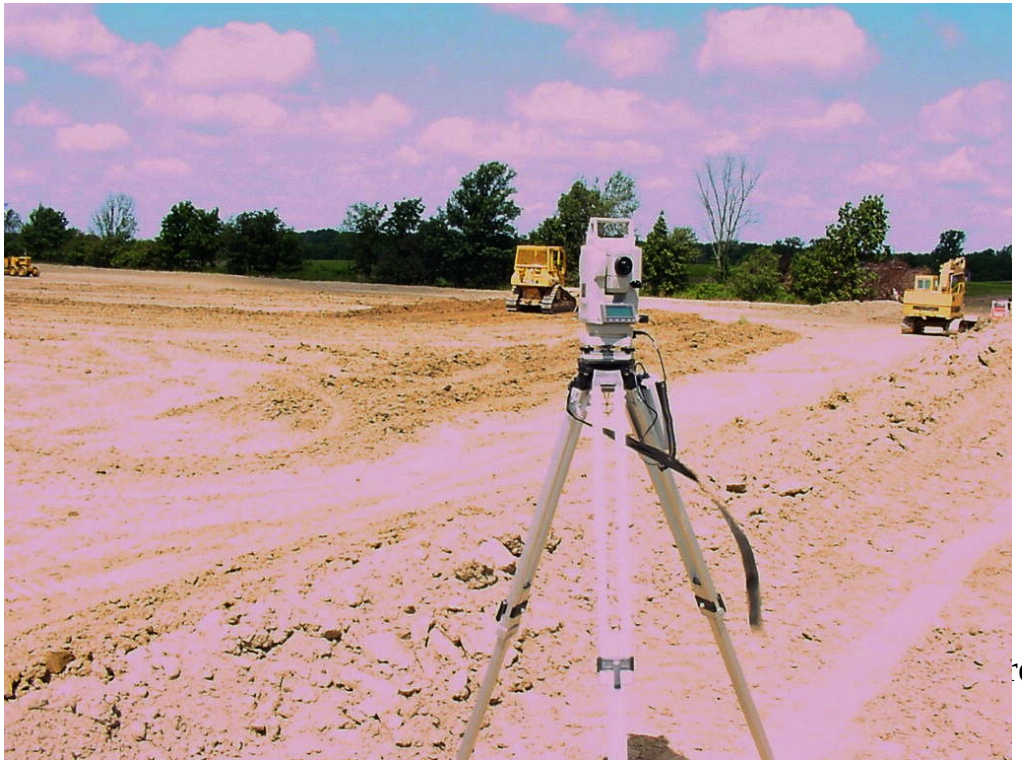
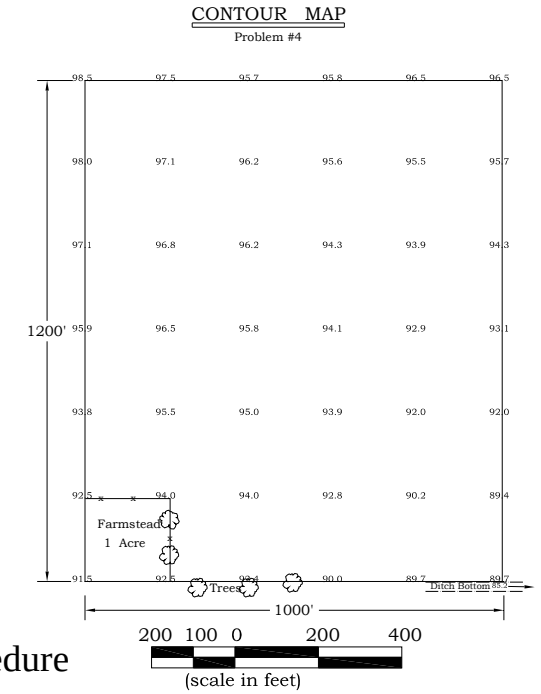
SUBSURFACE DRAIN DESIGN PROCEDURE

- 1. Topo Survey





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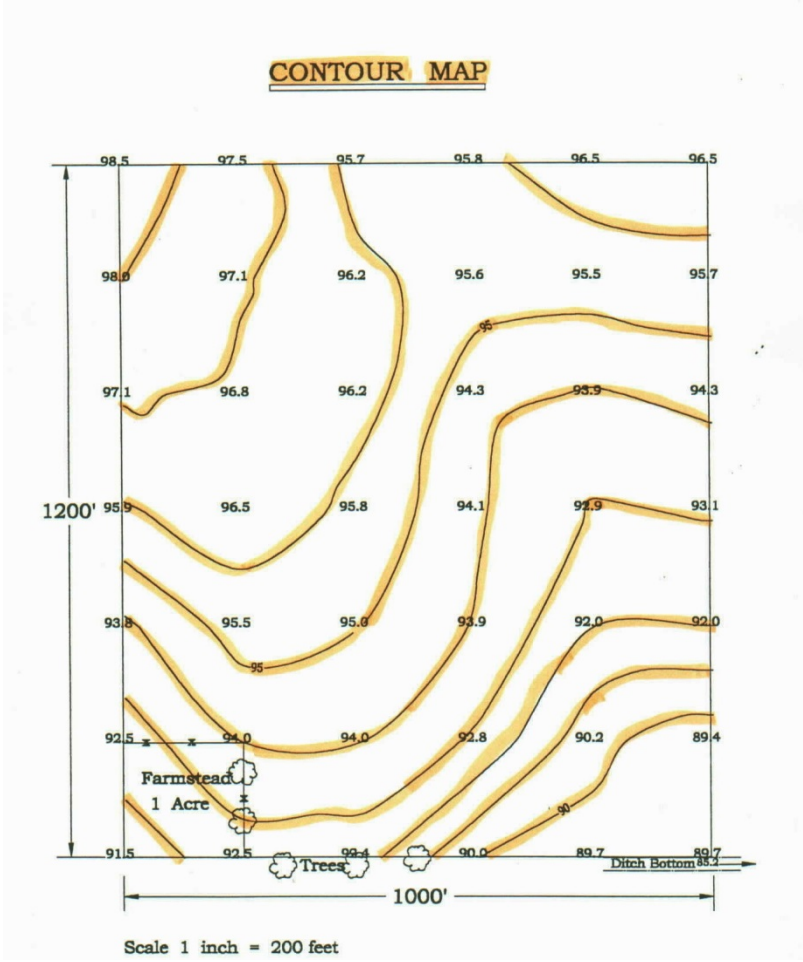

- 2. Contour Map

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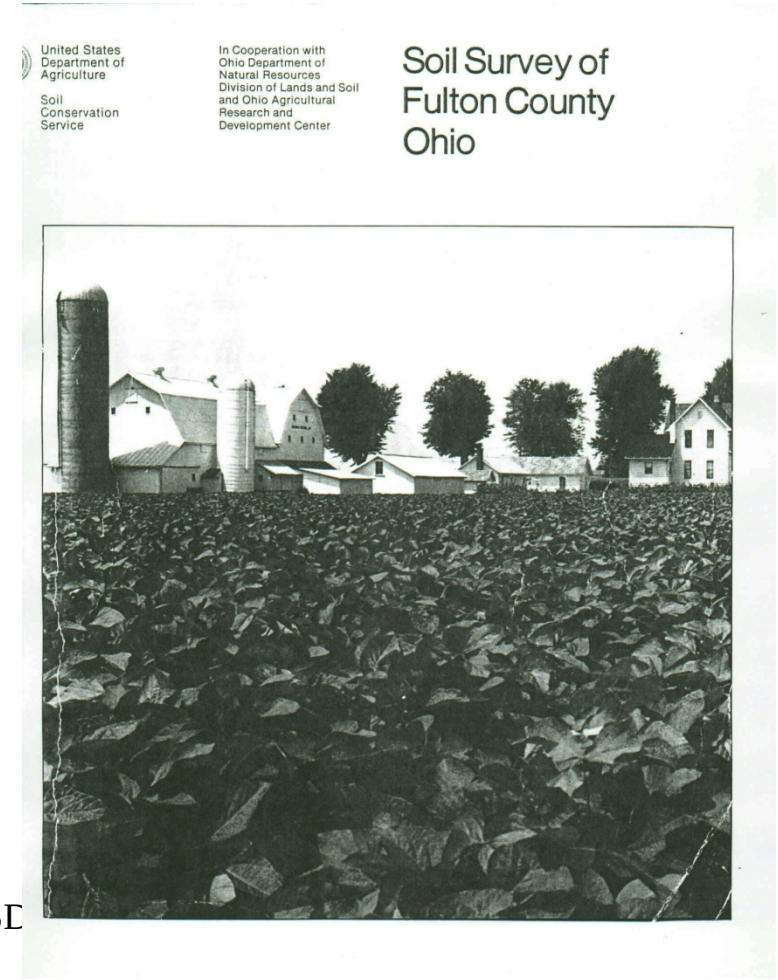
SUBSURFACE DRAIN DESIGN PROCEDURE

- 3. Soil Type



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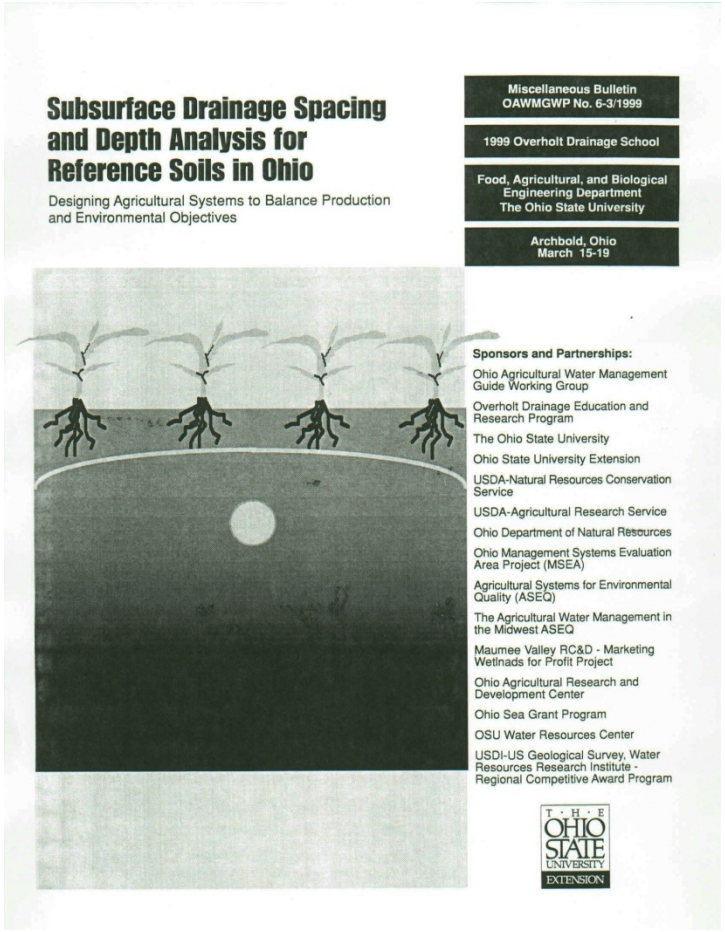

- 4. Drain Spacing

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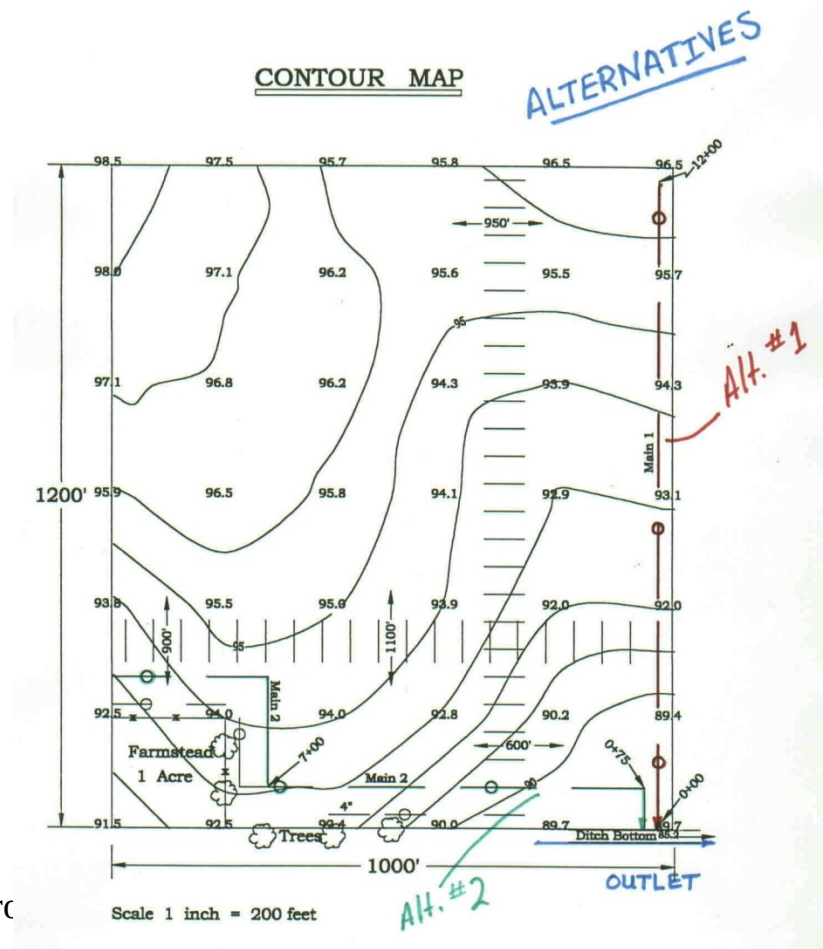
SUBSURFACE DRAIN DESIGN PROCEDURE

- 5. Layout Alternatives



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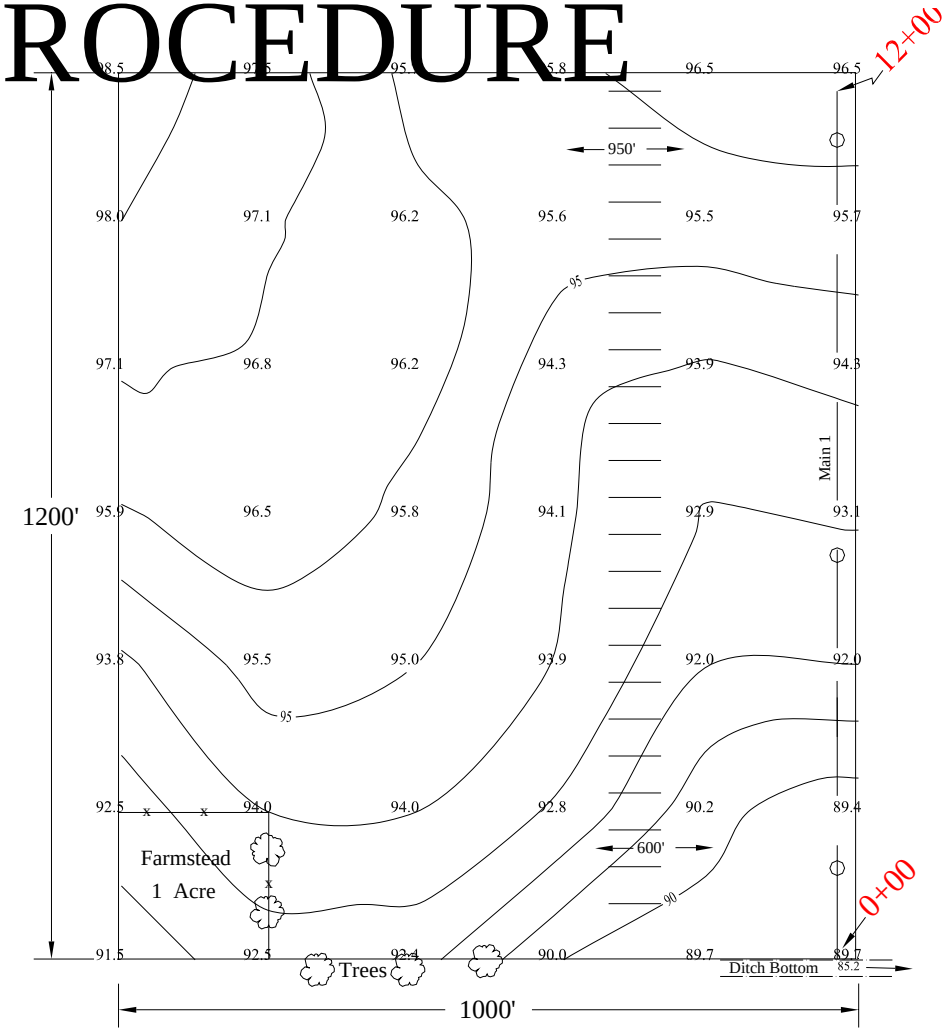
SUBSURFACE DRAIN DESIGN PROCEDURE

- 6. Layout & Station



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SUBSURFACE DRAIN DESIGN PROCEDURE

- 7. Plot Profile

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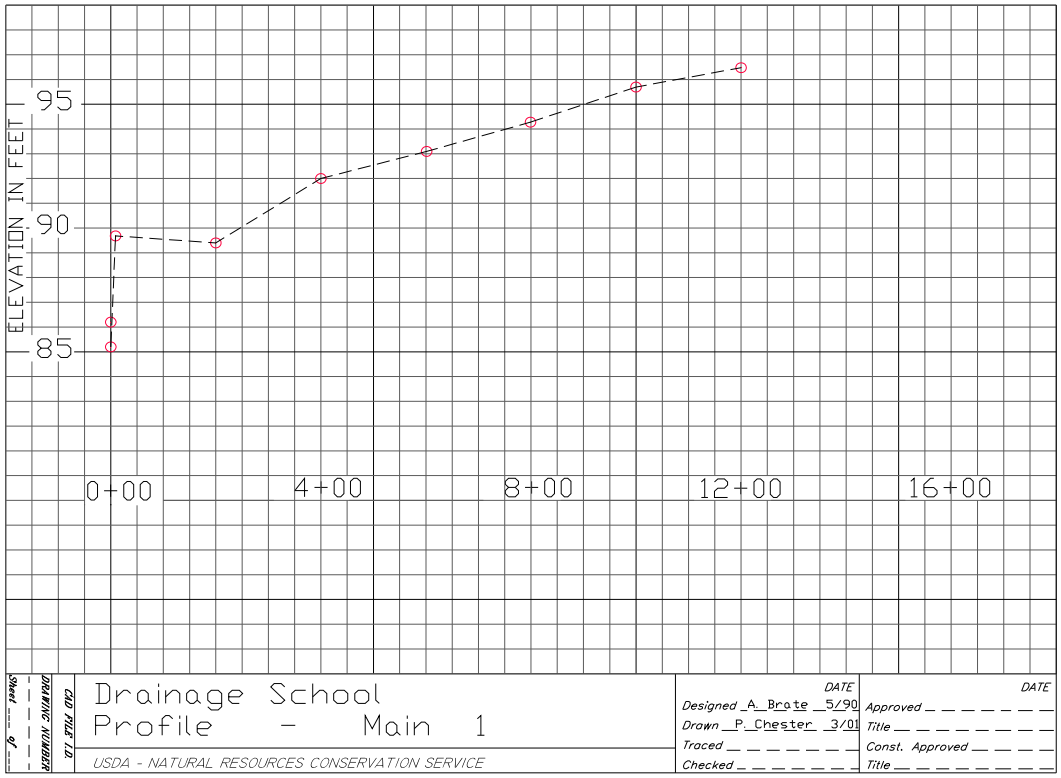
SUBSURFACE DRAIN DESIGN PROCEDURE

- 7. Plot Profile



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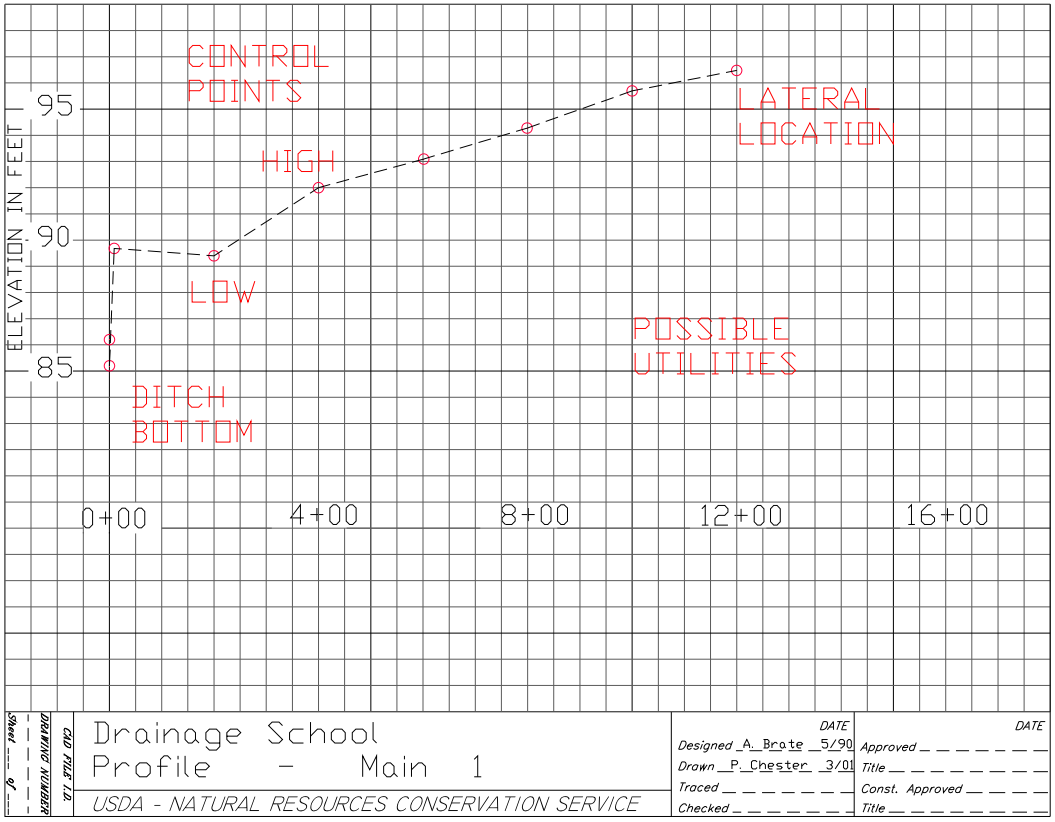
SUBSURFACE DRAIN DESIGN PROCEDURE

- 8. Control Points
- a) Low points
- b) High Points
- c) Outlet
- d) Laterals
- e) Obstructions
- f) Wetlands



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SUBSURFACE DRAIN DESIGN PROCEDURE

- 9. Set Main Gradelines
  - Start with outlet elevation
  - Based upon previous designs – choose main size
  - Keep cover
  - Keep lateral cover

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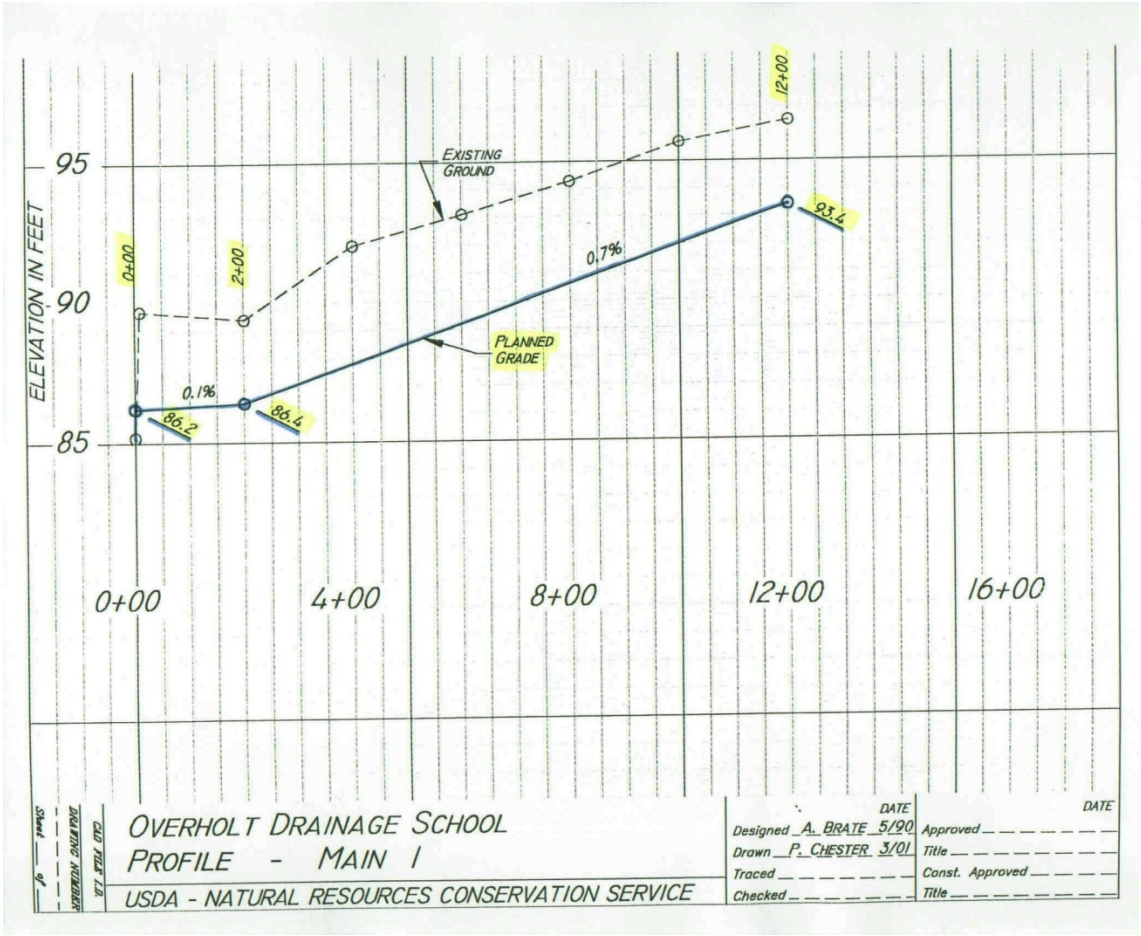

- 9. Gradelines
- a) Round off
- b) Station/Elev.

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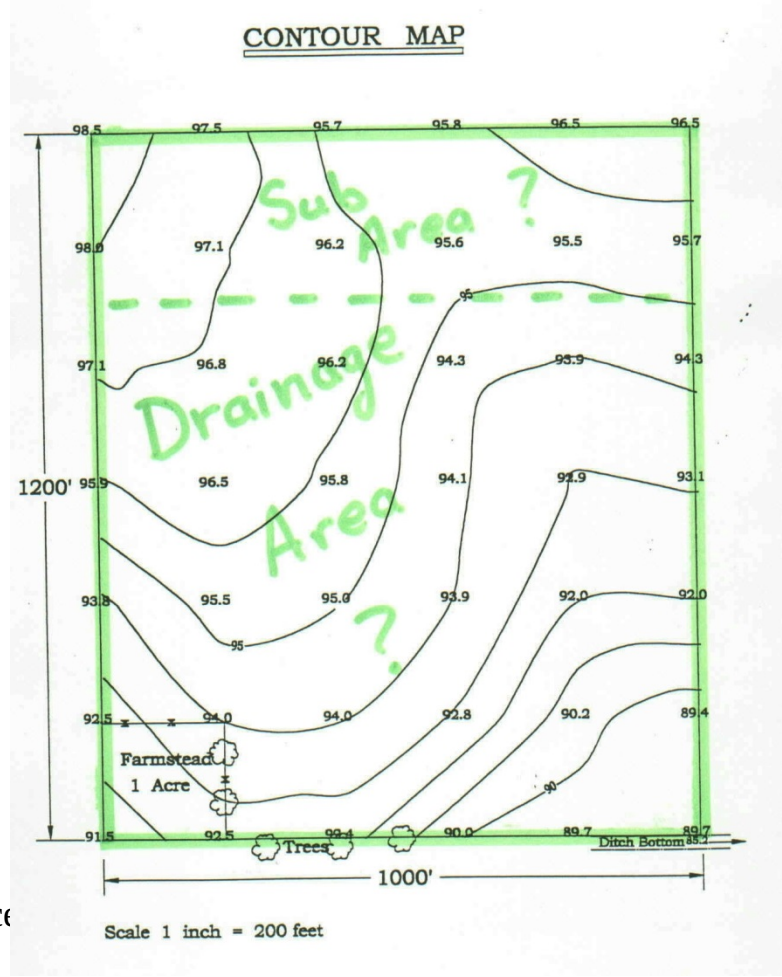
SUBSURFACE DRAIN DESIGN PROCEDURE

- 10. Drainage Area



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SUBSURFACE DRAIN DESIGN PROCEDURE

- 11. Drainage Coefficient

SOIL	FIELD CROPS	TRUCK CROPS
Mineral	3/8 to ½	½ to ¾
Organic	½ to ¾	¾ to 1½

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SUBSURFACE DRAIN DESIGN PROCEDURE

- 12. Capacity At Outlet

SUBSURFACE DRAIN CAPACITY
REQUIRED-CFS

TABLE I

DRAIN AREA ACRES	DRAINAGE COEFFICIENT						
	0.25 in 0.64 cm	0.375in 0.95 cm	0.50 in 1.27 cm	0.75 in 1.91 cm	1.00 in 2.54 cm	1.50 in 3.81 cm	2.00 in 5.08 cm
0.5	.005	.008	.011	.016	.021	.032	.042
1	.011	.016	.021	.032	.042	.063	.084
2	.021	.032	.042	.063	.084	.126	.168
3	.032	.047	.063	.095	.126	.189	.252
4	.042	.063	.084	.126	.168	.252	.336
5	.053	.079	.105	.158	.210	.315	.420
6	.063	.095	.126	.189	.252	.378	.504
7	.074	.110	.147	.221	.294	.441	.588
8	.084	.126	.168	.252	.336	.504	.672
9	.095	.142	.189	.284	.378	.567	.756
10	.105	.158	.210	.315	.420	.630	.840
12	.126	.189	.252	.378	.504	.756	1.008
14	.147	.221	.294	.441	.588	.882	1.176
16	.168	.252	.336	.504	.672	1.008	1.344

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SUBSURFACE DRAIN DESIGN PROCEDURE

- 13. Outlet
- Pipe
- Material

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SUBSURFACE DRAIN DESIGN PROCEDURE

- 14. Outlet Pipe Size

SUBSURFACE DRAIN CAPACITY
CFS

TABLE II
n-0.017

Corrugated Plastic Tubing
Normal Installation Condition

GRADE %	10	12	15				
0.05	.375	.609	1.105				
.10	.529	.861	1.559	1.4			
.15	.648	1.055	1.910				
.20	.748	1.218	2.206				
.25	.837	1.362	2.467				
.30	.917	1.492	2.704				
.35	.991	1.612	2.921				
.40	1.058	1.723	3.119				
.45	1.123	1.827	3.311				
.50	1.183	1.926	3.488				

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SUBSURFACE DRAIN DESIGN PROCEDURE

- 15. Main Design
- a) Upper Main Size
- b) Main Capacity
- c) Lat. Flow Area
- d) Lat. Contribution
- e) Sum Lat. Flow
- f) Note Flow & D.A.
- g) Note Stations
- h) Est. Main Size
- i) Main Capacity
- j) Cap. Available

- 16. Repeat 15c - 15j