footing was visible above the ground surface. This is known to have functioned as a post support for a machine shop constructed circa 1955 (Figure 13 & 15).

INTERPRETATIONS

Introduction

This section of the report will analyze the results of the excavations and compare these results with the information derived from the historic documentation presented above. A study of the site on both the intra-site and inter-site levels will be considered, including artifact distributions, activity area determination, and artifact pattern analysis.

The artifacts recovered from the Phase III excavations ranged in date from the mid-eighteenth to mid-twentieth centuries. Based on these artifacts and their resultant mean ceramic dates, a median occupation date for the William M. Hawthorn site was derived. As stated in South (1977), the formula Z= 235.5 + 87Y (where Y is the sum of South's Mean Ceramic Date) developed by Richard Carrillo gives the best mathematical prediction of the median occupation date as represented by the ceramic sample. For the Hawthorn site, Z = 1851.55. Objectively determined occupation dates for the Hawthorn site can be summarized as follows:

Historic Dates	1738? - 1961
Historic Median Date	1849.5
Mean Ceramic Date	1857.5
Mean Occupation Date	1851.55

An approximation of the beginning bracket date of occupation can be determined based on the known end of occupation dated at

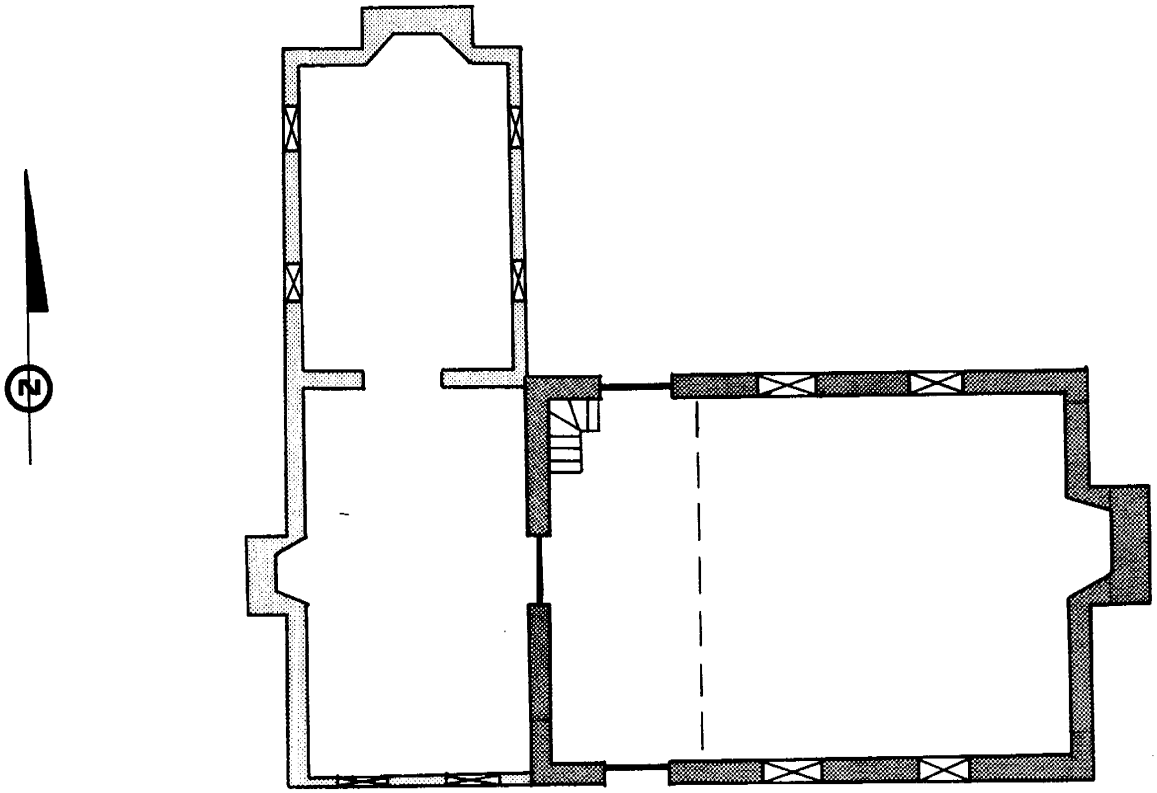
1961 and the mean occupation date (South 1977:224). A first occupation of circa 1742 is derived from subtracting a 109 year range from the mean occupation date. The presence of early to mid-eighteenth century redwares and stonewares in the ceramic assemblage supports this possibility. This quantitative determination is very valuable for this project, and other similar, less well-documented, rural historic sites. As previously discussed in the Regional Culture History, the historical records, specifically the transfer price of the parcel, seem to suggest that by 1738 the site might have been occupied. The determination of a similar date through historical and archaeological analysis supports the applicability of South's concepts and methods to eighteenth and nineteenth century sites under a different regional exchange system. In general, the similar quantitative results between the Hawthorn site and other sites analyzed by South supports his statement that "the patterns in the archaeological record are sometimes remarkably regular on some levels as a result of the regularity of the behavioral pattern in the past cultural system" (South 1977:8).

Using the documentary evidence presented in the Regional Culture History, a conjectural floorplan of the circa 1840 log-and-frame house was constructed (Figure 29). The County Orphans Court Records described the dwelling house as measuring twenty-one feet by forty-one feet, with a twelve foot by seventeen foot frame kitchen addition. Although chimney, window, door, and stair passage placements are not certain, the inventories of 1815 and 1840 verbally describe a house with a room configuration

FIGURE 29

CONJECTURAL FLOOR PLAN OF THE WILLIAM M. HAWTHORN HOUSE, BASED ON ACTUAL DIMENSIONS FROM DOCUMENTARY EVIDENCE

(SEE REGIONAL CULTURE HISTORY)



KEY

- LOGHOUSE CORE, CONSTRUCTED MID-EIGHTEENTH CENTURY
- FRAME ADDITION AND KITCHEN, PRESENT BY 1816.
- – – – INTERIOR WALL

similar to that shown. The house was originally a side-hall, one-room deep log structure, that was later enlarged (at least by 1815) by the addition of a frame wing and a kitchen ell. The log core was two-story, while the frame sections were one-story, probably with a shed or lean-to style roof. It should be noted that the house apparently had a southern orientation. While this is not the most frequent house exposure found in the Middle Atlantic, it was by no means uncommon (Bernard Herman, personal communication, 1983).

Figure 30 shows the floorplan of the same Hawthorn house, based on the archaeological evidence. The results are quite remarkable in their coincidence with those found by archival research. The house dimensions found at the site match those presented above. Located during the excavations (Test Unit 12, and Test Trenches 17 and 18) were the east and north stone foundation walls of the original log core, and part of the south wall. The foundation here was approximately four feet in depth; this area had served as a cellar in the post-1902 house. A twenty foot section of stone foundation was located, (Squares 58, 59, and Test Trench 16) one foot deep, that closely conformed to the west wall of the frame kitchen ell. North of this line were several post molds, probably the remains of a lean-to or porch that projected off the north wall of the kitchen ell. An additional line of stones was found extending along the north wall of the log core, perhaps remains of that structure's stone foundation, or the foundation of the post-1902 kitchen ell. Also shown in the figure is the location of the brick foundation of the post-1902 house structure, found by the excavation of test

Units 11 and 15. Of particular importance is the photograph of the house taken in 1960 (Plate 2) that shows the 1902 house facing easterly, indicating a reorientation of the house by 90 degrees. Thus the Phase III excavations were able to locate and identify the original mid-eighteenth century log house foundation, and show it to have been reoriented from south to east in 1902. This information, derived from documentary and archaeological evidence, is also supported by the intrasite distribution of artifact classes and groups. See also Heite (1984) for a similar circumstance in Kent County, DE.

Intrasite - Artifact Distribution, Activity Area Determination

Prior to the determination of activity areas at the site, an analysis of the artifact density distribution obtained by the shovel/postholer units was accomplished. The shovel/postholer units studied were located west of the division line between the plowzone and the main occupation area of the site (Figure 21). The main excavation area was analyzed separately due to differential artifact densities and excavation techniques. Ninety-seven shovel/postholer units were thus included. For the purposes of this study, all of these units were assumed to be of equal volume and depth. Based on the raw artifact counts obtained from these units, nine artifact distribution maps were prepared (Figures 31-38). Density contours were manually plotted on these maps, revealing areas of the site that contained high concentrations of functionally or chronologically significant artifact types or groups. The density contours were visually interpreted for each map to define specific intra-site

differences within artifact classes and groups. Using intra-site comparisons between classes and groups and an analyses of the density or dispersion of contours, the presence or absence of interrelationships between architectural and archaeological features were revealed. The maps prepared included one map of the total artifact counts for all of the studied shovel/postholer units (Figure 16); six artifact class maps showing the density distributions for (1) creamware, delftware, and redwares (Figure 31), (2) pearlware and yellow-ware (Figure 32), (3) whiteware and ironstone (Figure 33), (4) wrought and cut nails (Figure 34), (5) wire nails (Figure 35), and (6) building materials (Figure 36); and two maps illustrating functional differences through density distributions for the kitchen artifact group (Figure 37), and the architecture group (Figure 38).

In general, two major areas of high artifact density were located, separated by the house foundation rubble pile. To the north and west of the house, one area, actually composed of four smaller artifact concentrations, was apparent. The largest of these concentrations was centered around shovel/postholer units 10E/20S and 57, and contained large amounts of ironstone and whiteware (Figure 33), wire nails (Figure 35) and kitchen related artifacts (Figure 37). North of this area was a concentration of building material around shovel/postholer unit 10E/10N (Figure 36). To the west of these was a low concentration of building material, and architectural group artifacts (Figures 36 and 38) arranged around the intersection of the 20S and 40W transects. Finally, in the vicinity of 10E/50S was a significant architectural group concentration (Figure 38). All of these

concentrations were located in the rear or side yards of the post-1902 house, and are representative of generalized activity areas associated with the mid-19th to 20th century ocupation of the site. Continual occupation of this area has obscured any functional differences that may have existed in this area. It is noteworthy that no large densities of eighteenth century artifacts appeared in this area. The concentration of artifacts in the 20S/40W vicinity may be indicative of some temporary or ephemeral structure that stood there, such as a chickenhouse, which historic documentation records as having been in that general vicinity (Figure 13).

The second major artifact concentration was located east of the house foundation. This concentration consisted of three, and possibly four, separated high density areas. Three of these were located approximately thirty to forty feet east of the foundation, in the vicinity of the 90E/60S to 90E/40S transects, and contained high densities of creamware and redware, kitchen group material, and building material (Figure 31, 37 and 36). The final, smaller concentration was found centered on shovel/postholer unit 70E/20S, and was primarily a concentration of building material (Figure 36). The artifact concentrations in this area would all have been located in the side yard of the original, south-facing log house. Again spatially separate functional areas had been lost through long-term occupation and use of this area. The largest concentration of creamware and redware came from this area, which represents a yard area or activity area associated with the loghouse occupation of the

site.

After the completion of the distribution analysis of the shovel/postholer units, a similar analysis of an area approximately fifty feet by fifty feet was undertaken (Figure 15 and 39). Within this area, intensive testing in both the Phase I/II and Phase III excavations had combined to produce a 15% areal sample. The excavation units studied were ten, five foot by five foot units, three, three foot by three foot units, two three by four foot units, two, two foot by five foot units, and ten, two foot by ten foot units. These twenty-one excavation units provided an excellent sample of backyard and sideyard areas of the post-1902 site. Previous Phase I/II excavations had shown numerous features and a high density of artifacts. Through this analysis, different areas of artifact disposal for the late eighteenth to early nineteenth centuries, and the mid-nineteenth century to the present, could be studied further and compared.

As with the shovel/postholer units, distribution maps were prepared for these excavation units. The goal of the analysis was the determination of chronologically distinct areas through use of artifact classes and the elucidation of functionally distinct areas through examination of the artifact group distributions. These maps were of the same categories that were previously presented: total artifact counts (Figure 40), creamware, delftware, and redwares (Figure 41), pearlware and yellow-ware (Figure 42), whiteware and ironstone (Figure 43), wrought and cut nails (Figure 44), wire nails (Figure 45), building material (Figure 46), kitchen group artifacts (Figure 47), and architecture group artifacts (Figure 48). Counts for

FIGURE 39

MAIN ACTIVITY AREA
EXCAVATION UNITS STUDIED
FOR DENSITY DISTRIBUTIONS

(FOR LOCATION SEE SITE MAP)

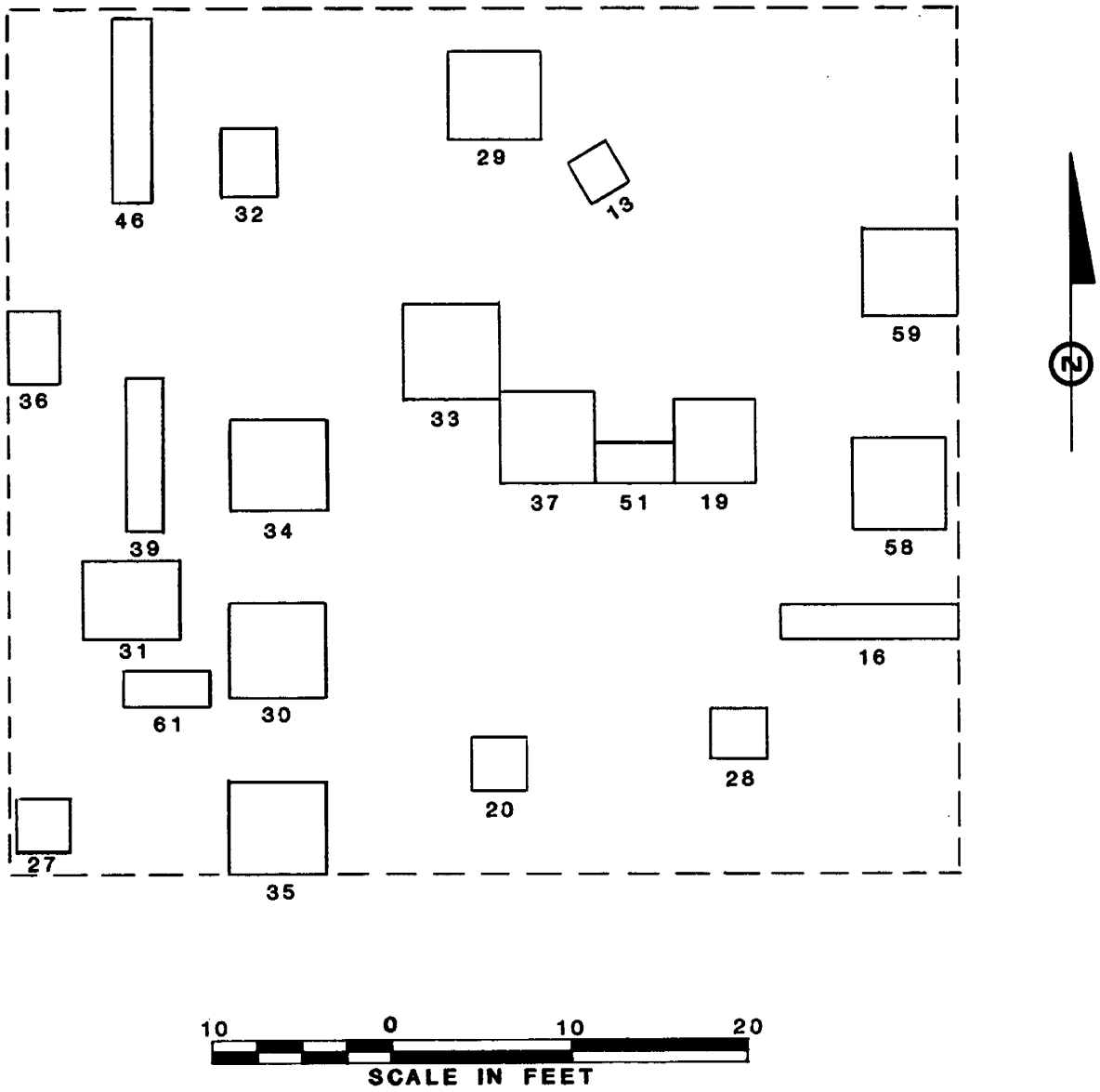
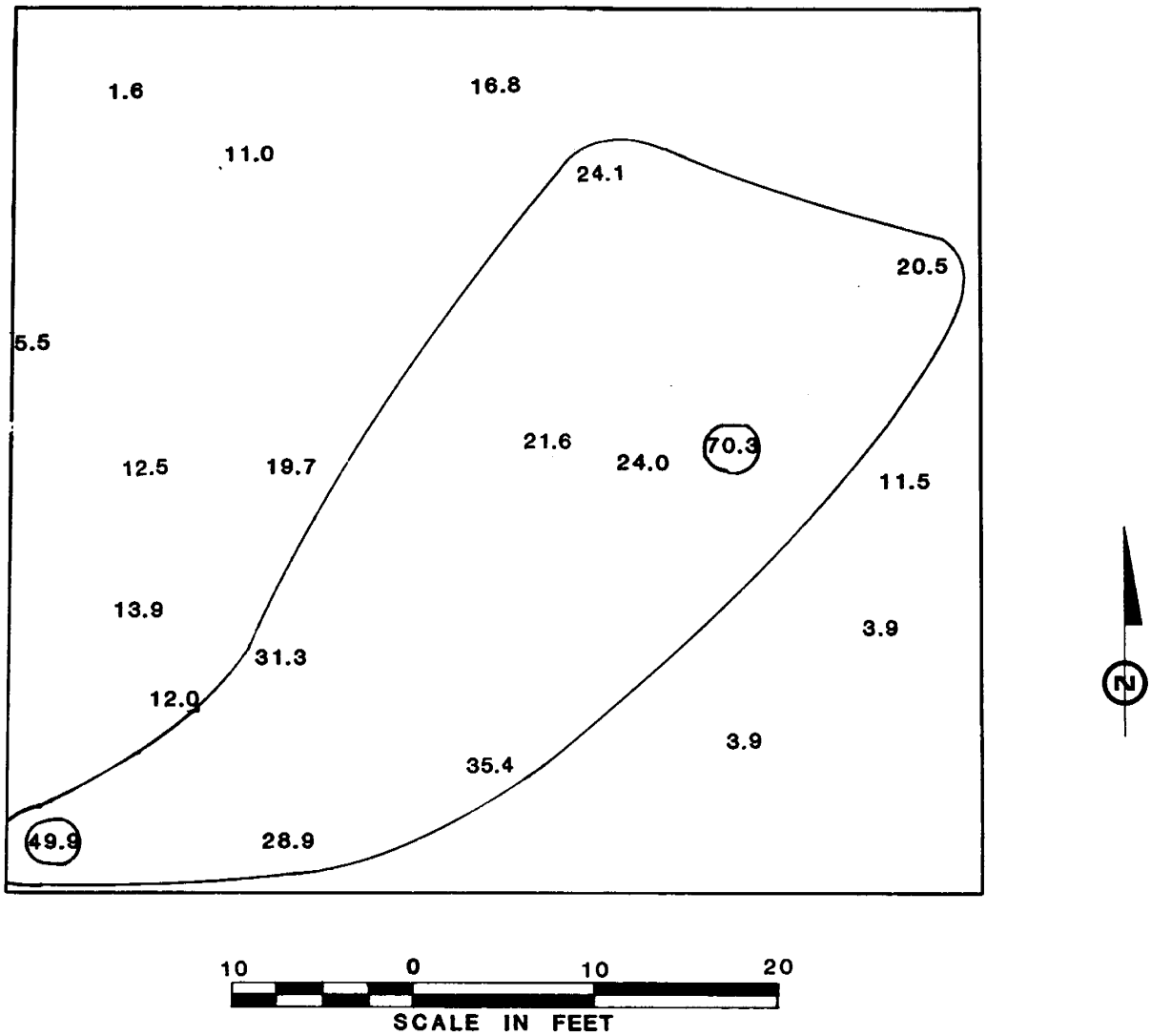


FIGURE 40

TOTAL ARTIFACT DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

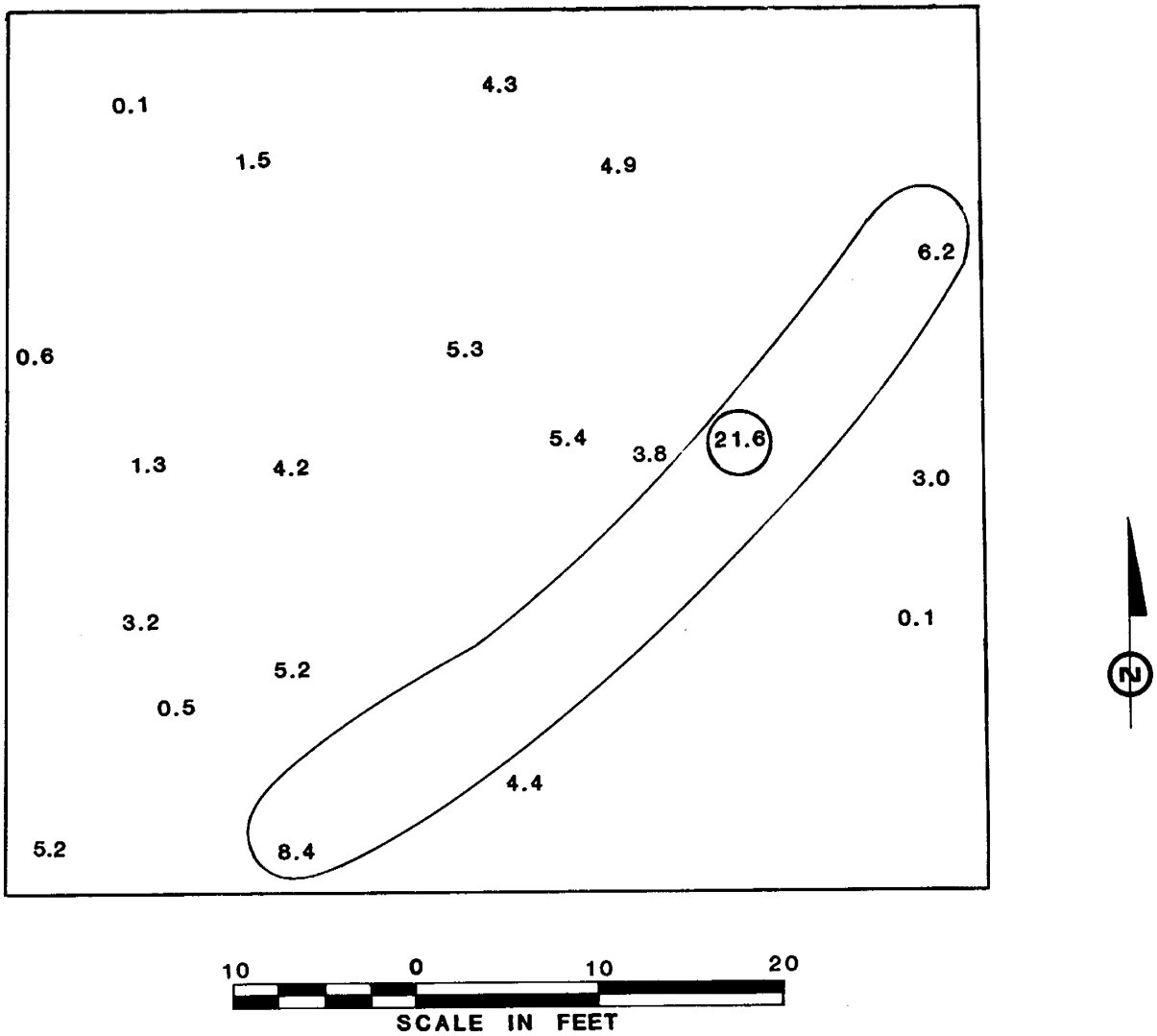
3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE: (In Contours)

1-20
21-40
41-60
>60

FIGURE 41

CREAMWARE AND REDWARES DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

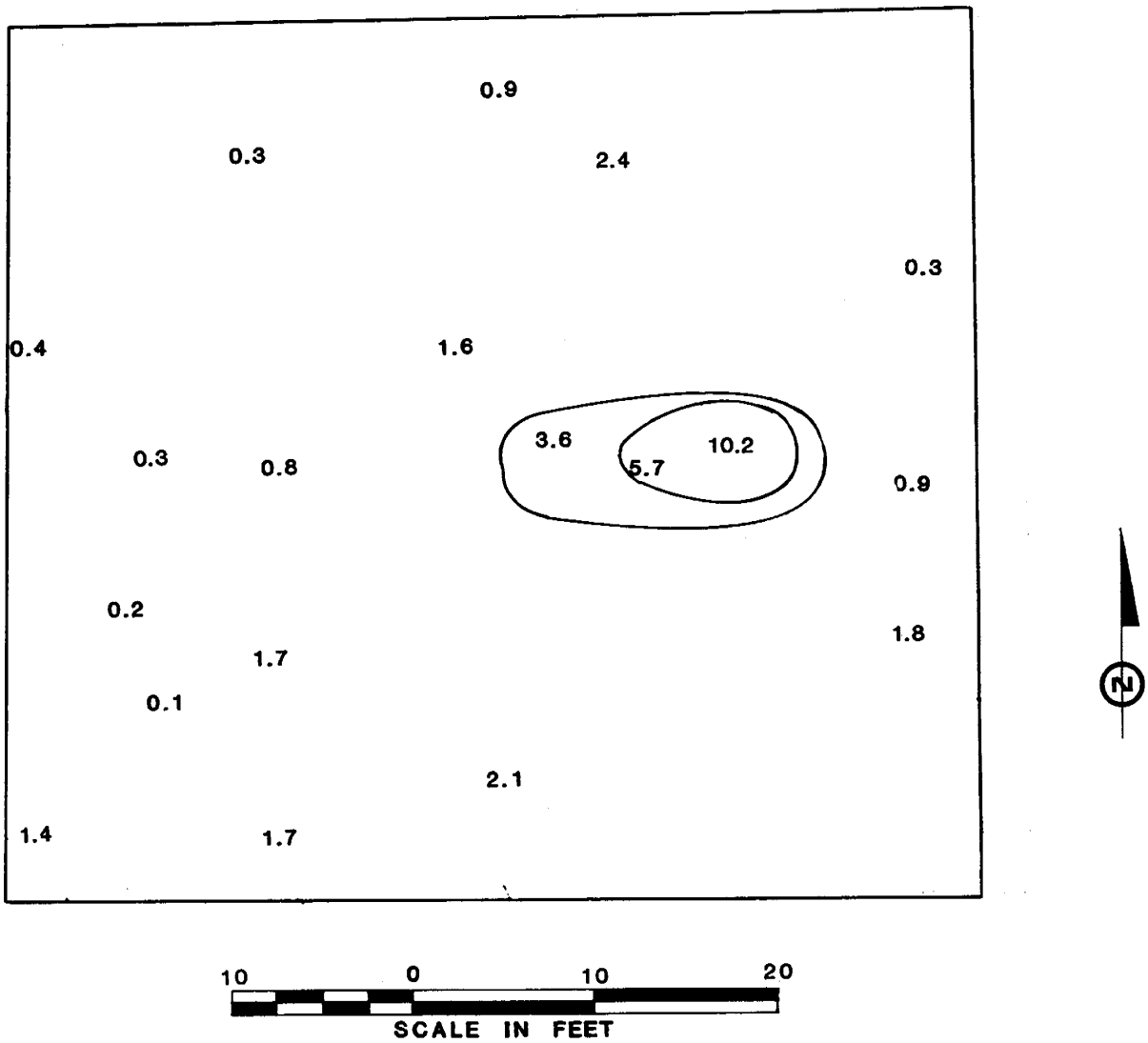
0-5

6-10

>10

FIGURE 42

PEARLWARE AND YELLOW-WARE DENSITY DISTRIBUTIONS FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

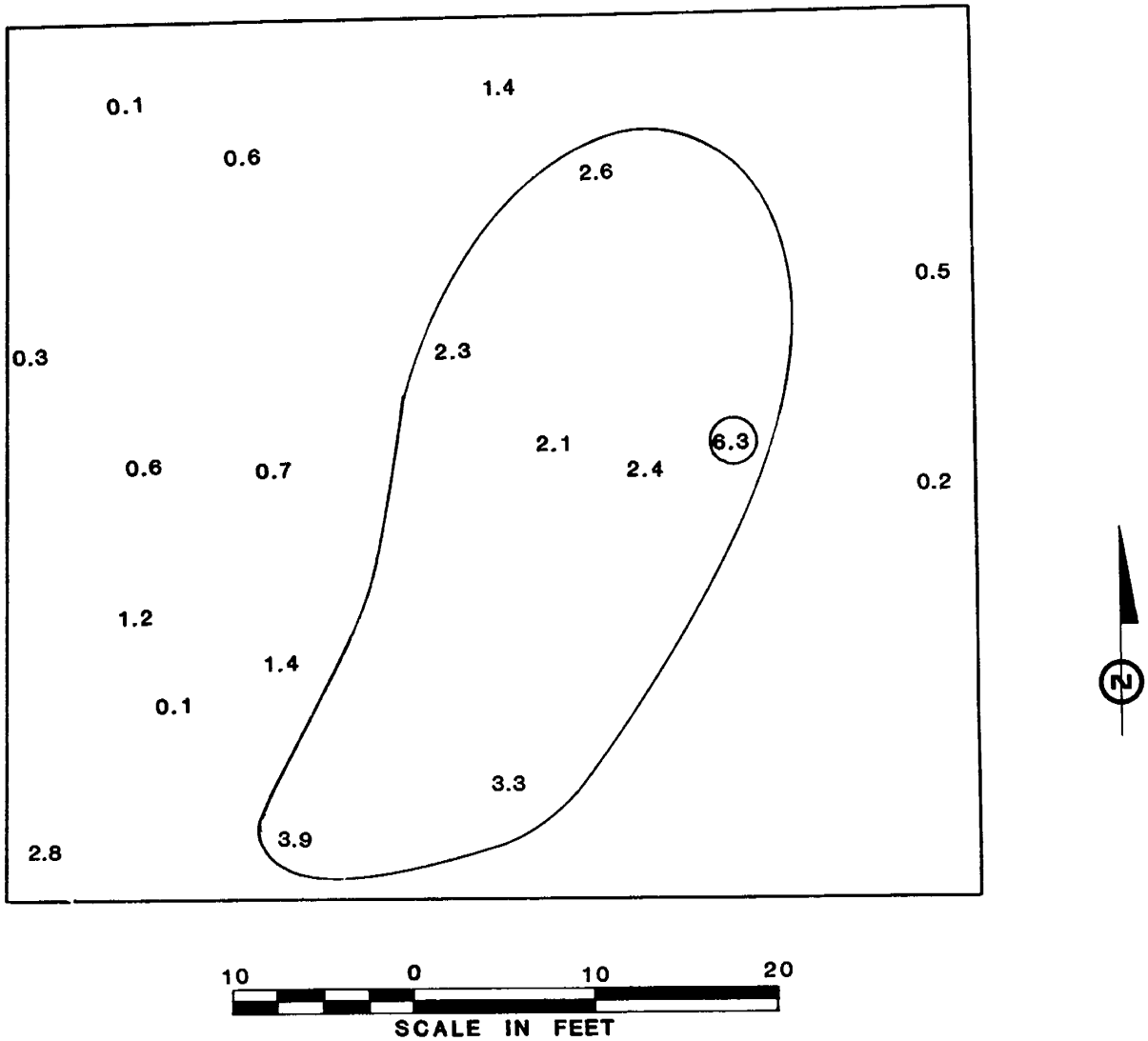
0-2

3-4

>4

FIGURE 43

IRONSTONE AND WHITEWARE DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

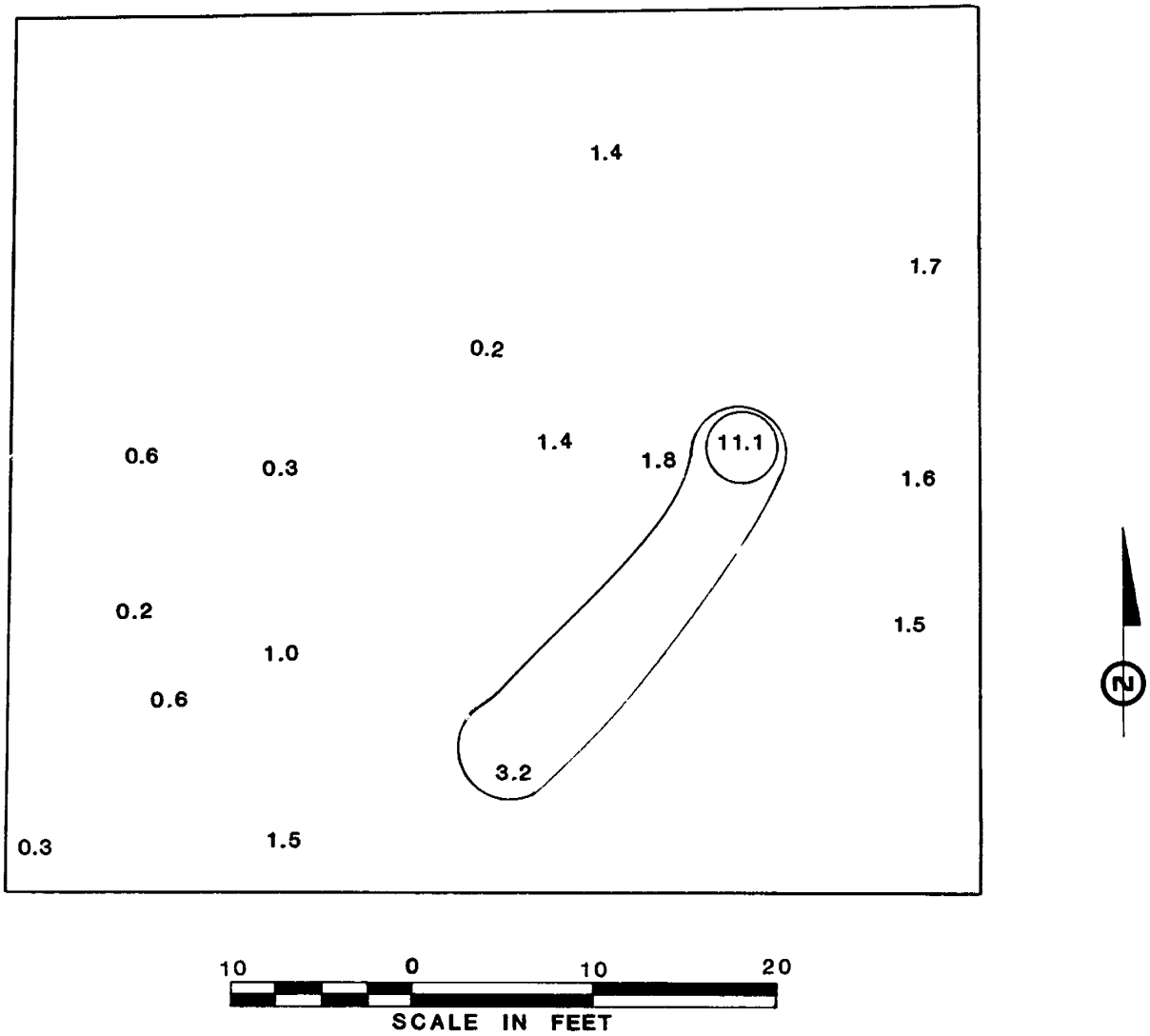
0-2

3-4

>5

FIGURE 44

WROUGHT AND CUT NAILS DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

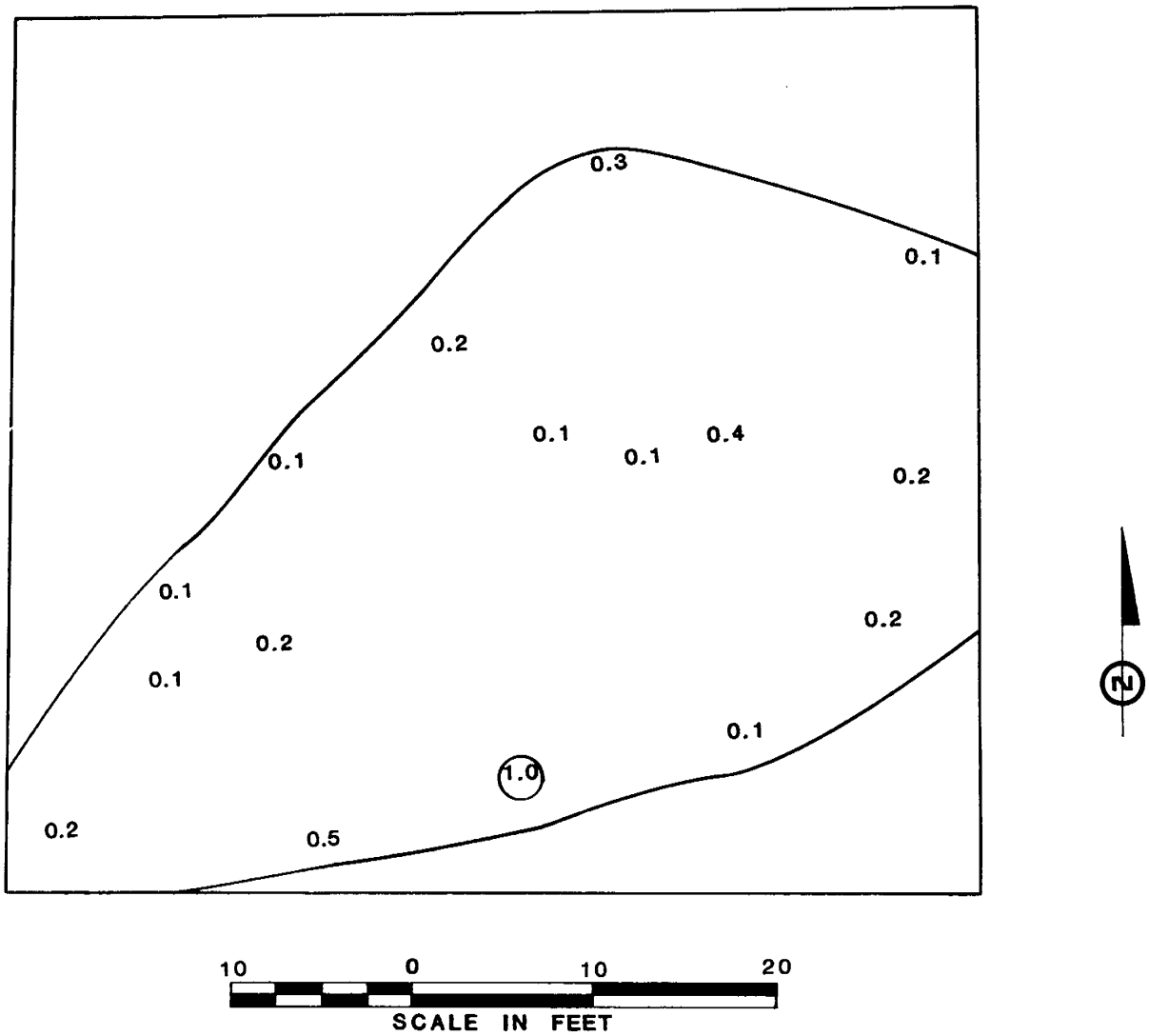
0-2

3-4

>5

FIGURE 45

WIRE NAILS DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

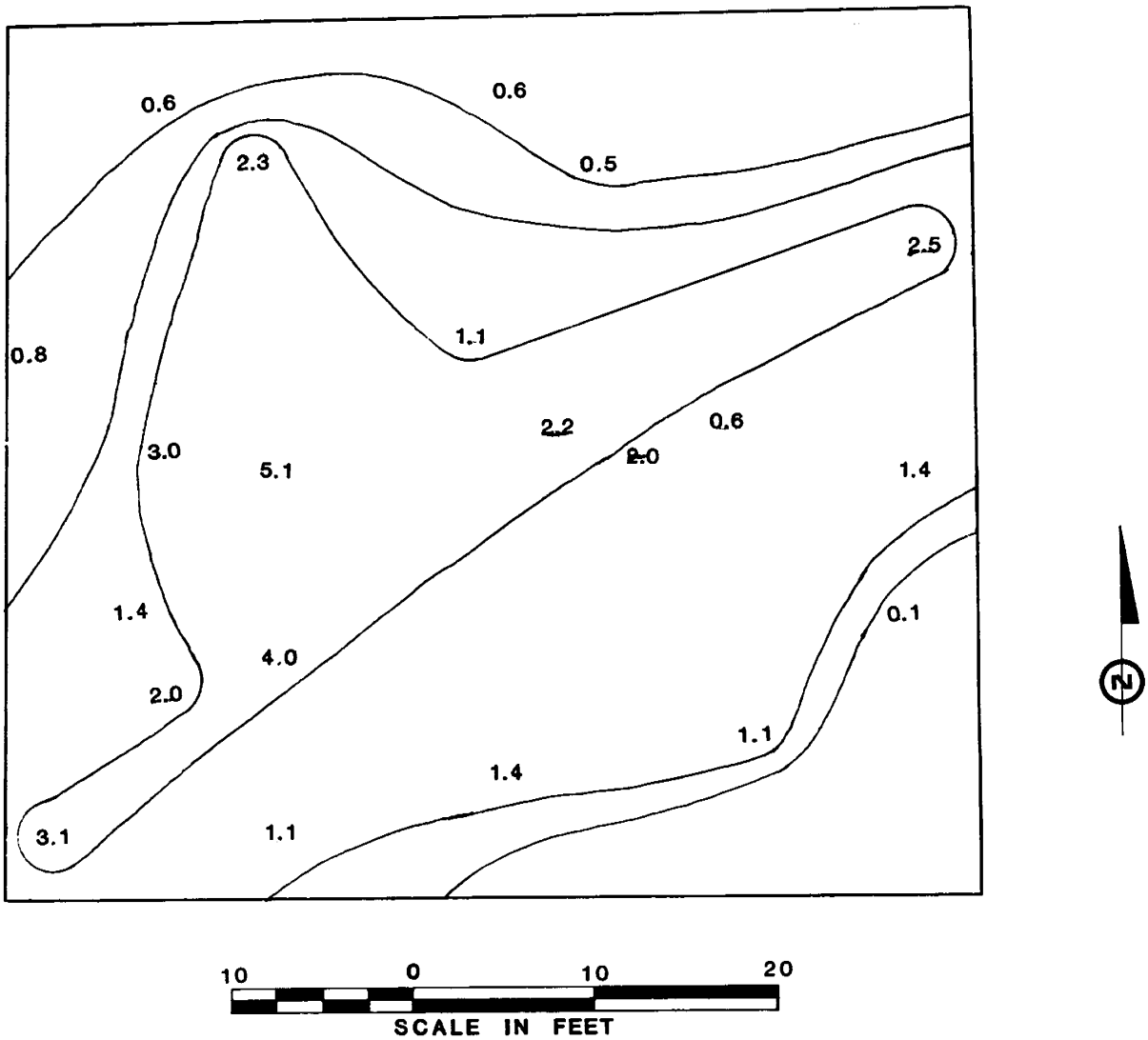
RANGE:(In Contours)

0-0.5

0.6-1.0

FIGURE 46

BUILDING MATERIALS DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

0-0.5

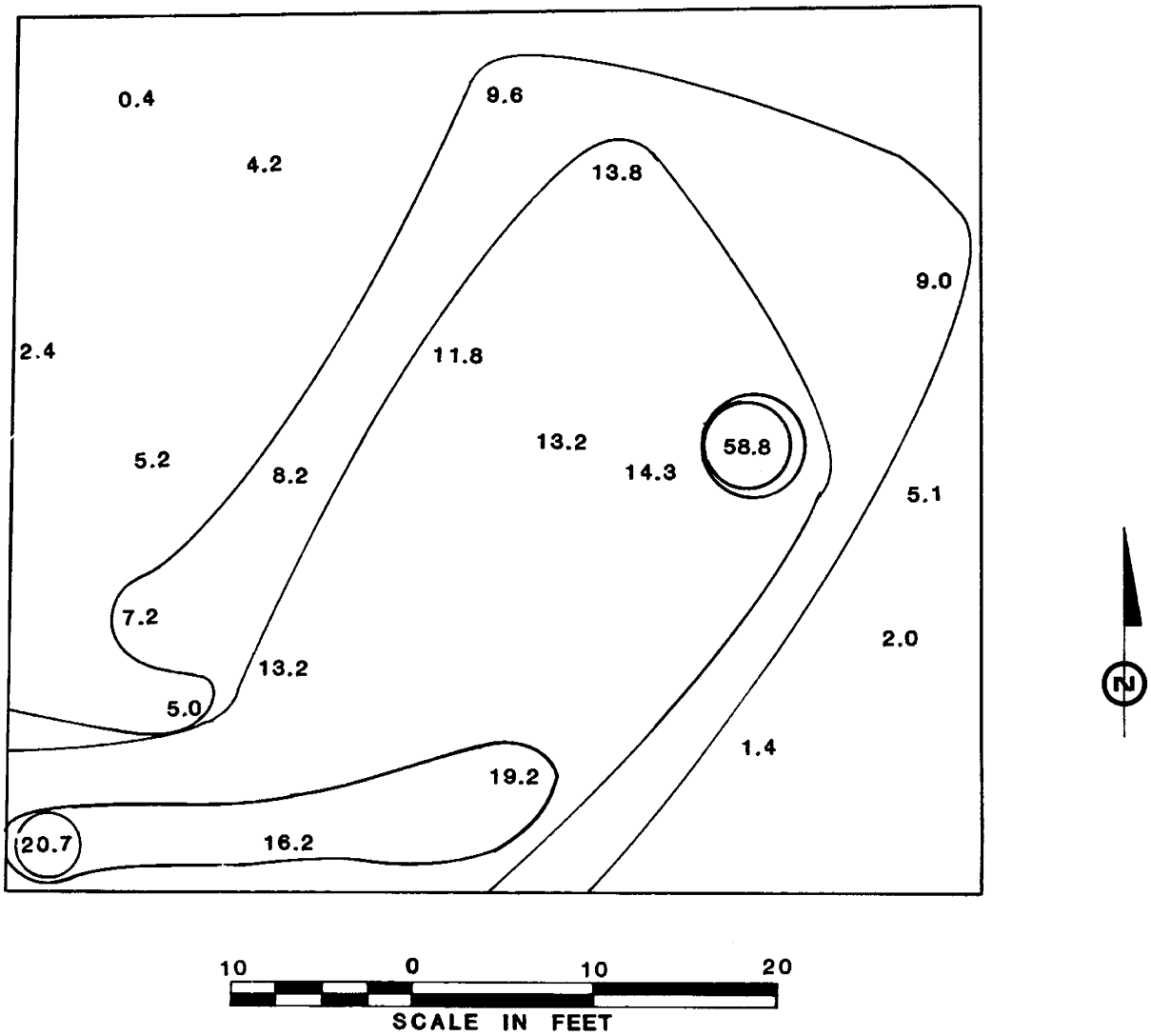
0.6-1.0

1.1-2.0

> 2.0

FIGURE 47

KITCHEN GROUP DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

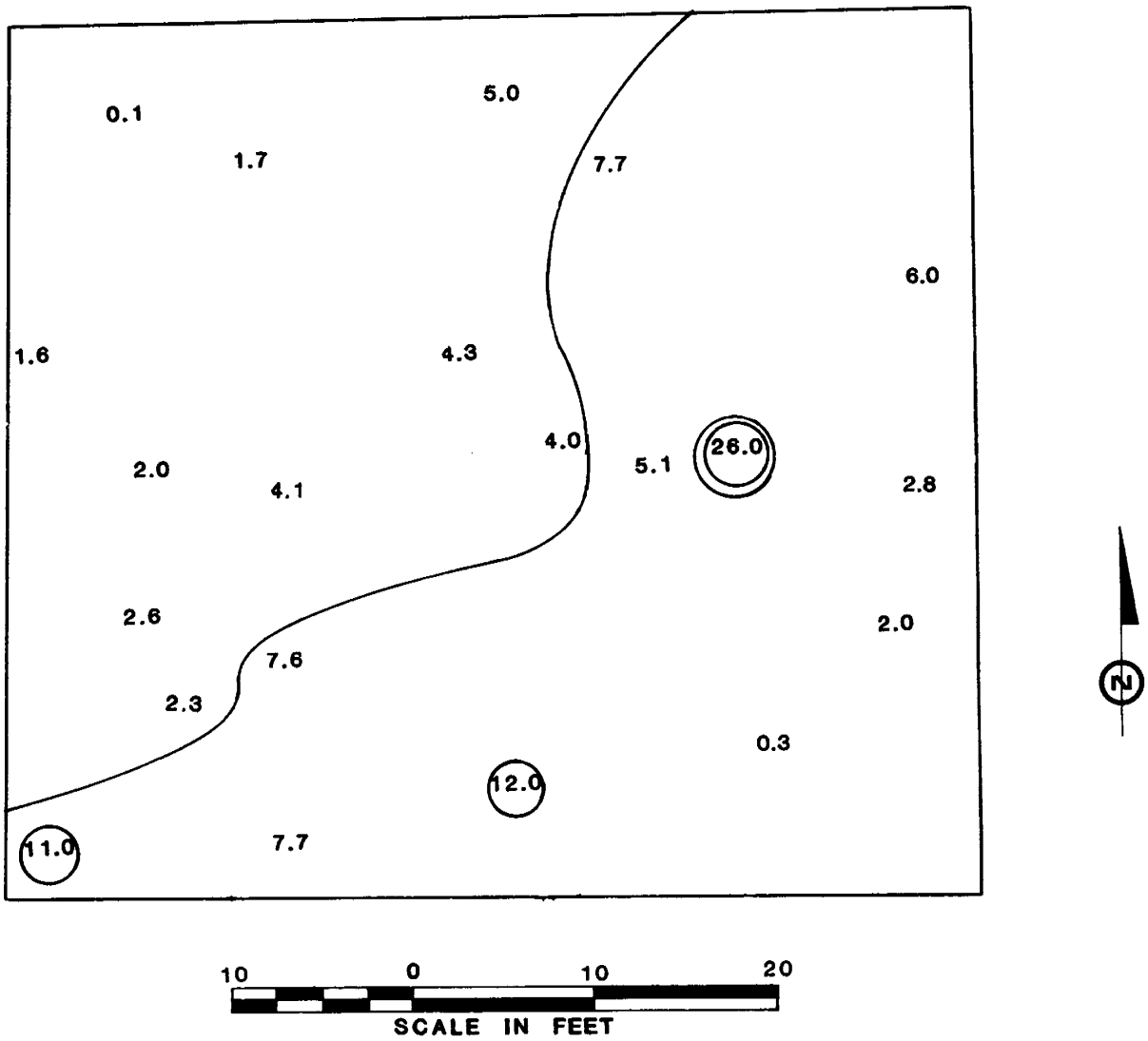
3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

0-5
6-10
11-15
16-20
>21

FIGURE 48

ARCHITECTURE GROUP DENSITY DISTRIBUTION FOR MAIN ACTIVITY AREA



NOTES:

1-COMBINED PROVENIENCES USED FOR EACH UNIT.

2-COUNTS REPRESENT DENSITY OF ARTIFACTS PER CUBIC INCH.

3-RESULTS ROUNDED TO NEAREST TENTH.

RANGE:(In Contours)

0-5

6-10

11-15

>15

the units utilized combined proveniences for a given unit, including all levels, features, and wall scrapings. Raw artifact counts were adjusted according to the volume of the excavation units, and the numbers shown in Figures 40 through 48 represent artifact counts per cubic inch. Density contours on these maps were manually plotted, and were visually interpreted for each map.

One major artifact concentration in the central section of the main activity area is apparent (Figure 40). This concentration is centered around units 13, 19, 20, 37, 30, and 35. By far the highest artifact density was found centered around unit 19. This area contained large concentrations of creamware and redwares, pearlware and yellow-ware, ironstone and whiteware, wrought and cut nails, architectural group artifacts, and kitchen group artifacts (Figure 41, 42, 43, 44, 47, and 48). An additional concentration of kitchen group artifacts is noted in the southwest corner of the main activity area (Figure 47). A high density of wrought and cut, nails and some architectural group artifacts, (Figures 44 and 48) is also present to the southeast of main concentration area.

The results of analysis of the main activity area artifact distributions confirmed the interpretations presented by the Phase I/II investigations (O'Connor et al. 1983). The main artifact concentration shown centering around units 13, 19, and 37 were probably associated with the late eighteenth to early nineteenth century frame kitchen ell. The largest amount of creamware and redwares recovered came from this area and supports

this statement (Figure 41). These units also had evidence of the longest occupation at the site. The concentration near units 20, 30 and 35 was associated with the mid to late nineteenth century cobble pavement discussed previously, and perhaps represent an interior activity and deposition area and an exterior activity area. Finally, unit 27 was in the vicinity of one of the post-1902 chickenhouses that were known to have been in the area (Figure 13), and was probably associated with one of those ephemeral structures. The distributions and concentrations suggest that the study area shows two occupation areas: an original loghouse activity area, in the vicinity of units 13, 37 and 19, and a later mid to late nineteenth century activity area (units 20, 27, 30, and 35) which also included the earlier activity area. Thus, while the use of the classes of artifacts for chronological separation was successful, all attempts to use the kitchen and architecture groups to locate spatially separate and functionally distinct areas met with failure due to the 200 year occupation and disturbance of the site's artifact patterns.

A comparison with the results of the shovel/postholer distributions supports this view of two occupation periods. Late eighteenth and early nineteenth century artifacts occurred in their heaviest concentrations from units 13 and 19 eastward, passing the house foundation. Artifacts dating from the mid nineteenth century to present, although found near units 13 and 19, were most often recovered from the area to the south and west of the foundation. This was probably due to the reorientation of the house circa 1902 from south to east, and illustrates two distinct occupational areas for the site.

Additional information on artifact/midden distribution at the Hawthorn site was determined through the bone ratio. The interpretation of this ratio is based on the assumption of bone refuse disposal on an "odorimetric" scale (South 1977). Based on a total of 922 bones and bone fragments and an adjusted artifact total less bone of 35,996, yielded a bone ratio of .0256. Using comparative ratios from previously excavated sites this extremely low ratio was indicative of an archaeological sampling of an adjacent secondary midden i.e. disposal of bone refuse adjacent to the house. In comparison, a bone ratio in the .36- 2.04 range would have indicated a peripheral secondary midden i.e. disposal of bone refuse at a distance from the house. While South (1977) states that a bone ratio in the range .002 to .03 parallels a decrease in Kitchen group artifacts, such was not the case at the Hawthorn site where a value of 62% was determined. Based on the lack of trash pit features within the area excavated, it was concluded that significant areas of midden deposits were located outside of right-of-way and the area sampled, especially those deposits dating to the first occupation period.

Intersite - Artifact Pattern Analysis

An intersite comparison was made of the artifact patterns from the Hawthorn site, the Robert Ferguson site (Coleman et al. 1983), and South's Carolina Artifact Pattern (1977). The specific intersite comparison of the artifact classes within groups was not possible due to the lack of comparable nineteenth century data. However, the present study will provide a data base for future intersite comparisons by using artifact classes

adapted from those developed by South (1977) (Appendix 12). It should be noted that within this data base, brick fragments, mortar fragments, wood, plaster, asbestos, shingle and pipe were not included. The presence of these objects was not due to normal patterns of disposal, but was mainly the result of the 1960s demolition of the structure. If these building materials were to be included in the architectural group, 4,866 artifacts would be added and the architectural total would equal 12,311, with a group percentage change from 32.6% to 44.4%. A corresponding change in the kitchen group would be seen from 62.45% to 51.4%. The counts for the Hawthorn and Ferguson sites shown in Tables 3 and 4 are adjusted counts which exclude the above-mentioned building materials from the analysis. In Table 4, the Carolina Pattern artifact counts represent South's (1977:105, Table 6) total counts. The range of values that distinguish artifact groups as characteristic of the Carolina Pattern are also given for comparative purposes.

The percentage values for South's artifact classes from the Hawthorn and Ferguson sites, and South's composite Carolina Artifact Pattern, were compared to see if significant differences were present. The difference-of-proportion test (Parsons 1974:445-448) was applied to assess the degree of difference among the percentage values. It is necessary to apply this test because the sample sizes among the three assemblages are quite different. These differences in sample size can make percentages that are truly different appear to be similar and vice versa. The difference-of-proportion test considers the differences of sample size and notes which pairs of percentages are

TABLE 3

Comparison of the W.M. Hawthorn Data with the Carolina Artifact Pattern

	Carolina Pattern		Hawthorn (Adjusted Counts)	
Artifact Group	**Percentage**	**Range**	**Percentage**	**Count**
Kitchen	63.1	51.8 - 69.2	62.45	14,258
Architecture	25.5	19.7 - 31.4	32.60	7,445
Furniture	.2	.1 - .6	.05	11
Arms	.5	.1 - 1.2	.12	29
Clothing	3.0	.6 - 5.4	.19	44
Personal	.2	.1 - .5	.05	11
Tobacco Pipes	5.8	1.8 - 13.9	.12	28
Activities	1.7	.9 - 2.7	4.42	1009
Totals	100.0		100.0	22,384

TABLE 4

Comparison of Artifact Groups from the W.M. Hawthorn Site with the Robert Ferguson Tenant Farm Site (Ogletown, Delaware) and the Carolina Artifact Pattern (from South 1977)

Artifact Group	Hawthorn		Ferguson		Carolina Pattern	
	Count	Percent	Count	Percent	Range	Count
Kitchen	14,258	62.45	4,383	50.02	51.8 - 69.2	- 47,521
Architecture	7,445	32.60	3,999	45.64	19.7 - 31.4	- 20,596
Furniture	11	.05	29	.33	.1 - .6	- 208
Arms	29	.12	30	.34	.1 - 1.2	- 165
Clothing	44	.19	17	.19	.6 - 5.4	- 2,416
Personal	11	.05	0	-	.1 - .5	- 207
Tobacco Pipes	28	.12	55	.63	1.8 - 13.9	- 5,225
Activities	1009	4.42	250	2.85	.9 - 2.7	- 1,272
	22,834	100.00	8,763	100.00		77,610

significantly different.

Table 5 shows the percentages and differences-of-proportion test statistic. Test statistics with associated p-values less than .05 can be viewed as significantly different and are marked in Table 5.

TABLE 5

Difference-of-Proportion Tests for the Artifact Assemblages from the W.M. Hawthorn Farmstead, the Robert Ferguson Tenant farm site, and the Carolina Artifact Pattern.

	H vs F				H vs C				F vs C			
Artifact Group	H	F	T		H	C	T		F	C	T	
Kitchen	.6244	.5001	14.62*	(p .001)	.6244	.6123	2.61*	(p .05)	.5002	.6123	14.51*	(p .001)
Architecture	.3260	.4563	13.83*	(p .001)	.3260	.2654	10.00*	(p .01)	.4563	.2653	24.49*	(p .001)
Furniture	.0005	.0033	.22	(p .75)	.0005	.0026	.15	(p .75)	.0033	.0026	.01	(p .75)
Arms	.0012	.0034	.19	(p .75)	.0012	.0021	.09	(p .75)	.0034	.0021	.14	(p .75)
Clothing	.0019	.0019	.001	(p .75)	.0019	.0311	1.24	(.75 p .50)	.0019	.0311	.72	(.75 p .50)
Personal	.0005	0	.001	(p .001)	.0005	.0026	.15	(p .75)	0	.0026	.001	(p .75)
Tobacco Pipes	.0012	.0063	.43	(.75 p .50)	.0012	.0673	1.56	(.25 p .10)	.0063	.0673	1.87	(.10 p .05)
Activities	.0442	.1285	1.13	(.75 p .50)	.0442	.0163	4.43*	(p .05)	.0285	.0163	1.33	(.25 p .10)

H = Hawthorn
F = Ferguson
C = Carolina
T = Test Statistic
P = Confidence Statistic

* - Significant Differences (p .05) (Note - these are the only differences that are really significant.)

The results of this study showed several significant, statistically different variables. In the comparison of Hawthorn to Ferguson, there were more kitchen group artifacts at Hawthorn than at Ferguson, and more architectural group artifacts at Ferguson than at Hawthorn. Likewise, in the comparison of the Carolina Pattern with Ferguson, there were more kitchen related artifacts in the Carolina Pattern than at Ferguson, and more architectural related artifacts at Ferguson than in the Carolina Pattern. Finally in the comparison of Hawthorn to the Carolina Pattern, the Hawthorn assemblage had more kitchen, architecture, and activity related artifacts than the Carolina Pattern.

The abundance of kitchen related artifacts in both the Hawthorn and Carolina Pattern assemblages when compared to Ferguson is probably indicative of length of site occupation. Ferguson was a mid-nineteenth century site, while the Hawthorn site and the sites used in the derivation of the Carolina Pattern had earlier occupations. In other words, the earlier sites had more time to accumulate kitchen remains. The larger percentage of architectural group artifacts at the Ferguson site when compared to the Hawthorn and Carolina Pattern assemblages is probably due to the site's mid-nineteenth century origins, and the attendant rise in the amount of metal and construction materials that would be associated with such a site. This result is much different than what was predicted, as demolition activities at the Hawthorn site were expected to greatly inflate the architectural group percentages.

In the comparison of the Hawthorn assemblages with the Carolina Pattern the most important factor to consider is the age

of the sites under study. The sites used in the derivation of the Carolina Artifact Pattern were all predominantly eighteenth century occupations, with no consideration of late nineteenth to twentieth century data. The Hawthorn site, and the Ferguson site too, were both occupied well into the twentieth century. Thus, the large percentages of kitchen, architecture, and activities related artifacts at Hawthorn are probably due to the longer occupation and the subsequent contribution to the data base of the site. It should be noted that, had the building materials listed earlier, such as brick, plaster, asbestos, etc., been included in the counts for the Hawthorn assemblage, the comparison would not have been with South's Carolina Pattern, but with South's (1977) Frontier Artifact Pattern. This pattern does not accurately reflect the regional or site specific development of the Middle Atlantic area, when considering the occupation period of the William M. Hawthorn site. That the data could be interpreted in this manner points to the need for further research into not only the mechanics, but also the archaeological reality of South's patterning.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This section of the site report will summarize the findings of the excavation, consider the placement and function of the site in the regional settlement pattern and socio-economic activity sphere, and note the implications of these findings for future research.

Generally, the Phase III data recovery program revealed that a historic component of the Hawthorn site existed continuously