

### 3. THE VIJAYANAGARA METROPOLITAN SURVEY: THE 1988 SEASON

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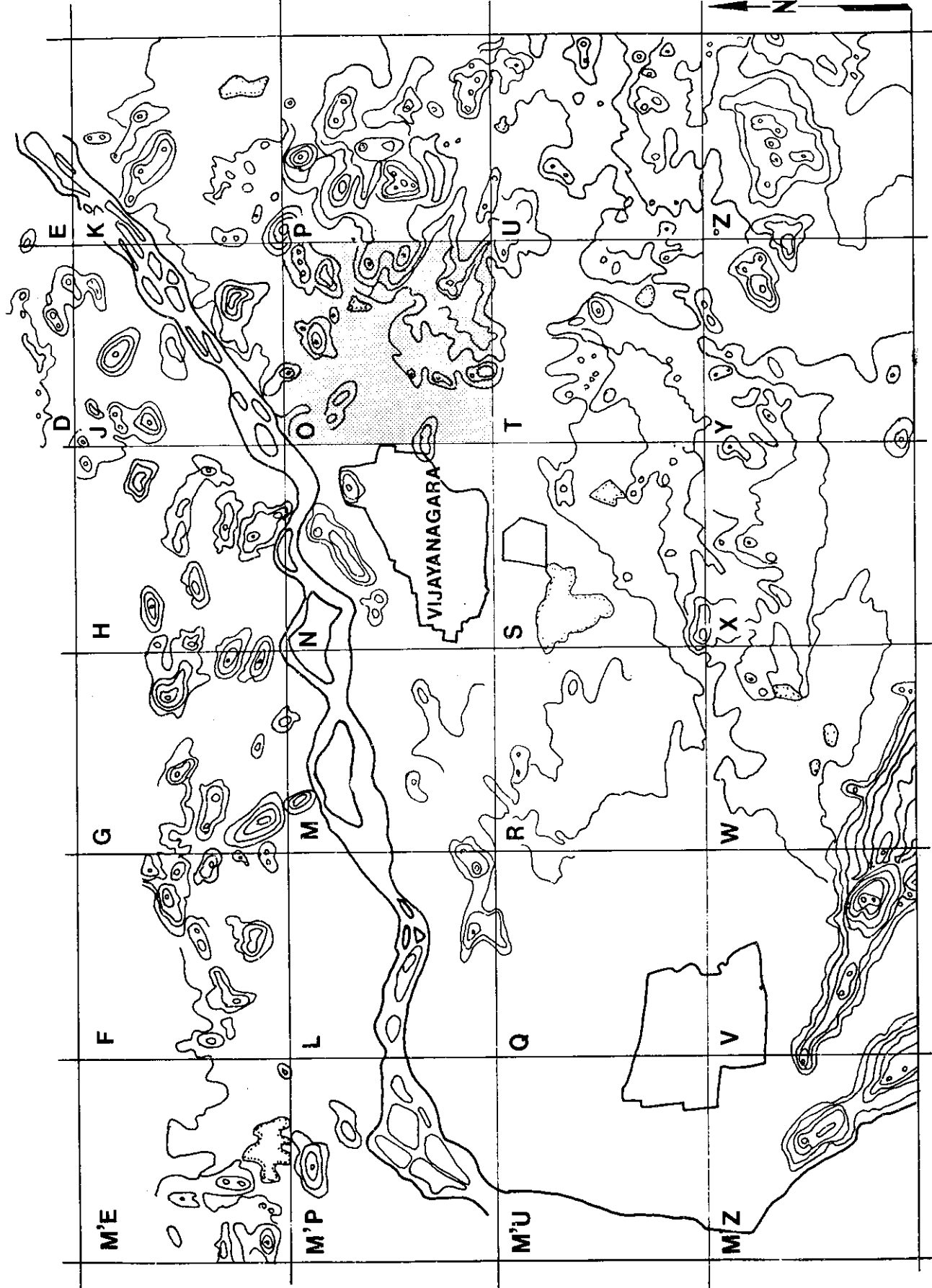
Like all cities, past and present, Vijayanagara did not exist in isolation. The population of the capital depended on outlying areas: for agricultural produce to feed the many inhabitants of the capital, for craft and other domestic goods, and for sources of labour to construct state works, such as tanks, temples, fortifications, and roads, necessary to the economic, political, and military effectiveness and survival of the empire. The political, economic, and ritual ties of the Vijayanagara empire extended over all of south India, as evident from temple inscriptions and Vijayanagara monuments found throughout the region. The Vijayanagara Metropolitan Survey (VMS) is focusing on a much smaller area of imperial control in order to examine the capital itself and its relations with its immediate hinterland. The VMS is a systematic survey of the city's "greater metropolitan region", an arbitrarily defined area, extending from the capital to its outermost fortifications, an area of some 350 square kilometres (Fig. 7).

#### SURVEY GOALS

The Vijayanagara Metropolitan Survey is structured by a number of research goals. First, we are interested in examining the agricultural base of the capital. Although food crops were certainly produced throughout the empire for consumption at the capital, the high costs of transporting such crops long distances with available transportation technologies (i.e., bullock carts and human porters) would, we suspect, have led to high investments in agricultural lands and facilities in the immediate proximity of the capital. Such

investments include the constructions of irrigation canals, tanks, and erosion control features to facilitate the expansion of agriculture into a range of areas around the capital, as well as the construction of road systems for the effective transport of foodstuffs into the city. The identification of the placement and scale of such agricultural sites in the greater metropolitan area of Vijayanagara will allow us to better understand the importance and organization of agricultural activities in the area.

Second, we are interested in documenting the production and distribution of other goods at and around the capital. The vast population of Vijayanagara must have required enormous quantities of goods such as ceramic vessels, iron and stone tools (including ground stone mortars and flaked stone tools [see Lycett, this volume]), leather garments and fixtures, wooden objects, votive figurines, textiles, jewels, and so on. In addition, the requirements of the army for armour and weapons, as well as for harnesses and fixtures for horses and carts had to be met, at least in part, by local specialists. Other artisans, such as stone carvers and sculptors must have been working and living in close proximity to the capital in order to produce the many sculpted columns, architectural elements, and images which are found within the city and throughout its hinterland. Despite years of intensive explorations of the city core by the Directorate of Archaeology and Museums' staff and other personnel, there is no evidence of large scale craft production within the capital itself. We therefore have chosen to seek such evidence within the greater metropolitan area of Vijayanagara.



7. The Greater Metropolitan Region of Vijayanagara

## THE SURVEY DESIGN

Third, we are interested in regional settlement in the greater metropolitan area. Many agricultural, craft, and other labourers must have resided in the villages and towns which surrounded the city. Some of these towns are still occupied, including, Hospet, Kamalapuram, Bukkasagara, Anantasayanagudi, Malapanagudi, and others; while other towns were undoubtedly abandoned when the capital fell in 1565. As well as being residential sites, these towns were probably important military outposts of the capital, and major ritual centres (and ritual 'gates to the city' [A.K. Das, Personal communications]) during Vijayanagara times. In addition, these settlements were undoubtedly nodes on road systems along which transportation and communication routes into and out of the capital were organized.

The accomplishment of these three research goals will contribute to the realization of the fourth goal of the Vijayanagara Metropolitan Survey - that is, the examination of the role of the rulers and administrators of the Vijayanagara empire in regulating the production and distribution of agricultural and craft goods near the capital and throughout the empire. In short, we are interested in examining the relations between polity and economy - the extent to which the Vijayanagara rulers directly controlled production, through state-run workshops or 'plantations', or indirectly regulated production through taxation and gifting of lands and privileges. Archaeological data from the relatively small area of the city's greater metropolitan region is only one, rather limited, way of examining these questions, and our work also includes studies of documentary and historic sources from throughout the empire to consider these questions.

Although exploration work has been a mainstay of Indian archaeology for the past century, the Vijayanagara Metropolitan Survey is the first systematic survey conducted in this region of Karnataka, and the first concerned with medieval settlements and economy in India. By systematic survey, we mean a survey that is organized in such a way as to provide complete and scientific coverage of a designated sample area, rather than a survey that looks only for the large or easily located sites in a region. In our work, we are, of course, interested in the big sites - the major towns, fortifications, and tanks of the Vijayanagara period - but we are equally interested in the small sites - the field houses, shrines, and specialized activity areas - which will allow us to understand the region in its full complexity.

The survey area has been defined on the basis of topographic features and the presence of fortification walls and other Vijayanagara period features, as well as by practical considerations, to include the city's 'greater metropolitan region'. The total survey area is approximately 350 square kilometres in extent (Fig. 7). This region has been subdivided into smaller blocks, or strata, squares 4.5 kilometres on a side. Each stratum is further subdivided into smaller units, north-south transects, 250 metres wide and 4.5 kilometres long, with 18 transects per stratum. These transects are our sampling units. A 1:25,000 base map has been prepared of each stratum, on which site locations can be marked.

Given the large size of the area, it was decided that only a portion of the area could be systematically examined. For the eight strata surrounding the city (Blocks

O,T,S,R,M,G,H,J) a random sampling technique was used to select a 50% sample of the area to examine. Random sampling in archaeology is a technique by which areas for survey, excavation, or other types of examination are selected from a total pool in an unbiased manner, such that the selection of any one unit is not affected by the selection of any other unit. All archaeology involves sampling; it is extremely rare that we can excavate an entire site, examine an entire region, or analyse all artifacts recovered from a site. Random sampling techniques permit the selection of an unbiased sample which can be legitimately used in statistical analyses. From the data collected in these eight blocks, it will be possible to quantify information on settlement patterns and site distribution in this 160 square kilometres area immediately surrounding the capital.

In the remaining 18 strata we have chosen to use a judgemental sampling technique, to examine only the major sites - towns, villages, tanks, and temples - in the region. This was a decision forced upon us by necessity; with the density of sites in the area and the small size of our crews, we calculated that a 50% sample of the entire region would take 15-20 field seasons to complete. The inner eight strata will permit broad interpretations of settlement patterns, while the remaining areas will allow us to focus on major sites within the region.

It is often the case that the selected transects cannot be fully surveyed. The greater metropolitan region of Vijayanagara is a dissected landscape, dominated by massive granitic outcrops and the valleys between them. The granite outcrops are often too steep to have been extensively used during Vijayanagara times and we have chosen to survey a smaller

percentage of them. Rather than survey the full 250 metres width of the transect, we cover only one quarter of that width, 62.5 metres. This permits the identification of sites on the outcrop, while decreasing the time necessary to scale each outcrop multiple times to cover the full transect width for negligible return. The quarter of the transect surveyed on outcrops is also determined by use of random numbers table.

A second factor affecting the proportion of the total transect actually surveyed is present land use and vegetation patterns. Most of the lowlying areas of the sample are under intensive cultivation today. The nature of the crops planted and their stage in development affects whether or not we can walk through individual fields. For example, dense sugar-cane plots are not surveyed, because vegetation is so thick that no sites are visible. Rice paddies are similarly not examined, unless they have been newly harvested, or newly planted. It is possible that a number of important sites lie within these non-surveyable areas, though we do expect that areas intensively irrigated today were also intensively irrigated during Vijayanagara times, and these areas may therefore have been dominated in the past, as today, by agricultural fields.

Transects are selected for survey by first numbering the transects from west to east, and then selecting nine transects from a random numbers table. The fieldwork can then begin. The 1:25,000 base maps and 1:50,000 Survey of India maps of the region (from which the larger scale maps have been developed), are used to locate ourselves on the landscape and to find the starting point of the transect. The archaeological crew, which in 1988 ranged from two to four members, walks the transect, spaced at distances of 20 metres

apart, and covers the full width and length of the transect in a number of passes. When sites are located, they are recorded on the base map, and detailed forms are used to describe each site. Given the nature of the landscape and vegetation, a great deal of time is also devoted to simply reaching our survey areas, and getting around areas which cannot be surveyed, such as sugar-cane fields.

In our work, a site is defined as any discrete and identifiable remains of past cultural activity. Thus, sites can include lithic or sherd scatters, single walls not associated with other features, structures, rock-cut shrines, temples, or villages and towns. After locating a site, crew members seek to define its boundaries. All clearly inter-related features are ideally incorporated within a single site designation, though some very complex site configurations are designated with more than one site number.

Each site located is assigned a unique number. Site numbers are prefixed by the letters VMS, and sites are numbered sequentially in the order in which they are found. Features within a site are also numbered, e.g. Site VMS35, Features 1-10. Sketch maps are prepared of most sites, with the exception of those that consist of single walls, which are simply described. Most sites are also photographed. A wide range of information on each site is recorded on the field forms. This includes information on the environmental setting of the site: landform, topography, the presence of natural resources, location of the nearest water source, and current land use in the area. The presence and nature of modern cultural activities in the area and the degree of disturbance a site has been subject to are also recorded. General information on site size and orientation and primary

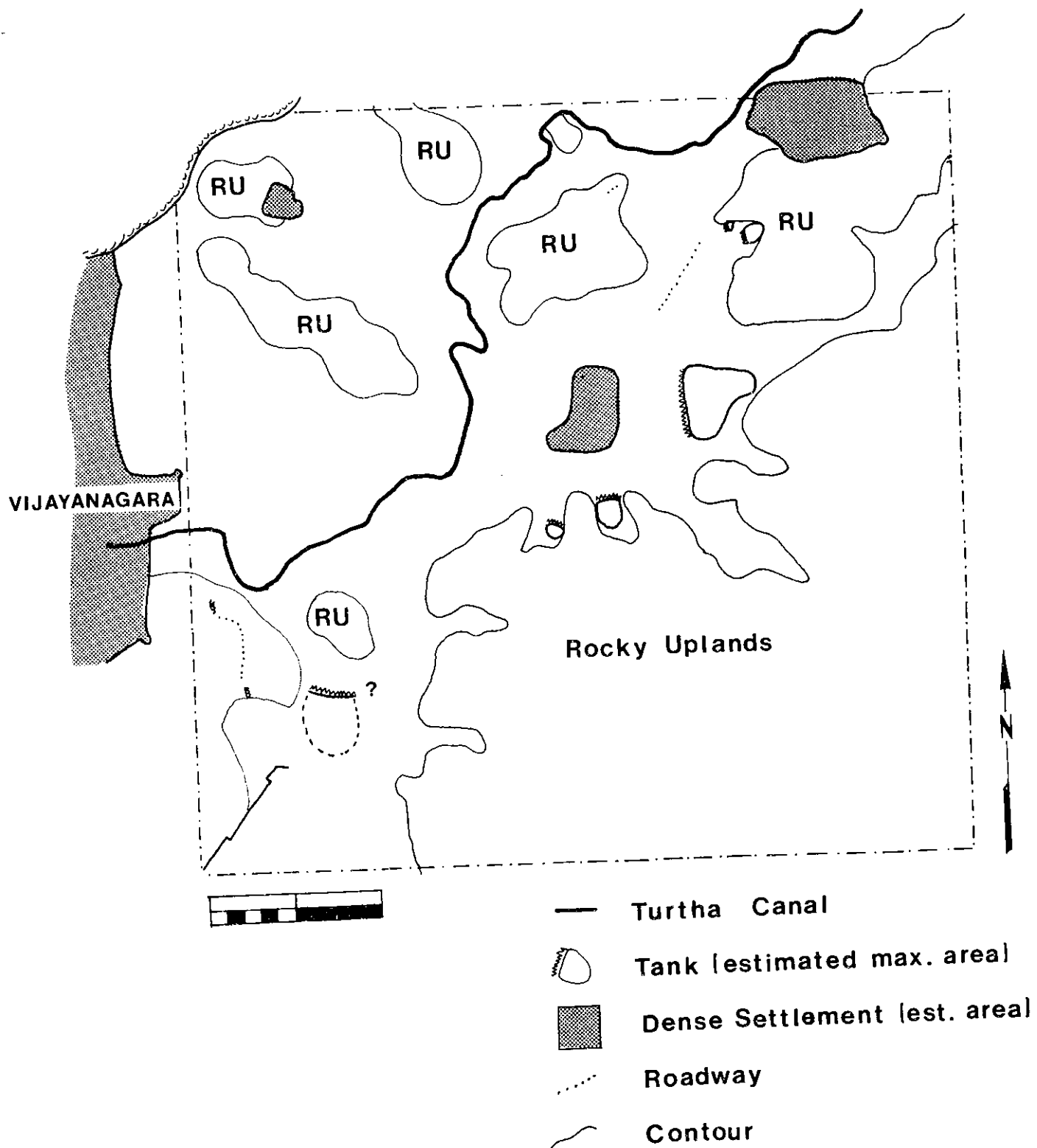
site function is noted, as is a much more detailed description of the site itself. Information on construction techniques, site plan, and artifact distribution on the site's surface are recorded. Preliminary interpretations of site use and site date are also recorded on the field forms

Surface collections of artifacts are made at each site, in order to record the density and types of artifacts found at the site, as well as for more detailed typological analyses of artifacts from certain of the sites. In some cases, 100% of a site is collected; more often the site is subdivided into collection units, which are individually collected in order to provide information on the differential distribution of artifacts across a site. Most of the ceramics are sorted, weighed, and discarded in the field, though some ceramics and other artifacts are brought back to the field camp for more detailed analyses. Small finds, such as figurines, coins, iron tools, etc., are brought to the camp, where they are drawn, photographed, and described.

In the 1988 season we completed the survey of Block O, the stratum located due east of the city's urban core (Block N). In a five week season, we surveyed slightly more than ten square kilometres, and located more than 100 sites. Information on the transects sampled and the sites located is presented below.

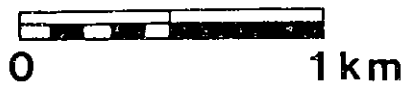
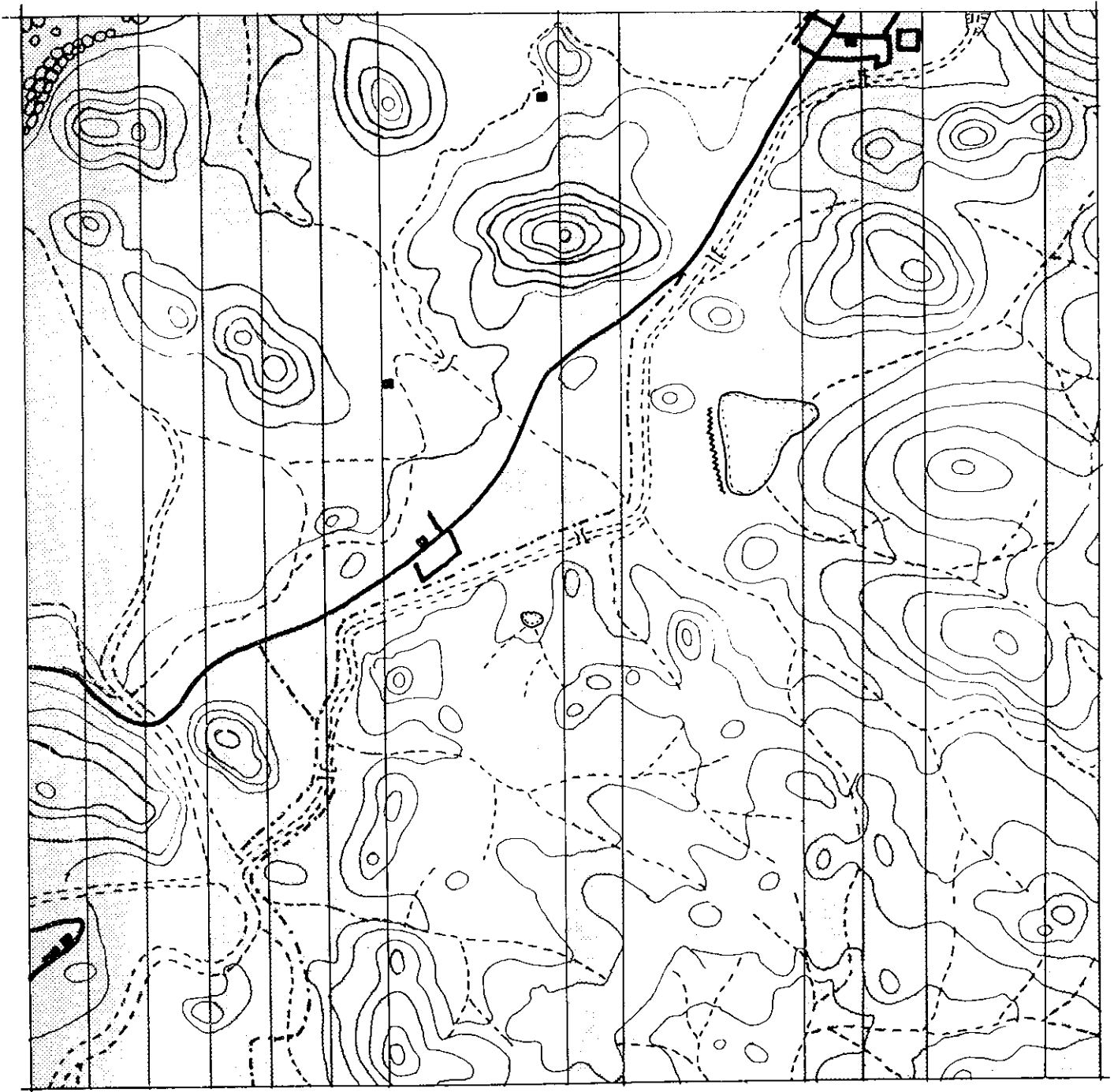
## BLOCK O

Block O provides a cross-section of the diverse topographic and environmental zones of the metropolitan region (Fig. 8). Ranging from fertile alluvial soils near the Tungabhadra river in the northwest corner of the block to the dry and rock granitic uplands of the southeast corner, this small area is a microcosm of the unique challenges to settlement and



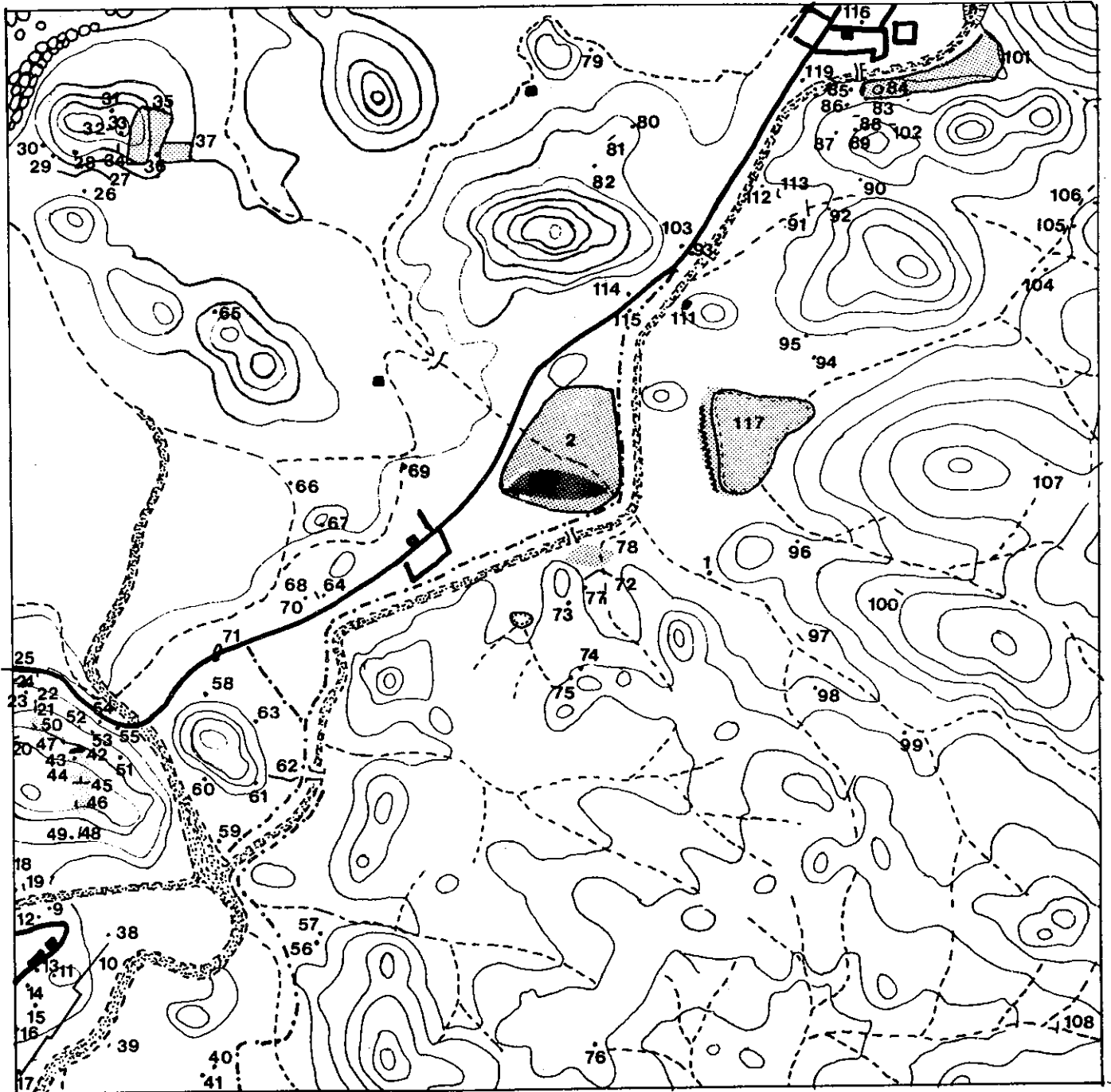
8. Topographic Features of Block O

0



9. Area Surveyed in 1988 Season

0



0 1 km

10. Sites Located in 1988 Season



production presented by the Karnatic landscape. The Turtha Canal runs diagonally through the sample area, making the "wet" cultivation of a fairly large area possible. This canal dates to an early period of the city's history, and indeed almost no cultural remains were found in the portion of the Turtha ayacut which falls in block O. The proximity of the city itself is an important factor in the location of sites near the western edge of the block, as the greater site density there indicates.

One hundred and eleven sites were identified and described in Block O. Of these, 98 fell in the randomly selected transects

(1,2,4,5,6,10,14,15, and 18; Figs. 9 and 10). The types and locations by topographic zone are summarized in Table. Cultural remains in the metropolitan region are highly variable, ranging from small scatters of artifacts to towns and temple complexes. Site density in the area is extremely high. The exact figure varies considerably, depending on how large complex sites are counted, singly or as clusters of smaller sites, but it falls between nine and ten sites per square kilometre. This overall figure, however, does not adequately convey the distribution of sites in the area, as sites tend to cluster in certain areas.

**Table**  
**Site Types and Topographic Settings, Block O**  
**All Time Periods**

Site Type	Granitic Outcrop Sheet-rock	Outcrop, Valley Edge	Flat, Colluvial Alluvial
Settlement	2	0	3
Agricultural	3	13	8
Fortification	5	4	1
Isolated Structure	7	5	5
Craft Production	0	0	2
Temple/Ritual	7	1	10
Artifact Scatter	4	1	2
Road/Gate	7	1	4
Unknown	5	4	0
Other	3	1	3

In general, domestic structures are aggregated into towns and villages, though there are a number of isolated structures which may have been residential. Temples, temple complexes, and small shrines are found throughout the study area, often associated with settlements and roads. Isolated craft production facilities are rare in Block O, related only to lime (*kankar*) processing and (outside of Block O) iron working. More information on the location of craft-producing areas must await detailed study of the internal layout and content of individual towns and

villages. Military/defensive features tend to be situated in areas of higher elevation, often in saddles or other likely transport routes across granitic outcrops. Agricultural features abound in the countryside around Vijayanagara. These facilities are located wherever the local topographic and environmental features allow.

#### Dating Sites

It is difficult to date medieval sites in the Vijayanagara region with any degree of certainty. In the absence of chronologically

sensitive artifacts, temporal assignments must often be based on a combination of architectural, artifactual, and contextual criteria. That is, although there are characteristic Vijayanagara period ceramic rim forms<sup>1</sup> and some temporally diagnostic ceramics such as Chinese porcelain and celadon, the known range of the earthenware rims is based entirely on ceramics from the city itself. Because of the paucity of analyses of pre- and post-Vijayanagara materials, we also have no way of knowing how long a particular form common in the city may extend on either side of the circa 200 year Vijayanagara period. In addition, no internal artifact-based chronology of the Vijayanagara period has yet been formulated.

Thus, our ability to date a given site depends to a large extent on the presence of a sufficient number of ceramic rim sherds and on the presence or absence of distinctive pre-modern and/or modern rim forms. Many sites are not associated with any artifacts at all, or with a small number of highly eroded examples. In the absence of an artifactual criterion of temporal affiliation, we have had to rely on a constructional and stylistic features. Some architectural elements can be used to assign dates; the presence of formal mouldings, brackets, columns, sculptures, and so on (where not obviously reused) of Vijayanagara style was taken to indicate a Vijayanagara period date. Thus, temples and shrines are fairly easy to date, while less formal architecture is more difficult. Techniques of wall construction, distinctive varieties of cement and mortar, as well as the shape of stone quarrying marks, all serve to separate pre-modern from modern structures, but exact dates can not always be determined by this method. In light of these problems in dating, we have identified sites only as pre-Vijaya-

nagara, Vijayanagara and Post-Vijayanagara.

### Pre-Vijayanagara Sites

The only pre-Vijayanagara site of certain temporal affiliation is VMS26, the Neolithic ash-mound locally known as "Wali Ghat" (Balasubramanyam, personal communications). This site consists of an oval-shaped mound, two to three metres high and 42 metres east-west by 21 metres north-south. It is situated in a narrow valley between two outcropping ridges, one-half kilometre south of the Tungabhadra River. The mound is surrounded by irrigated fields and has undoubtedly been eroded by the small irrigation channels which surround it. Although the surface vegetation cover is dense, VMS26 does appear to be formed of a light gray "slag" material, identical on inspection to that at Kupgal.<sup>2</sup> This material incorporates many small pebbles. Some surface artifacts have been collected previously by the Directorate of Archaeology and Museums, and they also have observed numerous examples of rock art on the outcrop south of VMS26.<sup>3</sup> We also observed a light scatter of ceramics, chipped stone of basalt and quartzite, basalt groundstone, and what appears to be basalt fire-cracked rock in the fields surrounding the mound. Very few artifacts were observed on the mound surface itself, or in exposed cross-sections.

Several other possible pre-Vijayanagara sites consist of scatters of artifacts; VMS28 lies circa 125 metres northwest of VMS26 on the slope of the outcrop north of the ash mound site. It contains several concentrations of chipped stone within an area of lower artifact density. Here the materials consist almost entirely of poor vein quartzite, and some basalt, in contrast to the ash mound where basalt was the most common material

type. VMS31 is located on the same outcrop as VMS28, circa 250 metres to the northeast of the latter. This artifact scatter contains lithic artifacts similar to those of VMS28, as well as some earthenware ceramics. Also on this ridge is VMS33, a rockshelter containing both lithic and ceramic artifacts. The location of these three sites seems to suggest that they are in some way associated with the ash mound in the valley below. However, the village site, VMS35 is also located on this ridge not far from VMS33, and rockshelters in this Vijayanagara period village contain similar lithics. The ceramics found at VMS31 and VMS33 are not similar to those of the ash mound, but appear to be more like Vijayanagara earthenware. The date of these sites is therefore unclear; they may be multicomponent sites with both a pre-Vijayanagara and a Vijayanagara artifact assemblage. However, the recognition of Vijayanagara period lithic technology (see Lycett, this volume) creates the possibility that these scatters are medieval rather than prehistoric.

VMS75 and VMS76 are lithic and ceramic scatters located in the southern half of transect 10. These sites too may result from pre-Vijayanagara occupation in the region. The artifacts of VMS75 are found in and around a small rockshelter, while those of VMS76 occur in the open. In all situations in which significant quantities of chipped stone artifacts occur in the context of artifact scatters, the sites are located on the rock-strewn slopes of the granitic uplands.

### **Vijayanagara Sites : Residential Structures**

Some of the most common types of sites encountered on the survey are isolated masonry features and structures - walls, clusters of walls, and rooms. These sites cannot always be assigned to an unambiguous

functional category; many are simply described as "unknown". However, isolated rooms may have served a residential function, even if only seasonally or temporarily. The distribution of single room structures in Block O exhibits a striking pattern. The "pull" of the city on these sites is evident, in that nearly all of the sites are located within one kilometre of the walls of the Urban Core. While these one room structures may be semi-permanent habitations of agriculturalists or herders (just as contemporary farmers erect shelters in their field while cutting sugar-cane and processing jaggery), it is also possible that these are the remains of houses of low-status inhabitants of Vijayanagara. The sites of this category occurring in the southern portions of transects 1 and 2 are largely contained within the massive outer fortification wall of the city (VMS10). Other isolated rooms do occur elsewhere in block O, but in much lower frequency. It must be noted that these single room structures typically have few associated artifacts and are especially difficult to date. A number of these sites may be abandoned field houses of post-Vijayanagara period and/or recent date. Despite these occasional isolated structures, most domestic structures located in Block O are clustered into towns and villages.

Three such settlements were identified in Block O, two associated with modern villages, and one completely abandoned. The latter, designated as VMS34-VMS37, contains two discrete clusters of structures and associated features (see Means, this volume). The first cluster, VMS35, is situated on the steep eastern slope of a rock outcrop less than 500 metres south of the Tungabhadra River. The numerous structures are informally laid out, so as to take advantage of the ubiquitous gneiss boulders and outcrops. Structure size ranges from one to eleven rooms. The layout of the

site suggests that fortification may have been a concern, as access to higher tiers of the site is fairly well-controlled via paths, stairways, and walls. There are also exterior walls partially enclosing the settlement on all sides (including site VMS34, an associated fortification wall located to the northwest of VMS35). At the base of the slope is a simple four-columned shrine, VMS36, which now contains a large Hanuman image sculpted on a slab. The walls of the platform surrounding VMS36 postdate the shrine itself.

To the east of VMS35 is a second cluster of structures, VMS37. Here the layout suggests a greater degree of planning than is evident in VMS35. VMS37 is composed of contiguous blocks of rooms arranged around open courtyards. The bedrock and block mortars so common to VMS35 are absent at VMS37; in addition, small quantities of metallic slag were recovered in surface collections at VMS37. These factors indicate that food processing activities were not carried out at VMS37, and that it may not have been a purely residential area. Evaluation of this proposal must await more detailed study of the site, however.

VMS2 lies on the outskirts of the modern village of Venkatapuram.<sup>4</sup> Its size is difficult to determine, as the settlement has been heavily disturbed by modern canal construction, field clearing, and settlement. However, it is clearly much larger than VMS34-VMS37, and, unlike the latter, contains formally differentiated architecture. These structures include one structure similar in plan to the palaces from the city of Vijayanagara, and several other large, well-constructed structures of unknown function. Two elephant balustrades, now set up in a small Vijayanagara period temple on the north bank of the modern canal, may have come from the

palace. Other indications of the presence of high-status residences include a fragment of Chinese porcelain and a terracotta roof tile. A second, smaller shrine is located near the evident northern edge of the settlement, as is a step well. Two inscribed boundary stones<sup>5</sup> of relatively recent date indicate a more recent occupation for the site as well.

A second large settlement, VMS101, is also associated with a modern village, Bukkasagara. As the name implies, this village was also occupied during the Vijayanagara period. A copper plate inscription dating to A.D. 1612 found in Bukkasagara mentions the Hampe-matha (VMS-83?) in Bukkasagara in relation to a land grant.<sup>6</sup> Within Bukkasagara there are at least three temples partly or entirely of Vijayanagara period construction, as well as an impressive hillside complex (VMS83) containing a temple, gateway, paved terraces, and a masonry-lined spring (VMS84). Like VMS2, the spatial extent of the Vijayanagara settlement is difficult to determine, as it has been cut by the modern canal and is overlain with recent structures. Fortification walls of Vijayanagara style extend to the outcrops to the north of the modern town, and may define the northernmost boundary of the Vijayanagara period settlement. Possible residential structures of VMS101 can be seen at the base of the high ridge containing the temple complex on the southern edge of the site. These are individual square or rectangular structures. Only a few multi-roomed structures are evident; one of these contains four to five rooms and had plastered masonry walls. In a nearby disturbed area, walls, trash lenses, and superimposed floor levels can be seen in profile.

### **Fortifications and Transportation**

Cultural features related to fortification and

transportation in the metropolitan region are often carefully placed on the landscape so as to utilize natural features such as passes over or between outcrops. Wall and linear rubble piles interpreted as defensive are found, with one exception, on the tops or sides of granitic outcrops, or in the narrow valleys between them. Only VMS10, a section of the massively built outer fortification walls of the city, is situated in a flat, not naturally defensible location. Defensive walls vary greatly in mode of construction, ranging from simple rubble piles to dressed and fitted gneiss blocks. Several walls were recorded which may have been the foundations for earthworks, judging from the soil deposition around them. As noted, the settlement VMS35 appears to have been laid out with an eye toward defense; VMS2 shows no evidence of fortification. A large bastion-like feature near the base of the ridge containing temple complex VMS83 may relate to the military needs of the temple or town, VMS101. As noted earlier, settlement along the main roads to the city served as one of the first lines of defense against aggressors.

Road systems can be difficult to identify as they often leave few archaeological remains. Transportation routes can be traced in part, however, from actual sections of constructed roads and stairs, wear patterns in sheet-rock, and the alignment of structures. Several roads, paths, and stairways are located in Block O. These include a route up to a temple (VMS42) and step tank (VMS43) atop a high outcrop in the southern portion of transects 1-3 (see Sinopoli, this volume). A second road segment, VMS81, is also probably associated with a temple. Only 60 metres long, it consists of two contiguous sections. The first is a slightly elevated paved roadway 12 metres wide. The second is indicated by a worn passage across a level expanse of sheet-rock. This road leads to the Vijayanagara period

Nageswara temple (VMS80) less than 100 metres away.

The modern route joining Vijayanagara with Kampli, which runs diagonally through Block O from southwest to northeast, is of considerable antiquity. While the exact route has undoubtedly changed through time, the position of several structures between Venkatapuram and Bukkasagara indicates that they lined either side of a road connecting the two, not far from a modern road. The current road also passes into Urban Core of Vijayanagara near one of the eastern gates in the city. Although difficult to identify archaeologically, textual information (A.K.Das, personal communications) and site alignment indicate the presence of a Vijayanagara period road along the Turtha canal. Such a road would have provided routes from settlements in the metropolitan region east of the capital to the Virupaksha temple at Hampi in the Sacred Centre of Vijayanagara.

### **Temples and Shrines**

Temple complexes, temples, small shrines, and religious sculpture dot the countryside around Vijayanagara, and attest to the devotion of city and country-dwellers alike. The association of temples with roads has already been noted. Many of the structures aligned along the suggested Vijayanagara route of the Kampli road are small temples (e.g., VMS93, a Sati shrine). One of these roadside ritual sites, VMS111, consists of a small shrine of three by two columns atop a rounded outcrop. It is surrounded by at least ten small rectangular rooms, two with square interior corner platforms. Sculpted into the bedrock is a devotee, facing the shrine. Two square blocks with sculpted feet (one pair encircled by a Naga) are set into niches cut

into bedrock. A sixteenth century inscription near these sculptures was located during the survey and refers to the construction of the temple by Nagayya, the son of a weaver (translation by the Directorate of Archaeology and Museums).

Temples are also commonly associated with towns and villages; no settlement of any size identified in the survey was without some religious architecture. While not every site can be discussed here, temples dedicated to a range of deities were identified. No Vijayanagara period structures clearly related to Jainism or Islam were noted. A large proportion of ritual sites identified in Block O are still in worship, and a few Vijayanagara period sculptures have been relocated and placed in modern buildings. As noted, Bukkasagara contains several modern temples as well as the temple complex (VMS83) on the ridge overlooking the town; a large modern *math* is located beneath this temple complex, indicative of the long term continuity of sacred sites in the region. North of Venkatapuram, near the south bank of the Turtha Canal, is a temple (VMS69) with a core of Vijayanagara construction and with several medieval sculptural elements enclosed in a more recent courtyard.

### **Agricultural Features**

Agricultural features around the city are both numerous and diverse. In sample Block O, 24 features associated with agricultural production were identified, not including the Turtha Canal. The latter was undoubtedly one of the major influences on crop selection and on the frequency of cropping during the Vijayanagara period. Tank irrigation also played an important role in areas above the level of the canal - to the south and east in this block. Three large tanks are placed above and

around VMS2; these undoubtedly watered fields and gardens on the outskirts of the settlement. The largest of these, VMS117, is circa 800 metres long and its original height is estimated at four metres.

VMS59 is another large, well-constructed tank. Its original size is difficult to determine as it has been largely destroyed by a modern canal, but the extant portion is nearly six metres high. It may have covered a considerable proportion of the broad valley southwest of Venkatapuram. Considering that tanks often block low-lying transportation routes, that canals provide a barrier to most traffic, and that irrigated fields are often soft and difficult to navigate, features relating to irrigated agriculture can also be thought of in terms of defense and transportation. Thus, the distribution of roads, walls, and gates cannot be considered solely in terms of natural features, but must also take into account the limitations on movement posed by agricultural land use.

Block O contains numerous smaller tanks and embankments (see Morrison, this volume). The latter, while formally similar to the water reservoirs commonly called tanks, are constructed expressly for cultivation in the bed. Some of these (e.g., VMS48) are also equipped with outlets for the drainage of water and thus serve a dual purpose. These features are functionally similar, though constructionally more elaborate, than hillside terraces (such as VMS100), which work to capture and slow runoff and to prevent soil erosion. Terraces and their less formal counterparts, check-dams, are common in the granitic uplands comprising the southeastern quadrant of Block O. Other small agricultural features include masonry walls placed at the base of outcrops, perpendicular to the direction of runoff flow from the outcrop.

These walls are invariably associated with tanks, and served as a check on siltation of the tank beds.

## DISCUSSION

Approximately ten square kilometres in Block O were fully surveyed during the 1988 season. In this relatively small area, a 50% percent sample of the block, 110 sites were identified, most of which date to the Vijayanagara period. In this report, we have attempted to highlight the goals of the survey and the diversity and complexity of the archaeological sites associated with the imperial capital of Vijayanagara. More detailed analyses of these sites are presently underway. This work, and future seasons of survey in the greater metropolitan region of Vijayanagara, will greatly enhance our understanding of the regional setting of Vijayanagara and the economic, social, political, and ritual relations between the capital and its rural hinterland.

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