

Road-Spine versus Road-Tube: Roads as Space Generators

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Abstract: Arteries devoted to sustain streams of users, resources and debris, are a foremost factor and pre-condition of the development of urban areas and of the transformation of landscapes. Roadscapes reflect outcomes related to super urbanization tendencies. Often conceived as isolated tubes, roads cut and obscure form, structure, biotic and abiotic factors of sites, urban fabrics and spaces. A broad vision of landscape is a basis for reconceiving roads. The concept of road-spine emerges: the road is conceived as the basis of a bundle of routes, nodes, surfaces, poles and tiles, devised to frame and shape a mosaic of open spaces, crops, farms, stores, basins and service areas. The road-spine entails the idea of a permeable infrastructure devised to integrate diverse functions: from serving various forms of motion, by ordering an isotropic grid of routes, to framing a porous urban space; from disposing surfaces meant to preserve biocenosis and biotopes, to favoring osmosis amid land uses. It also prefigures a distribution of land uses dependent on site vocations, and a mosaic of scenarios open to encounter, evasion, rest, amusement, participation, and to spontaneous practices of space.

Key words: Infrastructure, landscape, open space, edge, road.

1. Introduction

The proposed study intends to develop a renovated proposition on roadscapes. The aim is to elaborate an interpretation of roads as means for a profound renovation of urban and rural scapes.

A question arises: If roads define favored lines of dispersion of urban fabrics and of site mutations, can roadscapes, surfaces of motion and vague landscapes of residues and edges, be conceived as an armature apt to manage tendencies and tensions related to the urban metabolism and to the dispersion of urban spores?

A broader notion of landscape represents the theoretical basis for redefining functions and sense of roads: it permeates, for instance, the concepts of landscape infrastructures, urban landscape infrastructure and infrastructure as landscape. The notion of road-spine is thus introduced: the road is conceived as the spine of rural and urban spaces, as the basis of a structure integrating diverse elements and

spatial conditions: beams of fast lanes, soft edges, belts of prepared grounds, strips, nodes and spots.

Design enquiries conducted at the University of Cagliari are reported to underline a set of notions, tenets and strategies for a renovated discourse on the project for the regeneration of transport infrastructures. Such conjectures focus on landscapes of urban dispersion, sparse, vast and vague urbanized regions arisen around major cities, and on the edges of metropolitan areas. The concepts here proposed do not represent a precise enunciation of a novel road paradigm: Firstly, they aim to raise questions about concepts of road and of landscape; secondly, to infer a set of notions; thirdly, to define a line for future enquiries.

2. State of the Art

2.1 Questions

Due to variations in scale and aims of urban economies, policies, streams of resources, people, ideas, dross and capitals [1], super-urbanization can represent a strain for urban and rural areas.

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Urban filaments spread out along the edges of transit areas, as defined by Augè [2], depict a clear image of urban dispersion and reveal its dependence on surfaces devoted to the transit of resources and users.

Diverse urban models and forms of governance are required: As regional urbanist Odum, H. W. [3] observed, the overlap of ecological, social and economic regions can be the reference for a model based on the redistribution of population, production spaces, capital and culture.

Restoring urban regions as mosaics of ecotopes, factories, urban fabrics and farms, founded on isotropic, broad grids of routes and open spaces, envisages a model able to respond to social instances, to preserve scarce resources (for instance, of fertile soils), and to reduce impact of abrupt events. Moreover, it could enable circular softer economies, and it could engage traditions, social and cultural values and ecological forces. Reconceiving the space of the infrastructure prefigures a project for the contemporary territories able to repair a profound fracture among permanence of built environments, routines of public agencies, and paces of evolution of socio-economic tendencies [4]; as Smets and Shannon [5] observed, “once married with architecture, mobility and landscape, infrastructure can more meaningfully integrate territories, reduce marginalization and segregation, and stimulate new forms of interactions”.

2.2 *What Is Infrastructure?*

It is proper to question present and latent vocations of infrastructure to favor interactions, to serve trades of ideas and resources, to represent a diverse discourse on urbanized spaces.

A doubt rises: is infrastructure, as space and concept, a permanent form and a permanent notion, or can it evolve, acquiring a diverse sense? Can the road be conceived as a compound bundle devised to engage a vast set of interactions? Can it be defined as a spine

of a porous mosaic of vivid figures of space? And can it reclaim its function as urban space?

A glance on postulates about road and roadscape, is considered as a proper, even if prodromal, step to refute an idea of infrastructure reliant on sole tenets of performance, permanence and control. In present times, in fact, the concept of roads as isolated tubes prevails: roads cut and obscure form, structure, biotic and abiotic factors of sites. As a consequence, roads often entail the reduction of a site to mere use value functions. Such utilitarian model obscured a previous idea of road as a monument. Plans for Rio de Janeiro and Algiers, by le Corbusier, for instance, revealed a latent vision of infrastructure as a potent sign, generator of urban form, devised to substantiate the redemption of men in a diverse civic order.

A reaction to the idea of road as tube can be founded on the distinction between transport status and place status as co-present stems of a roadscape. The former involves a set of movements served by a road; it refers to a broad scale, and is presumed invariant, along a road. The latter, vice versa, refers to spatial qualities specific for each road section and dependent on specific site traits.

Landscape emerges as the precept of a renovated debate on infrastructure. As stated by Nunes [6], if landscape is a portrait of convictions of man inscribed in space, then roads, pipelines and ports are to be considered as landscape components. A profound renovation of tenets of road design can be deduced from the notion of landscape as a palimpsest, an *in fieri* product of adaptation of men to sites and of sites to visions and rites of men.

It encourages to mould scenarios open to future adaptations: it fosters processes, reinforces identities, engages and nurtures tradition, ecological factors and socio-economic forces.

As Belanger [3] states, roads as arcs of a grid superimposed to diverse scenarios can frame a varied landscape. If Strang [7] proposes to underscore roads, basins, ducts and grids as eminent factors of form and

image of an urbanscape, Mossop [8] envisages a redemption of infrastructure from its present state of mundane and removed fact: urban areas are depicted as bodies dependent and founded on a broad, obscured fabric of roots made of roads, rails, ducts and pipelines. Moreover, Czerniack [9] proposes the notion of dual infrastructures: spaces of streams define a mosaic of surfaces, devices, edges, grids, nodes meant to frame and punctuate urban spaces. Smets and Kagner [10] regard road and transit areas as foremost means to a broad renovation of urban spaces: due to perceiving infrastructure as a basis for socio-economic development, a vast consensus arises, and imposes spaces of movement as main concern and as favored fields of intervention for public bodies. Diverse tendencies emerge: an idea of infrastructure as landscape, for instance, proposes an object-oriented vision [5], that derives its principles and criteria from a specific dimension of the relation between infrastructure, users and places. Criteria related to space and perception, or to social instances, ecological processes and practices of land, arise as the core of a specific conception of the roadscape.

Moreover, a fecund lore, founded on oeuvres and propositions of Olmsted, Giedion, Seifert, is re-discovered: “park-ways” and autonomous roads evoke routes devised to exhilarate and reveal a projectual methodology founded on the spatial and scenic qualities of the road. Lynch et al. [11] propose a discourse on roadscape founded on visual experience of drivers; roads are thus conceived as a function of movement.

Vice versa, the idea of landscape as infrastructure, or of landscape infrastructure as defined by Belanger and SWA (Sasaki, Walker and Associates) [12], focuses on co-presence and sum of streams, and reduces landscape to an operative basis of slopes, contours, boundaries, cuts, gorges, basins, that orient and serve streams generated by ecology and economy. This basic infrastructure is regarded as the support for a broader, articulated, integrated system of surfaces,

nodes, grids, designed to combine various transactions, to dispose functions reliant on merger of streams, and to manage transformations of urban regions. Despite a more profound consideration of sites, the conception of landscape as a cultural fact still remains vague. Roads often represent a rupture and a cause of separation and segregation [13]. Moreover, an idea of roads as mere spaces of transit reduces areas of encounter, and deprives people of a realm of incubation of spontaneous routines.

Urban landscape infrastructure can provide a fecund solution to social concerns: Nijhuis and Jauslin [14] conceptualize infrastructure as an operative structure meant to direct urban development: Urban landscape infrastructures become an armature of urban and rural development, a frame for a precise image of urban form. Design emerges as the main medium to integrate operation and representation of urban realms, to bind scales, to compose ecological structures, cultural and socio-economic instances, and to ensure continuities and contingencies.

In addition, Tjallingii’s model [15] is based on fabrics of spaces of movement and blue-green grids: transport fabrics are to be conceived as fast lanes meant to serve rapid movements of large amounts of resources, debris, users, so as to sustain land uses meant to produce profit. Soft grids represent a quiet fabric of open spaces, composed of basins, ducts and reservoirs, devised to preserve biotopes, to sustain a vast set of sensitive interactions and to favor rest, encounter and contact. A frame composed of roads, rails, routes and grids of soft spaces, adequately faces intersections of land uses and practices of urban spaces so as to provide consonance of spaces, balance of streams and convergence of instances.

3. Road-Spine

Fast lanes and grids of open spaces are not separated, single-use realms. Fast spaces of movement and quiet spaces of contact can be considered as poles of a renovated model for a main road: it is here that

the notion of road-spine emerges.

3.1 Premises

Roads and roadscape are regarded as an armature of urban and rural areas: the concept of armature presumes an idea of organic structure and prefigures beams of curved lines designed to spread and to contract, to embrace vast areas and to infuse a tenet of order. Road-spine does not aim at defining a concluded form for the urban region: its goal is to mould a consistent structure apt to orient and set transformations of man-made landscapes. The proposed notions focus on infrastructure from a landscape-based perspective: the ecological notion of landscape is adopted as a lens, a medium and a concern:

- As a lens, it educates to understand a site as a deposit of signs superimposed on lands;
- As a medium, it proposes a paradigm of design meant to enlist time and to slide amid scales. Time becomes a medium to favour renovation of spaces, to respond to variations of uses and purposes: it confers sense, refines and blurs contours, and adorns forms of fugacious overtones. Integration of scales determines a transition from aseptic, remote infrastructures to leaner fabrics able to set interactions at macro and micro level;
- As a concern, landscape persuades to preserve biotic and abiotic factors of spaces of nature, biocenosis, ecotopes and ecotones, reserves and residues.

Road-spine envisage roadscape as a bond, as space and as a neat sign:

- As a bond, roadscape are to be devised to maintain and re-inforce interactions, favor trades and prevent segregation. As a medium meant to govern large scale forces, roads-spine are considered as a frame meant to dispose and to set interactions amid cores of land uses, i.e., to actuate a diverse norm of operation of spaces of man. As a set of routes, roads-spine are conceived to favor movements of

resources and users, merge and moderate streams, entailing a diverse model of transport able to engage economic tendencies, demands for leaner modes of motion and inclusion;

- As a space, roadscape must generate adaptive, robust and resilient scapes, suited to respond to mutations of sites, variations of instances and fluctuations of streams. Moreover, since routes intersect diverse conditions of space, a renovation of roadscape must also focus on construction of visual sequences apt to generate a readable, neat, eloquent and functional image of roads and of traversed sites: roadscape are to be devised as vivid and imageable scenarios [16], founded on a consistent and notable score of unique and distinctive forms and figures of space;

- As signs, in conclusion, roads must preserve, underscore and reinforce rites, codes and signs of sites, resources and substrates of unique identities. Previous traces and novel tenets and signs must be combined in a renovated code of space: a road could inscribe into a place a discourse and could represent a specific set of values.

3.2 Structure

The notions of frame, bundle and beam recurring in previous propositions depict a specific trait of a road-spine: its consisting of a set of diverse figures of space. The structure of roads-spine is epitomized by nodes, edges, beams, strips, belts and spots.

Beams, for instance, refer to fast lanes and subsume car lanes, bus lanes, railroads, ducts and pipelines. Beams envisage specialized areas of transit devoted to rapid and intense streams of resources, data, users and capital: they also entail the concept of split lanes, devised to seize vast areas, and to frame belts of prepared grounds and edges. Edges refer to voids and residues, transition spaces amid fast lanes and traversed sites, and parts of a broader ecological infrastructure. Their re-conception creates a space where diverse uses and instances cooperate, a mosaic

of reserves, open spaces, turbines, crops, basins, routes for soft forms of motion. Edges frame a scenario open to a spontaneous practice of spaces, a space meant for diversity, of routines and biocenoses, a soft device whose function is to absorb, to drain, to store water, to set and moderate ecological streams. Vague surfaces are a premise for “the rethinking of the mono-functional realm of infrastructure” and for “its rescue from the limbo of urban devastation to recognize its role as a part of the inhabited city” [8].

Nodes refer to point of decision and transition among diverse routes and diverse dimensions of movements. As points of decision, nodes involve intersections amid fast lanes and strips. As points of transition, nodes describe intermodal spaces meant to bind different grids of routes and forms of motion; moreover, they conduct transitions from spaces of motion and traversed sites, enclose services and amenities for road users. Nodes can be, for instance, clusters of train stations, bus stops, car lots, services areas, stores and retails.

Strips refer to minor transverse devices, composed of split lanes for diverse mode of transport, spots and open spaces, meant to distribute streams amid fast lanes, and to tie fast lanes, nodes, belts of prepared ground and traversed sites.

Belts refer to vast surfaces of prepared grounds, framed by fast lanes, served by strips, repaired by edges and clustered around nodes, meant to regroup land uses meant to generate profit. Belts of prepared ground can enclose a varied scenario of urban fabrics, of agrarian mosaics, of clusters of factories. Spots, in conclusion, refer to minor spaces, whose function is persuade users to stop, rest and observe sites. Spots represent realms where contacts between man and landscape intensify.

3.3 Operations of the Road-Spine

The Road-spine thus contemplates a frame which composes inclusion, ecologies, management of urban metabolism, identities and economies.

3.4 Transport Function

The road-spine should be primarily designed to meet a fragmented transport demand, defined by erratic movements amid dispersed couple of points. Nevertheless, the transport demand is not regarded as an ineluctable fact, for instance, a broad demand for large scale movements could be the evidence of a disease: the concentration of functions in specific dense centers. As a consequence, beams of fast lanes should be designed to support strategies and actions meant to restore the territorial balance. Moreover, the project of infrastructural grids for rapid and intense flows should reflect a transport model founded on criteria of accessibility and inclusion. Thus, in defining and organizing spaces and surfaces of the road-spine, priority should be given to elements and modes of transport that better ensure inclusion, i.e., that ensure, for most disadvantaged users, rapid, safe and autonomous movements. As a consequence, railroads and bus lanes are regarded as prime arcs of a beam of fast lanes, and must be tied to car lanes, promenades and trails disposed in road edges.

3.5 Distribution of Land Uses

Moreover, outlining beams of fast lanes as an armature meant to frame belts of prepared ground prefigures a first tenet for a proper disposition of land uses: profit-oriented practices and basic services are to be grouped along main routes and, in primis, around intermodal nodes. The aim is to profit from intersection of streams to nurture land uses oriented to produce profit and to favor a fairer and broader fruition of basic services. Diverse positive outcomes could arise. For production of spaces, disposition along fast lanes can provide rapid procurement of resources and deliveries of products; it can favor control on streams of users and resources and cost cutting. Concentrating basic services around intermodal nodes could reduce scope and scale of movements and could reinforce a model of transport which promotes softer forms of motion and favors disadvantaged users' fruition of

basic services.

3.6 Open Spaces

A second tenet for a safe distribution of land uses and basic services focuses on the definition of new systems of compatibility and incompatibility between anthropic practices and site specific traits. Traits, which are presumed to condition the aptitude of sites, refer to biocenoses, properties of soils, and form and structure of a region, i.e., slopes, contours, aquifers, river basins, plains, edges, gorges and ravines.

A basic purpose is to individuate vulnerable areas, i.e., those which are sensitive to intense practices of space or exposed to critical events. Vulnerable areas (for instance coastal areas, riversides, precipitous slopes, forests, wetlands) are worthy to be preserved in order to maintain scarce, precious resources and to prevent calamitous events. Belts of prepared ground, apt to sustain and enclose basic services and profit-oriented land uses, are consequently situated in not vulnerable areas, that is, without biotic or abiotic factors to be preserved. The disposition of functions within the belts depends on consistencies amid qualities of land uses and a combination of preconditions due to distance from bundles and nodes of transport grids, presence of abandoned spaces or structures to be reclaimed, and site specific resources: a fertile plain, for instance, must be reserved for agriculture.

Seeing beams, nodes, belts, edges and strips as frames for a renovated norm of distribution of land uses, in addition to a model of transport founded on public transport and soft forms of movement could not only moderate streams and set the metabolism of a region, but also preserve and manage ecological interactions, enabling diverse forms of practice of space and of governance of landscapes. Rapid and easy movements are a precondition in order to broaden user bases of services, to constitute union of municipalities, to structure an urban region or to order a sparse multi-nodal urban structure. Improving the service for a broader user base merges ethic tenets

linked to preventing the segregation of remote areas, and economic canons of profit and remuneration of investment.

Renovated and restored as porous edges, spine of a broader mosaic of biotopes, ecotones, residues and reserves [17], roadsides also support the integration of transit areas and ecological infrastructures. Vulnerable areas, residues and edges, could be composed in a broad grid of reserves, open to lean modes of use and devised to nurture various biocenoses, to frame and tie diverse biotopes.

3.7 Dual Spaces

There is a double perspective in edges: as reserves, edges can frame a space of diverse biotopes, biocenoses and ecotones, acting as a soft device which sets ecological streams; as open spaces, edges can frame intense urban spaces. Spaces of motion, edges, strips and mosaics of open spaces could compose an isotropic fabric meant to serve a broad osmosis and mould a porous and permeable landscape [13]. The notion of porosity is then crucial: Benjamin refers to it as a precondition for a spontaneous fruition of urban spaces, produced by an eruption of mundane episodes from interiors to outer spaces [18]. Spontaneous episodes subvert the routines set by outer forces; a sort of permanent carnival favours the auto-poiesis of societies [19] as it enables people to find in encounters a peculiar set of codes and routines.

As a consequence, edges of beams of routes must frame urban spaces devised as fabrics of transient nodes and signs, as generous voids, devised to adapt to a vast set of spontaneous modes of use, and to variations of routines and interpretations. Hence, the concept of decorum [19], the regard to spontaneous modes of fruition of urban spaces and to memories and utopias stored in sites, becomes essential.

3.8 Roads as Generators

The conception of edges as energy generators is a

fecund consequence of the notion of dual space. Groups of devices, panels, turbines, plantations and generators can be devised to punctuate roadsides, or they can be grouped in bare areas to sustain poles of activities, and underscore nodes and points of transition.

In Rotterdam, strategies to regenerate port lands focus on fostering intensification along industrial arteries [3] and envisage a merger of surface land uses and subsurface infrastructure, based on a conception of road sections as a tool to represent, order and engage dual nature and vocation of road spaces.

Road spaces can also become areas for tests of devices integrated in furniture or in pavements. Rail lines can be converted into a linear device capable of deriving energy from vibrations provoked by a subsidence of rails produced by trains in motion [20].

3.9 *Image of Landscape*

In focusing on the design of spaces generated by infrastructure, the first objective is to conceive roads as signs capable to describe memories, rites, practices of traversed sites. A vivid and readable image of a roadscape can be the basis for a readable image of traversed rural or urbanscapes. Sense of space, scale, orientation, sense of motion, motion of field, content, variation, a continuous and fluid alignment define a conceptual basis for designing a vivid, structured and imageable roadscape [11]: it can be interpreted as a neat, vivid, ordered sequence of spaces, devised to engage, in a neat structure, a vast repertoire of varied, distinct elements:

- remote reference points;
- groups of eminent artefacts;
- events disposed along edges;
- grain;
- colour;
- partition of surfaces;
- pavements;
- pieces of furniture.

Such distinction derives, in primis, from visual

evidence, and refers to form, colour, contour and grain. But space is perceived through motion: a space must induce motion, even of gaze, in its users. Its merits stem from a disposition of its components apt to reinforce and set a basic motive tension.

A sequent level of significance depends on the sense of a space or of an artefact, on its roots in codes, rites and memories of places.

Tectonics of a road could define a sinuous and continuous space punctuated by unforeseen variations; edges and ornament can be moulded as a porous border meant to conceal and reveal goals and reference points, to propose and variate tempo and basic beat of a roadscape, to set dramatic sequences of confined spaces and of open, vast scenarios. Sequences, variation, counterpoint, contrast and curved spaces would generate a fluid motion of self and of gaze, modulate sense of motion and surprise, tension and relief, concentration and quiet, and prefigure a neat relation of scale between observer and environment. As a result, the road would be able to amuse, favor orientation and decisions, prevent confusion, lack of concentration and boredom and to induce a feeling of evasion, as a consequence of an apparent merging of road and landscape.

Edges, devised to frame fugacious perspectives, can arouse a sense of infiniteness, whose premise is a frustrated desire to measure and discover a landscape concealed to the eyes. Deprived of a clear, broad, vision, the observer images a vast, indefinite space beyond those edges: senses and soul forge and roam in an infinite landscape. The infinite arises as a dramatic and romantic form of beauty [21]: each point of the visual field is the vertex of a reversed pyramid whose base cannot be determined [22].

Reference points, or events posed along edges, can become focuses of oriented perspectives, pivots of movements and rotations of road sections or points of a subdivision of a trip in a series of steps, so as to confer on motion, purpose and measure. Course and tectonics of a road can be devised to modulate mutual

positions of observers and reference points, so as to modulate perceived rotation and movement of far eminent artefacts: grace and vigour of perceived motion confer a vibrant tone on sequences of spaces.

If diverse forms of significance concur in a same element, they emerge as a powerful sign. For instance, a monument, rooted in the memory of a place, can be the focus of oriented perspectives, a goal, and the pivot of a rotation or movement of the road. Sequences of nodes and of spots can underscore points of interest. Signs can contribute to enable users to read sense, reasons, practices, memories of traversed sites.

Since art is a medium, road surfaces, edges, vague areas, viaducts, furniture, can become a realm for its diverse forms. Pinuccio Sciola [23], an Italian sculptor, recognizes in banal viaducts a resource to transform a road in a vivid sequence of artistic episodes. Ryan and Hays Holladay, vice versa, focus on a concept of soundscape, that is, the acoustic map of a space: the road can be conceived as a score of GPS (global position system)-based compositions [24].

3.10 Conclusion

The road spine is a reference for a broad re-conception, and conversion of roads, routes, devices, present in situ, and of residues, voids, framed by infrastructure. Reuse, adaptation, upgrade of available roads, routes, rails and edges, founded on a broad vision and on a broad time frame, are all main strategies in order to reduce soil consumption and prevent erosion of landscapes.

Roads devised to serve same itineraries are to be integrated in a bundle. Specific routes can perform a specific function, inside a structure conceived to serve a vast set of streams. The road can be upgraded in order to serve as a rapid and safe car transit, as well as a fast route for transit of goods; edges or minor routes can be recovered as surfaces for leaner modes of transport, i.e., lanes for public transport lines or railroads. Residual spaces framed by routes can be

recovered, in order to forge a broad mosaic of porous edges, nodes, belts of prepared ground and spots.

4. A Project for the Cixerri Valley

4.1 Premises and Purposes for a Case Study

Can infrastructure be considered as a tool for a profound re-conception of urbanized areas? Design enquiries conducted at the University of Cagliari, supervised by Giorgio Peghin and Jordi Bellmunt focus on infrastructure as a medium for a regeneration of man-made landscapes. Superimposition and merger of spaces of life and spaces of transit are regarded as an operative realm for design activities meant to infer a frame of means, concepts and strategies apt to construct, on a novel paradigm for infrastructures, a model for broad, sparse urbanized region and for edges of metropolitan areas.

Studies focused on the Cixerri region. It is a vast, linear, urbanized area moulded by a river basin and interspersed with broad urban structures (Cagliari and the Cities of Iglesias, Carbonia and Portoscuso), as well as farmlands, production areas (Macchiareddu, close to Cagliari and Portoscuso), and punctuated with reservoirs, dams, bundles of roads and rails, ducts. It is a crucial area, modified by a vast set of large scale tendencies: divestiture of former spaces of production, concentration of basic services in major urban areas, segregation of marginal areas, depletion of soil, erosion of rural areas, depopulation of minor centers and “metropolization”, i.e., concentration of population in outer metropolitan edges.

One of the main aims of the project is to propose a spatial organization able to restore a balance among infrastructure and landscape, and among nature and second nature. Hence, the proposition of a linear urban structure which adapts to the linear infrastructure of the Valley, and recalls the idea of a linear organization as a premise for a democratic model, fits for an equitable distribution of functions and resources.

The broad structure resulting from this peculiar

spatial model engages rapid and unpredictable variations; an adaptive trait presumes enunciation of future and alternative scenarios. Infrastructure, freshly seen as part of an organic bundle, structured as spine for a linear urban organism, entails then a radical project of man-made landscapes, meant to promote non-hierarchical relations among diverse realms and between the space of the infrastructure and the space of life (Fig.1): infrastructural bundles are designed to include diverse spatial conditions, engage both colonized and preserved spaces, retractions and expansions, extensions and cuts. The radical nature of processes and the emergence of new paradigms require, and in turn favor, a re-conception of the very idea of the city and the contemporary urban form, so as to better understand and interpret the potential and the magnitude of ongoing transformations.

4.2 Strategies

Existing rails, main roads and riverbeds are re-thought as arcs of anorganic infrastructural grid through which ecological forces, economic tendencies and routines of people are integrated. A multi-modal and multifunctional grid of fast lanes and soft infrastructures, in fact, could favor rapid streams of resources and substances, of goods and users, of information and energy. Moreover, favoring an easy access to services and facilities, that is, ensuring, for each category of users, rapid and safe movements,

reinforces a condition of social inclusion.

A series of transverse strips is designed to bind fast lanes, soft edges, transport nodes, urban fabrics and sacred sites. The space of the strip organizes within itself different facilities, a sustainable public transport system and a broad structure of basins, plains, and permeable surfaces devised to drain, absorb, retain and store water. Strips prefigure a set of vectors with the purpose of ordering a diverse urban condition and a grid of urban devices meant to compose a transverse armature to foster interactions between portions of space divided by roads and rails and among practices, land uses and ecological structures.

Edges and fringe areas individuated by infrastructure are converted to interfaces amid spaces of motion and practices, interactions, intersected land uses. A vision founded on a softer economic model urges to define strategies for in situ energy generation, necessary to produce and use urban fabric spread out in a vast area. Beams of infrastructures frame a mosaic of boarders and ribs with various purposes: voids and residues of space along rails and roads are converted to a landscape of turbines and generators. On the same perspective, the maintenance of arboretums, which frame the open spaces disposed along road edges, is a source of biomass; crops of brassica carinata cover and permeate residual spaces along fast lanes and abandoned soils, and convert depleted lands to a source of bio-fuel.



Fig. 1 Bundles of infrastructures, edges, strips and belts of prepared ground frame a field of action for a regeneration of spaces of man.

A foremost tenet is to ground form and structure of a renovated urbanscape, on vocations of sites. Structural traits of sites, properties of soils, biotopes and ecotones are regarded as tools to orient decisions, moderate transformations of site and distribution of land uses, services, functions; thus, contours of areas defined by diverse qualities of soils are regarded as traces of the basic structure of the region. River edges are recovered as a linear forest so as to forge an adaptive space, open to spontaneous practices and apt to define a resilient filter space meant to protect from flooding the space of human practices.

Since fertile soils are to be considered a precious resource, plain areas along riverbeds are reserved for cultivations rooted in specific site traditions. Moreover, preserving a broad landscape composed of crops, farms and vegetable gardens, makes rural scapes a document of how men can adapt to sites, and shape them according to their visions, aims and routines. The agrarian landscape emerges as a resource and a vector of economic tendencies; moreover, as the mosaic of diverse spatial conditions, it is regarded as a formal and structural motive for a novel model of urbanized landscape. Traces of ancient land uses and residues of former spaces of production can be recovered as deposit of memories, spots of a broad open-air museum, poles of services, incubators of a novel economic model. Abandoned sites can become vectors of strategies meant to preserve unique heritages and local identities and to favour re-distribution of resources and services. Interstices and voids are retrieved as arcs of a broad grid of soft edges, meant to suture biotopes, residual spaces, open spaces and surfaces modified by anthropic practices: the aim is to compose a fabric of adaptive, informal public spaces where people can seize stories, memories and transformations of places and practice apperception, by observing intersections, mutual dependencies and overlapping of ecological processes.

5. Conclusions

This being said, several concepts converge. As observed, roads, rails, pipelines, riverbeds and basins can be arcs to mould an urbanscape and set its operation. A potent poetics can compose nodes and point of transition amid grids, fabrics, streams, as eminent points of a renovated urbanscape [7].

Roads, as bundle of fast lanes and quiet edges, serve broad streams of users and resources, and frame spaces able to sustain and dispose land uses; Promotion of fairer urban economies, reduction of streams, protection of vulnerable areas and redistribution of services are further goals.

Routes (bus lanes, roads and railroads) must compose an isotropic grid and enclose nodes—space of softer forms of motion—so as to provide an equal condition for the fruition of resources stored in an urbanscape. To this end, Bernardo Secchi, Paola Viganò, Lorenzo Fabian and Dao-Ming Chang [25] propose a broad grid of roads and railroads, frames of a vast urban region, to suture and recover dispersed urban fabrics in Veneto.

A renovation of spaces of motion must aim to favour reuse and reconversion of minor routes and voids. Roads are to be conceived as framework for ribs, open spaces, nodes founded on river basins, ecotopes, ducts and reservoirs.

As a result, a continuous fabric of fast routes and dual urban spaces composes a robust frame apt to mediate amid ground, land uses and urban form.

As for Calvino [26], the form of Isaura reverberates contours of a vast basin, a grid of open spaces, conceived as a broad retention and drainage device, must preserve and underscore river basins, slopes, plains, gorges, ecotones and biotopes.

Grids of fast lanes, if meant to set interactions amid land uses, must rest on a diverse norm for a fairer distribution of land uses: it must be a norm founded on mutual dependencies and overlap amid streams of resources, debris, people and interactions amid

ecotopes, ecotones, and landscapes.

As a consequence, nature, as proposed by Mc Harg [27], can be recovered as a code for a fair urban metabolism and for a vivid urbanscape.

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