

**APPENDIX II**

**BENNETT-THOMAS MILL SITE, PLOW ZONE SAMPLING PROCEDURE**

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As part of the research undertaken at the Bennett-Thomas Mill (7NC-G-111) area of the Scott's Run Project area, an analysis of plow zone excavation units was undertaken. Previous studies of plow zone excavation sampling methods (Custer 1992) were undertaken using data from sites excavated by UDCAR for Del DOT, and these studies focused on how to choose which plow zone units to excavate and how many should be chosen. This study concentrated on how big the plow zone units need to be.

Based on the results of the earlier studies, and conventions used by many historic archaeologists, the standard sampling technique used was to excavate one 5- x 5-foot square randomly chosen from the four quadrants of a 10- x 10-foot square. In this study we tried to determine if sufficient data were gathered using a 3- x 3-foot square instead of a 5- x 5-foot square. A 5- x 5-foot square measures 25 square feet; however, a 3- x 3-foot square measures only 9 square feet, and is somewhat more than one-third of the size of the 5- x 5-foot square. Significant savings in time and money could be realized if the smaller units were used instead of the larger ones.

In order to investigate this issue, special field excavation methods were used. The Standard 5- x 5-foot squares were laid out at the site and a 25 percent sample of them were chosen. However, when these units were excavated, we first excavated a 3- x 3-foot section, usually in the southwest corner of the 5- x 5-foot unit. Artifacts recovered from this subset of the entire unit were bagged separately, and then the remainder of the unit was excavated and screened. Units from the remainder of the unit were also bagged separately. Tables A and B show the artifact counts for the 3- x 3-foot sections and the entire 5- x 5-foot squares. Artifact counts with and without brick were compiled because brick was often a major component of the units' assemblages and we did not want this single data set to skew the results of the analysis.

In order to see if smaller units were producing artifact assemblages similar to those of the large units, we analyzed the mean percentage of the artifacts produced by the smaller units. Because a 3- x 3-foot unit represents an area that is 36 percent of the area of a 5- x 5-foot unit, we assumed that if the smaller units produced artifact counts that were approximately 36 percent of the total unit artifact counts, we were obtaining relatively unbiased samples. When artifact assemblages without brick were considered, the mean percentage was 38 percent with a standard deviation of 13 percent. In this case there is a 95 percent chance that the 36 percent expected value falls within one standard deviation of the mean and, thus, the sample is producing proportional, and most likely unbiased, samples.

Regression equations to predict the 5- x 5-foot squares' artifact counts using the counts from the 3- x 3-foot squares were calculated. For the total assemblage the regression equation was:

5 foot square count = 2.89 (3 foot square count).  
for the assemblage without the bricks the equation was:

5 foot square count = 2.75 (3 foot square count) + 5.71.

Both equations were used to retrodict the actual square counts and subjected to a goodness-of-fit test. In both cases there were no significant differences between the actual values and the retrodicted values.

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In conclusion, the results of this study suggest that 3- x 3-foot squares can be substituted for 5- x 5-foot excavation units within the standard plow zone excavation sampling scheme without biasing the data. It Recommended that the 10 foot square with a four constituent 5- x 5-foot squares be maintained as the basic sampling unit and the 3- x 3-foot squares be considered as a subset of the sampling unit. It is also important to note that this approach and this study apply only to historic sites. Additional studies will need to be done on prehistoric sites, where artifact yields tend to be much smaller, before the 3 foot squares can be used as substitutes for larger units.

### References Cited

Custer, J. F.

1992 "A Simulation Study of Plow Zone Excavation Sample Designs.", North American Archaeologist, 13:263-279.

**TABLE A**  
**Artifact Counts Without Brick; Sampling Study**

Unit	Artifact Counts		
	3x3	5x5	
N140	E300	0	9
N160	E300	19	25
N180	E280	9	9
N180	E320	16	90
N197	E357	19	65
N200	E240	7	14
N200	E260	15	17
N200	E280	20	31
N200	E300	30	43
N200	E337	44	66
N220	E260	35	82
N220	E277	30	64
N220	E360	46	67
N221	E320	60	45
N237	E300	104	129
N240	E280	52	198
N240	E357	11	28
N257	E357	31	49
N260	E180	3	5
N260	E220	1	25
N260	E257	69	290
N260	E320	26	38
N260	E340	30	54
N277	E300	61	54
N280	E160	6	20
N280	E197	15	30
N280	E220	35	68
N280	E337	35	69
N280	E360	46	48
N287	E262	577	1420
N300	E200	24	64
N300	E220	43	126
N300	E360	24	48
N300	E380	11	12
N317	E220	35	135
N317	E360	19	47
N320	E197	13	38
N320	E320	49	72
N337	E217	14	27
N340	E160	26	75
N340	E180	20	48
N340	E200	8	20
N340	E237	24	29
N340	E320	23	31
N340	E340	7	26
N340	E360	9	5
N360	E300	5	5
N360	E320	8	32

n=48

**TABLE B**  
**Artifact Counts with Brick; Sampling Study**

Unit		Artifact Counts	
		3x3	5x5
N140	E300	0	9
N160	E300	19	25
N180	E280	9	9
N140	E300	0	12
N160	E300	20	29
N180	E280	10	11
N180	E320	22	36
N197	E357	26	87
N200	E240	10	17
N200	E260	31	37
N200	E280	39	60
N200	E300	31	46
N200	E337	50	72
N220	E260	85	129
N220	E277	57	78
N220	E320	73	134
N220	E360	74	108
N237	E300	126	152
N280	E197	17	47
N280	E220	65	138
N280	E277	57	79
N277	E300	61	54
N280	E337	58	104
N280	E360	71	64
N260	E220	20	35
N260	E257	74	300
N260	E320	38	109
N260	E340	80	134
N257	E357	81	109
N240	E280	82	231
N240	E357	31	59
N260	E180	11	26
N277	E300	79	57
N280	E160	30	77
N300	E200	39	119
N300	E220	59	146
N300	E360	27	63
N300	E380	13	19
N317	E220	79	192
N317	E360	23	62
N320	E197	15	94
N320	E320	49	132
N337	E217	18	82
N340	E160	41	160
N340	E180	43	180
N340	E237	43	63
N340	E320	36	44
N340	E340	7	41
N340	E360	8	12
N360	E300	6	7
N360	E320	11	59

n=48