

# **Earthworks: ground actions inside Landscape**

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## **Abstract**

The research theme explores how some basic and fundamental architectural actions connected with the figural concept of ground (dropping, founding, digging, excavating, filling, carving, mass grading, sloping...) are expanding their compositional complexity, together with the expanding field of landscape architecture.

After a first presentation of the general theme during the CA2RE Symposium in Berlin (September 2018), the middle-stage research process now proceeds with the clarification of methodology and literature about the topic. The reflection on “Moving ground actions in Landscape Architecture”, indeed, lies between:

- . an individual design-based research approach, which uses photographs, drawings and short descriptions in narrative-poetic prose as tools to underline initial empiric recognitions and spatial considerations between wonder and consciousness, memory and imagination;
- . a theoretical framework which gives an insight into a broad history of ground-based operations, from the alteration of the mount Athos described by Vitruvio and Alberti to the primal, founding action of building architectures explained by Semper, from the handling of the re-signification of post-industrial landscapes by Smithson to the shifting of the meaning of ground inside ecological urbanism and environmental landscape design;
- . a critical overview of on-going projects and contemporary case studies where the moving ground design process inside complex construction sites is urgently facing social, ecological, economic problems and global political challenges, opening some crucial questions like the need to re-cycle, re-think and re-value earth and inert waste through the practice of landscape design.

The research is intended as an instrument to interpret and deepen the compositional, strategic meaning of moving ground actions inside the design process, reflecting on how, millennia after first ancestral earth mounds, earthworks inside landscape could today become part of a continuously renewed sublime collective imagination.

**Keywords:** Moving ground, Landscape architecture, construction sites

## 1. *Empiric recognitions*

An empiric observation of the construction phase of landscape architecture interventions, from private gardens to public parks planned and realized in the south part of Switzerland between 2009 and 2018, becomes an opportunity to think about ground movements connected to the construction and realization of projects dealing with changes of the site's surface.

This section of the research investigates on both the physical and inspirational aspects of these vast earthworks: "But actually this grandeur is most active in the realm of intimate space. For this grandeur does not come from the spectacle witnessed, but from the unfathomable depths of vast thoughts. [...] The exterior spectacle helps intimate grandeur unfold" (Bachelard, 1964: 193). At the same time, it evidences how a number of great mounds of mud resulting from the excavations for buildings foundations or from land levelling are often omitted and excluded from the creative process. The primary question therefore is about how these kinds of earthworks could enter straight into the landscape design thinking. In spite of the powerful suggestion of their forms and sizes, tumuli of earth and stones inside building sites are rather treated, as per standard practice, like outcomes to be handled as secondary concerns. During the groundwork activity, at the beginning of the construction phase, indeed, the excavated soil is often *deposited* in a temporary and shapeless accumulation near the extraction site (embankment), successively a part of the same material or, sometime, the entire mound is *removed* from the original site and, finally, *dislocated* into another place, which usually is a dedicated specific depot or landfill,



Fig. 1: Earthwork deposited in the building site, Tessin, Switzerland, photo by the author

while simultaneously the primary landscape and/or architectural project proceeds lying on a digged, renewed and oblivious ground. "The lie of the land" is a play on words that John Dixon Hunt uses to indicate both the land topography, including its fundamental geology, its climatic and cultural responses and its historical associations, "but also that designed land *lies* or tells untruths about itself, by virtue of whatever landscape architects do to it" (Dixon Hunt, 2016: 1).

Indeed earth deriving from buildings and infrastructures fabrication, maintenance or dismantlement, the so called construction and demolition waste (C&D), represents one of the heaviest waste stream generated in Europe. *Movement* of such a great volume of debris leads to several visible, even if not always easy-recognisable, effects inside landscape, which, together with the *ground*, is in constant metamorphosis in itself. For instance, the observation of the small region of Cantone Ticino, Switzerland, where I actually live and practice, highlights a large quantity of inert dumps, consisting mainly of digging

material (about 30%). Precisely, the Department of the Territory of Tessin mapped, within the 2018-2022 Waste Management Plan, about 32 deposits already in operation or soon to be opened, to house approximately 115'000'000 cubic meters of material spread in an overall area of about 2'800 square kilometres, a region not only densely urbanized, but also characterized and occupied by mountains, narrow wooded valleys and lakes. In this extent, 28 sites are type B depots, that, according to Swiss parameters, are destined for the collection of inert and construction waste (Dipartimento del Territorio, 2017). As a result, even if it is expected that these natural, rur-urban or urban areas are left untouched, many of the dumps are visible on a daily basis; some of them indeed are quite close to inhabited villages and small city centres, inevitably becoming deeply connected with the mountains and the meadows where they are located. Therefore, in all respect they are inside the familiar, intimate environment that one inhabit, and enter in that "portion of the earth's surface that can be comprehended as a glance" (Jackson, 1984: 3), thus becoming definitely part of our perceived landscape.

## **2. Theoretical framework**

To deal with terrain is a basic component of landscape architecture discipline. In human history, the process of re-shaping the land with earth has always had great, consolidated implications: sacred, social, ecological, artistic, political and economic (Bourdon, 1995). Together, the act to shape and move the ground has been mentioned by Gottfried Semper inside his "Four Elements of architecture", together with the other first and original signs of human settlements: "hearth" (ceramics), "roof" (carpentry), "weaving" (walling) and,

finally, "mound" (earthworks) (Semper, 1851: 102), where the last one refers not only to the planning of the basement of a building, but also recalls the deeper meaning of the first contact with the earth and the penetration of the ground to dig or heap it. Many early civilizations which have developed in different continents have produced mounds of earth as a means of a collective human language.

One of the most impressive projects has been the aim to shape the entire Athos mountain by Dinocrate, the architect of Alexander the Great. This extraordinary vision was chronicled by Vitruvio in the first century BC and by Plutarco in the first century AD, and subsequently by Leon Battista Alberti in his "De re aedificatoria" (1486), in which he explicitly considered Dinocrate's concept as a negative model and an emblem of excess (Backhaus and Murungi, 2009: 117), especially because of the exaggerated pomp of the proposed intervention, which was in contrast with the Vitruvio principle of *utilitas*.

In contemporary time, landscape architecture still defines its discipline through ground-based design actions, which interact with terrain and model it. A number of scholars and designer still investigate by research or by design on the meaning of those actions (among others U. Weilacher, D. Leatherbarrow, C. Girot, D. Schaal, B. Lassus...).

The fact that in ancient times extraction and ground-moving works were operations that through centuries had been done by hand, by carrying baskets of materials in a very expensive, long-lasting and laborious way, contributes to transmit its preciousness, as well as its exceptional nature and meaning. Together, it recalls the fundamental feature of a technical aspect, which has had an increasing role, starting from the 19th century. On the one hand, several

evolving mechanical procedures, scientific means, new mapping and design methods have helped to increase knowledge and considerably reduce and optimize work efforts and costs (Walker 2008: 9), allowing for the development of an extractive engine drawing resources, while on the other hand, a growing mass of material becomes more easily and rapidly wasted, as a final, definitive point of a “cradle-to-grave” process (Braungart and McDonough, 2009: 27) which produces and externalizes waste as an unavoidable outcome. In this regard, an important turning point for Art, Architecture and Landscape design, and a stance on the complexity of both ecological and formal issues connected with the shaping of the ground, can be found in the Land Art movement. The work of Robert Smithson, which the art installation realized for the “Earthworks” exhibition for Dwan Gallery in New York (1968) reveals, introduces a topical reflection on the relationship between nature and human actions, on the beauty of discarded things like earth and on their implication for our culture (Kastner and Wallis, 1998). At that time, an environmental movement, anticipated at the beginning of the century by figures like John Muir, began to develop in America and in Europe, leading to a more conscious approach not only to social, political and economic issues, but to design as well (McHarg, 1969). Moreover, design became the medium of reclaiming neglected landscapes, managing storm water, detoxifying contaminated soil (Baird, 2003). Especially in the post-industrial era, an increasing accumulation of things remaining from anthropic activities has occupied water and land, the typical official territories of landscapes, creating a constellation of contaminated, abandoned sites; the places for which Berger in the early 2000s coined the expression “drosscapes” (Berger, 2006: 36), to

define areas that have been heavily degraded by humans. In this sense, also the prime, ground-based actions in landscape, like founding, dropping, and excavating should shift from assumed linear, static meanings to more complex actions where the rethinking of the ground is strictly connected with a circular process and a new perception of both the extraordinary power and the awareness of the fragility of the environment we live in.

### **3. Projects**

Building sites are places of production of inert waste, but also a chance to experience, inside a landscape design context, how to *reuse* and to *recycle* earth. Nevertheless, as seen during the empiric observation of small to medium landscape interventions, the fragmented nature of the C&D practices, the standardized procedures and the lack of geographical and temporal overlap between different ground activities make quite difficult to implement the rethink and reuse of debris at a significant design level.

The study of complex building sites, as the infrastructural ones, by contrast allows the observation of great earth movements inside construction processes, which often should anticipate and clarify design strategies and policies in a concrete and strategic way.

The research in particular is moving forward an investigation of two study cases, related to the TEN-T Network (Trans-European conventional rail network): the on-going railway project linking Lyon to Turin by 57.5 km long Mont Cenis base tunnel and the Alptransit rail route, which connects south Germany to north Italy through the Alps. For both of them the focus is on the *reuse*, the *relocation* or the *dumping* of the removed spoils (earth and rocks) from galleries and tunnels inside landscape.

The analysis is significant for the research progress by reason of the prominence and topicality of the infrastructural interventions inside their environment, e.g. tunnels are usually excavated in mountain areas of great value and source of great criticism, the recentness of the construction activities, the experimental approach of planning and design processes which are urgently facing social, ecological, economic problems and large-scale political challenges, as the European Directive 2008/98/CE which implies, within 2020, the recycling of at least the 70% of inert waste deriving from construction sites.

In the first case the excavation of 7 km long exploratory tunnel named “La Maddalena” under the Ambin mountain slopes -built to gather useful information about the geological conditions, to test the mechanized excavation method and to provide a security and ventilation conduit and an access point for construction of the primary tunnel- produced an amount of about 300'000 cubic meters of earth and rocks. The entire volume of non-hazardous material is at the present time already deposited against the existing slopes near the construction site, in such a manner that several steps are created and greened up, first and foremost according to environmental guidelines and to the aim of reproduce a form as close to nature as possible. In the coming years there will be a notable production of excavated rock from construction of the Turin-Lyon main tunnel (about 14 million of cubic meters) and the consequent need to think about the end use of large quantity of material.

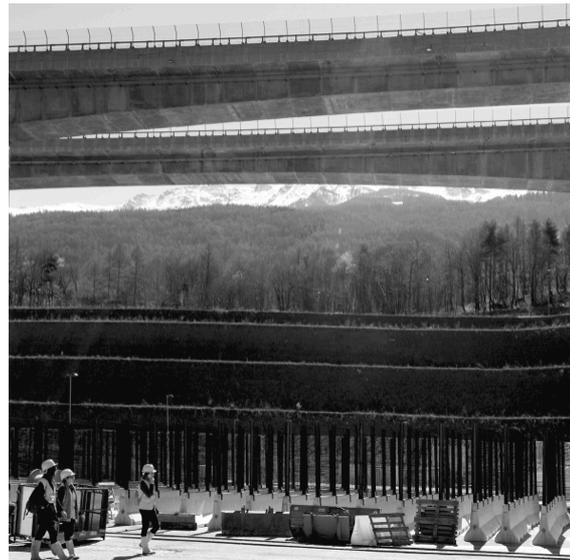


Fig. 2: “La Maddalena” construction site, Chiomonte, Italy, photo by the author

The second study case, the Alptransit railway, includes the Lötschberg tunnel, inaugurated in 2007 and the Gotthard, with three important tunnels: the Ceneri Base Tunnel in the southern part (about 15km long), the Zimmerberg Base Tunnel in the northern section (total length 20km) and the Gotthard Base Tunnel, inaugurated in 2016: a 57km long and 500-550 meter undersea deep tube connecting Erstfeld, in Canton Uri, to Bodio, in Tessin. The entire excavation volume of the Gotthard axis is estimated in about 13.3 million cubic meters, of which about 46 percent has been reused in projects for embankments or for concrete aggregates, 53 percent for environmental restorations, filling material for cultivation or construction materials, while the remaining 1 percent has been sent to a special reactor landfill for contaminated material (Jeker, 2002).

From an initial analysis, in particular, three design approaches on the theme of the reuse of aggregates in the landscape on which to focus emerged:

- . a *renaturalization* approach, which is an attempt to re-use earth as a living,

cultivable resource inside the environment and to direct the design intervention according to the fundamental codes and morphology of natural phenomena and processes.

. the *topological approach*, which opens the site to spatial and temporal transformations thanks to holistic, ecological thinking and to the metabolic understanding of the environment. Landscape, indeed, has contexts too, beyond the immediate physical materials of the site;

. the *cultur-scaping approach*, as a cultural awareness of landscape and a deeper understanding of its resources, which acts by design to transform the site thanks to a sculptural interpretation, staging its irretrievably vanishing, tampered, fragile aspect.

Earthworks are no more conceived as a mere passive object inside a Kantian natural beauty to be redeemed, but rather elements that can nourish both the design meaning and the material character of the landscape intervention (Braae, 2015; Rocca, 2006: 10). In this sense “design has [...] shifted from thinking in terms of a stable nature and a destabilizing humanity to working with an unstable and changing nature” toward a “constructed ecology” (Grose, 2017: 13-14).

## **Conclusion**

The research aims to investigate the possibilities of landscape architectural interventions connected with ground movements as the reuse in the environment of excavated soil coming from construction of big infrastructures, questioning both traditional strategies and design approaches, to collect new points of orientation and provoke a change in the ways of seeing, imagining and conceiving earthworks.

Conclusions at this point of the research are only intermediate and



**Fig. 3:** Reuss Delta, protected natural area, Switzerland, photo by the author

partial, since the investigation is still in development and some data collected are yet to be processed, while contextually it is necessary to proceed by the in-depth analysis of additional projects and scrutiny of their ground-based design potential.

Whether to combine and merge the “empirical recognition” ( section 1 of this paper ) and the “overview of cases study” ( section 3 of this paper ) or to keep them separate and maintain, instead, a constant dialectic between them is an open question pertinent to the research method.

The sequential definitions -through words, drawings or ideograms and photographs- of selected eidetic moving ground actions, like for example terracing, sloping, grading, reusing, relocating..., that should show how today compositional, strategic meaning of those acts enter inside the landscape design process, could be the further step of this research.

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