The Cass Archaeological Site and Northeastern Colorado Prehistory

Stephen M. Kalasz

Christian J. Zier

Colorado Department of Transportation

THE CASS ARCHAEOLOGICAL SITE AND NORTHEASTERN COLORADO PREHISTORY

by

Stephen M. Kalasz
Christian J. Zier

Colorado Department of Transportation
Denver, Colorado

1993

Colorado Department of Transportation
4201 East Arkansas Avenue
Denver, Colorado 80222

CONTENTS

ACKNOWLEDGMENTS

Archaeological study of the Cass site was funded by the Colorado Department of Transportation (CDOT). Preparation of this publication was made possible by Enhancement Program funding of the Federal Highway Administrations's Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.

Many individuals share responsibility for the successful completion of the Cass site project. From CDOT the authors wish to thank Debra Angulski, former Archaeological Unit Director; OD Hand, Assistant Archaeological Unit Director; Kim Gambrill, Manager of the Office of Environmental Services; and John Crier, Region 4 Environmental Manager. Daniel A. Jepson served as Assistant Field Supervisor for Centennial Archaeology, Inc., and also assisted the effort in his current position as CDOT Archaeological Unit Director.

Centennial Archaeology, Inc. field crew members were Bridget M. Ambler, William R. Arbogast, Lucha A. Martinez, and Jeffrey S. Smith. Ms. Ambler and Brett N. Meroney were responsible for drafting and technical illustration, and Andrea M. Barnes for artifact cataloguing. Denise Fallon edited the manuscript.

Geomorphological studies were undertaken through a subcontracting arrangement by Michael McFaul of LaRamie Soils Service, Laramie, Wyoming. Bone identification was conducted by Elaine Anderson, Denver, Colorado, under a similar agreement. Others who shared knowledge of the site and project area were Robert J. Brunswig, Jr., University of Northern Colorado, Greeley; Fred Harris, Gill, Colorado; and Mike Toft, Sterling, Colorado.

Bill Tate, Aurora, Colorado, and E. Steve Cassells, Judson College, Elgin, Illinois, provided thoughtful review comments on an earlier draft of this manuscript.

Finally, heartfelt thanks are extended to the Stanley D. Cass family of Briggsdale, Colorado, for their friendship and support during the six-week field season. That support included but was by no means limited to permitting access to land controlled by the Cass Farms Company.

INTRODUCTION

Background

The Cass archaeological site is located in the rolling prairie country of central Weld County, northeastern Colorado, on high ground overlooking Crow Creek (Figure 1). It was excavated in the spring and summer of 1990 by a team of archaeologists from Centennial Archaeology, Inc., operating under contract to the Colorado Department of Transportation (CDOT). Occurring in a hitherto poorly studied sector of the high plains, the project brought to light aspects of human lifeways and adaptation during the period A.D. 600 to 800, a millenium before the arrival in the area of people of European descent.

Based on information derived from the field study and subsequent laboratory analysis, it is known that the inhabitants of the Cass site practiced a basic hunting-gathering economy. The site was not occupied continuously and was seldom, if ever, used by large groups of people. Fires were built, animals were butchered, and seeds were ground. Several large and small varieties of animal were consumed, as were various wild plant foods. There is no evidence of agriculture of any kind. Stone tools were manufactured and rejuvenated, using raw materials from local as well as distant sources. Approximately 1,200 years ago the Cass site was abandoned for the final time. Human occupation of the region continued, but for reasons not presently understood the Cass site was no longer used.

Why Excavate?

Excavation of the Cass site was mandated by federal and state statutes which seek to protect places of prehistoric and historic significance. In order to qualify for protection under the

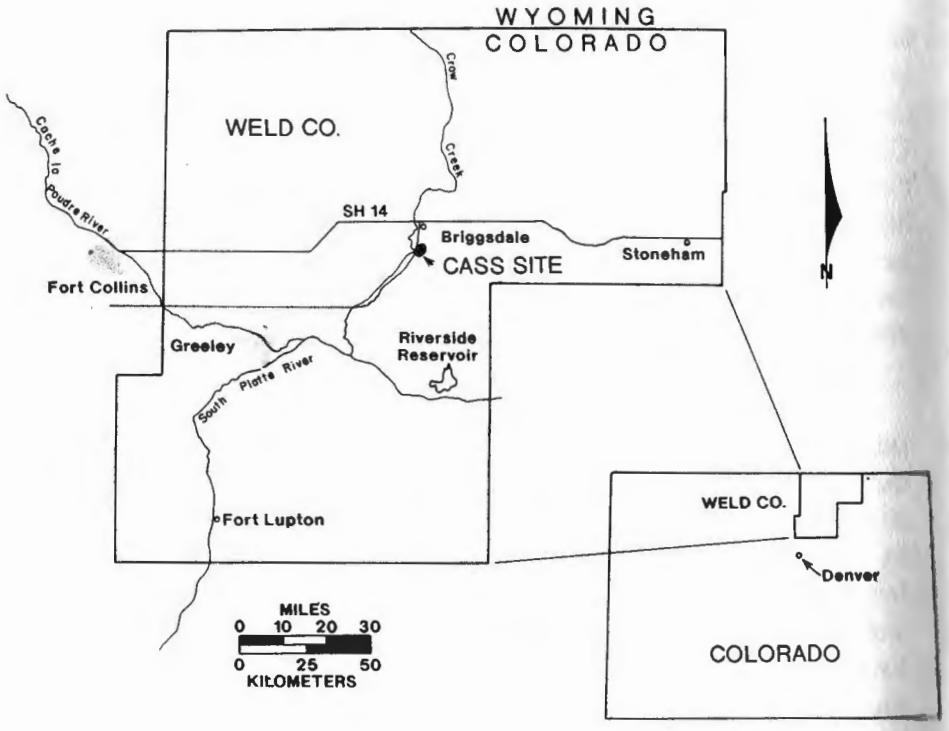

Figure 1. Map of Weld County, Colorado showing general location of the Cass site.

law a site must first be deemed "significant" according to the criteria of the National Register of Historic Places (although the site need not actually be on the National Register). Thus, not all sites are accorded an automatic blanket of protection, and in fact the great majority of prehistoric and historic sites do not meet National Register criteria. A site may qualify for National Register inclusion for such reasons as association with important events or persons, manifestation of a unique architectural style, or simply because of its perceived research potential. For such a site, protection is provided in the event that threats are posed by actions of a public agency, actions licensed by such an agency, or by any actions if the site lies on public land.

The Cass site is bisected by Colorado State Highway 392, an improved gravel road some 50 feet in width. Professional study of the site was not conducted when the road was built many years ago simply because archaeological preservation statutes did not exist at that time. In the late 1980s the CDOT developed plans to reconstruct an aging bridge across Crow Creek 900 feet southwest of the Cass site on Highway 392. Both federal and state dollars were to be used for the project. In order to meet federal engineering specifications the Highway 392 approach to the new bridge from the northeast needed to be realigned. The realignment would directly affect the Cass site by shifting the roadway somewhat to the east of its original location, and new right-of-way would have to be acquired from agricultural lands owned by Cass Farms Company.

It was at this time, in 1989, that a professional archaeological survey of the area was performed by CDOT archaeologists. Although known to local collectors for many years, the Cass site was first recorded and entered into the state inventory of sites as a result of this work. Small-scale excavation was conducted as part of the survey. Despite massive disturbance

within the existing roadway, the CDOT work demonstrated that other parts of the site were reasonably intact and that buried archaeological materials were present. The Cass site was assessed by CDOT archaeologists as meeting National Register eligibility criteria, and in a report to the Office of Archaeology and Historic Preservation of the Colorado Historical Society this assessment was advanced, as was a recommendation that parts of the site be professionally excavated prior to road realignment.

In the jargon of contract archaeology and federal and state bureaucracy, the act of excavating a threatened archaeological site is known as "impact mitigation through data retrieval." In plainer language it is salvage of valuable information through excavation prior to destruction. In order for excavation to proceed, federal law mandates that a *mitigation plan* or *treatment plan* first be written and approved by the federal Advisory Council on Historic Preservation. CDOT developed such a plan, which was subsequently accepted by the Advisory Council. The plan is essentially a *research design* (discussed more fully in a later section) which establishes important objectives of the work, identifies data needs, and details the manner in which the project will be conducted both in the field and in the laboratory.

Centennial Archaeology, Inc. entered into a long-term professional services agreement with CDOT in 1989 to conduct archaeological survey and excavation work in advance of road construction projects. Centennial agreed to excavate the Cass site following approval of a project budget, and began six weeks of fieldwork in May of 1989. Data analysis and report writing consumed much of the ensuing two years, and a final technical report detailing all aspects of the project was submitted to CDOT in April of 1992 (Kalasz et al. 1992). Construction of the new Crow Creek bridge, meanwhile, began after the archaeological work had been terminated, and was completed in 1991. This

publication describes the techniques used to study the Cass site, discoveries that were made, and interpretations of those discoveries.

ENVIRONMENTAL SETTING

General Description

The landscape of northeastern Colorado east of the Rocky Mountains appears monotonous only from a distance. An observer on the ground discovers that this landscape changes--often dramatically--as one travels across it, and that it also changes with the seasons. While characterized in the most general sense as rolling prairie, northeastern Colorado in fact exhibits steep-sided buttes, mesas, and escarpments, deep arroyos, wide river valleys with usually gentle slopes, nearly level plains, abundant *playas* (internally drained basins) of varying size, and extensive sand dune fields. Elevations range downward from nearly 6,000 feet at the base of the foothills in the west to around 3,500 feet along the Nebraska and Kansas borders.

A vast area of northeastern Colorado, including virtually all of Weld County, lies within the drainage basin of the South Platte River. Rising along the Continental Divide in central Colorado, this stream emerges from the mountain front near Denver and flows north, then east across the prairie, exiting Colorado in the extreme northeastern corner of the state near Julesburg. Relatively few large streams feed the South Platte east of the mountains. Tributaries entering from the west and north include St. Vrain, Big Thompson, and Cache la Poudre Rivers and Crow and Pawnee Creeks; and from the south, Kiowa, Bijou, Badger, and Beaver Creeks. Even these streams are as likely to be intermittent as

permanent, some carrying water only seasonally or following rain storms.

While the northeastern Colorado climate is relatively mild throughout much of the year, this ultimately is a land of extremes. Precipitation is generally scant, averaging 12 inches annually near the foothills and increasing very gradually as one proceeds eastward. Winters are cold and fairly dry, springs erratic and frequently wet, summers hot and dry but punctuated by occasional drenching thunderstorms, and autumns mild and usually dry. The average low temperature in the winter is about 14° F. and average high temperature in summer is 87° F. (Kalasz et al. 1992:9).

Exceptions to any generalization about the area's climate are readily found. Averages do not effectively describe the climate because of tremendous year-to-year fluctuations in precipitation. Droughts are commonplace, as they were in the past, and tend to occur in periodic cycles. Prevailing winds are from the south although short-term and sustained winds may blow from almost any direction. The air is rarely calm at any time during the year; spring in particular is windy. Only sunshine is predictable and relatively constant. In most years the sun shines about 70% of the time during daylight hours, with little variation from summer to winter.

Northeastern Colorado lies within a vast linear tract of shortgrass prairie vegetation that stretches north from New Mexico into Montana. The shortgrass prairie is bounded on the west by the foothills of the Rocky Mountains and on the east by the so-called bluestem prairies, which replace shortgrass prairie at about longitude 90° 30' W (Wedel 1986:16). Shortgrass prairies occur mainly between elevations of 4500 feet and 6000 feet and are characterized by a near-absence of shrubs and virtual absence of trees except along larger streams. Plant species diversity is

deceptively high. In northeastern Colorado, common plants include needlegrass, blue grama grass, buffalo grass, yucca, prickly pear, lupine, beardtongue, and psoralea. Cottonwoods and willows grow along streams.

A great many animal species thrive within the shortgrass prairie although historic alterations in the landscape, mostly attributable to farming and the establishment of cities and towns, have drastically changed the overall composition of species, and the ranges and numbers of certain species. While too numerous to list individually, animals important as prehistoric food sources included large species such as bison (buffalo), pronghorn antelope, mule deer, white-tailed deer, and elk, and small species such as cottontail, jackrabbit, and prairie dog. Various fish and shellfish may be found in permanent streams. The presence of insects needs hardly be noted; suffice to say that a staggering number of species of great variety is present, including some, such as grasshoppers, which at times figured significantly in the composition of prehistoric human diets.

The climate of northeastern Colorado has changed considerably during the approximately 12,000 years of human occupation. The *Pleistocene* epoch, or Ice Age, ended between 10,000 and 12,000 years ago and gave way to a prolonged warm and dry period known as the *Altithermal* which ended about 5,000 years ago. Conditions since that time have fluctuated--at times considerably--but have probably not varied greatly from those of the present. In other words, the region's climate over the course of the past 5,000 years or so has essentially been modern, and the plant and animal life present during this period were about the same as those found today.

Setting of the Cass Site

Crow Creek originates in the Laramie Mountains of Wyoming, flows eastward through the city of Cheyenne, and then bends southward and crosses the northeastern Colorado plains. It joins the South Platte 12 miles east of Greeley. The Cass site is perched on a nearly level hill on the east side of Crow Creek, about 750 feet from the creek and 18 miles north of the South Platte confluence (Figures 2-4). The hill, 65 feet higher in elevation than Crow Creek, is in fact an ancient surface worn into bedrock by Crow Creek near the end of the Ice Age, when the stream was much larger and flowed at a higher level than today. Following the Ice Age, Crow Creek cut down to its present level and the hill was left high and dry. The hill has probably changed little in the past 10,000 years or so, except that fine sand (possibly blown up from the stream bottom below) has accumulated on the hill crest, and small channels have been eroded into the surface by water. Crow Creek no longer has a year-round flow of water but this may be due to modern agriculture and upstream irrigation diversion. Ample ground water exists, and it is probable that the stream was permanently flowing prior to a century ago.

The Cass site location, at 4,820 feet elevation, affords a fine view of the valley of Crow Creek, as well as a vast sweep of landscape extending to the Rocky Mountains. The terrain to the east is gently rolling. Some is poorly drained, and playas are common. One playa, covering about 10 acres, is centered about three-tenths of a mile south of the Cass site. On the east side of Highway 392 is a wheat field. To the west, pasture land featuring shortgrass prairie vegetation extends from the road edge down to Crow Creek. Aside from road construction and farming, the site area over the years has been affected by small-scale gravel mining (west of the road) and dumping (east of the road).

Figure 2. View to the northwest from the Cass site, showing edge of ancient stream terrace (foreground) dropping away toward Crow Creek (marked by trees in background).

Resource Availability

A wide range of plant, animal, mineral, and water resources would have been available for use by prehistoric people in the area. The advantages of a location close to a major stream in an otherwise dry plains environment are obvious. Bison, antelope, and deer were once abundant although perhaps not at all times. These large herding animals provided not only meat but also *bone grease* (grease boiled from splintered bones), hides, and the raw material for bone implements such as awls. As noted above, small animals such as rabbits and prairie dogs may also have been used for food, as undoubtedly insects were. Plants of

Figure 3. View south from the Cass site showing State Highway 392 descending toward old bridge over Crow Creek (middle distance, right).

Figure 4. Photo of the broad, nearly level floor of the valley of Crow Creek near the Cass site. View is to the south-southwest.

the immediate Cass site area that produce edible seeds or fleshy parts include goosefoot, sunflower, Indian ricegrass and various other grasses, hedgehog cactus, and prickly pear cactus. Yucca provided raw material for fiber and soap (a common second name is *soapweed*). Wood was available for fuel, for the manufacture of items such as bows, arrows, dart shafts, and fire drills, and if needed, for construction of shelters. Water was probably present at the surface in Crow Creek during much of prehistory and certainly was always present below the surface in the streambed. The playa south of the Cass site also holds water seasonally, and while it may never have been used as a source of drinking water it would certainly have attracted large herding animals.

Raw tool stone, consisting of an array of *silicates*--cherts, quartzites, and chalcedonies--occurs in cobble form in and near the surface near the Cass site. It could be readily exploited and was easily tested for quality through intentional breakage, simply by striking one cobble with another. These cobbles may originally have come from Ice Age gravels associated with Crow Creek or could be much older materials washed down from the Rocky Mountains between about 2 million and 25 million years ago during the *Tertiary* geological period. Sandstone of the Laramie Formation outcrops near the Cass site and was used prehistorically as a source for grinding stones.

ORGANIZING TIME AND SPACE: A REVIEW OF NORTHEASTERN COLORADO PREHISTORY

Archaeologists recognize the existence of *culture areas* in prehistory. A culture area is a geographical region within which prehistoric people shared fundamental traits, for example basic modes of *subsistence* (obtaining food and other basic necessities), tool forms, architectural styles in dwellings, and possibly language. While variations exist within a culture area, it nonetheless exhibits internal uniformity and is basically unlike neighboring culture areas. Culture areas tend to correspond with geographical regions, a fact that reflects the close link between humans and their environments in prehistoric times.

The Cass site is situated near the western margin of the plains culture area, which corresponds rather precisely with the shortgrass prairie region as defined in the previous section. In the western, or high plains, portion of the plains culture area, archaeologists have identified three major stages of human occupation: Paleo-Indian, Archaic, and Ceramic. Periods of shorter duration are recognized within the stages (Eighmy 1984). Brief descriptions of the three stages follow. The sequence of prehistoric occupation in the region is illustrated in Figure 5.

The *Paleo-Indian stage* extends back to nearly 10,000 years before Christ (B.C.) and is divided into three periods: *Clovis*, *Folsom*, and *Plano*. The approximate ending date of the latest period is 5500 years B.C. The Paleo-Indian stage corresponds with the waning days of the Ice Age and the subsequent transition from colder to warmer conditions on the plains. Paleo-Indian archaeological sites often have butchered remains of large, now-extinct animal species such as mammoth and Pleistocene varieties of bison.

DATE		STAGE	PERIOD
YEARS BEFORE PRESENT (B.P)	CHRISTIAN CALENDAR DATE		
250	A.D. 1700	CERAMIC STAGE	LATE CERAMIC (PROTOHISTORIC) PERIOD
350	A.D. 1600		
550	A.D 1400		MIDDLE CERAMIC PERIOD
750	A.D 1200		
950	A.D 1000		
1150	A.D 800		EARLY CERAMIC (WOODLAND) PERIOD
1350	A.D 600		
1550	A.D 400		
1750	A.D 200		
1950	A.D/B.C	ARCHAIC STAGE	LATE ARCHAIC PERIOD
2450	500 B.C		
2950	1000 B.C		
3450	1500 B.C		MIDDLE ARCHAIC PERIOD
3950	2000 B.C		
4950	3000 B.C		EARLY ARCHAIC PERIOD
5950	4000 B.C		
6950	5000 B.C		
7950	6000 B.C	PALEO-INDIAN STAGE	PLANO PERIOD
8950	7000 B.C		
9950	8000 B.C		FOLSOM PERIOD
10050	9000 B.C		CLOVIS PERIOD

Figure 5. Prehistoric culture sequence for the high plains region of eastern Colorado.

The *Archaic stage* (5500 B.C. - A.D. 200) is also broken into three periods: *Early Archaic*, *Middle Archaic*, and *Late Archaic*. The Early Archaic period corresponds in time with the dry, warm Altithermal climatic episode described above, while subsequent periods were associated with climatic conditions more similar to those of today. Archaic stage people lived a basically hunting-gathering lifestyle but may have been less dependent on large game and more on wild plant foods than were the Paleo-Indians.

The *Ceramic stage*--so named because of the appearance of pottery in the plains area--dates from A.D. 200 to A.D. 1800. The Cass site falls within the first of three periods in this stage, known as the *Early Ceramic* or *Woodland* period. Something of a misnomer in the unwooded plains region, the Woodland period was originally defined further east and came to be applied to plains cultures because of broad economic similarities. The two remaining periods within the Ceramic stage are the *Middle Ceramic* and *Late Ceramic* (or *Protohistoric)*.

The Ceramic stage witnessed a continuation of the Archaic hunting-gathering lifestyle. However, certain technological innovations are also apparent, particularly the introduction of ceramics and the replacement of the atlatl and spear by the bow and arrow. (An *atlatl* is a socketed stick that essentially serves as an extension of the human arm; fitted to the base end of a spear, it permits the user to launch the spear with considerably greater leverage than the arm alone could supply.) In conjunction with the new bow and arrow hunting technology, *projectile points* (spear or arrow tips) became dramatically smaller and can be referred to legitimately as "arrowheads" for the first time.

CASS SITE RESEARCH DESIGN

The 1989 survey crew from the Colorado Department of Transportation encountered a large expanse of uniformly gray, ash-stained soil exposed in a road cut at the edge of a wheat field. As described in the Introduction, much of the Cass site surface had been disturbed by heavy equipment operation associated with cultivation, a nearby dump, and road construction and maintenance. Cultivation had uncovered *artifacts*--defined as portable objects modified by past human behavior--such as chipped stone, ground stone, and pottery, as well as reddened, heat-fractured rock indicative of campfires. All of this evidence attested to possibly intensive periods of prehistoric human activity. Perhaps most striking was a dark basin-shaped charcoal stain visible in the Highway 392 road cut adjacent to the plowed field. Burned bone and artifacts were recovered from this feature and its shape was suggestive of the floor of some sort of buried pit structure, possibly a house.

The survey was soon followed by excavation of five *test pits*, each consisting of a square unit one meter (3 feet-4 inches) on a side and distributed widely across the site. Their purpose was to give CDOT archaeologists some idea of the nature and distribution of buried archaeological materials throughout the site. Test excavations revealed the presence of intact *hearths*, or fire pits, with associated high artifact densities. Based on the test excavation results, the site was thought to include areas with buried prehistoric living surfaces that had remained relatively unaltered through the years. In other words, buried portions of the site existed that had not been severely affected by erosion, construction, cultivation, and so forth, and it was believed that key aspects of the site's occupation could be adequately reconstructed through additional study.

The project research design (treatment plan), written subsequent to the survey and test excavation phase, pulled together all available archaeological data about the site and placed it within a regional research context. The research design asked simply: What do we know about the site, and based on this information, what research themes can be explored that would add to our knowledge of the area's prehistory? Plainly stated, the document posed pertinent questions about the site--the "who, when, what, and why" questions--and presented the means by which archaeologists would endeavor to answer them.

A rough estimate of the age of the site was made during preparation of the research design. The estimate was based on time-sensitive (or *temporally diagnostic*) pottery and projectile point (dart tip, arrow tip) styles and a single *radiocarbon date* obtained from a charcoal sample taken out of a hearth. It was suggested on the basis of this information that occupation of the Cass site was restricted to the Early and/or Middle Ceramic periods, roughly between A.D. 200 and A.D. 1500. Archaeologists with expertise in the region's pottery styles were consulted in an attempt to pin down an association with a particular prehistoric group. One expert noted pottery attributes suggesting an affiliation with groups known collectively as the *Upper Republican* culture, which dominated southern Nebraska and northern Kansas during the Middle Ceramic period. However, the radiocarbon date of around A.D. 600 and the style of most of the projectile points suggested Early Ceramic period occupation. Therefore it was important first and foremost for the research design to incorporate questions pertaining to site *chronology* (age and sequence of events) and cultural affiliation.

Equally important yet much more difficult to resolve are a wide ranging series of interrelated research topics often subsumed under headings such as *settlement patterns*, *site function*, and

subsistence. These subjects together refer to the manner in which a particular group adapted to its environment--the resources it exploited, the types of sites it occupied, and the activities it performed as it moved across the various landscape settings of its homeland. There was limited background information from which to draw during preparation of the research design, particularly in matters relating to site function. The preliminary analysis that followed survey and test excavation at the Cass site was so limited in scope that it offered little help in formulating viable research questions; for that matter, northeastern Colorado in general is not well known archaeologically. Therefore, questions pertaining to site function in the research design were very generalized and oriented toward distinguishing among populations along a scale defined by a highly mobile lifestyle at one extreme and a semi-sedentary to sedentary existence at the other. It was also hoped that information would come to light that might allow the archaeologists to determine if the Cass site was the result of a single major occupation event, or if archaeological debris had accumulated in the course of several short-term occupations.

The final major theme addressed in the research design can be described simply as *technology* and encompassed questions best dealt with through analysis of artifacts and architectural and nonarchitectural features such as walls or hearths. Description of the technological aspects of a site's occupation is typically the backbone of any archaeological report since so-called technological analysis supports most of the other spheres of research, particularly those of site function, settlement, and subsistence. Cass site artifact assemblages collected through survey and test excavation indicated that additional excavations would likely result in a large sample of chipped and ground stone artifacts, a small sample of pottery, and few if any examples of bone tools, ornamentation, or textiles. Research would therefore have to emphasize the manufacture and use of stone tools. The large

number of stone implements would provide an opportunity for archaeologists to define the range of Cass site tool manufacturing strategies and how they might or might not have changed through time. In addition, the distribution of the various products (tools and discarded/unfinished tools) and by-products (chipping debris, referred to by archaeologists as *debitage* or *waste flakes*) of the process over a large area might provide clues as to the location of *activity zones* (localities within the site where specific activities took place) and changes in overall site function through time when viewed in conjunction with the distribution of the various datable materials. The research design thus proposed that technological aspects be tied to site function and settlement. A simple assumption was made that certain strategies for stone tool manufacture and use would likely be associated with particular site functions. For example, it is likely that the tools associated with a short term *hunting camp* would differ significantly from those of a long term *residential base* where numerous domestic chores were accomplished. Whereas the former would more likely feature specialized (less diverse) tools, the latter should be characterized by greater variety in finished tools and waste flakes.

Included with the Cass site research design was a detailed description of the procedures that were to be used in retrieving and processing the information necessary to address the research questions. Additional test excavation, systematic shovel probing, backhoe trenching, major grid block excavation, and transit mapping were called for considering the size and complexity of the Cass site. After acceptance of the research design by the appropriate regulatory agencies, the final phase of field work began.

SITE EXCAVATION

A six person crew employed by Centennial Archaeology, Inc. set up a field camp along Crow Creek in early May of 1990 and commenced excavation of the Cass site (Figures 6, 7). At first, the area encompassing the basin-shaped stain recorded in the road cut by CDOT archaeologists was selected for extensive excavation. As noted above, this feature's appearance was suggestive of prehistoric architecture. The high density of artifacts and remains of a hearth uncovered in nearby test pits also indicated that substantial prehistoric activity had occurred. A *grid system* with an alpha-numeric labeling scheme was first laid out over the central site area. Within this grid a block of 71 contiguous squares or grid units, each measuring one meter by one meter, was excavated (Figure 8). Grid units were excavated individually in 10-centimeter-thick (4-inch) levels, measured from a fixed elevation point known as the *datum* (Datum "A" on the grid block map). Each of the 1 meter x 1 meter grid units was given a designation according to its north-south and east-west positions within the grid system, and grid units bear labels such as Grid B-3, Grid G-5, etc. A large grid block affords an unbroken rather than fragmentary view of a site and therefore creates an opportunity to define more clearly the major aspects of a prehistoric living surface, for example the relationship of one concentration of artifacts to a particular kind of feature, or comparison of the archaeological materials on one side of the block with those on the other. (A *feature*--for example, a hearth--consists of any non-portable product of human effort.) Information about the locations, or *proveniences*, of artifacts and features in such contexts allows for more accurate reconstruction of the events that formed the site.

Figure 6. Excavation just underway in the main grid block at the Cass site. State Highway 392 cuts across center of photograph; view is to the northwest.

Figure 7. Excavation nearly complete in the main grid block. Photo taken from center of State Highway 392; view is to the east-northeast.

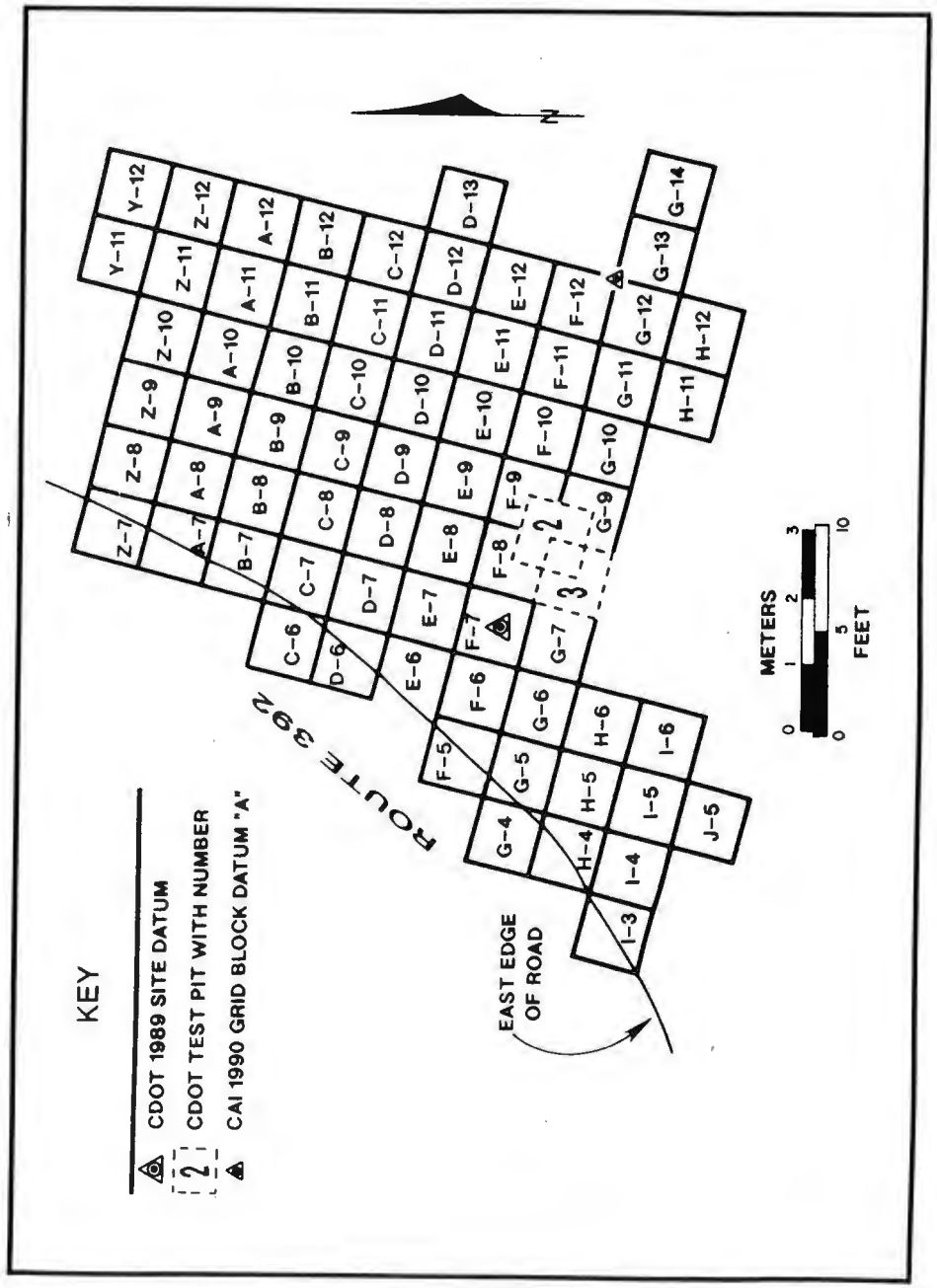

Figure 8. Map of main grid block showing overall layout and alpha-numeric grid designation system. "CAI" in key refers to Centennial Archaeology, Inc.

During excavation, all soil was sifted through quarter-inch mesh (hardware cloth) to maximize artifact retrieval. Other controls and procedures were implemented including maintaining written descriptions of soil properties and other data for each 10-centimeter level within each grid unit; production of maps and *profiles* (side wall cross section drawings) of various locations within the grid block; bagging of artifacts by specific provenience (grid unit, level) and assigning unique field specimen (FS) numbers; and extraction of samples for such purposes as radiocarbon dating and microscopic seed identification.

As the grid system was being set up and excavations initiated, the overall potential of the site was explored for additional buried features, such as hearths, and areas with artifact concentrations. This was accomplished through a systematic shovel testing procedure. Shovel tests are small posthole-size pits arranged in parallel rows, in this instance excavated at 10-meter (33-foot) intervals across the site area. They were excavated in approximate 10-centimeter increments. This method is designed to locate potential buried prehistoric activity zones (for example, hearths, stone tool manufacture areas, buried structures) within a large site area. An additional five 1 meter x 1 meter test pits were subsequently excavated near the most productive shovel tests to confirm the presence of these zones. Depending on the results, larger contiguous blocks of excavations units could be opened or further investigation halted.

The additional test pits and shovel tests were largely unproductive with the exception of three contiguous pits (Test Pits 5, 8, and 10), which formed an L-shaped block on the west side of Highway 392. These units were situated on the opposite side of the road from the main excavation area. Investigations here had been initiated by the CDOT archaeologists with the excavation of Test Pit 5 during the original testing phase. The associated high

artifact density prompted a decision by Centennial to extend additional test pits from the initial excavation. No other multiple unit blocks were warranted based on the results of test pits or shovel tests.

Midway through the site excavation a deep, long backhoe trench was dug which connected the large grid block with an area of very high artifact density in the cultivated field to the east. The objective was to determine how the plowed archaeological materials on the surface of the wheat field were related to the excavated materials being recovered in the grid block. Did the wheat field artifacts represent a separate occupation overlying the grid block materials or were they one and the same? A *geomorphologist*--an expert on soils and landform development--was brought in to inspect the completed trench and provide information about overall site *stratigraphy* (the layering of soil, rock and artifacts). By sampling the soils across the site and in the backhoe trench the geomorphologist was able to interpret site formation processes and the relationships among the various natural soil units.

Finally, Centennial's field investigations included the production of a scaled map of the site and its surroundings (Figure 9). Accomplished with a transit, this map incorporated natural features of the site vicinity such as contours and drainages, man-made features such as Highway 392 and gravel pits, and the locations of all excavation units.

Excavations at the Cass site continued for six weeks. During that time a 71-square-meter (764-square-foot) grid block was excavated to an average depth of 80 centimeters (32 inches), in addition to several test pits, numerous shovel tests, and a single lengthy backhoe trench. Approximately 65 cubic meters (2300 cubic feet) of soil were removed and screened for artifacts (not

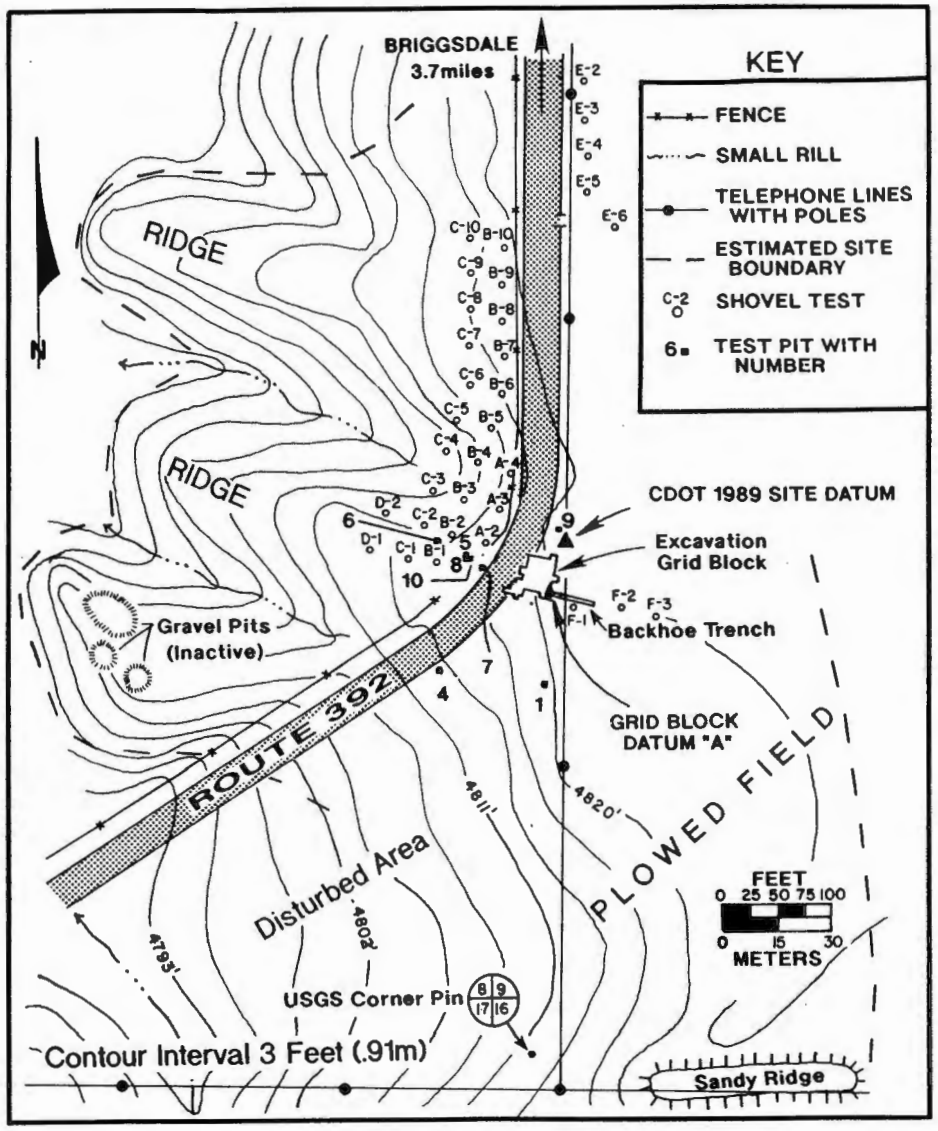

Figure 9. Map of the Cass site and immediate surroundings.

including backhoe trench fill, which was not screened). Over seven thousand artifacts and three hundred bones and bone fragments were recovered, and five hearths were exposed and excavated. The analysis of these materials is described in the following section.

POST-FIELD ANALYSIS

Upon completion of fieldwork in late June of 1990, all notes, maps, and artifacts were removed to the Centennial laboratory in Fort Collins, Colorado and preparations were made for production of a final technical report. Prior to processing all the collected materials in the lab, some initial subjective impressions garnered during and immediately after the field phase were contemplated. These post-field judgements were important in developing precise analytical procedures, that is, procedures that perhaps more closely reflected the nature of information extracted from the site than did the original research design. It was a process whereby the archaeologists sorted through initial tentative conceptions of the site and threw out the ones that field investigations proved abjectly wrong without even having to resort to laboratory analysis. For example, following excavations it was apparent that:

(1) There were no structural remains present at the site; the basin-shaped stain first noted by CDOT archaeologists was evidently a rodent burrow or series of burrows within a natural depression.

(2) The bone, pottery and ground stone yield was lower than expected.

(3) Features were limited to simple, shallow hearths; no storage facilities or elaborately constructed fire pits were uncovered.

(4) Small, finished, finely crafted chipped stone implements, although present, were not the big story at this site. Instead, there was an abundance of chipping debris and unfinished, poorly formed tools that were probably discards.

(5) Many of the better crafted chipped stone specimens seemed to have been made out of exotic, fine-grained raw materials including a clear to milky white chalcedony, believed to be from the Flattop Mesa prehistoric quarry area north of Sterling, Colorado. Excavators generally believed that some sort of patterning was occurring in the distribution of chipped stone material types across the site, that is, material types appeared not to be randomly distributed.

With the above considerations in mind some sense still had to be made out of the 7,369 chipped stone artifacts, 47 ground or battered stone implements, 26 pottery sherds, 333 pieces of bone, 84 charred seeds, and eight hearths (these totals include materials resulting from the CDOT work, which were also analyzed at this time). Although description and illustration of these materials would form an important part of the final report, interpretation of the data in light of the research design questions was a primary consideration. Accomplishing this goal required that large sets of recovered materials, particularly those of chipped stone (or *lithics*), be made more analytically manageable by *classification* (sorting). Select physical properties of each class of archaeological material would then be measured and the measurements transformed into managable *data sets*, mainly through computer entry.

There are countless options for measurement and classification available to the analyst. Most archaeologists today agree that there is no single standard analytical method best for any particular class of archaeological materials. Analysis instead should be individually designed for a particular sample to provide adequate description (so that other archaeologists in the area can compare their material with yours) and to address specific research needs. For example, measurement and classification can be quantitatively or qualitatively oriented, or some sort of combination thereof. A collection of artifacts can be *quantitatively* sorted through observations that are entirely numeric and therefore replicable, for example, large projectile points are those which measure 4.5 centimeters to 8.6 centimeters in length and small points are anything less than 4.5 centimeters in length. *Qualitative* sorting (also known as descriptive sorting or "eyeballing") takes a bit more experience since the analyst may distinguish, for example, "Cordmarked Category I" pottery from "Cordmarked Category II" on the basis of an intuitive assessment of just a few key characteristics; numeric values in these situations are not considered for sorting. Each method has its advantages and disadvantages, and there are good and bad examples of each. Certain kinds of qualitative sorting also take on a decided functional viewpoint since implements are sometimes designated "scrapers" or "spokeshaves" solely on the basis of their overall appearance. Such classification often generates spurious interpretations because other characteristics are not examined to support the functional inferences. In any case, the size, condition, and context from which a sample was recovered essentially restrict the number of available analytical methods.

The Cass site collection was subjected to a variety of analytical techniques, some undertaken by specialists. The small sample of pottery fragments, or *sherds*, was sorted entirely on the basis of descriptive characteristics; the sample was divided into

wares according to surface characteristics apparent on each sherd, for example cord-marking versus incising. *Types* were recognized within the wares on the basis of intuitive observations that took into account a number of different pottery characteristics. Each type was illustrated and described in terms of several distinct *attributes* (characteristics): color, firing method, construction method, *paste* (the clay mixture from which a pot was made), and *temper* (grains such as sand that were added to the paste to prevent breakage during firing). Sherds of each type were compared with pottery previously described and dated in northeastern Colorado and adjacent areas in an attempt to establish a time frame for each particular style.

Because stone artifacts form the great bulk of the Cass site collections, its analysis would be crucial for addressing all research concerns. The size of the sample required a much more complex technique utilizing a combination of both numeric (quantitative) and descriptive (qualitative) measurements. All stone artifacts were initially sorted according to whether they were the products of grinding or controlled fracturing (chipping or *knapping*). The ground stone collection was further divided simply on the basis of whether an implement was a cobble (a hand-held grinder, or *mano*) or a slab (a fixed grinding surface, or *metate*). The huge chipped stone collection required a much higher degree of sorting, but with specific research needs in mind. The sorting process for any large sample is by necessity one that is decidedly hierarchical; in such a system, large, general, all-encompassing categories are progressively split into smaller and smaller groupings that require increasingly precise measurement for definition.

Chipped stone was first sorted according to whether an individual piece did or did not show evidence of intentional modification. Modified specimens are those presumed to represent both finished and unfinished tools. Artifacts that did not exhibit

modification were designated waste flakes and were further sorted into categories on the basis of size and other attributes. Tools were sorted first on the basis of whether they did or did not exhibit bifacial shaping, the most intricate of tool manufacturing techniques. The term *bifacial* refers to the intentional removal of flakes on two sides, or "faces", of an implement in the process of thinning and shaping it. The biface sample includes a wide variety of tool forms from large crude "choppers" to finely crafted projectile points and knife-like implements. The remaining tools are generally less intricately crafted than bifacial tools but still include a wide range of implements from formally shaped "scrapers" (typically *unifacially* thinned) to those that exhibit only minimal modification, for example, pieces of sharp chipping debris that were used "as is" for some task at hand. Tools not classified as bifaces were further sorted on the basis of other attributes.

Once the chipped stone artifacts were divided into the various waste flake and tool categories several other measurements were taken and the raw data entered into a computer. Since stone tool manufacture is very much an assembly-line kind of process (known as *reduction*), the collection of waste flakes is a very good reflection of the specific manufacturing approaches that were employed at the site. The idea is to distinguish chipping debris reflective of the early stages of tool manufacture from that associated with the latter stages. For example, as tools become progressively smaller and thinner during the manufacture process, so do the waste flakes. While large intact flakes generally result from the introductory stages of tool manufacture, small, thin, easily broken specimens are associated with the final stages. Such measurements as the weight of intact specimens (a good indicator of overall size) were therefore also taken to elucidate further the tool manufacturing processes at the site.

For tools, additional qualitative measurements were selected to aid in gauging the level of effort invested in manufacturing a particular implement. Tools within each category described above were designated *low effort*, *medium effort*, or *high effort* on the basis of assessments of the amount of work that was applied to their manufacture. Quantitative measurements were used primarily to describe more precisely each final tool category. One particular category of tools--projectile points--is important not only in a functional sense but also in determining site age. In general, projectile points are characterized by the greatest amount of craftmanship, and most have distinctive attributes that permit their assignment to a particular style. Since styles changed through time, projectile point types tend to serve as effective age indicators for archaeological sites, often supplementing other information sources such as radiocarbon dates. Types at the Cass site were defined on the basis of visual inspection of form and size; numeric measurements were then used to describe further these types.

A sampling of artifacts recovered from the Cass site during excavation is illustrated in Figures 10 through 16. These materials include projectile points (Figures 10, 11), bifacial tools (Figure 12), flake and cobble tools (Figures 13, 14), manos (Figure 15), and pottery sherds (Figure 16).

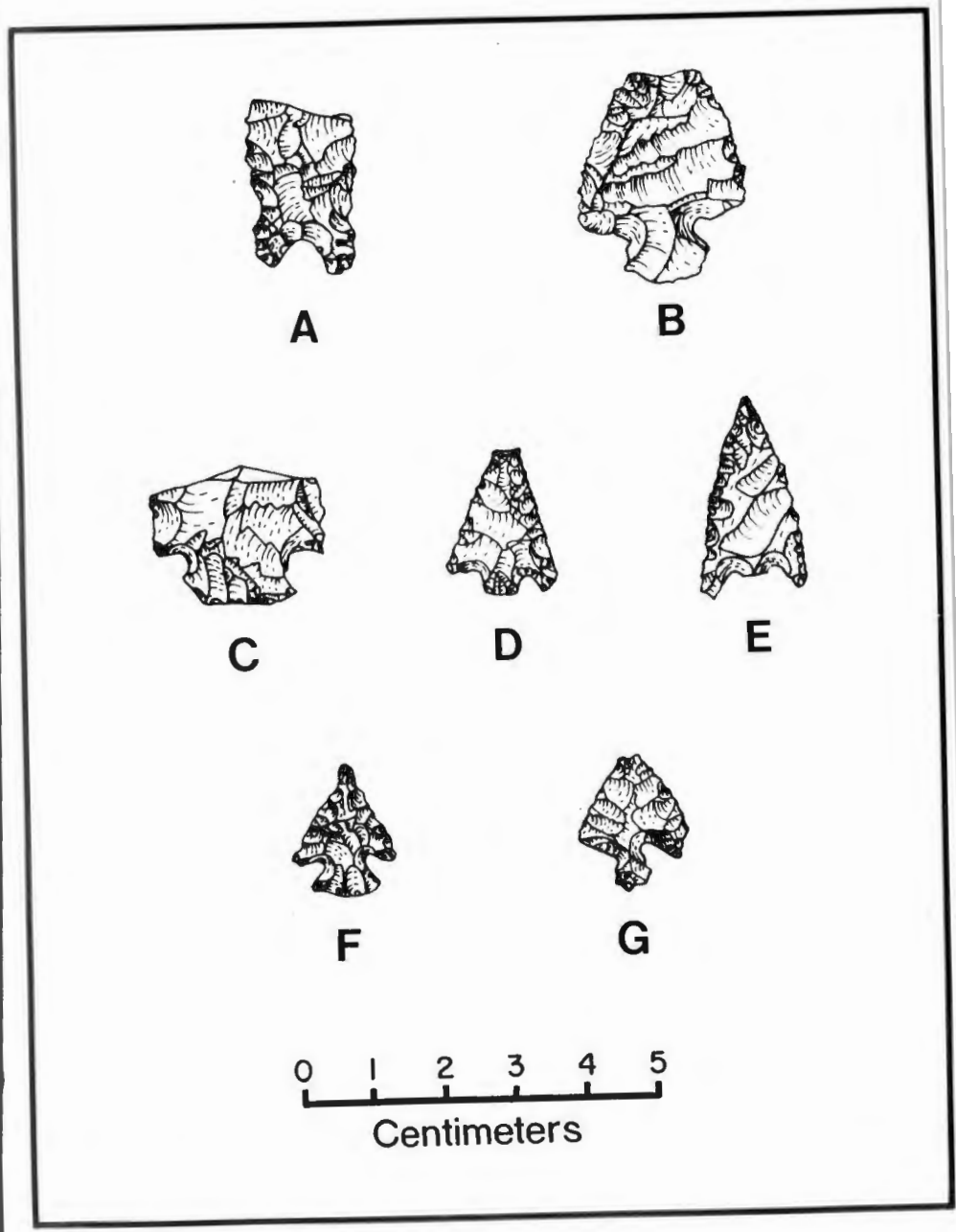

Figure 10. Projectile points from the Cass site.

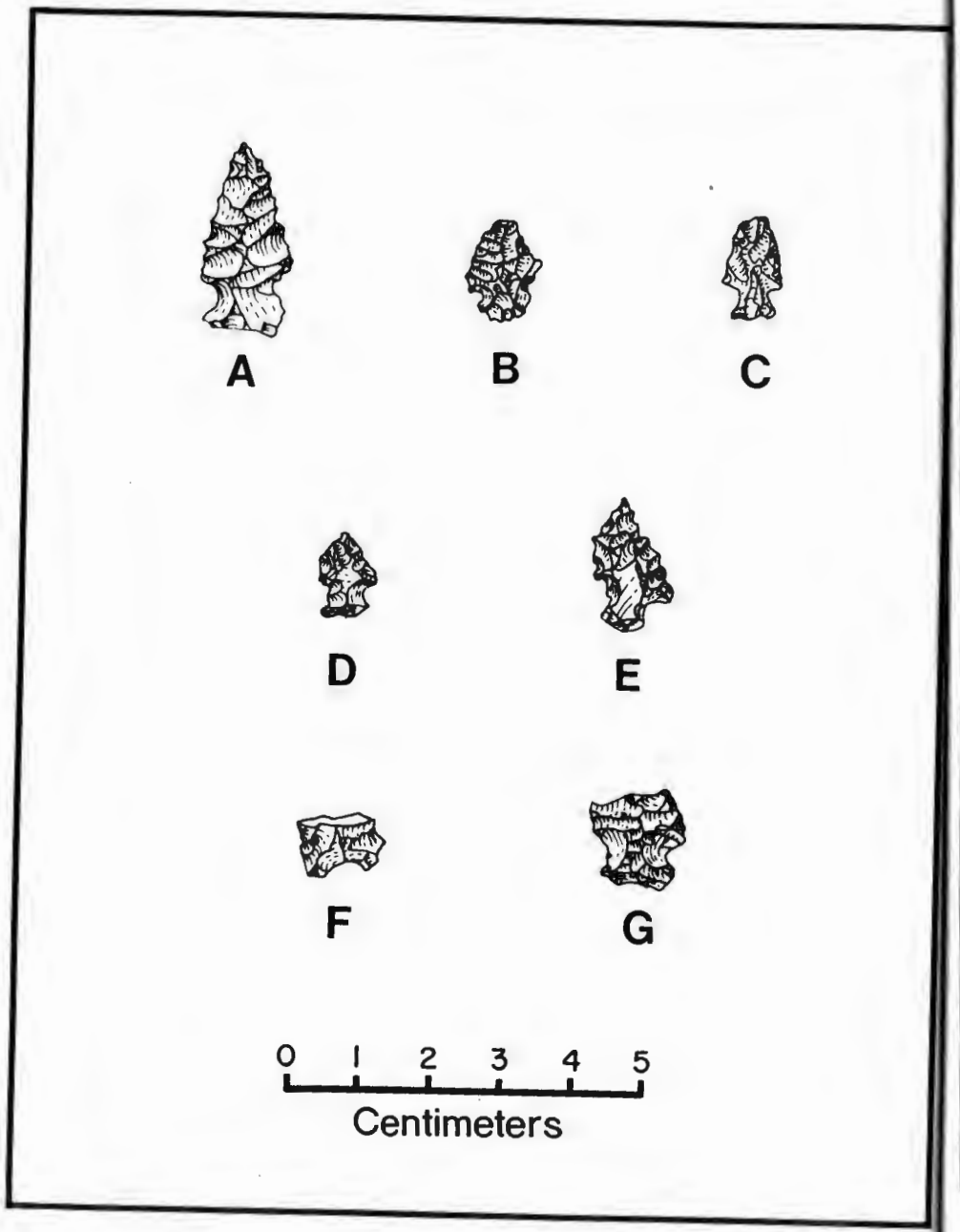

Figure 11. Projectile points from the Cass site.

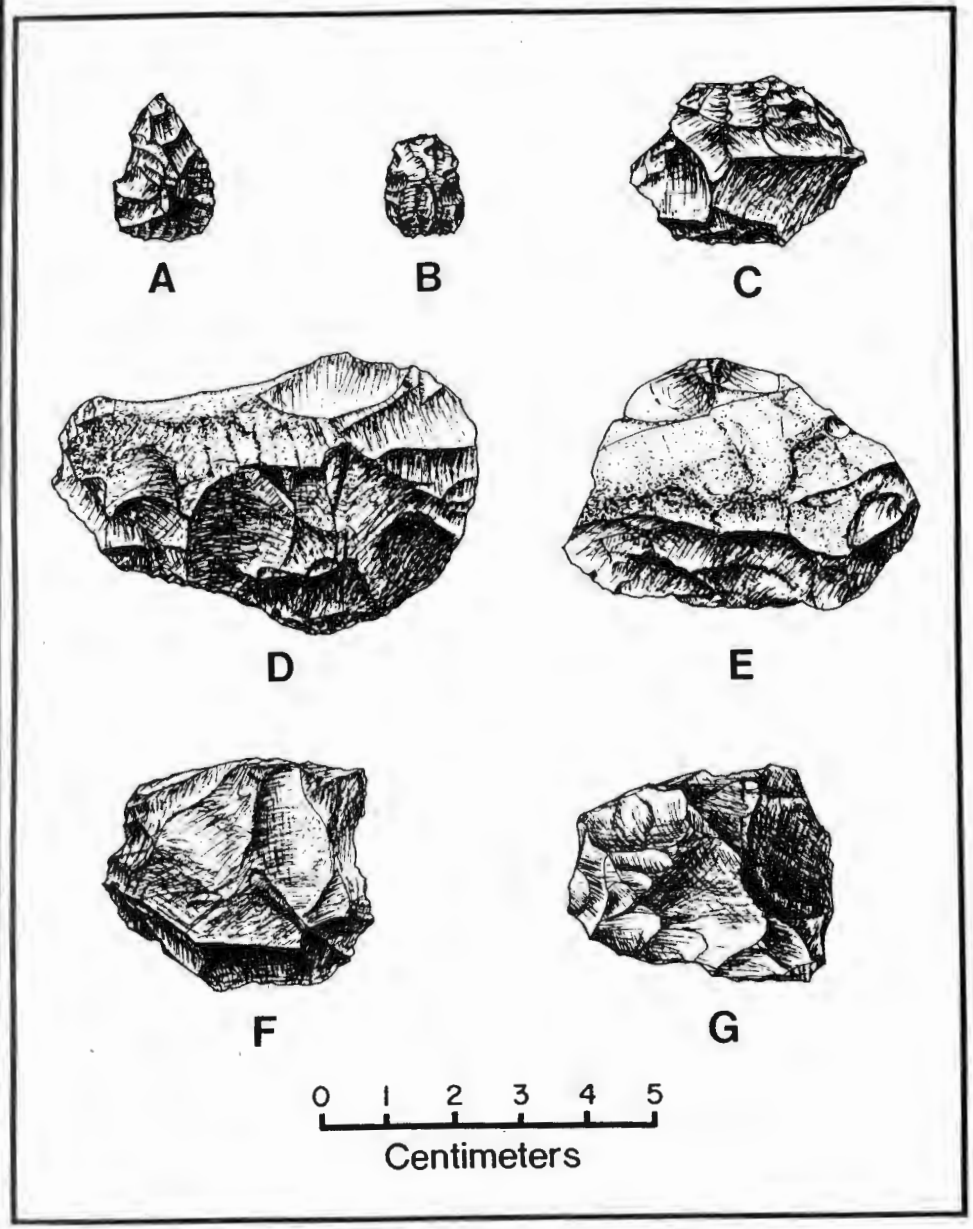

Figure 12. Bifacial tools from the Cass site.

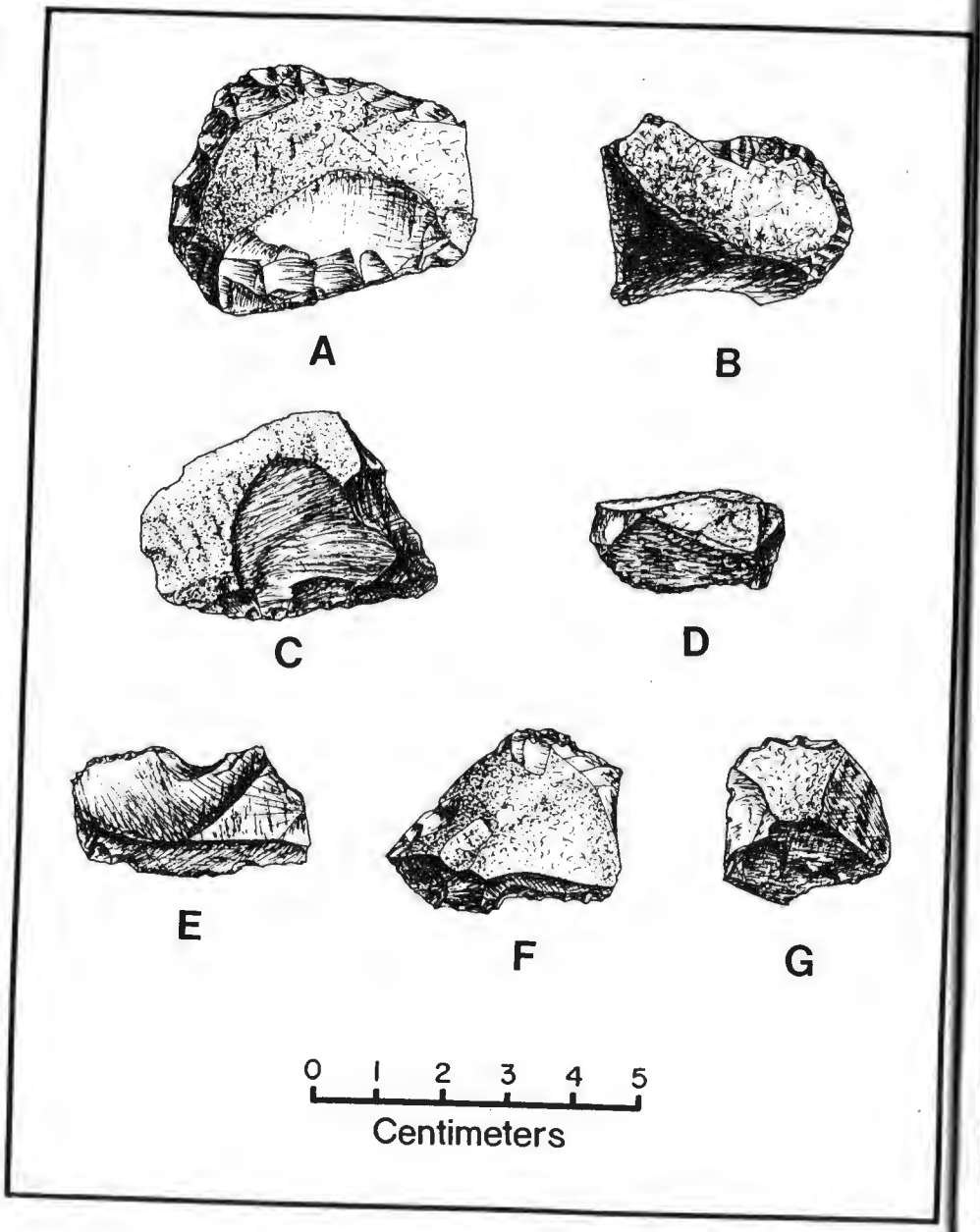

Figure 13. Flake tools from the Cass site.

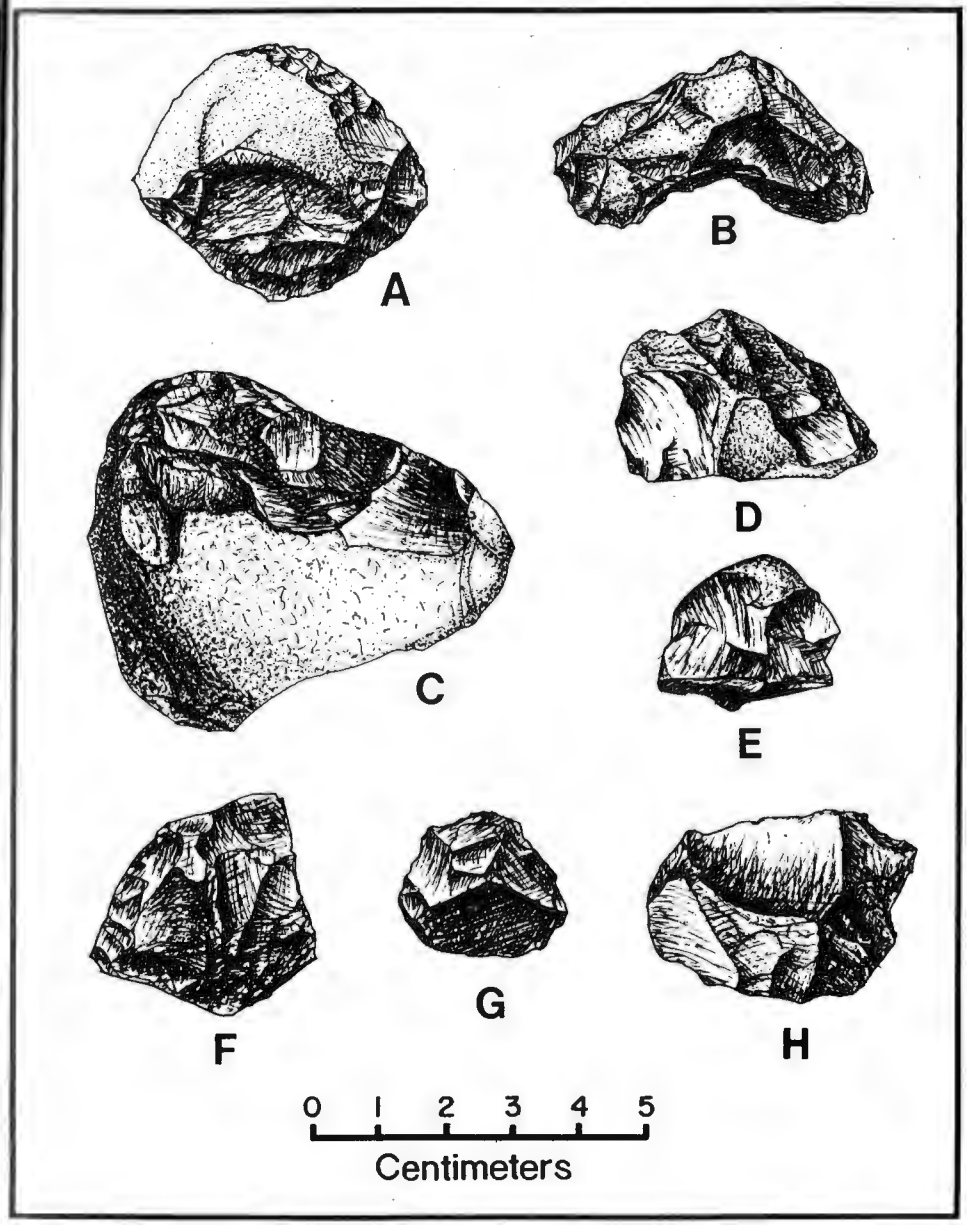

Figure 14. Cobble tools and miscellaneous tools from the Cass site.

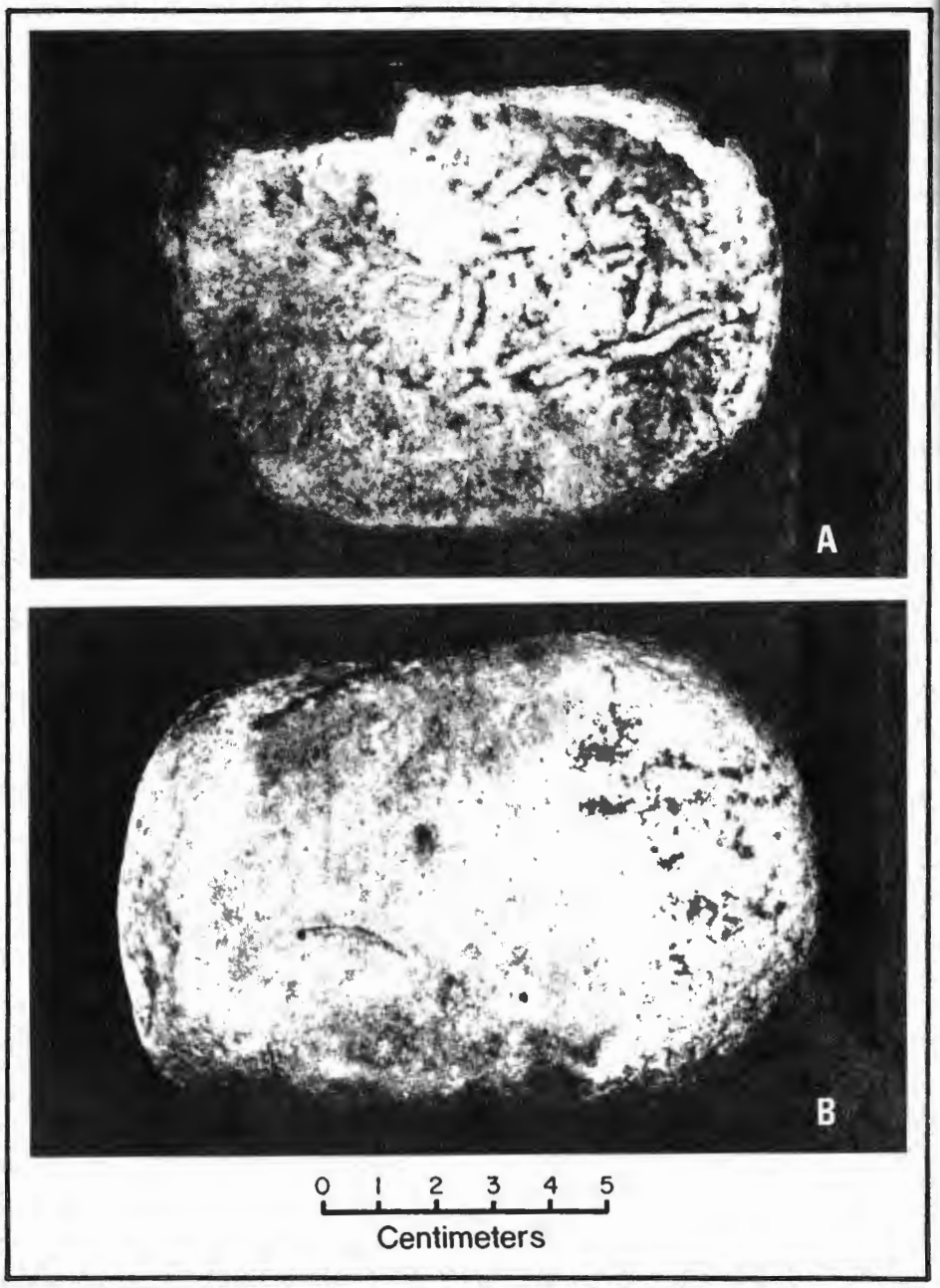

Figure 15. Manos from the Cass site.

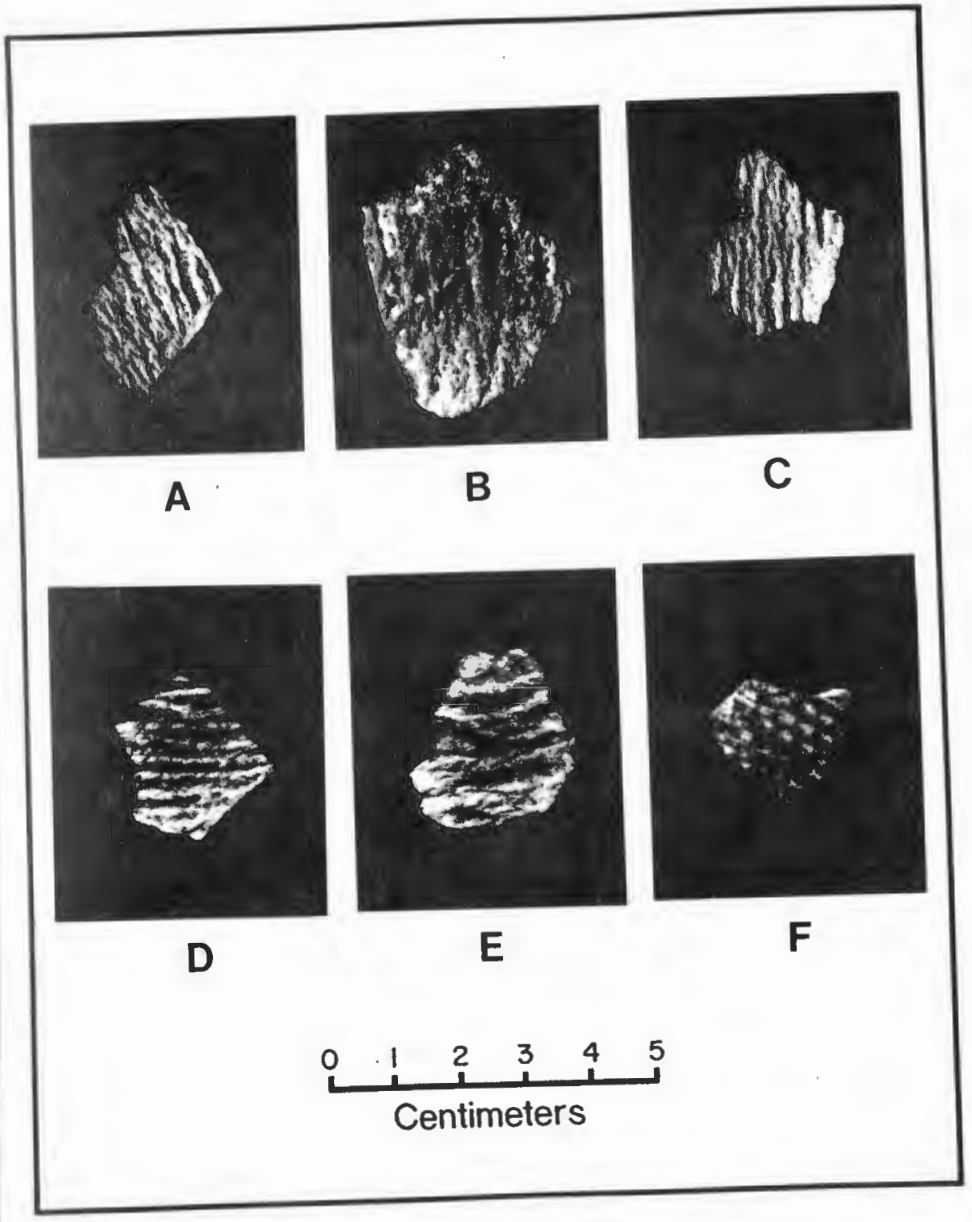

Figure 16. Examples of cord-marked pottery sherds from the Cass site.

ANALYTICAL RESULTS AND INTERPRETATION

The bulk of the analysis was accomplished in one winter of intensive work. The results are summarized below and appear in more comprehensive form in the final technical report (Kalasz et al. 1992). The major topics addressed in the analysis mirror those of the research design: site chronology, site function, and technology. There is an additional section summarizing the results of an attempt to reconstruct activity zones or work areas within the large grid block.

Site Chronology

Information pertaining to the age of the Cass site deposits comes from radiocarbon samples, projectile points, and pottery sherds. The radiocarbon data, summarized in Table I, suggest that the Cass site represents an amalgamation of occupations occurring over a period of perhaps two hundred years during the Early Ceramic (Woodland) period. The set of radiocarbon dates does not indicate the presence of more recent (Middle Ceramic period) occupational events, as had been suspected prior to excavation.

The projectile point collection (Figures 10 and 11) supports the radiocarbon dates in that, although it exhibits quite a range of shapes and sizes, it is dominated by small, triangular, corner-notched specimens that previous work in the eastern plains of Colorado had demonstrated to be predominant during Early Ceramic times. The most unusual or out-of-place point is a specimen of the *McKean* style (Figure 10, A), generally associated with Middle Archaic period contexts on the high plains and much older than the estimated age of the Cass site. This particular point could represent a *curated* tool, that is, it may have been found somewhere by Early Ceramic period people and was simply kept and possibly reused. This item was recovered from a highly

TABLE I: RADIOCARBON DATES FROM THE CASS SITE*

Provenience**	Raw Age in Years Before Present (B.P.)	Calibrated Age in Years B.P.***
Test Pit 1, CDOT Feature 2 (hearth)	1460 ± 50 B.P.	1345 B.P.
Grid Block, CAI Feature 1 (hearth)	1240 ± 80 B.P.	1173 B.P.
Backhoe Trench, CAI Feature 4 (hearth)	1370 ± 60 B.P.	1293 B.P.
Grid Block, CAI Feature 6 (hearth)	1260 ± 70 B.P.	1225/1215/1184 B.P.

* Radiocarbon dates are expressed in years before present (B.P.); by convention, the "present" is defined as the year 1950 – a constant point of reference, and the year that this dating technique was developed. Thus, the figure 1460 B.P. listed for the first date (column 2) actually translates to 1950 minus 1460, or a Christian calendar date of A.D. 490. Using other sources of age information, such as tree-rings, *calibration* systems have been developed to compensate for fluctuations over time in atmospheric Carbon-14. These fluctuations, if not taken into account, tend to distort dates and skew age estimates for archaeological sites. A calibration is essentially an adjustment in the raw date that brings the date closer to the real age of the sample. Returning to the example of the first date, the calibrated age is 1345 B.P., which if subtracted from 1950 yields a Christian calendar date of A.D. 605 – a more accurate estimate of the sample's true age than the raw date of A.D. 490. Calibration systems are themselves imperfect and sometimes result in multiple ages as in the fourth sample. A plus-minus range, or *sigma* value, accompanies any radiocarbon date; it reflects various uncertainties inherent in the dating technique. Statistically, the actual date of the sample (in the example of the first date, 50 years to either side of the stated date) has about a two-thirds chance of falling within the sigma range. It is because of the uncertainties and error potential of any single sample that archaeologists try to secure a series of radiocarbon dates from every excavated site.

** CDOT = Colorado Department of Transportation; CAI = Centennial Archaeology, Inc.

*** Calibration system of Stuiver and Reimer (1986).

rodent disturbed grid unit, and may have been removed from its original location prior to discovery in 1990.

The results of pottery analysis (Figure 16) are not conclusive in terms of resolving the issue of Early Ceramic versus Middle Ceramic occupation of the Cass site. The simple fact when working on the eastern Colorado plains is that pottery did not change very much from the Early Ceramic to the Middle Ceramic period, and without supporting information (for instance, radiocarbon dates), ceramics serve as only a very general indicator of age.

Site Function and Technology

The prehistoric activities at the Cass site included a variety of common camp chores, for example the processing and consumption of both plant and animal foods, and the manufacture and maintenance of tools to accomplish these tasks. However, the results of all analyses indicate that these chores were probably auxiliary to the site's primary function as what has been termed a mid-stage lithic workshop (defined below). Several lines of evidence resulting from the analysis led to this conclusion. As was suspected soon after the excavations began, the recovered materials were not suggestive of any sort of base camp. Although fairly diverse in nature, the density of materials was skewed heavily toward chipped stone artifacts; the site seemed more a factory than a residence. The presence of charred seeds and seed fragments, pottery sherds, hearths, and burned bone all attest to subsistence-related activities but their numbers suggest only short duration camps. The following information is presented in support of this proposition:

(1) Twenty-six pottery sherds were recovered, with the minimum number of vessels represented conservatively estimated to be nine to eleven. There is little variability in the sample; nearly all have surfaces that had been cord-roughened at the time of manufacture, when the clay was still wet and had not yet been fired.

(2) Although some 3,670 seeds were recovered through a flotation technique performed on 13 soil samples, many from the contents of hearths, all but 84 are uncharred and thought to represent modern contaminants. Of these 84 seeds, 82 are of a single species, goosefoot (*Chenopodium*), and the remaining two are sunflower (*Helianthus*). No evidence of domesticated plants such as corn was found.

(3) The inventory of animal bones and bone fragments (referred to by archaeologists as *faunal* remains) does not suggest large-scale animal processing. The 333 items of bone consist almost entirely of small fragments, the entire sample weighing just 9.6 ounces (240 grams). Of the total bone weight, 68.5% is identified as bison; other species identified include pronghorn antelope, coyote, deer, and jackrabbit or cottontail.

(4) The sample of ground stone is not only quite small and fragmentary, but use-wear evidence and the degree of intentional modification that is apparent suggest that many are only lightly ground and were probably not used repeatedly. Twenty-three manos, of which seven are complete or nearly complete, and 21 metates, none complete, were recovered. None displays the formality of shape and manufacture exhibited in, for example, ground stone of the Puebloan Southwest. Manos are generally lightly ground stream or terrace cobbles, and metates are simple flat or shallow basin-shaped slabs.

(5) Either charcoal preservation was bad, or not a great deal of wood was burned in the Cass site hearths. In any case, the hearths are not typified by much depth or effort in construction. Eight hearths in total were excavated at the Cass site. Most are circular or roughly circular in shape and consist of shallow basins lacking the slab lining sometimes seen in the high plains and nearby areas. Similarly, the soil within the hearths contained little or no heat-fractured rock. It was dark and ashy--burned and highly organic--but with little or no visible charcoal. It is possible that, because firewood was not always in abundant supply at the immediate site locality, dried buffalo "chips" were sometimes used for fuel. Figures 17 and 18 illustrate two typical Cass site hearths; a cross section drawing of one hearth is included.

Figure 17. Photo of Feature 1 (hearth) following excavation. Length of north arrow is 12 inches (30 centimeters).

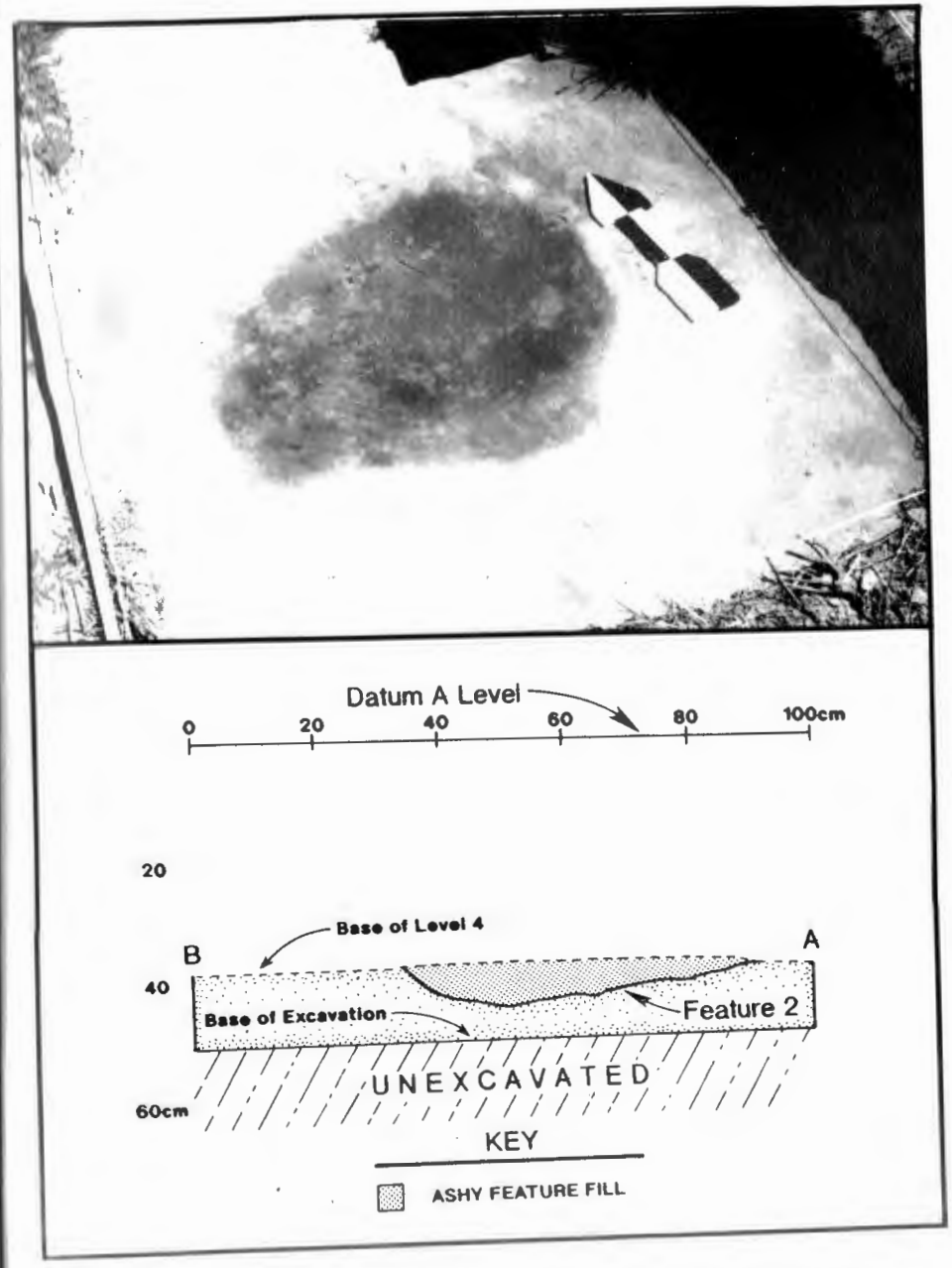

Figure 18. Photo (top) and profile drawing (bottom) of Feature 2 (hearth).

The synthesis of subsidiary activities brings us to a discussion of what we believe to have been the primary role of the Cass site. Of the 7,369 chipped stone artifacts, 6,879 were classified as waste flakes and the remaining 490 as tools. As noted above, the process of lithic reduction yields waste flakes as by-products. As the reduction process proceeds, progressively smaller waste flakes are produced. The general character of the waste flakes at the Cass site--particularly their size and shape--suggests that neither early nor late stages of reduction are represented. Rather, the chipped stone tool collection is characterized by attributes suggesting middle stages of reduction. And while the tools are diverse in form, those displaying high levels of craftsmanship in the form of significant thinning and retouch have the poorest representation among the entire collection.

This information enables us to speculate that the Cass site artifacts represent a very specialized type of site. Crow Creek was evidently a locale where chipped stone supplies were replenished by small groups of people because of the availability of naturally occurring workable cobbles and gravels. Variability in size, flaking quality, and edge characteristics among the available materials dictated that many of the cobbles were initially split or "tested" at as-yet-unidentified quarry locations in the area. At the Cass site, these materials were further reduced for transport, trade, or to provide tools for immediate use in the variety of domestic tasks performed in what appears to be a series of short duration occupations. Recent literature concerning the role of chipped stone materials in prehistoric human settlement systems takes note of the importance of "gearing up" in anticipation of tool needs and preparing those materials for transport (for example, see Binford [1980] or Kelly [1988]). The term *mid-stage lithic workshop* is used here to distinguish the Cass site from quarries--the actual raw material source areas--and from localities where tools underwent

maintenance or final shaping for specialized tasks such as butchering or hide working. The main idea here is that the local cobbles were reduced to easily transportable forms ready for subsequent modification as dictated by the needs of a small band of people during the course of its seasonal movements. It is evident that these activities were generally not accomplished in a matter of hours, as there are indications of overnight camping activities at the Cass site, for example construction of hearths, plant and animal processing and consumption, and so forth.

Spatial Reconstruction

The 71-square-meter grid block excavated at the Cass site is illustrated in Figure 8. Moving north to south, each row of grids is labeled alphabetically, for example, A, B, C, and so on. East/west positioning is designated numerically with the westernmost units assigned the lowest values. Datum A, the excavation reference point in the main grid, was established at ground surface in the northeastern corner of Grid G-12.

Figure 19 provides a view of a representative vertical slice of the grid block area through illustration of the stratigraphy profiled along a series of contiguous excavated grid units. These are the northern walls of the "F" series of grid units. The profile is split into two segments in order to fit it on a single page. The upper portion of the figure represents the westernmost units in the series, and the lower portion the easternmost units. Note that the major soil units are labeled I through IV from bottom to top. Lower case letters are used to denote subtle color or gravel content differences in the major units. The lowest level, Unit I, was almost completely devoid of artifacts, and the uppermost, Unit IV, was totally disturbed from the effects of old road construction. The relatively undisturbed materials are therefore confined to Units II and III. Note that the archaeological deposits are generally thin

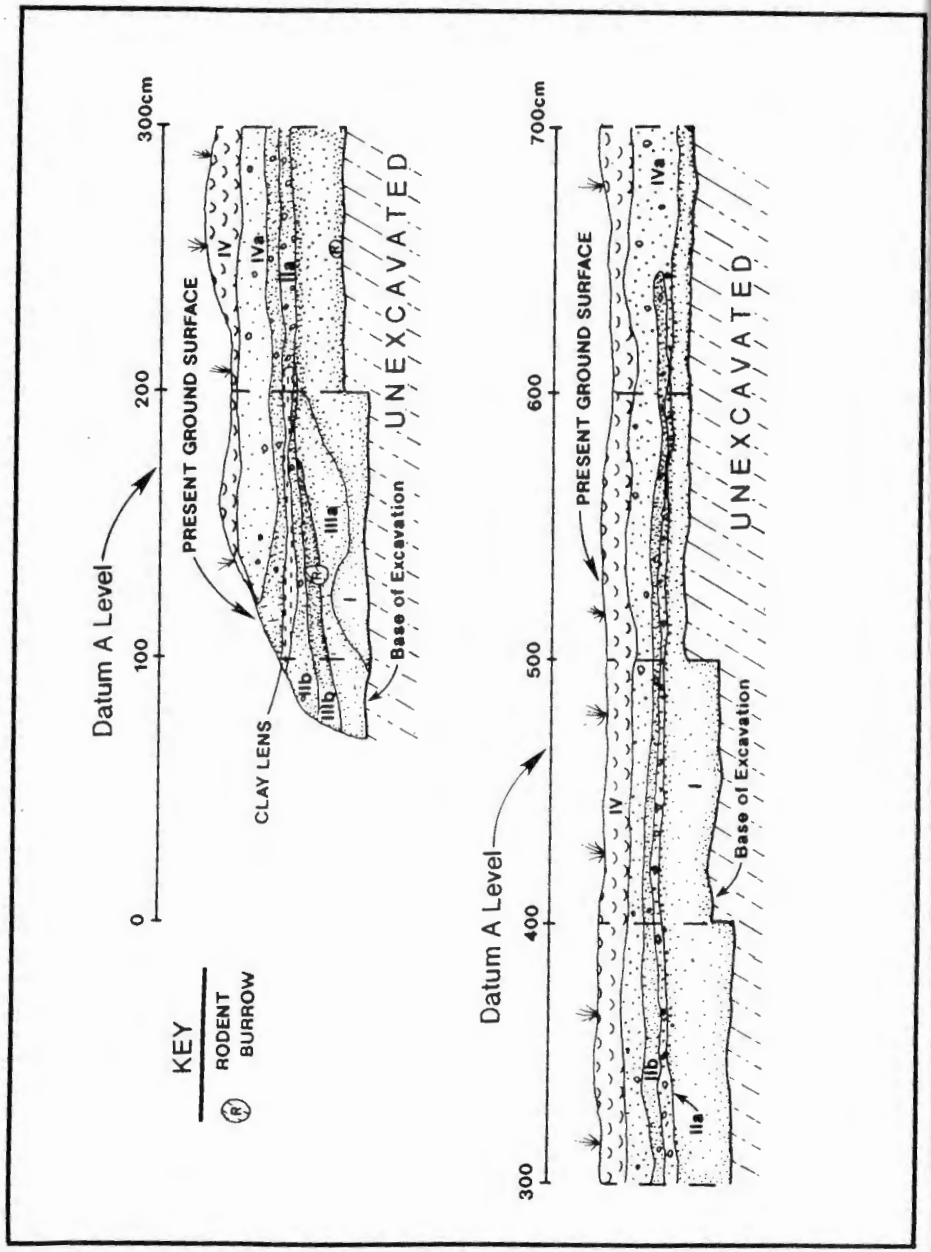

Figure 19. Profile drawing showing soil stratigraphy along the "F" row of grid units in the main grid block. View is to the north.

in this area with the exception of a basin-like feature in the westernmost units. All soils restricted to the distinctive basin were designated Unit III. Figure 20 presents another series of wall profiles from further south in the grid block (the "G" series).

It is evident from such stratigraphy that distinctive superimposed or "layercake" soil deposits--the stuff of illustrations in archaeological textbooks--were largely absent at the Cass site. A site with superimposed occupations might be characterized by lower and upper soil strata, each with artifacts, separated by a *sterile* stratum lacking archaeological materials. In such a situation an archaeologist can easily compare and contrast earlier with later occupations. At the Cass site no such opportunity existed, and the analytical focus necessarily shifted to the horizontal rather than vertical distribution of artifacts.

Although we had determined through analysis that, overall, the site represented a mid-stage lithic workshop, it was hoped that viewing the horizontal distribution of cultural material would reveal internal characteristics of such an operation. It is a given in archaeological site formation and structure that processes such as erosion cause materials to be displaced to a certain extent after a site has been abandoned. At the Cass site, could patterning in the locations of different types of artifacts and features be recognized? Are differences in the densities of particular items across the site recognizable? Obviously, chipped stone artifacts would play the major role in these determinations but it was important to consider other sources of information as well.

The excavation data were subjected to a series of tests, including computer-assisted statistical analysis, which permitted the archaeologists to visualize better the distributions of cultural remains across the excavated portions of the site. A very non-uniform distribution of artifacts and other materials across the grid

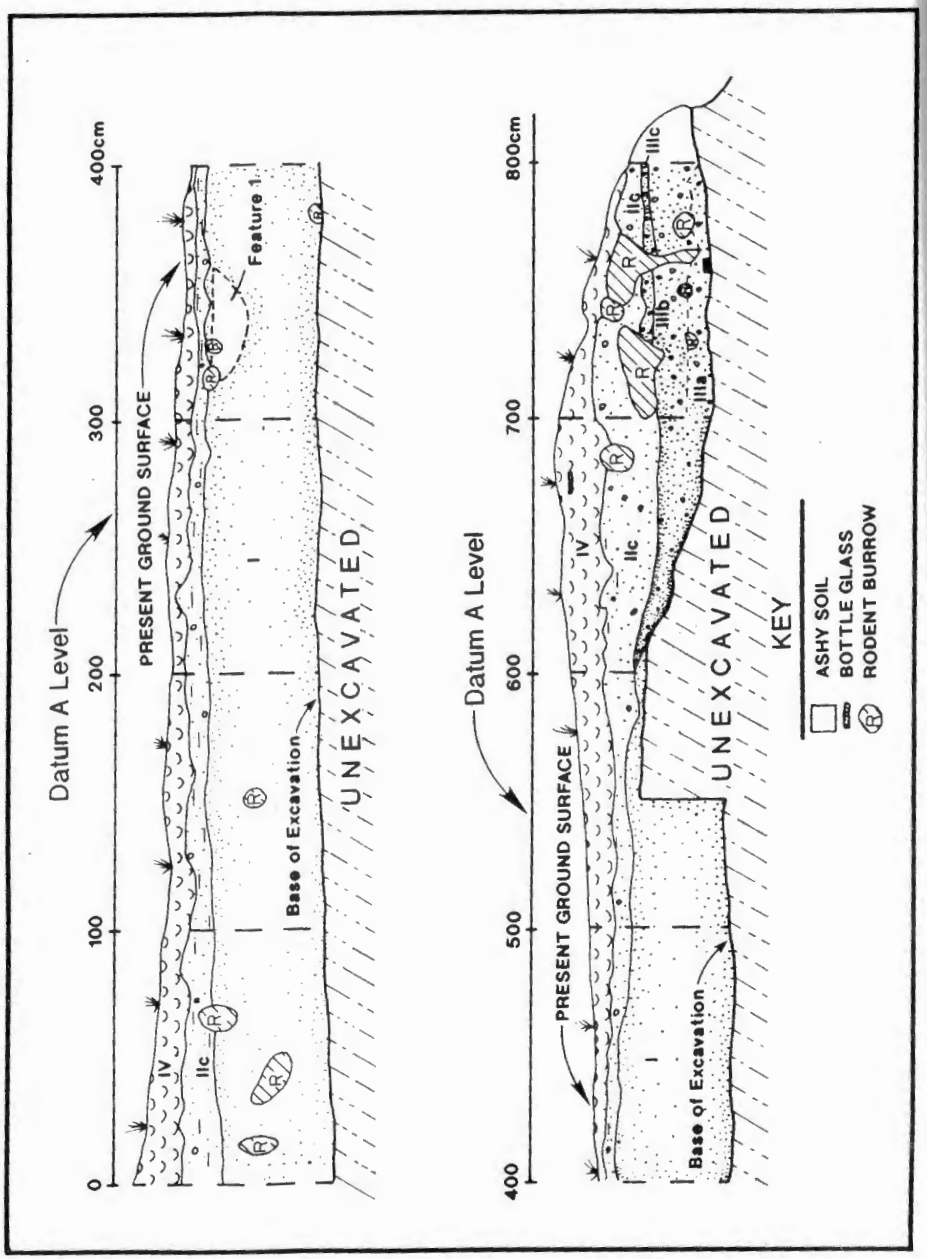

Figure 20. Profile drawing showing soil stratigraphy along the "G" row of grid units in the main grid block. View is to the south.

block was recognizable. It is reiterated that the grid block encompasses only a small portion of the overall site area; we are viewing only a few pieces of a large puzzle. Activity areas defined on the peripheries of the block that appear small may in actuality extend some distance into unexcavated areas. In any case the study revealed that the formation of the Cass site was a very complex process.

Figure 21 illustrates the locations of activity zones in the grid block, based on computer-assisted analysis of the distribution and density of various kinds of chipped stone artifacts. Because excavation grid units were the basic units of analysis, each was assigned to a particular activity zone. Eight such zones were identified. In Figure 21, all grid units labeled with a "1" fall within a single activity zone, units with a "2" are in another zone, and so on. It is apparent that these zones vary greatly in size and that most border unexcavated or disturbed areas, suggesting that the total extent of most zones is not known.

Figure 22 displays the distribution of hearths, ground stone, pottery, and projectile points across the grid block. Note that ground stone artifacts were recovered in higher densities from the northern portions of the grid block. The small sample of pottery and projectile points is widely dispersed and no activity patterning can be confidently associated. It is interesting to note that the only grid unit with three items of ground stone is adjacent to Feature 5, a small hearth that yielded a relatively high number of charred goosefoot seeds. In contrast, the areas characterized by the highest levels of chipped stone tool manufacture activities in the southwestern corner of the block have little associated ground stone or pottery. It makes sense that any intensive flint knapping--which can produce thousands of small, sharp waste flakes--take place in a natural depression well away from the scene of any activities relating to food processing.

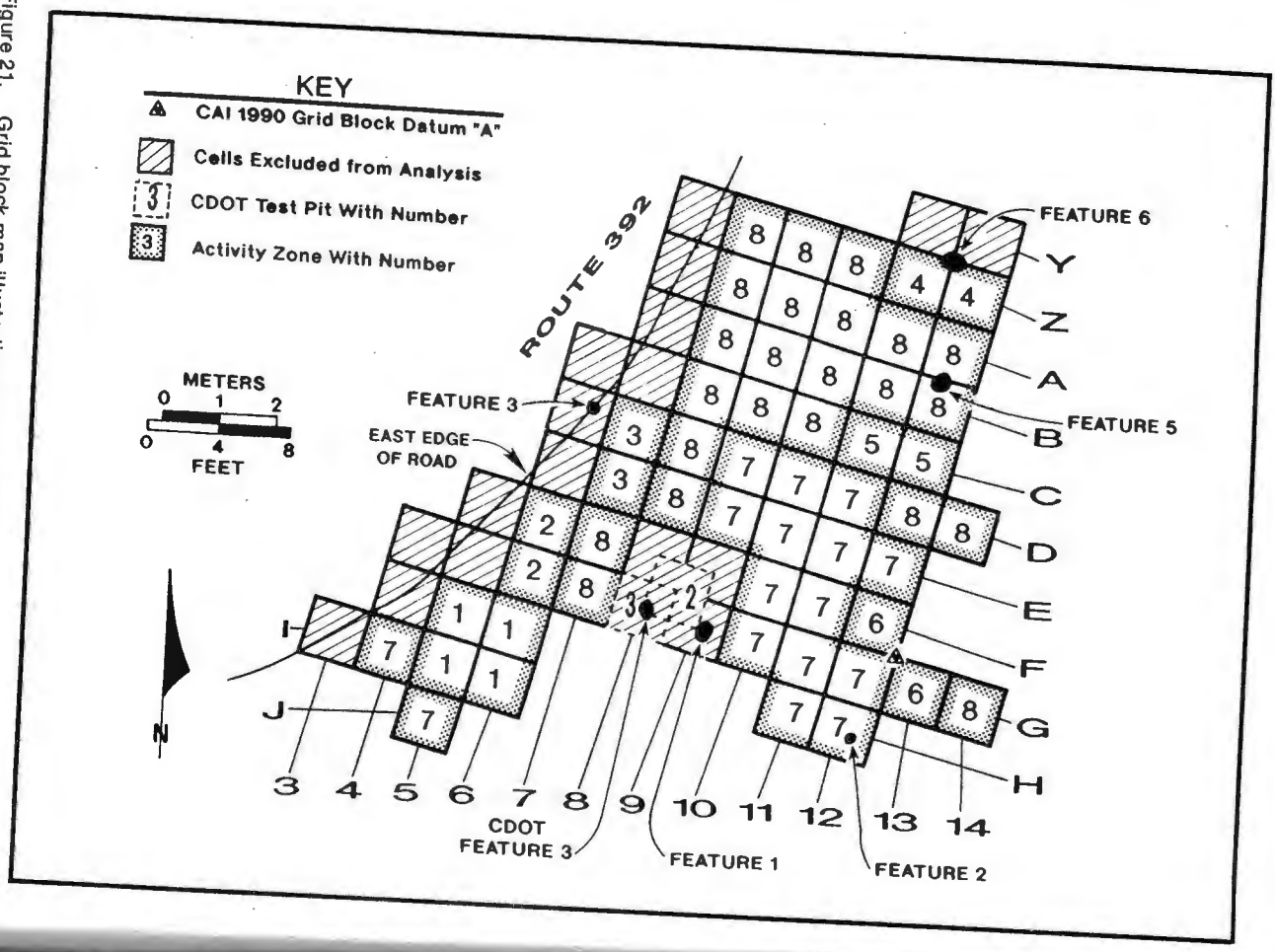

Figure 21. Grid block map illustrating probable prehistoric activity zones, based on the results of chipped stone artifact analysis.

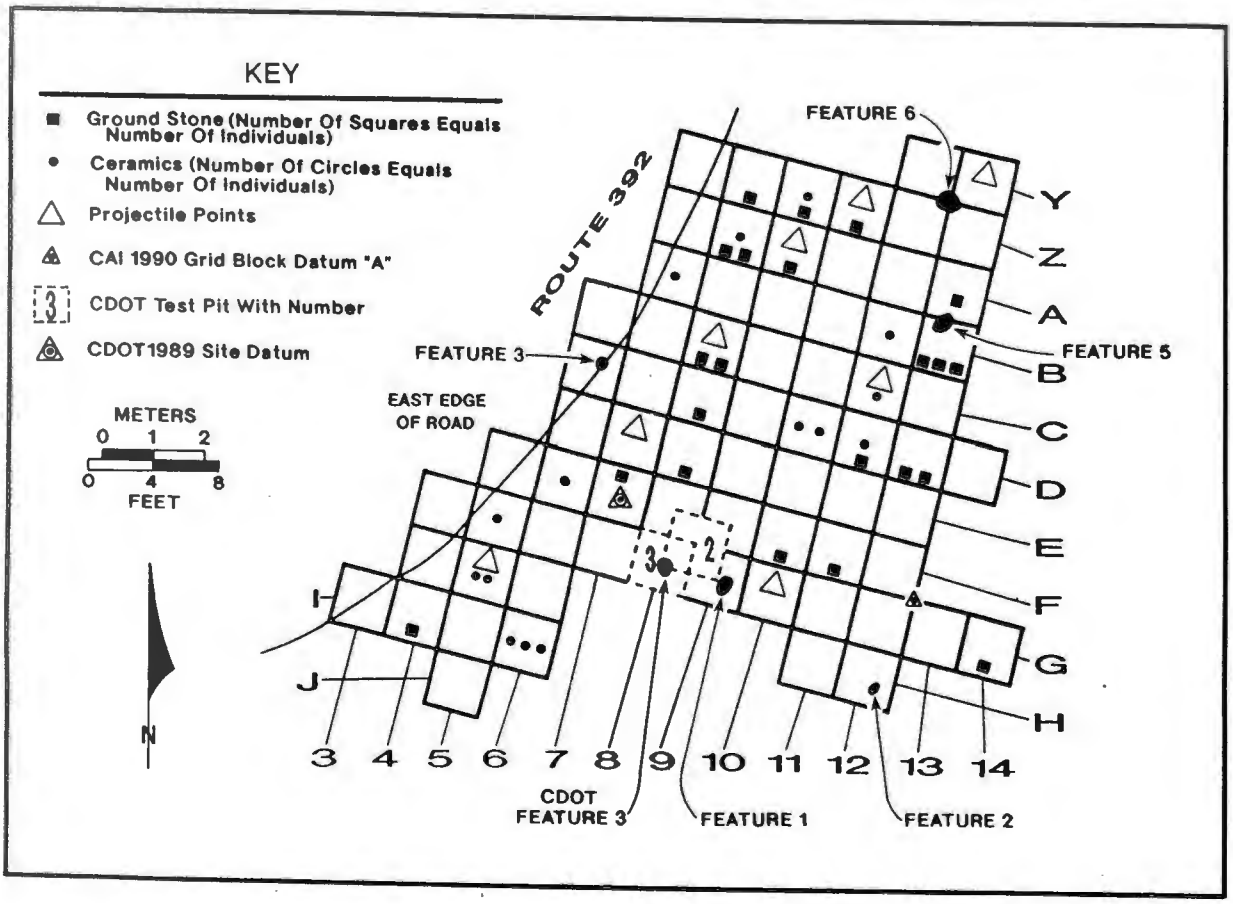

Figure 22. Grid block map illustrating the distribution of ground stone artifacts, ceramic artifacts (pottery), and projectile points. Refer to Figure 21 for boundaries of activity zones.

Summary

The fairly tight range of radiocarbon dates from opposite ends of the grid block suggests that the site represents successive occupations within a relatively short time span. Although long-term natural processes and modern disturbance have undoubtedly affected artifact distribution, it is believed that the artifact patterning detected during analysis reflects actual prehistoric human behavior. *Zonation*--distributions of artifacts and other archaeological materials that could not have occurred by chance--is apparent both in types and intensity of activity. However, interpretation of activity levels is tentative because portions of the site area may have been affected by heavy equipment long before the archaeological study. Human activity intensity is presumed to be directly proportional to chipped stone artifact density, and there are indications of considerable differences in levels of activity. The darkly stained basin is apparently the most intensively used locale within the grid block. This basin was discernible in the Highway 392 road cut and was originally thought to represent an architectural feature. Also noteworthy are correlations between high artifact density zones and hearths. Hearths are distributed throughout the grid block and their respective proveniences do not necessarily correlate with artifact levels suggestive of the most intensive activity. For example, Feature 6 is partially encompassed by high chipped stone activity cells, but Features 1 and 2 are within low activity zones.

Types or classes of activity are appraised through the distribution of not only artifacts, but also plant and animal remains. Subsistence-related items such as bone and seeds were recovered throughout the grid block but in consistently low frequencies. Some feature-specific trends are discernible. Features 1 and 5 are conspicuous in the comparatively high

amounts of bone and/or seeds they produced. Feature 1 yielded higher levels of bone (bison) and charred seeds (goosefoot), but no distinctive artifact patterning is associated. Feature 5 is associated with comparatively high numbers of charred seeds (goosefoot) and, additionally, greater numbers of ground stone were recovered in the immediate vicinity. It should be noted that in no instance were truly large quantities of bone or seeds found in association with hearths.

This information suggests that identifiable activity zones are probably not discrete areas where a single task was performed. Rather, they represent a conglomeration of a number of different tasks; preparing chipped stone for transport was emphasized but a variety of domestic/culinary tasks was also accomplished. Some activity zones are situated on the grid block boundaries and therefore may be representative of peripheral fragments of technologically dissimilar occupational areas extending beyond the boundaries of the excavation.

PROJECT SYNTHESIS

Extensive and varied investigations were carried out at the Cass site (5WL1483) by the Colorado Department of Transportation and Centennial Archaeology, Inc. in 1989 and 1990. Analyses were conducted by Centennial Archaeology, Inc. and several of its consultants in 1990 and 1991. Archaeological field investigations consisted of surface inventory and recording, shovel testing, formal test excavation, backhoe trenching, intensive (mitigative) excavation, and instrument mapping. Ancillary studies included geomorphological field investigation, faunal and seed analyses, and radiocarbon dating. Intensive excavation was confined to that portion of the site lying within a segment of realigned right-of-way of Highway 392.

Initial impressions of the Cass site as a major, possibly semisedentary locality with architectural remains were proven by excavation and data analysis to be in error. A broad basin-shaped feature visible in a road cut, believed at first to be a pit structure, was shown to be a depression of probable natural origin. It is definitely not architectural. The great density of artifacts visible on the site surface--which has attracted local collectors for the past half-century or more--was demonstrated to have accumulated over a period of perhaps 200 years in the course of a series of small, spatially coincident or overlapping occupations.

The Cass site was inhabited during a portion of the Early Ceramic (Woodland) period, in the seventh and eighth centuries A.D. Within the main area of excavation, an irregularly shaped block of 71 square meters, several activity zones were identified through analysis of chipped stone artifact attributes and other archaeological data. Although functional distinctions can be drawn among these zones, the site in general is believed to have served the role of a mid-stage lithic workshop. According to this interpretation, locally obtained tool stone was prepared at the Cass site for transport to other locations, where final tool production presumably occurred. Indications of intensive or long-term occupation of the Cass site are virtually absent. Despite the presence of several well-preserved hearths, seeds and animal remains were found only in very small quantities.

More is presumed than firmly understood about the settlement system of which the Cass site residents were a part. It is presumed, for example, that northeastern Colorado during the Early Ceramic period was occupied by mobile hunter-gatherers whose numbers were low. It is not known, however, what patterns of seasonal movement were engaged in, how structured those patterns were, or how they may have changed through time. Basic data about seasonal scheduling of movements, total range,

subsistence base, and the nature of relationships with neighboring groups are still rather meager. The Cass site study, while underscoring such deficiencies, has provided the region with a solid body of information with which future studies may be compared and contrasted.

* *

REFERENCES CITED

Binford, Lewis R.
1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45(1):4-20.

Eighmy, Jeffrey L.
1984 *Colorado Plains Prehistoric Context.* Office of Archaeology and Historic Preservation, Colorado Historical Society, Denver.

Kalasz, Stephen M., Christian J. Zier, Daniel A. Jepson, Michael McFaul, William Doering, and Margaret A. Van Ness
1992 Archaeological Excavation of the Cass Site (5WL1483), Weld County, Colorado. Report prepared for Colorado Department of Transportation by Centennial Archaeology, Inc., Fort Collins, Colorado.

Kelly, Robert L.
1988 The Three Sides of a Biface. *American Antiquity* 53(4):717-734.

Stuiver, Minze, and P. J. Reimer
1986 A Computer Program for Radiocarbon Age Calibrations. *Radiocarbon* 28(2B):1022-1030.

Wedel, Waldo R.
1986 *Central Plains Prehistory.* University of Nebraska Press, Lincoln.