URBAN SOLIDS

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HOW CAN VENTILATION OUTLETS, SUBWAY EXHAUSTS AND TRANSFORMER ROOMS BE SO INTEGRAL TO OUR URBAN ENVIRONMENT AND YET REMAIN INVISIBLE TO THE EYE? **PETER BENZ** EXPLORES THE PHENOMENON OF THESE SIMPLE GEOMETRIC SHAPES.

solid

adjective (-ider, -idest)
1 firm and stable in shape; not liquid or fluid
2 not hollow or containing spaces or gaps
3 dependable; reliable

noun
a substance or object that is solid rather than liquid or fluid. Geometry: a body or geometric figure having three dimensions.

ORIGIN late Middle English: from Latin solidus; related to salvus 'safe' and sollus 'entire.'

New Oxford American Dictionary

The characteristics of solids have been an issue with mathematicians, astronomers, philosophers and engineers for several millennia. Already the ancient Greeks discussed their proportions and relations, developed construction methods, and dwelled on their inner logic. Plato – the same Plato to invent the concept of Platonic love – was the first to distinguish a special group of solids – the Platonic solids – which he defined as "convex regular polyhedrons" (=many faces) of which

1. All faces are congruent convex regular polygons,
2. None of the faces intersect except at their edges, and
3. The same number of faces meet at each of the vertices.

NOT A GEOMETRIC CATEGORY IN THE STRICT SENSE OF THE WORD, THIS GROUP OF SOLIDS IS MADE UP BY ALL THE VARIOUS VENTILATION OUTLETS, SUBWAY EXHAUSTS, TRANSFORMER ROOMS AND OTHER OBSCURE CONCRETE BLOCKS SCATTERED AROUND ANY METROPOLITAN AREA.

There are precisely and only five such solids possible: the tetrahedron, the hexahedron (colloquial: the cube), the octahedron, the dodecahedron and the icosahedron. What all of them have in common is that all of their faces and all relations between the faces are identical in every way.

Plato's disciple Archimedes later came up with his own, additional set of solids: the Archimedean solids. Different from the Platonic solids, he allows his solids to be composed of two or more types of regular polygons meeting in identical vertices, ergo different faces, but with identical relations. In opposite to common feeling there are again only thirteen such solids possible and again they have wonderfully complicated names – like rhombicuboctahedron or truncated icosidodecahedron – that defy the fact that these solids are actually quite easy to grasp when seen rather than heard of.

The latest addition to this line of thinking – until today – came only in 1966 when American mathematician Norman Johnson published his list of Johnson solids which are basically same, same but different to the sets of his predecessors as his solids are simply "strictly convex polyhedrons, of which each face is a regular polygon." Full stop. There is no requirement that each face must be the same polygon, and there is no definition for any of the relations between the faces. His solids' definition obviously is widest of all, yet still – there are actually only ninety-two such solids possible.

Out of all the billions of solids we non-mathematicians believe should exist, only 110 can actually be composed on the basis of these 3 distinct sets of rules and only these 110 solids share a number of typical features: specific side-ratios, relations of surface and

volume and especially various symmetries. They also share a sense of harmony, possibly even immanent beauty, based on the previously mentioned ratios and symmetries as well as on an overall balance of composition.

What at first glance seems merely like a vaguely interesting obsession of mathematicians of all times, turns out to really have rather little impact on real life. The only solid in the above groups with any practical use – apart from the cube, of course – is the truncated icosahedron, commonly known as the football. Apart from that, one has to dig very deep to at least find some viruses – such as the herpes virus – that have the shape of regular icosahedrons. But that is more or less already the end of the list …

There is only one big exception: the "Urban Solids." Not a geometric category in the strict sense of the word, this group of solids is made up by all the various ventilation outlets, subway exhausts, transformer rooms and other obscure concrete blocks scattered around any metropolitan area. Like their more famous brothers, Urban Solids usually don't make their function very obvious, but unlike the former, they do exist physically: they inhabit parks and courtyards, they block sidewalks and passages, they are cramped into niches and small leftover pockets of the urban tissue everywhere.

In a common sense they are usually not very pretty, indeed, their ugliness could be their only distinguishing feature: big, rough blocks of concrete and steel, totally solid in every meaning of the word, often badly maintained, devoid of any caring touch, yet – magically – they manage to linger below our

everyday perceptive threshold and above our aesthetic tolerance level.

How can that be? Why doesn't anybody complain about that massive grey car park exhaust in the backyard? Do we really need transformer rooms in every street and do they have to be standing right in the middle of the playground? Surely there must be more sophisticated ways to ventilate the metro than by concrete-towers in the public park? In some few cases the problem has been address by designers and architects, most famously perhaps by Toyo Ito in his 1986 Tower of Winds in Yokohama, Japan. However, all told, Urban Solids remain quite that: solids in an urban context.

Interestingly many of the Urban Solids closely mimic the complex simplicity of the Platonic, Archimedean and Johnson solids, their implicit logic and balanced ratios. For whatever reason, Urban Solids usually have a very simple geometric shape, which is emphasized by their placement away from other buildings. They are completely without visual pleasantries – unless you count graffiti and torn-off posters as decoration – but are stripped down to the bare necessities of their physicality.

In effect, one has to perceive them as entities thrown into this world, constantly threatened by their surroundings – which is why they have to be so solid – yet drawing their power from

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somewhere within themselves. Their whole compact bodies emanate such harmonic self-confidence, it guarantees them survival even in the meanest of urban environments. Urban Solids indeed seem to be something like the pure form architects/designers attempt, executed within tight budget-constraints and therefore never really refined. They are ugly, but they are not offensive; they carry a gentle, if slightly rugged dignity that let us tolerate these ducklings that will never be swans. ▰