Ecology & Geology

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New build

On-site Geology conservation

1. For any site with rocky substrata, basement construction that involves blasting or disturbing the rocky substrata will not be allowed
2. Rock formations listed by HMDA as Heritage Sites and by 'Society to Save Rocks' as 'Important Rock formations' should not be disturbed.
3. Rock formations that are located on and within 50m of the site boundary have to be identified prior to construction. All the formations on site will have to be
   - A. Integrated into the building or landscape design where ever possible
   - B. If they have to be disturbed, prior permission from an accredited geologist has to be acquired.
4. Adequate care should be taken on the following issues while integrating rock formations into a building or landscape design
   - Natural stability of the rock formation should not be disturbed where ever possible
   - Artificial means of stabilising rock should be as per the accredited geologist's recommendations
   - Native flora and fauna existing in rock clusters should not be disturbed while integrating the rock formations into the landscape design where ever possible.

Checklist

1. Presence of rocks/ rock clusters on-site ☐
2. Basement proposal not allowed ☐
3. Rock as a design element ☐
4. Rock Blasting Ban ☐

Special points of interest:

- Hyderabad is the only city in the world which has recognized rocks as heritage structures
- Rock-scaping and rock architecture are simple techniques of integrating rocks into the built environment

Why is this required?

Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education. Criteria-based policies are required to be established in local development documents against which proposals for any development on, or affecting, such sites will be judged.

The gneissic rocks of Peninsular India, which lie exposed in parts of Andhra Pradesh, have weathered over million years to produce the rock formations that we observe today. Almost all are very ancient rock systems of great geological, cultural and aesthetic value. They harbour flora and fauna and many support water conservation by recharging ground water through subterranean passages. They are part of the hydrological regime of the State. Today, due to intensive urban development, especially in Hyderabad, most of them are threatened by quarrying for metal ores, building or other developmental activity.

This guideline intends to internalise the requirement of specific con-

serving efforts of the rock formations into site planning and design, thus promoting the recognition of this unique geological asset into sustainable building practices.

The need to conserve the rock formations of Hyderabad is as given below-

The rocks are a key elementary component of a fundamental ecosystem. Their weathering and sedimentation has also prepared the ground for living organisms to live there. Most of them harbour micro flora and fauna and many are known to support water conservation by generating waterfalls, springs and streams and recharging ground water through subterranean passages. They are also responsible for formation of lakes and other water bodies.

These rock formations are referred to as Basement Complex. The relative position of the granites and associated rocks and the chronological studies suggests an age of 2.5 billion years. These rocks are amongst the oldest rocks in the world and form the basement of all the younger rocks formed after them in the region.

Their destruction will mean a loss of not only a rich heritage having intrinsic as well as recreational and tourist value but also of natural features having botanical, zoological and geological importance that may hold the key to our future environmental health.

Most of these rock sites are threatened by quarrying for metal ores, building or other developmental activity, triggering irreversible ecosystem extinction.

Although the exploitation of rocks has been facilitated by the burgeoning construction industry, there are currently no relative building regulations/ legislation in place that categorically addresses the prohibition of construction-based activities in rock sites.

How is it beneficial?

This guideline aims to be instrumental in conserving the rock sites of Hyderabad by-

- Primarily increasing the awareness and recognition of their geological significance by general public
- Preventing destruction and facilitating sustainable, eco-friendly use of rocks
- Compelling the construction industry professionals to internalise the rock formations into the building and landscape design, thus including rock-scape as a potential aesthetic element
- Taking Hyderabad towards a new architectural style evolution and a definitive new identity that would include rocks as building elements
- Highlighting the ULB's commitment towards environmental consciousness.

Submittals

Existing Legislation:

The Society to Save the Rocks is a registered Society, which has been in existence for eleven years. It has pioneered work on the study of rock formations in Hyderabad city and its vicinity. It has helped build up public interest in conservation of rocks. Its efforts along with INTACH Hyderabad have resulted in the Government of Andhra Pradesh including nine rock sites in Hyderabad city in the Regulation 13 of the Hyderabad Urban Development Authority Zoning Regulations as Heritage Precincts. More rocks in and around the twin cities are also likely to be notified.

Proposed submittal requirements:

The following documents will be needed for submission:

- Site plan showing the location of all rocks, rocky clusters on and within 50 mtrs vicinity of the site, giving physical and geological details of the same. The services of a geologist may be utilised for this purpose.

- Mandatory ban of construction of Basement in the incidence of rocky substrata and blasting of rocks in connection with any building/ construction related activity. Heavy penalisation for the same shall be attached.
- The proposed building design – Floor plans to show details regarding incorporation of the rocks as a building element. Description note explaining the intended use and the construction method proposed to be implemented for the same, also to be included with individual floor plan
- Architectural views regarding how the proposed rock surface development shall look like will also need to be submitted
- If the rocks/ rock clusters are being utilised in the landscaped area of the proposal, the detailed landscape plan, description note and architectural views need to be submitted in such a case also.
- After the accredited Geologist's recommendations are given to the building owner/ builder, adherence for the recommendations shall be necessary for the release of the Occupancy Certificate.

Guidance Notes

The rock formations of Hyderabad, Medak, Nizamabad and Ranga Reddy districts have been shaped by nature and remind us of the importance of conserving them. These are the sentinels that withstood the test of time, all of 2,500 million years, in the Deccan plateau.

Important Rock Formations in Hyderabad

Rock formations in the Heritage List of Hyderabad

Attempts to preserve a few of the existing rock formations in and around the twin cities, as `heritage precincts' seems to be finally yielding positive results. Heritage committee of Hyderabad Urban Development Authority (HMDA) has sent a pruned list of rock sites for approval and induction into the Heritage list. The nine rock sites that are on the Heritage list are as listed below

- "Hillocks around Durgam Cheruvu", a lake situated between Jubilee Hills and Hitecity
- "Rock Park", Hillock on Old Bombay Road, near Gachibowli
- "Bear's Nose", Formation behind Cyber Tower, Hitec City
- "Mushroom Rock", Formation in the campus of Central University of Hyderabad, Gachi bowli
- "Cliff Rock", Hillock in Road No. 46, Jubilee Hills
- "Monster Rock", Formation in Road No. 71, Jubilee Hills
- "Tortoise Rock", Formation in Nandi Hills Colony, near Durgam Cheruvu
- "Toadstool", Formation in Road No. 35, Jubilee Hills
- "Obelisk", Formation in Road No. 66, Jubilee Hill

Rocks identified by 'Society to Save Rocks'

The Society to Save Rocks has received the INTACH Heritage Award 2003 for its untiring work for the preservation of the ancient rocks of the Deccan. It has also received a Certificate of the Andhra Pradesh Department of Culture and Tourism as best NGO promoting tourism and the National Tourism Award 2002 – 2003 by the Govt. of India.

Members of Society to Save Rocks had recently forwarded a list of 20 rock sites to HMDA for recognition as important rock formations having heritage value. In turn, the HMDA officials called for `no objections' from private parties. Barring three areas, most of the other rock formations proposed by the society have not received any objections. Rock sites likely to be notified as heri-

tage precincts are as follows-

- Fakruddin Gutta at Gachibowli,
- Kulsum's Rock at Road No-10, Banjara Hills
- Kaithalpur Rocks near Moosapet
- Rocks at Moula Ali
- Rock near Telecom Colony, Gachibowli,
- Hamburger rocks at Dargah Kohe-Imam-e Zamin, Trimulgherry,
- Pahaar-e-Shareef, United-we-stand rock
- Pathar Dil rock, Gachibowli,
- Rocks at Mahendra Hills,
- Gun Rock,
- Rocks near Dattatreya temple, Asifnagar, Allahbanda Hill, Sitarambagh, Taramati Baradari, AP Police Academy (APPA), Shamirpet lake
- Rocks near Malkam Cheruvu, Sheikhpet.

Rock Formations or Rock Clusters on a Site

Integrating Rock formations into the Building or Landscape Design

The following case studies are exemplary in nature for integrating rocks into the Built environment.(*Source: www.saverocks.org*)

Case Studies

Residents of the Nizam's city learn to value their monolithic heritage

The Deccan Plateau, that vast expanse of peninsular India south of the Vindhyas composed mostly of grey granite, is among the oldest and hardest rock formations in the world. There are few who care for it as Frauke Quader does. More specifically, care for the plateau in and around Hyderabad. Quader, who has made Hyderabad her home, developed an interest in rock formations while with the German Foreign Office in Bonn, Brussels and then in Delhi. The German woman has single-handedly forged a citizens alliance for preserving the fascinating rock forms that dot Hyderabad and its outskirts. Bringing together diverse sections of the city, Quader started the Society To Save Rocks (STSR) which till date has made the Hyderabad Metropolitan Development Authority (HMDA) declare nine such formations in and around the city as protected "natural heritage" sites.#

Quader and the STSR have charted a rocky route trying to get citizens backing and official support after blasting and bulldozing of rock formations to make way for houses and for granite quarrying started picking up in the mid '80s. In 1992 she got artist Laxma Goud, then a member of the Arts Commission of HMDA, and photographer Moyed Hasan to portray the stunning formations on canvas and in print. While some like Mushroom Rock on the University of Hyderabad campus had a name, they christened others Bear's Nose, Cliff Rock, Monster Rock, Toadstool Rock, Obelisk, etc, depending on their shapes before putting the paintings and photographs on show. "Exhibitions highlighting the formations helped build sensitivity about their value and beauty," recalls Quader, who moved into the city with her Hyderbadi husband, an engineer-turned-homoeopath, back in 1975.

It was an encouraging start for rallying Hyderabadis to the cause. Rock walks, painting contests for schoolchildren, greeting cards with photographs of the rocks and T-shirts and caps with STSR slogans made several enthusiasts join the society. Yet, the activists could do little to prevent the quarrying and destruction till recently, when with the help of a few civil servants among them STSR got HMDA to put some sites on its protected list.

The most impressive of these formations on the fringes of the Durgam Cheruvu in Jubilee Hills is now safe thanks to the STSR, with the lake beside it a boating area under the state Tourism De-

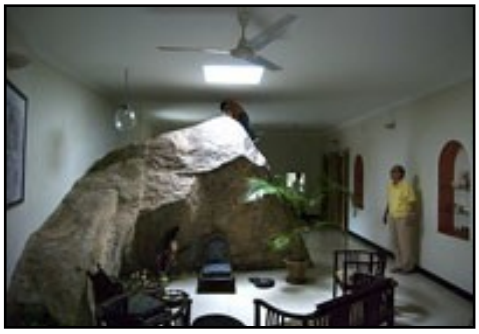
partment. But the society wasn't as lucky with a 67-acre site on a majestic ridge overlooking Malkan Cheruvu where a film industry housing society was to come up. Though the STSR moved the Andhra Pradesh High Court to stay the construction and hopes the Government will choose another site, the ridge has already been damaged by blasting. Meanwhile, the STSR has compiled three more lists of sites and presented it to HMDA.

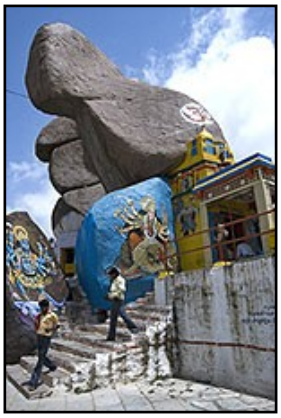
The success of this environmental protection group is largely due to its awareness campaigns. Rock walks are organised regularly, and rock excursions arranged for school students. "The walks are full of fun and serve as a good base for mountaineering," says Rehan Chinoy, a class VII student of the Hyderabad Public School who has been on eight of these walks. Exhibitions of rock paintings and photographs by leading Hyderabad-based artists are also held. The society's appeal is not limited to the young. "We are reaching out to builders and houseowners and explaining to them the value of these rocks," says STSR President Narender Luther, a retired Chief Secretary of the Andhra Pradesh Government.

The society, which arranges for funds through private contributions and donations, is currently surveying other formations for inclusion in a comprehensive heritage site list of Andhra Pradesh being compiled by them. "Our search is for sites with a geomorphic expression that harbour medicinal plants and little known fauna," says Dr Rayaprolu Pavanaguru, associate professor of geology, Osmania University and leader of a multi-disciplinary team currently identifying areas for the list to be finalised within a year. "This will unveil a new nature book on Andhra's past," says an excited Quader. The society clearly realises that contributing to conservation is a continuous effort.

Citizens' Initiatives for Preservation

Citizens have taken their own steps to express their love and admiration for our granite rocks by preserving rock formations in their properties, even inside their houses.





The photographs above are of Sh. Narendra Luther's Wall of Rock in his house in Banjara Hills.

The gods like to dwell in or on the rocks. One can find innumerable shrines, from small one-stone places of worship to big temples in and amongst many rocks, and dargahs and chillas as well.

Also, more and more landscaped rock gardens are emerging near company buildings who are aware of the great asset they possess in the beautiful natural rockscape around them.

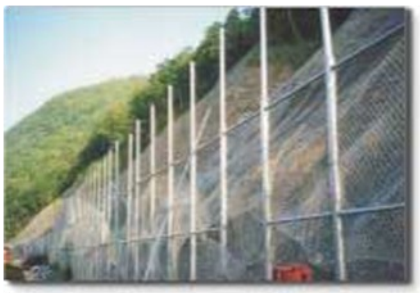
Rock Stabilisation

It is an unfortunate truth that the general perception prevailing in public regarding rocks, is that they may collapse or slide down or tumble over any time and are highly unstable. As a result of this fear, the most common solution that is practised is to excavate or blast them and remove them from site proposed for any development. Although some geologists also believe that rocks are actually in an unstable state, and their position/ location stability can never be guaranteed, nevertheless, there is a pertinent need to conserve them as part of our geological heritage. However, this need can be combined with technological methods to rid the fear about their stability. There are several methods based on the solution they offer for various rock stability issues and are categorised as Rock Stabilizing techniques. A brief overview of the methods are given below-

- *Rock Bolting and Grouting*

Rock bolts are used to tie unstable or potentially unstable rock structures into the slope. There are static and tensioned rock bolts-
Tensioned rock bolts should be used only where a force is needed to counteract the forces making the structure unstable. In most cases static bolts should be used. The logic behind a static bolt is that if the structure is safe enough to drill into and install rock bolts, it already has an inherent factor of safety. If the stability of the structure is adversely affected in the future the static bolt will automatically go into tension with the exact amount of force and in the exact location required

- *Rock Slope Netting*



Rock Netting is used to cover an entire area of unstable rock. The slope netting can be either draped or bolted in each corner of each panel. Rock netting is used where the unstable rock is big and blocky but not big enough to make bolting the only option.

- *Tecco System*

The Tecco System installed by Janod is the first system of its kind to be installed in Eastern North America. Vertec Contractors is a subcontractor to Janod on the Tecco system.
With its extremely high tensile strength and adaptability to site-specific conditions the Tecco system is a very economical alternative to other means of slope stability. Subsurface investigations and the proper analysis of the information by experienced personnel are of utmost importance. This information determines the number of soil and rock anchors that is needed in order to ten-

sion the system onto the slope. Lime, fertilizers and seed are placed prior to the erosion control mat and then finally the tecco mesh is installed and tensioned to the soil and rock anchors that have been drilled and grouted.
The Tecco system can combine the use of soil nails, rock anchors, shotcrete, erosion control materials and seeding in order to offer an end result of addressing the issues of safety, stability, erosion and environmental concerns. The Tecco system is comprised of tecco steel wire mesh, tecco spike plates, tecco compression claws, soil anchors, rock anchors, shotcrete, grout, erosion control mats and seeding.

- *Wire Mesh for Slope Stabilization*

Wire mesh is used when the slope is highly weathered and/or a new slope that will weather quickly, and small rock will continuously unravel from the slope. The most effective technique for wire mesh is to drape the mesh on the slope and allow the material to make its way to the base of the slope.
The wire mesh will control the material and not allow it to gain any destructive energy as it works its way down the slope.

- *Soil Stabilization using Soil Nailing*

Soil nailing was originally introduced in France in the 1970's. Soil nailing can be used for building excavations or for stabilizing existing slopes that have a history of problems. The influence of geology is critical in the design of a soil nail wall. Subsurface investigations and the proper analysis of the information by experienced personnel is of the utmost importance. Soil nailing is a combination of soil anchors that are similar to rock anchors that are drilled and grouted into the rock slope. These anchors are used to tie down whatever material you are using to support the soil. Whether it be the Pentafix, Tecco, Shotcrete or other material that is used to cover the slope.

- *Rock Fall Barriers*

Rock fall barriers are an effective and cost efficient technique for containing and immobilizing rock fall debris.
The capacity of the rock fall barrier can be adapted for the potential size of the debris coming down from the slope. Bounce heights and the distance the fence expands upon impact are important considerations when designing the rock fall barrier.

- *Shotcrete Slope Protection*

Shotcrete is an effective technique to use for dental work in the slope and to fill in void areas below rock structures. Shotcreting can also be used to support rock structures where rock scaling is not an option.

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