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The Design of Protection Zoning: A Critical Planning Technique for Balancing Conservation and Development of Large-scale Archaeological Sites

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Abstract

As a key link to implement the conservation concepts and requirements through specific conservation measures, the conservation plan for large-scale archaeological sites in China is a basic means for the Chinese governments at all levels to guide and manage the work of archaeological site conservation. As one of the most critical techniques, the design of protection zoning has been basically shaped after nearly 30 years of exploration. This paper, firstly, attempts to clarify the concept of large-scale archaeological sites, the evolution of conservation planning for large-scale archaeological sites, and the evolution of protection zoning. Then, to address the challenges of protection zoning design, the technical attempts are explained using actual projects as case studies. In particular, in order to ensure “integrity”, the design of protection zoning is mainly combined with the archaeological results, through the analysis of GIS software and spatial coupling technology, to delineate the accurate boundaries of the three-level protection zoning. In order to harmonize the conservation of the site with the development of the region, the design of protection zoning takes into account factors such as "restriction and diversion", "effectiveness and operationalization", and "different focuses", etc., and continues to refine the three-level protection zoning to clarify hierarchical and categorized regulations. Ultimately, the design of protection zoning provides technical support to balance the relationship between site conservation and sustainable development of the region.

Keywords

Large-scale archaeological site, conservation plan, protection zoning, integrity, harmonization

1. Research background

1.1 The concept of a "Large-Scale Archaeological Site" (LAS)

The concept of LAS from the perspective of conservation and management began in the mid-1990s. In 1995, the State Council organized the "National Conference on the Protection of Cultural Relics". At the conference, the representative of the National Cultural Heritage Administration (NCHA) for the first time put forward the concept of LAS and the serious situation faced by protecting LAS. Subsequently, in 1997, the State Council issued the "Notice of the State Council on Strengthening and Improving the Work on Cultural Relics" (the State Council, 1997, No. 13), which began to use the concepts of "large sites" and "large-scale ancient cultural sites" (State Council, 1997). Finally, the concept of LAS was formalized in "Instructions on the Proposed Plan for the Construction of a System for the Protection and Display of LAS in China to be Included as a Special Item in the Tenth Five-Year Plan" issued by the NCHA in 1999 (Tongbin, C., 2002).

1.2 The evolution of a system for "Conservation Planning for LAS" (CPLAS)

In the [1997] No. 13 document, it is proposed that:

(1) Proposing the establishment of a system for the protection of cultural relics in line with the socialist market economic system.

(2) Correctly deal with the protection of cultural relics and economic construction as well as the relationship between the interests of the people, and effectively do a good job in the rescue and protection of cultural relics.

It is under the guidance of such a policy that the protection of LAS, which is particularly relevant to society, must be discussed from the level of mere conservation and utilization projects to the level of planning that harmonizes the relationship with society. Moreover, as early as in the mid-to-late 1990s, along with the discussion on the preparation of the Principles for the Conservation of Heritage Sites in China (PCHSC, 2000), as well as the growing demand for special planning for repair, remediation and display works for immovable cultural relics, the Institute of Architectural History, China Architecture Design & Research Group (IAH, CADG) pioneered in a series of planning explorations by interpreting international concepts and combining them with China's national conditions (Tongbin, C., 2004). More importantly, between 2002 and 2004, IAH was commissioned by the NCHA to draft and prepare China's first set of normative documents for the conservation planning of immovable cultural relics: "Measures for Examination and Approval of the Plans Compiled for National Cultural Relic Protection Units" (MEAPC-NCRPU) and "Requirements for the Compilation of Plans for National Cultural Relic Protection Units” (RCP-NCRPU) (National Cultural Heritage Administration, 2004). These two documents were promulgated by the NCHA in 2004, marking the formalization of the technical system of China's immovable cultural relics protection planning, and have been used until now.

Since LAS is different from immovable cultural relics such as ancient buildings and grotto temples of limited scale, the land it occupies will involve local development issues regarding land use, regulation of residents, etc., MEAPC-NCRPU and RCP-NCRPUare not sufficient to provide comprehensive guidance for the preparation of CPLAS. In 2004, NCHA commissioned IAH to prepare the "Outline of Conservation Master Plan for National Important LAS" (OCMP-NILAS), which took four years to complete. In this process, IAH was also commissioned by NCHA in 2006 to work on the preparation of Specification for Conservation Planning of Large-scale Archaeological Sites (SCPLAS) (National Cultural Heritage Administration, 2015). The specification was finally published by the NCHA in December 2015 and went into effect on January 1, 2016. Thus, the technical system for CPLAS has been formed with the goal of "comprehensive protection" and "harmonious development".

1.3 The evolution of "Protection Zoning" (PZ)

As early as 1963, in The Interim Measures of the Protection and Management for National Cultural Relic Protection Units (IMPM-NCRPU) issued by the Ministry of Culture, the concept of immovable cultural relics’ PZ was already proposed (National Cultural Heritage Administration, 1963). By 1982, PZ was further clarified into two categories, protection area (PA) and development control area (DCA), in the National Cultural Relics Protection Act (NCRPA) (The National People's Congress, 1982). Till 2004, PZ was further refined and categorized in the MEAPC-NCRPU and RCP-NCRPU. Drawing on IMPM-NCRPU, PA is divided into two categories, CPA and GPA, for detailed management. Drawing on the Beijing Municipal Government's exploration of DCA categorization in 1984, it is proposed in MEAPC-NCRPU and RCP-NCRPU that DCA can be classified into several categories based on different requirements for heritage environmental protection, and differentiated management regulations for construction intensity control can be formulated.

At the same time, during the period of 2000-2003, with the advancement of the preparation work for the *C*onservation Master Plan for Liangzhu Site (CMP-LS), the determination of the scope of the DCA and the operability of the management procedures have become the biggest bottleneck in the publication and implementation of the plan (People's Government of Zhejiang Province, 2013). Expanding on this, a DCA of sufficient size is often required to ensure that the various elements of a LAS are included within the scope of the PZ, as well as to ensure that the elements of the historic environment are protected as much as possible from high rates of development in towns and cities. However, according to regulations in NCRPA, construction projects in DCA must be approved by the administrative authorities of the national heritage before they can be implemented. Therefore, the operationalization of the management of DCA had become the biggest resistance to the rapid development of the region. In view of this, for the first time, more than 60 km^2 of the 90 km^2 DCA, which is related to the protection of the historical environment, has been designated as a "coordination area" (CA) in the CMP-LS. Through the "five incorporation" measures, control requirements of CA have been incorporated into the work of provincial cultural relics authorities and local governments. The operationalization of the plan's implementation has been substantially improved. Since then, the three-level PA containing PA, DCA, and CA has been applied to the preparation of most CPLAS in China.

2. Challenges of designing PZ

The protection of LAS is very closely related to the society of the region, and in order to meet the comprehensive protection needs of LAS, as well as to consider the harmonious of social development in the process of protection, the design of PZ is mainly faced with two major challenges: the uncertainty of archaeological sites and the scarcity of land resources.

2.1 Challenge I: Uncertainty of archaeological sites challenges the need for planning to clearly delineate the boundaries of LAS's PZ

When preparing CPLAS, the identification of site distribution boundaries, functional layout, spatial structure, composition of elements, etc. depends on archaeological results in the first place. Therefore, the progress of archaeological work should be the basis and prerequisite for the design of PZ for LAS (Zhongpei, Z., 2008). However, in practice, archaeological work has its limitations. This is manifested not only in the fact that archaeologically discovered remains do not represent something complete but also in the fact that the spatial and temporal scope of the remains cannot be accurately determined (Zhongpei, Z., 1992). Due to this limitation, the design of PZ with well-defined boundaries for LAS with uncertain boundaries becomes the most challenging task in the preparation of CPLAS.

Take the Liangzhu site group as an example, from 1997 to 2002, the Liangzhu Archaeological Workstation launched a comprehensive survey of the site cluster, and the list of sites increased from 55 to 135 (Zhejiang Provincial Institute of Cultural Relics and Archaeology, 2005). Although the results of the comprehensive survey had improved conservationists' knowledge of the general distribution of the group, the boundaries remained uncertain for most points. Moreover, the comprehensive distributional boundaries of the group were even more difficult to grasp. This also leads to the fact that when the preparation of CMP-LS was initiated in 2000, the first challenge faced was the uncertainty of the distribution boundary of the Liangzhu site group.

2.2 Challenge II: Scarcity of land resources under rapid urbanization challenges the balanced relationship between LAS protection and the development of the region

Since the mid-1990s, with the rapid progress of urbanization in China, the greatest pressure on the conservation of LAS has been the issue of land resources. First, although China's arable land area ranks fourth in the world, the per capita arable land area is only 0.097 ha, which is less than half of the world's per capita arable land area. Insufficient arable land per capita is one of the most important manifestations of China's land resource scarcity. Whereas nearly 90% of China's LAS involves arable land resources. Taking the 100 LAS in the OCMP-NILAS as an example, the region of countable arable land alone is up to about 750 km^2, which is nearly 50% of the total size (National Cultural Heritage Administration, 2006). Similarly, from 1996 to 2021, China's urban built-up area has surged from 20,214.18 km^2 to 62,420.53 km^2, more than tripling (National Bureau of Statistics, 2023) (Figure 1). This act of high-speed urbanization and construction has put unprecedented and continuously advancing pressure on the protection of LAS. Therefore, how to realize the goals of "comprehensive protection" and "harmonious development" under the constraints of limited land resources is another important challenge facing the preparation of CPLAS.

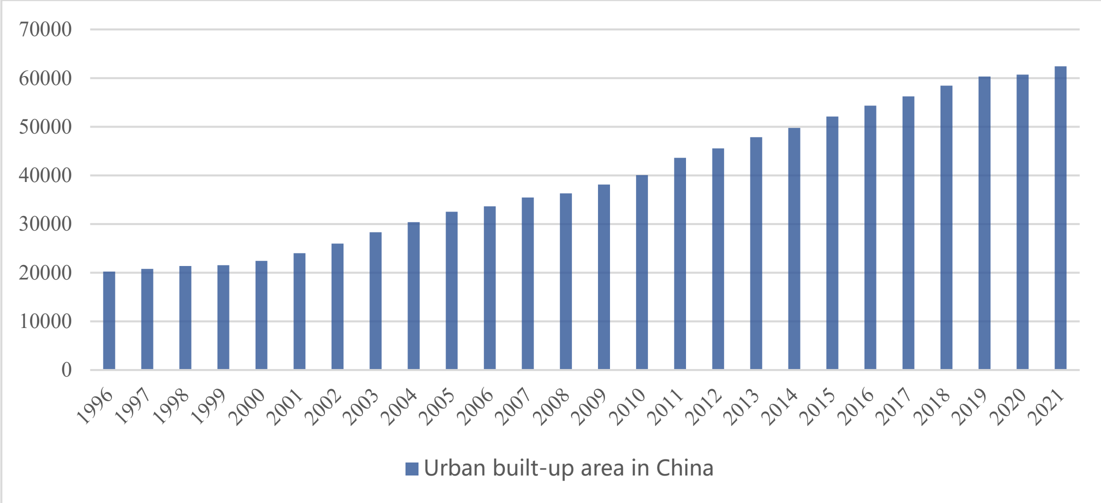

Figure 1. Statistical Bar Chart of Urban Built-up Area in China from 1996 to 2021.

3. Key strategies for the design of PZ

The design of PZ in CPLAS usually refers to the design of the type and level of PZ. That is to say, in conjunction with the protection and management requirements of different land parcels, different levels and types of PZ will be delineated, and the corresponding construction activity control and management regulations for each zone will be formulated. Ultimately, the design of PZ will realize the integrity protection of the LAS's value, while balancing the development of all aspects related to the society of the region.

3.1 Ensuring the "integrity" of LAS: delineating boundaries in response to Challenge I

3.1.1 Definition of "integrity"

As core concepts in the field of World Heritage, "authenticity" and "integrity" are not only yardsticks for measuring the value of heritage but also basic principles that must be observed in heritage conservation. With China's accession to the convention Concerning the Protection of the World Cultural and Natural Heritage (CCPWCNH) in 1985, and especially in the late twentieth century along with China's declaration of its world cultural heritage, these two principles have gained widespread attention and discussion in the field of heritage conservation in China.

The concept of "integrity" was originally derived from natural heritage and later extended to cultural heritage. In the Operational Guidelines for the Implementation of the World Heritage Convention (2021), "integrity" is expressed as (ICOMOS China, 2021):

90. Integrity is a measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes. Examining the conditions of integrity, therefore requires assessing the extent to which the property:

(1) includes all elements necessary to express its Outstanding Universal Value;

(2) is of adequate size to ensure the complete representation of the features and processes that convey the property's significance;

(3) suffers from adverse effects of development and/or neglect.

This should be presented in a statement of integrity.

91. For properties nominated under criteria (i) to (vi), the physical fabric of the property and/or its significant features should be in good condition, and the impact of deterioration processes controlled. A significant proportion of the elements necessary to convey the totality of the value conveyed by the property should be included. Relationships and dynamic functions present in cultural landscapes, historic towns, or other living properties essential to their distinctive character should also be maintained.

The key to achieving "integrity" conservation " lies in the need to include all the elements of heritage values and features within the Property and Buffer Zone for effective conservation management. Therefore, how to analyze the uncertainty of the archaeological site to identify all the elements of the site's value characteristics, which can be used as the basis for the definition of conservation zoning, has become a major challenge in the design of PZ.

3.1.2 Combination of GIS software application and archaeological results – take CMP-LS as an example

At the time of the initiation of the CMP-LZ preparation, the archaeological results were not yet able to provide clear support for delineating the boundaries of PZ. Therefore, before determining the protection zone, the IAH first used GPS to systematically sort out the existing archaeological results, and on the basis of determining the coordinates of 135 sites, combined with GIS software to analyze the topography and geomorphology of each site, as well as the geographic environment characteristics of the entire site distribution area of 60 km^2, so as to clarify the spatial distribution of the site's group. Then, based on the concept of "integrity", the IAH included the distribution range of artificial remains of the site and the directly related natural topography into the scope of PA, and according to the spatial density of the distribution, PA was designated as CPA and GPA. Furthermore, the IAH delineated DCA and CA, and established different requirements and management procedures for the control of construction intensity, taking into account the security of the remains' potential distribution area, the elements of the historic environment, and the harmonization of the urban and rural environments.

Of these, the PA, which was largely finalized in 2008, encompasses 42 km^2 of the site's distribution, mainly including Moguashan Area (city site), Yaoshan Area, Xunshan Area, Huiguanshan Area, Tangshan Area, Yaojiadun Area, and etc. DCA corresponds to the environmental elements of the site and the distribution area where remains may be distributed, mainly involving the southern foot of Dazhashan Mountain and the area around Boudou Mountain, the northern foot of Daxiong Mountain and the area around Liangzhu Harbor, etc. CA corresponds to a basically complete range of sight space, mainly involving the area around the southern foot of Daxiong Mountain, the area east of Liangxiang Road, and the area south of Gouliang Road to Kangliang Road, etc. The design of the three-level PA basically establishes a spatial control pattern for the integrity protection of the site and its environment (Tongbin, C., 2019).

3.1.3 Combination of spatial coupling technology and archaeological results—take Conservation Master Plan for Luoyang City during the Sui & Tang Dynasties (CMP-LC) as an example

Similarly, the preparation of the ABC was faced with the inability of the archaeological team to provide a valid basis for delineating the boundaries of PZ. Therefore, IAH firstly utilized the spatial coupling technique to overlay the measured maps of the city site, the restoration maps of the city site, etc., with the contemporary topographic maps of the city, and basically deduced the approximate distribution range of the subterranean remains of the Luoyang City during Sui & Tang Dynasty. Further, taking the excavation and positioning of important archaeological sites such as the city wall, the city gate, the Paradise, and the Mingtang as benchmarks, the scope of the urban functional zoning like the Gonghuangcheng District, Luobei Rifang District, and Luonan Rifang District, etc., was projected. Finally, combined with the special analysis of the distribution area of the remains, the possible distribution area of the remains, as well as the historical environment elements, the plan clearly delineates the three-level PA for the Luoyang City during Sui & Tang Dynasties: PA, DCA, and CA. And the plan requires that the archaeological team should further verify the reasonableness of the PA.

Among them, the PA mainly includes the Gonghuangcheng District, Luobei Rifang District, and Luonan Rifang District, the Luo River, ruins of water conservancy facilities, etc. The DCA mainly takes into account the difference in the intensity of urban construction and the actual situation, and finally, the plan determines that the boundary of the protection area is extended by 25 meters to 500 meters. The delineation of CA is based on the edge of the mountainous and hydrographic net in the Luoyang Basin, and the aim is to control the negative environmental impacts of large-scale industrial construction projects. The design of the three-level PA supports the "comprehensive protection" of Luoyang City during the Sui and Tang Dynasties from a spatial planning technical perspective.

3.2 Ensuring the harmonization of protection and development: formulating management regulations in response to Challenge II

In order to improve the degree of harmonization between protection and development, the design of PZ needs to continue to be graded/classified on the basis of the three-level PZ, with corresponding management regulations. In other words, the further design not only ensures the safety of physical remains and the elements of the historical (natural) environment but at the same time meets the needs of sustainable local development. Specifically, in the design of PZ, management regulations are formulated with three main considerations in mind: "restriction and diversion", "effectiveness and operationalization", and "different focuses".

3.2.1 "Restriction" and "diversion": harmonization inside and outside the PA

In view of the rapid urbanization and industrialization of the heritage sites, in order to effectively coordinate the relationship between conservation and development of the heritage sites, CPLAS should specify a dedicated countermeasure of "restriction" and "diversion" inside and outside the PA. This is an extremely important and successful exploration in the development of CPLAS. In this regard, the countermeasure of "restriction" is a set of planning measures arising from the need for site protection, like reducing the population, stopping construction projects, restricting industrial patterns, controlling and reducing the amount of land used for construction, etc. The ultimate goal is to curb and gradually dissolve the urbanization and industrialization process inside the PA, and to provide an effective guarantee for the comprehensive protection of physical remains and elements of the historical environment. The countermeasure of "diversion" is a series of planning measures that can strengthen the urbanization process outside the PA, such as delineating the direction of the city and town's development and construction, establishing industrial parks, adjusting and improving the transit transport system, optimizing the infrastructure for the construction of villages and towns, restructuring the economy and reducing the agricultural population, increasing the rate of urbanization, etc.

Take the CMP-LS as an example. Inside the PA, the plan firstly combines the local social and economic development plan, puts forward the requirement of moving the development and expansion direction of Pingyao Town and Liangzhu Street out of the PA, and radically restricts the process of urbanization and industrialization inside the PA by adjusting the nature of land utilization, such as cutting down the construction land, increasing the proportion of non-construction land (cultural relics protection land, agricultural cultivated land, forest land, etc.), etc. In addition, to address the factors that already exist within the PA that threaten the "comprehensive protection" of the site, such as transportation routes, industrial construction, residential activities, etc., the plan reduces or eliminates the above threats by cutting off the main urban transportation routes through the CPA, relocating 117 factories and mines, as well as relocating more than 800 agricultural households, etc. Ultimately, the urbanization and industrialization process inside the PA is gradually dissolved. Outside the PA, the plan first ensures the possibility of "diversion" by expanding the land for urban construction. In addition, through the establishment of industrial development zones and agricultural product processing bases outside the PA, the plan not only solves the problem of relocating 117 factories and mines but also provides a solution to the employment problem of the agricultural population. In addition, the plan increases the main urban transportation routes at the outer edge of the PA, which improves and strengthens the urban transportation functions outside the PA while eliminating the transit transportation functions inside the PA. Eventually, the urbanization and industrialization process outside the PA is gradually strengthened.

3.2.2 Effectiveness and operationalization: hierarchical and categorized regulations

In response to the effectiveness and operationalization of the implementation of the planning measures, the design of PZ requires further grading/classification of areas after the identification of the three-level PA. To be precise, the PA should be divided into CPA and GPA according to the importance of the remains and the degree of sparseness of distribution; DCA should be divided into different categories according to different construction control objectives and intensity; CA should be divided into different categories according to the requirements of different degrees of environmental harmonization (National Cultural Heritage Administration, 2015). In turn, it develops management regulations that take into account the main factors affecting each area, while taking into account the social context, in order to harmonize and coordinate the effectiveness and rationality of protection efforts and to enhance their operability.

As well, take the CMP-LS as an example. The most outstanding contribution of the plan in the design of PZ is to break down the 60 km^2 of DCA into two parts: 35 km^2 of DCA and 33 km^2 of CA that fall under the category of historic environmental conservation. The plan is implemented by incorporating the control requirements of CA into the work of provincial cultural heritage authorities and local governments via the regulatory status of CPLAS, in order to improve the operability of implementation. In addition, in the design of PZ, based on the preservation status of the site group, the degree of support for the heritage value, as well as the spatial density of the distribution of the site group, the 42 km^2 of PA is divided into two categories of CPA and GPA. DCA, on the other hand, is divided into 5 categories based on the complex distribution of the site group and different construction control efforts. At the same time, taking into account the different requirements for the degree of environmental coordination, the CA is divided into 3 categories. Further, for the factors that may affect the safety of physical remains and the historical environment, slightly different regulations are formulated for the control of the CPA and GPA, including construction restriction requirements, adjustment of land utilization, and population control. For five categories of DCA and three categories of CA, the design of PZ further takes into account the factors that may affect the coordination of the environment of the LAS and the development needs of the region, and formulates the regulations from strict to loose respectively, mainly involving the construction control requirements, architectural style requirements, building volume requirements, etc. In the end, the design of PZ ensures the effective implementation of the planning measures by further refining and formulating the corresponding management regulations, taking into account the interests of all parties on the basis of the comprehensive protection of the site.

3.2.3 Regulations for different focuses: four types of LAS

In addition to the above two considerations, the design of PZ should also give full consideration to the relationship between the distribution location of the LAS and the intensity of urban and rural construction. In other words, the design needs to consider the degree of spatial correlation between LAS and built-up area. In this regard, Chapter 4, Article 11 of SCPLAS proposes, for the first time, four distinctly different types according to the LAS's location:

Depending on their relative location, LAS can be categorized into four types:

(1) Urban Type: located in built-up areas of cities and towns;
(2) Suburban Type: city and countryside areas;
(3) Rural Type: located in rural areas;
(4) Wilderness Type: located in uninhabited wilderness areas.

For Urban Type, in the design of PZ, construction control requirements should be strengthened for construction activities at the region in response to the fact that the development and construction of the cities and towns have already posed a serious threat to the conservation of the site and that the integrity of physical remains and elements of the historical environment is generally weak. Surburban Type is located in the potential area of China's urbanization development, and its protection faces the threat and challenge of large-scale construction demand, so in the design of PZ, the requirements for adjusting the development direction should be put forward from the level of urban-rural planning, focusing on the formulation of diversionary measures for the construction activities inside the PA. The design of PZ for Rural Type should fully integrate the basic farmland protection policy, focusing on adjusting the proportion of non-building land. Finally, with regard to Wilderness Type, most of its ecological setting has been severely degraded, and since the site is far from areas of human economic activity, the preparation of its conservation planning should be combined with regional ecological protection measures, and the design of PZ should incorporate regional ecological protection measures, focusing on addressing safety precautions, natural disaster prevention, avoidance of anthropogenic interventions, etc.

4. Discussion and suggestions

The preparation of CPLAS requires the joint efforts of scholars from multiple disciplines, levels, and fields, which is not only related to the comprehensive protection of physical remains and elements of the historical environment, but also requires targeted planning to solve the problems related to the interests of the region in social development such as urban and rural construction, land utilization, population regulation, ecological protection, etc. As one of the most critical techniques, the design of PZ, through the delineation of clear boundaries of the three-level PZ and the refinement of PZ to develop corresponding management regulations, in order to ensure a balanced relationship between site protection and the sustainable development of the region.

Especially today, China's urban and rural development is moving towards a new stage of high-quality development. Various requirements for high-quality development of society, such as urban renewal, functional transformation, environmental enhancement, cultural inheritance, etc., have posed higher challenges to the protection of LAS. Functional spillovers from urban renewal have created new demands for industrial transformation and functional restructuring in areas located on the edge of built-up urban areas and in urban-rural areas. At the same time, under the layout of the rural revitalization strategy, the large sites located in rural areas are directly facing issues concerning agriculture, the countryside, and farmers. And how to promote a new urban-rural relationship of coordinated development and common prosperity under the premise of LAS's protection has become the focus of the government's work. In conclusion, the background of the preparation of CPLAS in China has also entered a new phase of comprehensive and high-quality development of society, and heritage conservation planners have a long way to go.

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