

Chankillo, Peru

Iván Ghezzi

1. Identification of the property

1.a Country/State Party: Peru

1.b State/Province/Region: Ancash region, Casma province, Casma district

1.c Name: Chankillo

1.d Location: 803325 E, 8942566 N, UTM Zone 17S, elevation 300m above MSL.

1.e Maps and Plans: See Figs. 5.1, 5.2 and 5.5.

1.f Area of the property: 17.41254 km².

2. Description

2.a Description of the property

Like many of Peru's coastal valleys, Casma has long been an 'oasis' for human settlement in an otherwise inhospitable environment. The Casma-Sechin river basin runs down the western slopes of the Andes mountain range through one of the world's driest deserts, an arid landscape of barren foothills, sandy plains, and narrow valleys that has geologically remained relatively unchanged since the Pleistocene.

Despite this extreme environment, sites such as Las Haldas, Sechin, Pampa de las Llamas-Moxeke, Chankillo, El Purgatorio, and Manchan demonstrate a long period of occupation (4500 years) from the Archaic period to the Incas, suggesting that the area has always been an important regional ceremonial center. Formative period sites in Casma are unequalled nationally in terms of their size, quality, and public architecture. It is now only the ceremonial structures that survive, generally using spaces that would not compromise maximum use of the riverside land for agriculture. The less robust residential sites and cemeteries, perhaps more closely associated with the cultivation zone along the rivers, are no longer visible.

Chankillo is a ceremonial site with complex ritual, administrative, and defensive functions found 365 km north of Lima and 15 km from the Pacific coast (Fig. 5.1). It is adjacent to the irrigated valley of the southern branch of the Casma/Sechin river basin, facing the rugged foothills of the western slopes of the Andes. Dozens of ¹⁴C dates, all in the range 2350–2150 CalBP, place the construction, occupation, and abandonment of Chankillo within the late Early Horizon period (500–200 BC) in central Peruvian chronology (Burger 1995).

In 2008, Peru's Ministry of Culture determined Chankillo to be a "monumental archaeological zone", spread over 17.4 km² (Fig. 5.2). A buffer zone was not determined. This area includes archaeological evidence from various periods of occupation, but is characterized by late Early Horizon period monumental stone and mortar constructions, originally plastered and painted with ochre, tan, yellow, and white pigments, sometimes decorated with relief, graffiti, or textured with finger impressions.

These constructions define three main site sectors. The most outstanding feature of Sector 1 is an oval-shaped hilltop building known as the Fortified Temple (Fig. 5.3). A massive construction, located strategically 180 m above the valley floor, it is composed of three central structures surrounded by concentric defensive walls. At its center, two identical buildings with circular ground plan and a rectangular building are surrounded by a platform with parapets, which serves as the innermost defensive wall as well. The twin buildings are composed of pairs of concentric circular walls with three restricted-access gates. They may have served as a last level of refuge.



Fig. 5.1. Plan of Chankillo. © Iván Ghezzi

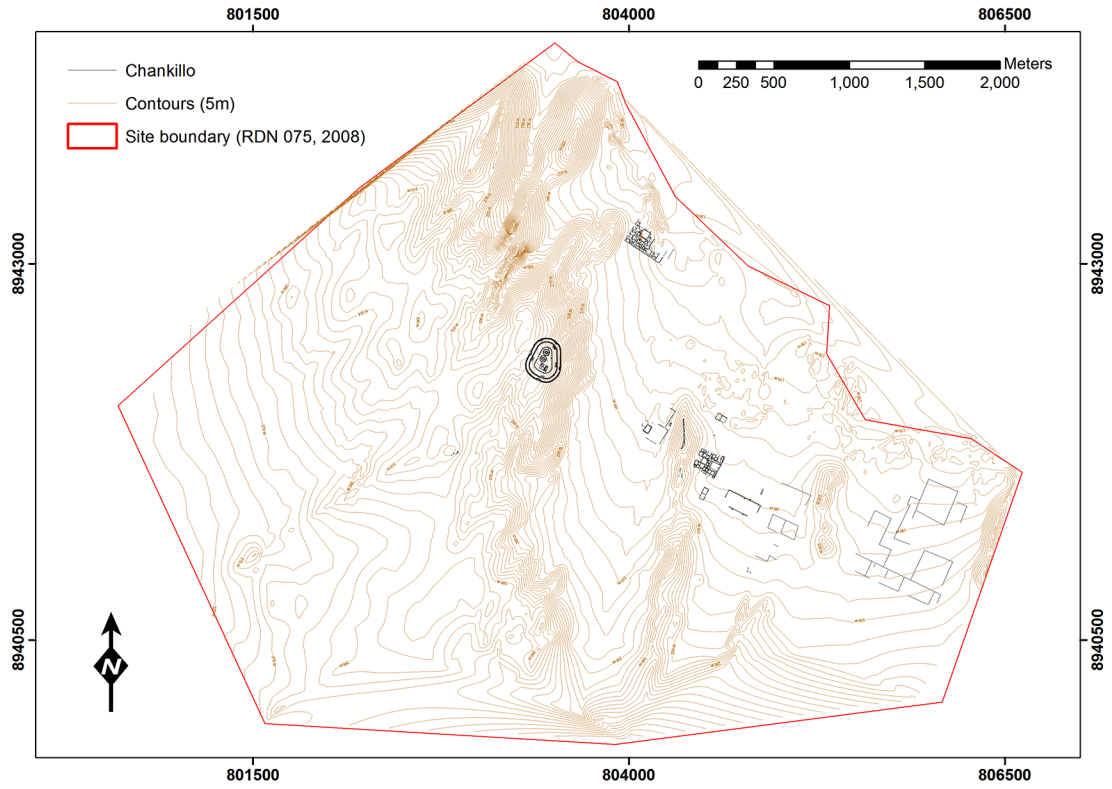


Fig. 5.2. The “monumental archaeological zone” at Chankillo, spread over 17.4 km². © Iván Ghezzi

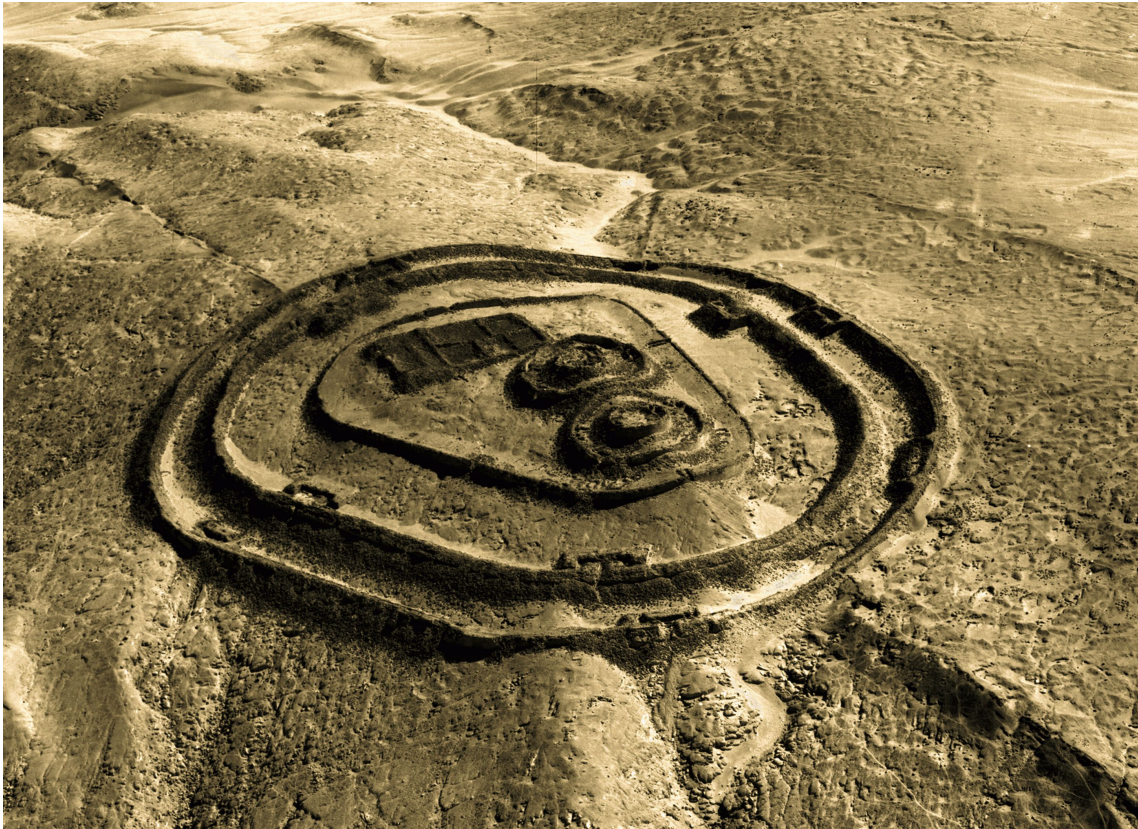


Fig. 5.3. Aerial view of the fortified temple at Chankillo. Photograph © Servicio Aerofotográfico Nacional, Lima

The rectangular building is a temple or palace oriented to the December solstice sunrise. Its front atrium is a U-shaped two-tiered platform with dual staircases on each level. The rooms behind it, sometimes bearing mural decoration (Fig. 5.4), were used for ritual and possibly elite habitation.

The walls surrounding the inner buildings and platform are massive, standing in places up to 8 m. These are complex walls, made up of several parallel wall sections with in-between fill. The wall tops were accessed through staircases spread around the perimeter at regular intervals. There were nine baffled gates, protected with parapets, top rooms hidden from outside view, false corridors, and other strategic measures. Though their defensive function has been ably questioned (Topic and Topic 1997), the available evidence indicates the main purpose of these walls was to provide protection, while regulating traffic, to the interior of the fort.

Excavations at the rectangular building within the central platform revealed the intentional destruction of its walls, pillars, and religious images, the possible looting of objects, and its entombment under a thick layer of rock and debris. It was probably due to conflict, causing the forced abandonment of the site (Ghezzi 2006).

East of the Fortified Temple are Sectors 2 and 3, a large ceremonial area with buildings, plazas, storage facilities, and the Thirteen Towers, the main feature of Sector 2 (Fig. 5.5B). These are a row of thirteen constructions placed along the ridge of a low hill at the center of the site, whose summit is reached by inset staircases on their north and south sides (Fig. 5.6). Their groundplan varies from rectangular to rhomboidal. Their size (75–125 m²) and height (2–6 m) vary widely: the northernmost towers are taller, apparently to compensate for the drop in elevation of the natural hill on which they rest. Nonetheless, they are regularly spaced: the gaps between the towers range from 4.7 to 5.1 m.

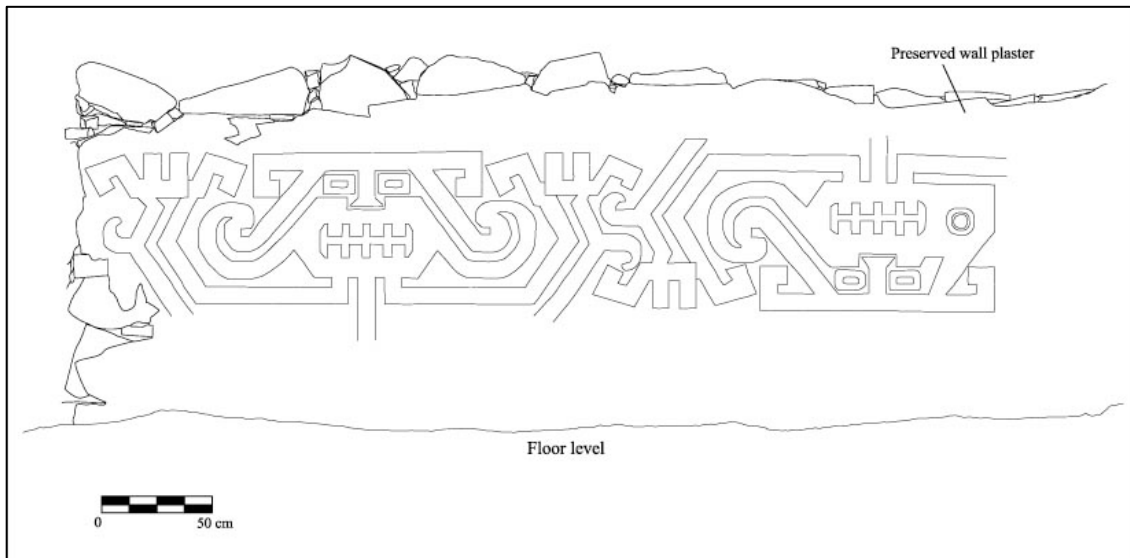


Fig. 5.4. Mural decoration in one of the rooms of the rectangular building within the fortified temple at Chankillo. © Iván Ghezzi

The towers were flat-topped, originally forming a smooth, “false” horizon as viewed from the lower ground to the west or east. No artifacts remain on the summits, yet the staircases strongly suggest that these surfaces were occupied at special times. The ascension to the summits may have been ritually important, yet since the staircases are narrow (1.3–1.5 m wide), and their length (1.3–5.2 m) and height (2–6 m) vary in proportion to tower dimensions, several of them are too steep to climb. The importance of the concept of duality has been amply discussed for the Central Andes, and its manifestation in the dual staircases at the towers, the layout of rooms within buildings, and the use of the double step-motif in sacred architectural elements and pottery vessels at Chankillo reflect the great symbolic importance of the Thirteen Towers.

The line of towers runs north-south, although towers 11–13 are twisted around towards the south-west (Fig 5.5B). In addition, Towers 11-12 cover the largest area. This may suggest that Tower 13 was intentionally “hidden” from some eastern viewing positions. Yet the azimuths of the gaps between the towers, which vary progressively, north to south, from approximately 90° – 270° to 120° – 300° , indicate that the purpose of the variations in the orientation of the tower axes was to orient the gaps between them towards a group of buildings within a walled enclosure to the west.

The best preserved of these buildings, known as the West Observatory, is 53.6 m long, 36 m wide, and has an outer corridor running 40 m along its south side (Fig. 5.5C). This corridor connected a restricted doorway on the southwest side of the building with a southeast opening that directly faced the Thirteen Towers 235 m away. However, the southeast doorway, unlike every other doorway at Chankillo, did not have the typical barholds, or niches where a stone pin was firmly tied into the masonry, presumably used to attach a door. In other words, it was a doorless opening. This corridor was a unique construction that ran alongside the building, but never led into it. Its purpose was to channel movement from its restricted gateway to its doorless opening directly facing the Thirteen Towers.

Sector 3 is a public area composed of a *plaza* surrounded by buildings, among them a complex of interconnected rooms, corridors, and patios, with associated facilities for the serving and storage of drinks directly southeast of the Thirteen Towers (Fig. 5.5). A small staircase on the eastern perimeter wall is apparently the single point of access to this building’s interior, and leads into a large *patio* surrounded by a U-shaped platform with inset staircases that distribute

traffic towards the different rooms and courtyards. The pattern of circulation suggests a complex spatial organization. Towards the interior of the building, the rooms are reduced in size, but gain in elevation and wall height, and have a more restricted control of access. This building, the adjacent plaza, and other small buildings in Sector 3 were a setting for ceremonial feasts. In several places within the *plaza* were found offerings of panpipes and thorny oyster (*Spondylus*) shells. Middens near it contain the remains of serving vessels, panpipes, and maize.

The Thirteen Towers of Chankillo have been interpreted as horizon markers for astronomical observations (Ghezzi and Ruggles 2007). From several locations around Chankillo, the towers are the dominant feature in the horizon and could be used as solar horizon markers, but two buildings are of particular interest. From the doorless opening of the West Observatory, known as the west observing point, the spread of the towers along the horizon corresponds very closely to the range of movement of the rising and setting positions of the Sun over the year. This in itself argues strongly that the towers were used for solar observation. From this observing point, the southern slopes of Mucho Malo mountain, at a distance of 3 km, meet the nearer horizon (formed by the nearby hill on which the towers are constructed) just to the left of the northernmost tower (Tower 1), providing a 13th “gap” of similar width to those between each pair of adjacent towers down the line. During the June solstice, the sun rises in this position (Fig. 5.7); conversely, during the December solstice, it rises directly to the left of the southernmost tower (Tower 13).

In Sector 3, there is a small, isolated structure (Fig. 5.5D). Only the incomplete outline of a rectangular room, 6 m wide, is preserved. Its position in relation to the towers mirrors almost exactly the west observing point: the two lie on the same east-west line, have similar elevation, and are at the same distance from the Thirteen Towers. When viewed from inside this building, the spread of the towers forms an artificial horizon as well. Like the corridor leading to the western observing point on the opposite side of the towers, we hypothesize that this room contained an eastern observing point, though its exact position cannot be known, due to poor preservation, with the same certainty as that of the western observing point. From this eastern observing point, the southernmost tower (Tower 13) would not have been visible, and the top of Tower 12 would only just have been visible (it is only partially visible now due to its ruinous condition). From

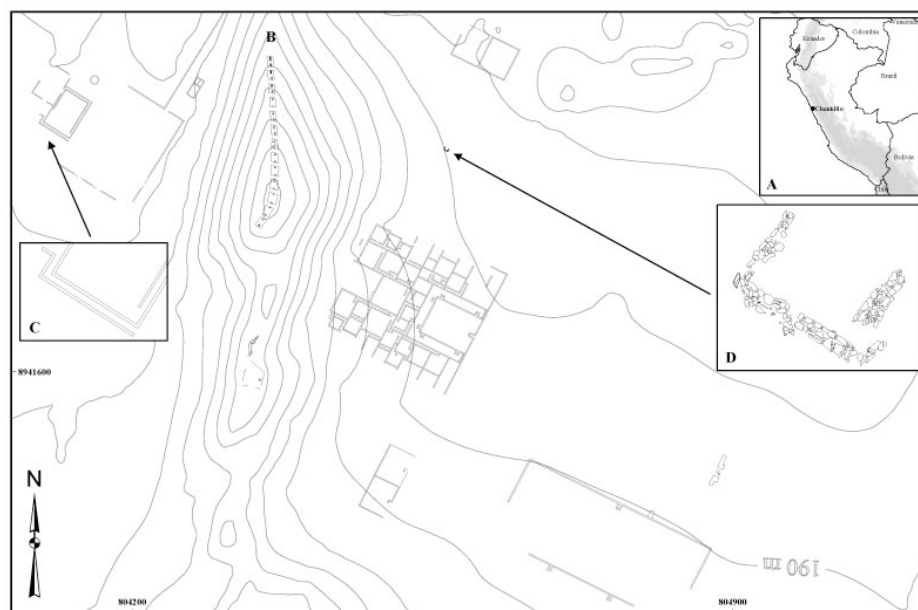


Fig. 5.5. Plan of the area in the vicinity of the thirteen towers. © Iván Ghezzi



Fig. 5.6. The thirteen towers as seen from the fortified temple. © Iván Ghezzi



Fig. 5.7. June solstice sunrise viewed from the western observing point. Photograph © Iván Ghezzi

here, the December solstice Sun set behind the left side of the southernmost visible tower (Tower 12), whereas the June solstice Sun sets directly to the right of the northernmost tower (Tower 1).

From each observing point, once the Sun had begun to move appreciably away from either of its extreme rising positions a few days after each solstice, the towers and gaps would have provided a means to track the progress of the Sun up and down this artificial horizon to within an accuracy of two or three days.

2.b History and development

Chankillo was occupied in 350-100 BC, during the late Early Horizon period of Peruvian prehistory. Research suggests it was devoted to regulating seasonal ritual events, such as religious festivals, solar worship, and the staging of ritual or real battles, maintaining a ceremonial calendar through solar observations.

To judge from the available evidence, the entire site was built and used within a relatively short period. A unique axis of orientation and the functional interconnections between sectors of the site suggest that its layout is the result of a master design. Preliminary dendro-chronological research, though unable to provide calendar dates at present, indicates that all wooden lintels used in the construction of gates and doorways are contemporaneous. Radiocarbon date ranges, though broad for this period owing to calibration, does not differentiate at all between site sectors. Finally, excavations reveal that all buildings, save for one peripheral construction, were completed and in use by the time of Chankillo's abrupt abandonment.

No significant developments or modifications to the site are obvious from its surface, or from excavation. For example, there is no evidence that any of the lintels were ever replaced. Walls or floors were often repaired, but rooms were not remodeled, thus reinforcing the impression that Chankillo was occupied briefly, and not significantly modified in regard to its form, function, and use.

Excavations at the Fortified Temple clearly revealed the intentional destruction of its inner temple and religious images, the possible looting of objects, and its entombment under a thick layer of rock and debris. This attempt at erasing the temple from cultural memory was probably due to a violent conflict with an outside power, which ended in the defeat of Chankillo and an abrupt abandonment of the site (Ghezzi 2006).

There is some evidence of later occupations in the form of Early to Late Intermediate period temporary habitations and human burials. However, the significance of Chankillo may have persisted for a long time in the area, as suggested by numerous graffiti of warriors on the Fortified Temple walls, Late Intermediate period figurine offerings at the gates, and, most notably, an Inca 'fertility' offering recovered precisely from the tower clearly associated with the date of harvest festivals in prehistoric Peru (Fig. 5.8). Similarly, Early to Late Intermediate period cemeteries around the Thirteen Towers and the northern periphery of the site may have taken advantage of what was thought of as sacred ground long after its abandonment.

No mention of Chankillo has been found in colonial-era documents. The earliest references belong to the second half of the 19th century, when some of the most famous explorers and naturalists of the time published accounts and drawings of the site (Squier 1877; Raimondi 1874, 1909; Middendorf 1973). Julio C. Tello, who explored the site in the 1930s, led the first archaeological investigations (Tello 1956). Other scholars published additional reports, but Fung and Pimentel, who carried out a research and conservation project, offered the most comprehensive description of Chankillo to date (Collier 1962, Fung and Pimentel 1973; Kroeber 1944; Kosok 1965; Pozorski and Pozorski 1987; Roosevelt 1935; Thompson, 1962, 1974; Topic and Topic 1978, 1997; Wilson 1995).



Fig. 5.8 Inca 'fertility' offering recovered from Tower 1. © Iván Ghezzi

In 2008, by resolution RDN #075, January 15, 2008, Peru's National Institute of Culture declared the "Chankillo Monumental Archaeological Zone" a national cultural heritage site, and approved a map that establishes its protected boundaries (Fig. 5.2). A buffer zone was not determined. Recent encroachment on the site, through agricultural, mining, and commercial activities, highlights the urgent need for a buffer zone, which is now under consideration by the Ministry of Culture.

3. Justification for inscription

3.c Comparative analysis

Monumental remains from pre-literate cultures can exhibit relationships to the sky in many different ways, but one of the most extensively investigated is where they incorporate structural alignments upon the horizon rising and setting points of celestial objects. A problem in

assessing the significance of such alignments is to establish beyond reasonable doubt, in the absence of corroborating cultural evidence other than that available from the archaeological record itself, that such alignments were likely to have been intentional. There always exists the possibility that any oriented structure could align purely fortuitously upon an apparently significant rising or setting point.

Alignments upon the rising or setting positions of stars, while possibly commonplace in prehistory, can only rarely be demonstrated in the absence of corroborating historical evidence. This is because of the large number of bright stars in the sky and the fact that, owing to precession of the equinoxes, their rising and setting positions shift significantly over the centuries (there are further problems owing to atmospheric effects such as extinction: see Ruggles 1999: 52). This means that there is a high chance of being able to fit an astronomical explanation to any random direction by choosing a suitable star and a suitable date within the chronological range suggested by the archaeological evidence. A typical example is the discovery that an offering chamber in a temple complex at Buena Vista, Peru, is aligned so as to face the star Girtab (κ Sco), the 84th brightest star in the sky, on the basis of which the site has widely but very unwisely been reported in the media as “the oldest calendar in the New World”. Claims to have dated sites astronomically based on stellar alignments are especially suspect, being usually based on dangerously circular arguments.

The rising and setting positions of the sun, moon and planets, while changing on a day-to-day basis, are not affected by precession, although they are subject to a much smaller systematic change on a timescale of millennia. Apart from this, the sun’s motions are essentially straightforward (it swings steadily to and fro over an annual cycle between limits at the two solstices), the moon’s are more complex (moonrise and moonset move up and down the horizon once each month, with the limits themselves varying over a cycle of 18.6 years), and those of the planets more complex still. Since simplicity in the motions of a heavenly body means that there are relatively few plausible “targets,” it is primarily solar, and to a lesser extent lunar alignments, which can be established with the greatest confidence from the disposition of archaeological remains.

There are two ways of establishing the likely intentionality of a putative astronomical alignment: statistical and contextual (Ruggles 2000). The statistical argument is only applicable where there exists a group of similar monuments that can be shown to be consistently aligned, when paying due care and attention to the fair selection of evidence. Excellent examples exist from the Neolithic in western Europe, such as the 177 seven-stone antas of central Portugal and western Spain which are aligned without exception upon sunrise (Hoskin 2001: 95–100) and the 58 recumbent stone circles of eastern Scotland, which are consistently aligned in relation to the midsummer moon (Ruggles 1999: 91–99). No sites such as these are yet included on the World Heritage List, since no individual site in either group stands out as particularly significant, although they are candidates for serial nomination.

The contextual approach is more subjective but has two distinct advantages: 1) it can help identify ‘one-off’ instances of deliberate astronomical orientation; and 2) it can help to address questions of motive and meaning. Thus at the Neolithic passage grave at Newgrange in Ireland, part of the “Archaeological Ensemble of the Bend of the Boyne” World Heritage Site (#659), the presence of the famous ‘roof-box’ argues that the alignment of the passage upon winter solstice sunrise was intentional; and the fact that the primary purpose of the site was as a tomb argues that the solstitial alignment expressed some perceived connection between the sun and seasonal cycles and death and ancestors: this was clearly not an ‘observatory’ or calendrical device (Ruggles 1999: 12–19). On the other hand, the solstitial orientation of the Dacian fortress of Sarmizegetusa Regia in Romania, part of the “Dacian Fortresses of the Orastie Mountains” WHS (#906), was ‘ideal’ rather than practical. It assumes a flat rather than a

mountainous horizon; if deliberate, it does not result from direct observations of sunrise but reflects the influence of geometrical concepts from Hellenistic Greece (Ruggles 2005: 370–372).

Unfortunately, at many sites where numerous putative solar and/or lunar alignments and alignments have been identified, providing the basis on which the site has been claimed to be an ancient astronomical ‘observatory’, it has not turned out to be possible to substantiate the evidence archaeologically or statistically. This includes Stonehenge in England, part of the Stonehenge, Avebury and Associated Sites WHS (#373) (Ruggles 1999: 35–41), where only the solstitial alignment of the main axis of the Phase 3 (stone) monument is securely established, being repeated at several similar contemporary monuments in the immediate vicinity (Ruggles 2007; see also Chapter 4).

At many sites around the world, including all of those above mentioned, their significance in relation to the sky is evident through a single astronomical alignment. In contrast, the Chankillo towers span (to within a couple of degrees) the entire solar rising and setting arcs as seen from two observing points, each clearly defined by a unique structure with no other apparent purpose. Thus we are not selecting putative astronomical targets from innumerable possibilities, but seeing direct indications of all four solstitial rising and setting points together with the means to observe and uniquely identify every other day in the year by observing sunrise or sunset against the intervening towers (Ghezzi and Ruggles 2007). The broad significance across cultures of the solstices as astronomical ‘targets’ is self-evident and widely attested. In this sense, Chankillo is unique, not just in Peru or in the Americas but in the entire world.

It is clear from a range of evidence at Chankillo that direct observations were made of the annual movement of the rising or setting sun along the horizon for the purposes of regulating seasonal events such as religious festivals, and very possibly for maintaining a seasonal calendar. In this sense, the site can truly be referred to as an ‘observatory’ despite the ethnocentric connotations this term has acquired in recent years. In this sense, it even stands out from the so-called Group E structures, one of the most significant sets of monuments in the Americas with regard to their relationship to the motions of the sun. These fifty structures in the Mayan heartlands of the Petén, Guatemala, are named from their similarity to the structure known as Group E at the city of Uaxactun, which incorporates architectural alignments upon both solstices and the equinoxes, and has become renowned as a solar observatory. However, the remaining Group E structures, although broadly contemporaneous and similar in form, do not generally exhibit the same precise alignments as at Uaxactun. Furthermore, the Uaxactun structure was itself modified later, which had the effect of rendering it useless for precise observations. A possible interpretation is that, while some of the Group E structures incorporated functional solar alignments, others were ‘non-functioning’ replicas whose importance—even in so far as this related to calendrical rituals and ceremonials—did not need to be reinforced by actual observations of the sun.

3.d Integrity and/or authenticity

Integrity

Chankillo was a ritual complex devoted to a solar cult, by means of a ceremonial calendar structured through precise astronomical observation of the alignments between the Thirteen Towers and observing points. The comprehensive research carried out at the site testifies to its integrity, specifically the constructions that make up the fabric on which these exceptional values rest.

The Thirteen Towers are a row of cubic constructions along the ridge of a hill at the center of the site (Figs. 5.5B and 5.6). Their purpose was to be used as horizon markers, providing multiple alignment positions when viewed from the observing points. Survey and

excavations show that many walls have collapsed partially, yet enough is preserved to estimate each tower's dimensions. They are subject to deterioration from unregulated visits, wind erosion, and occasional seismic activity.

The West Observatory contains a special-purpose corridor that channeled traffic to a doorless opening directly facing the towers. From this observing point, the spread of the towers along the horizon corresponds very closely to the range of movement of the rising positions of the Sun over the year. The condition of this building is relatively good. It is almost completely covered by sand. The excavations show that although all walls have lost their upper section, the rubble rests at a stable angle, and the wall plaster is exceptionally preserved, retaining its original pigment.

East of the Thirteen Towers, a small, isolated structure has been interpreted as the east observing point. Its position in relation to the towers mirrors almost exactly the west observing point: the two lie on the same east-west line, have similar elevation, and are at the same distance from the towers. When viewed from inside this building, the spread of the towers forms an artificial horizon as well, and their spread also matches closely the annual range of movement of the setting positions of the Sun. Nevertheless, only the incomplete outline of a rectangular room, is preserved, possibly due to stone robbing for nearby constructions of a later period.

Further research is needed to characterize the nature of occupations at Chankillo to the east and north of the Thirteen Towers, and assess their integrity. Similarly, more studies are required to define the extent to which the horizon visible to the east from the Fortified Temple and the Thirteen Towers contained natural features that could also be exploited for astronomical purposes (Ghezzi & Ruggles 2011). This proposed cultural landscape is outside of the current protection zone, and its extent remains to be defined.

Authenticity

The archaeological evidence affirms the authenticity of the solar observation installation at Chankillo (Ghezzi & Ruggles 2007). We find direct indications of the solstitial rising and setting points, together with the means to observe and uniquely identify the time of the year with a precision of 2-3 days, by observing sunrises/sunsets against the towers.

No conservation or restoration has been attempted to date on the features bearing the universal value of this site. In the 1960s, archaeologist Rosa Fung and conservator Victor Pimentel drafted plans for a conservation and restoration project at the Fortified Temple. Currently, the Chankillo project, with support from international, national and regional sponsors, is preparing a conservation intervention of the entire site, including the most outstanding features, such as the Thirteen Towers and its observing points.

3.a Potential criteria under which inscription might be proposed

Criterion (i): The Chankillo solar observation device is a masterful example of *landscape timekeeping*, a practice of ancient civilizations worldwide that used visible natural or cultural features. At Chankillo, we find direct indications of all four solstitial rising and setting points, together with means to observe and uniquely identify the time of year, with a precision of 2-3 days, by observing sunrises or sunsets against the intervening towers. In this sense, the astronomical facilities at this site represent a masterpiece of human creative genius.

Criterion (iii): Ancient Andean peoples often structured their actions within a particular view and understanding of the landscape, including the sky. The solar observation device at Chankillo reveals a great deal about the ways in which, in this part of the world—people before the advent of written records—perceived, understood, and attempted to order and

control the world they inhabited through astronomy. Therefore, Chankillo and its astronomical installations bear unique and exceptional testimony to a cultural tradition that has disappeared.

3.b Suggested statement of outstanding universal value

The solar observation facility at Chankillo is the earliest example known to date in the Americas of a monument devoted to an astronomical function (Ghezzi and Ruggles 2007). The carefully chosen location (in a place of exceptional natural beauty, with an appropriately low natural horizon for sky observation), the construction of an artificial horizon, and the precise design of the observing points and markers constitute an extraordinary example of the cultural transformation of a natural landscape, and of the vital role of astronomical knowledge within ancient civilizations.

At this site we find direct indications of all solstitial rising and setting points, together with the means to observe and uniquely identify the time of year, to a precision of 2-3 days, by observing sunrises or sunsets against the Thirteen Towers. This is an example of *landscape timekeeping*, a practice of ancient civilizations that used visible natural or cultural features to keep track of the cyclical passage of celestial bodies, and represents a masterpiece of human creative genius.

The Chankillo solar observation device represents an early developmental stage of native astronomy in the Americas (Aveni 2008). In this part of the world, there is a long-standing relationship between humanity and the sky. Ancient Andean peoples, like other ancient civilizations, often structured their actions within a particular view and understanding of the landscape, including the sky. Chankillo reveals a great deal about the ways in which people, before the advent of written records, perceived, understood, and attempted to order and control the world they inhabited through astronomy.

Like many other ancient civilizations, Andean peoples imprinted their particular worldview onto their sacred buildings. At Chankillo, they incorporated specific features for astronomical observation and timekeeping. Thus, in the category of architectural monuments incorporating astronomical functions (see *Comparative Analysis*), Chankillo is unique and exceptional, bearing testimony to a cultural tradition that has disappeared.

4. Factors affecting the property

4.a Present state of conservation

Chankillo, although relatively shielded from threats of cultural origin, is exposed without any control to the damaging action of winds, daily thermal variation, seasonal humidity, earthquakes, and uncontrolled visits. Aeolian erosion causes a severe loss of wall mortar, weakening its stone masonry and causing a gradual fall from wall tops, the appearance of cracks, sometimes running all the way down, and, thus, gradual collapse. The structural instabilities caused by these physical-mechanical flaws increase the risk of collapse due to earthquakes, a common event in Peru.

The general neglect suffered by the site causes greater exposure to the above-mentioned threats, and a significant increase in their rate of action, compounded with the effects of unsupervised tourism, which is growing slowly but steadily.

A total site condition survey is under way. Coupled with increased stakeholder interest, this baseline study will offer a chance to reverse Chankillo's deterioration. It will require planning, infrastructure, management, and education for local populations. Presently there are no issues of competing research interests, or accessibility. However, as the significance of the site becomes more widely known, development pressures on Chankillo's buffer zone are mounting.

5. Protection and management

5.a Ownership

The Peruvian government is the sole owner of archaeological sites in Peru. Its “Law on National Cultural Patrimony” (www.bnp.gob.pe/portallbnp/pdf/ley28296.pdf) charges branches of the government, headed by the recently created Ministry of Culture, with the protection and management of these sites, such as Chankillo.

5.b Protective designation

By resolution RDN #075, January 15, 2008, the National Institute of Culture of Peru declared the “Chankillo Monumental Archaeological Zone” a national cultural heritage site, and approved a map that establishes its boundaries (Fig. 5.2). For full protection under Peruvian cultural heritage laws, this map must be registered with SUNARP, Peru’s official agency for public records. However, the Ministry of Culture of Peru has a very poor record of officially inscribing archaeological site boundaries.

5.c Means of implementing protective measures

The Ministry of Culture of Peru is charged with the protection and management of all archaeological sites. Unfortunately, it is severely underfunded and generally can only react to imminent threats to the best-known sites. The local Casma province office does not have the resources to monitor Chankillo, or any of the major sites in the area. However, recent administrative changes will place regional cultural authority within the regional government of Ancash, which has one of the largest revenues in the country.

The Chankillo Project, through a partnership with the World Monuments Fund, receives expertise and funding from national and international sources. However, local matching is always required to get any activities approved, and this is a great challenge in Peru. At this initial stage in the project, no permanent structure or staff is in place for conservation or management efforts, much less to open the site to visitors, but these are valued goals of the project.

The Chankillo project’s site investigation and conservation have led to its being considered by the Ministry of Culture for inclusion in Peru’s WHS tentative list. As such, it would be afforded the highest level of protection and management from the office in charge of world heritage sites in the country. Even if the site were not included in the tentative list promptly, it is likely that the regional culture office will assume the responsibility for its protection.

5.d Existing Plans

Besides global plans from the Ministry of Culture to protect archaeological sites, if Chankillo is included in Peru’s WHS tentative list, it will be afforded a specific level of protection and management from the ministry’s office in charge of such sites. On the other hand, the Chankillo project plans to carry out in coming years the conservation and restoration interventions necessary to preserve the site and prepare it for tourism.

5.e Property Management Plan

There is no property management system yet. However, as the most valued goal of the Chankillo project, its development will begin in late 2012, under an agreement with the Ministry of Culture. In the near term, the Chankillo project and its sponsors provide all the human and financial resources necessary to develop the plan and begin its implementation. Meanwhile, an agreement with the regional government of Ancash, in progress, seeks to secure long term funding for the management system.

5.f Sources and levels of finance

The Chankillo Project, through a partnership with the World Monuments Fund, receives funding from national and international sources. WMF has set up a special fund for the project. However, local matching is required to get any activities approved, and this is a great challenge in Peru.

Private sector support has been essential to carry out the required site condition survey. In regards to the public sector, the regional government of Ancash and the national government of Peru are in the early stages of providing funding for the public presentation and conservation of Chankillo.

5.g Sources of expertise and training

The World Monuments Fund is the main technical partner for the Chankillo project, providing when necessary expertise, local and international consultants, and training, in all aspects of research and conservation activities.

6. Monitoring

6.a Key indicators for measuring state of conservation

A condition survey of Chankillo, including low-altitude aerial photography with kite and balloon, photogrammetry, laser scanning at 5-10 mm resolution, High Dynamic Range photography, and conservation annotations on forms and orthophotos, covering every single standing architectural element at the site, was completed in 2010-12 by the Chankillo project. Such a comprehensive study is the baseline for adequately planning upcoming conservation interventions, as well as monitoring this site's current and future state of conservation. A key indicator is the 3D point cloud of all structures obtained through 3D laser scanning, surveyed with a permanent control network. In the future, laser scans could be accurately repeated to monitor changes.

7. Documentation

7.a Photos and other AV materials

The World Monuments Fund has acquired the reproduction rights to a collection of photographs from 1967-8 by Peruvian conservator Victor Pimentel. As part of the condition survey carried out at the site, the Chankillo project obtained high-resolution satellite imagery and low-altitude aerial photographs, scanned the site in 3D, carried out a High Dynamic Range photographic survey, and documented excavation/conservation activities with high-resolution photographs. This documentation will be made available through publications and web sites of the cooperating institutions (see 7.d).

7.b Texts relating to protective designation

Peru's general law of national cultural heritage grants the state the exclusive property of all archaeological sites. The recently created Ministry of Culture is charged with their protection and management, which includes officially declaring properties as cultural heritage. By resolution RDN #075, January 15, 2008, the National Institute of Culture declared the "Chankillo Monumental Archaeological Zone" a cultural heritage site and approved the official map that establishes its boundaries. Nevertheless, for full protection under Peruvian cultural heritage regulations, this map must be inscribed with SUNARP, Peru's official agency for public records. There are no regulations at the regional or local government level that protect specifically cultural heritage in the area where Chankillo is located.

7.c Most recent records or inventory

The Chankillo project carried out a condition survey in 2010-2, which included: review of high-resolution satellite images and government aerial photographs and maps; low-altitude aerial photography survey with kites and balloons; High Dynamic Range photographic study; 3D laser-scanning at 5-10 mm resolution; total station survey at 3" angular precision; and excavations, thoroughly documented in photographs, drawings, forms, and 3D models. Photogrammetric processing of aerial/hand-held photographs, as well as 3D laser scanning, have yielded point clouds and 3D models covering all the architecture at the site. These were used to create orthophotos of every single standing architectural element at the site. The orthophotos were used as base maps for detailed conservation annotations, in combination with varied recording forms, sketches, photos, etc. All of these data were analyzed in a geographical information system environment to produce a Condition Survey Report covering 100% of the site.

7.d Agencies holding inventory records

Instituto de Investigaciones Arqueológicas (www.idarq.org), World Monuments Fund (www.wmf.org), and Ministerio de Cultura del Peru (www.mcultura.gob.pe).

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