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RESEARCH ON NASA'S EXTRACTION OF WATER AND ESTABLISHMENT OF PILE BORING AND EMPLOYMENT OF TUNNEL WITH RESPECT TO 'MARS'QUAKE TO HAVE FUTURE BUILD BLOCK IN MARTIAN PLANET(MARS) IN ADVANCED TREND OF CIVIL ENGINEERING VIA REMOTE SENSING & GIS

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ABSTRACT

This paper explores about the innovative future trends of NASA and it gives the great solution to the question of NASA in extracting the water from the MARTIAN PLANET (MARS) that the NASA finds very difficult also it explores about the future 'MARS'QUAKE resistant building and to construct a reference tunnel in any surface. By 2020 the NASA's mission is to launch robots for investigating the new adventure planet MARS for the research as well as establishment for human convenience. Also the geological factors have been analyzed with the help of MARS Rover which makes the significant role in implanting civil structures in MARS also to get the water extraction, tunnel employment etc. The above could be done by the methodology of Frasch process in which three inlets and 1st two have very high temperature, hot compressed air and the third have the outlet through which water can be extracted and these pipes has to be bored in the available water bed which could be analyzed from remote sensing of NASA's image that can be done by rover. Also with the Remote Sensing techniques it has proved that the surface layer is made of MARS made up of rocks named "BURN-CLIFF" and tunnel could be made twice to the depth usually laid in earth. Also oftenly occuring Martian Dustorm and considering 'MARS'QUAKE the future building can be employed with pile-boring. The foundation has to be laid twice in depth as that of earth according to research and values from NASA's official website as the gravity in MARS is (1/3)rd of the earth in order to eliminate the uplift and the future high rise building with V-shaped seismic structures.

KEYWORDS: Marsquake, Frasch Process, Martian Dust

The rover is planned to be launched by the NASA in 2020. The Jet Propulsion Laboratory will manage the mission. Precise mission details will be determined by the mission's science definition team. NASA's main objective is to analyze for the livelihood also for establishing science methodology for the future people in MARS. On 9 July 2013, the Mars 2020 Science Definition Team reiterated that the rover should look for signs of past life and detected more fossils, collect samples for possible future return to Earth, and demonstrate technology for future human exploration of Mars. The Science Definition Team proposed the rover collects as many and package as many as 31 samples of rock cores used for extraction of minerals and soil for research of abundant particles a later mission and we are here for the finding of another rock to bring back for more definitive analysis in laboratories on Earth, but in 2016 the concept was changed to collect even more samples and distribute the tubes in small piles across the surface of Mars and to ready for the boring over the rocks for smart city establishment and to establish tunnel for convenience and also for innovative technique.. We devloped those missions is under development by NASA, butwe are expecting from our methodology side for extraction of water and smart city construction it has been suggested that the proposed Mars 2022 orbiter may play a role in such future mission.

In September 2013 NASA launched rover named of Opportunity for researchers to propose and develop the instruments needed, including a core sample cache. The rover made more measurements and technology for about 3 years demonstrations to help designers of a human expedition understand any hazards and poisonous carbon-monoxide (CO) highly posed by Martian dust, and will test technology to produce oxygen (O_2) from Martian atmospheric carbon dioxide (CO_2). Improved precision landing technology also the avail of necessary oxygen content that enhances the scientific value of robotic missions also will be critical for eventual human exploration on the surface. Based on input from the Science Definition Team also from NASA's official website(NASA.GOV), NASA defined the final objectives for the 2020 rover.

METHODOLOGY

In the mars only the image has been taken by the rover and not the video or 3-D parameters can be taken .So here we apply the remote sensed data to get the basic geographic attribute and her the flow chart of

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the algorithm is as follows is same for all implementation (Fig 1)

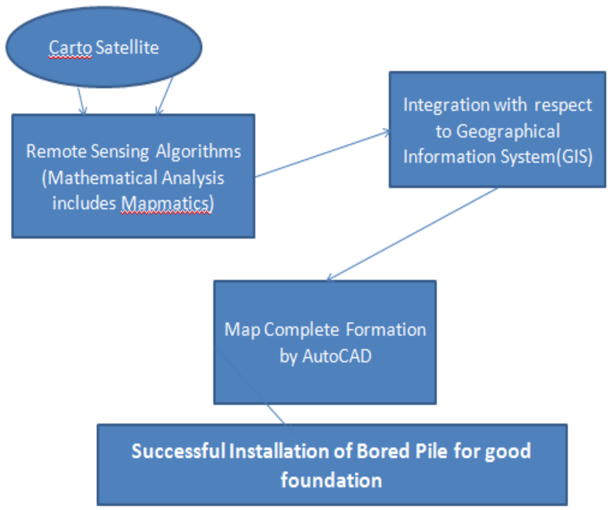


Figure 1: Flow diagram of our .methodology

CARTO SATELLITE

The Cartosat series is a part of the Indian Remote Sensing Programme.It provides provide a unique service of high-resolution digital imagery for your data-driven visualizations

REMOTE SENSING ALGORITHMS

The images of the NASA has been taken from NASA's official website also with the images of high resolution it is to be applied under mathematical calculations and some Tunnel Engineered methodology is implemented (Fig 2)

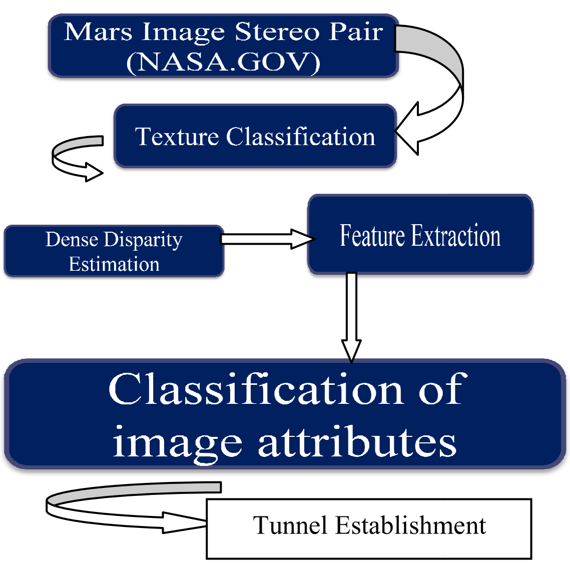


Figure 2: Remote Sensing Flow diagram for images

TEXTURE CLASSIFICATION

In texture classification the goal is to assign an unknown unit sample of finite sample image to one or more of a set of known texture classes to have seperations. Texture classification is a major thing in the part of texture analysis. The other three are texture segmentation (partitioning of an original image into regions which should have homogeneous sample properties with respect spatial analysis to texture; superimposed texture segmentation with a reference knowledge of textures to be separated simplifies to texture classification), texture synthesis and shape from texture (a 2D image is considered to be a base & sample projection of a 3D scene and apparent texture distortions in the 2D image are used to estimate surface orientations in the 3D scene).Texture analysis is important in many applications of digital image analysis forimage (2-D) classification or segmentation of images based on local spatial variations of intensity,brightness or color. A successful classification or segmentation requires an efficient description of classification image texture. Important applications include industrial and biomedical surface inspection, for example for defects and diseasealso in our case for finding the fossils got burried by MARS dust storms, ground classification and segmentation of satellite or radar imagery, and context-based access to image databases. A major problem is that textures in the future explorating planet are often not uniform, due to changes in orientation, scale or other visual appearance.Texture classification process involves two phases: the learning phase and the recognition phase. In the learning phase we have taken an image from NASA.gov, the target is to build a model for the simple texture content of each texture in a class present in the training data. The texture content of the our image is got by downloading from website of NASA with high quality, which yields a set of textural features for each image. These features, which can be scalar numbers or discrete or in directional histograms or empirical distributions, contrast, ,rigidity,roughness, orientation, etc. In the recognition phase the texture content of the unknown sample is first described with the same texture analysis method. Then the textural features of our image is compared to those of the training images with a classification algorithm,namely Support Vector Machine(SVM) and the sample is assigned to the category with the best match to have a future construction. Optionally and more importantly, if the best match is not sufficiently good according to some predefined criteria, the unknown sample can be rejected instead.Theseall are for construction of 3-D structure in MARS. (Fig 3)

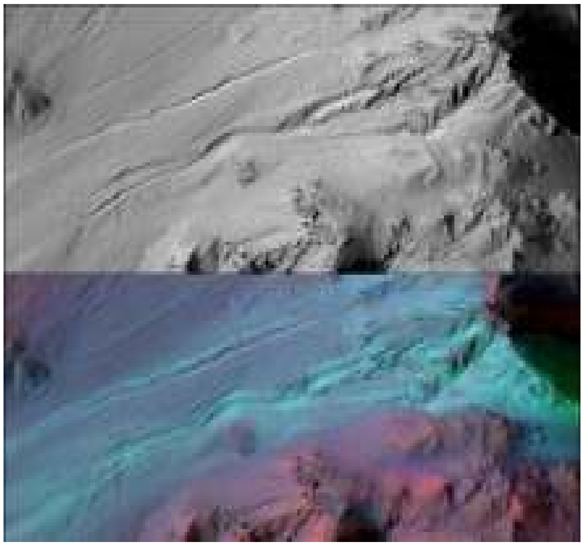


Figure 3: Reference MARS image with RGB& Grey scale

DENSE DISPAIRITY ESTIMATION

Disparity estimation is one of the most fundamental problems in stereo image processing. It is also a new layer of giving the build block for 3-D model of an image.. Disparity fields can be used to help image classification & segmentation for object-based image processing and coding to get the structure in remote areas . As multiview image into elevated structure applications becoming popular, disparity estimation again plays an important role in spatial image synthesis. We have taken sample image from NASA website, the goal of disparity estimation is to locate for each point in one image its corresponding point in the other image. To reduce the complexity of disparity estimation, the cameras from the rovers are usually arranged in a parallel-axis or in serial line configuration (or equivalently, the stereo image pair). In this case, the stereo matching problem is simplified to an intra-scanline pixel matching problem. The DEM(Digital Elevation Model)-based technique is of particular interest here because it incorporates clear and with that of AutoCAD models of design of new building in MARS or to make tunnel directly into the estimation process, while other techniques usually require an occlusion determination process after the analysis of the disparity field In addition, if a dense disparity field is desired, the DEM technique usually gives better performance. For example, ground control points (GCP's) are selected using several critical rules. So we finally used DEM model for estimation of salient physical properties includes slope, height etc.

PRESSURE CRITERIA & VENTILATION METHODS

The challenge was to design the tunnel lining for extraordinary conditions with regard to outside pressure and chemical aggressivity and also to design joints to be resistant to the ambient water pressure.

So outside ambiguity pressure is also one of the major criteria in actual transportation Normally, for road tunnels longer than 4-5 km the longitudinal ventilation method may not be feasible This leads to longitudinal ventilation provided by a push-pull concept using ventilation plants at adjacent stations or intermediate shafts, sometimes combined with exhaust from large caverns as, for example, cross-overs or bifurcations. For long tunnels a full or semi-transverse ventilation concept could be introduced to supply fresh air and extract polluted air at certain points.The connection includes a 3,240 metre immersed tunnel– one of the longest and deepest in the world –and two cable-stayed bridges, each 2 km in length. Both tunnel and bridges are designed the total length of the tunnel is 3.6 km with two 170 metre long cut and cover sections at both ends.

TUNNEL DESIGN

The design of the immersed tunnel includes the structural design of tunnel elements, joints, foundations and tunnel protection, west approach cut and cover structure, east approach cut and cover structure, ventilation buildings and all related mechanical, electrical and communication systems. The immersed tunnel is designed for two lane traffic with emergency and crawler lane where appropriate. The central gallery in the tunnel, between the motorway lanes, will contain utilities and an escape route. The immersed tunnel consists of 18 pre-cast tunnel elements placed in a dredged trench at a maximum water depth of 50 metres – the first time a concrete segment immersed tunnel is constructed at such depth. The outer dimensions of the elements are 180 metres long, 39.8 metres wide and 10.0 metres high. The maximum gradient is 5%. The design life of the tunnel is 100 years (Fig 4)

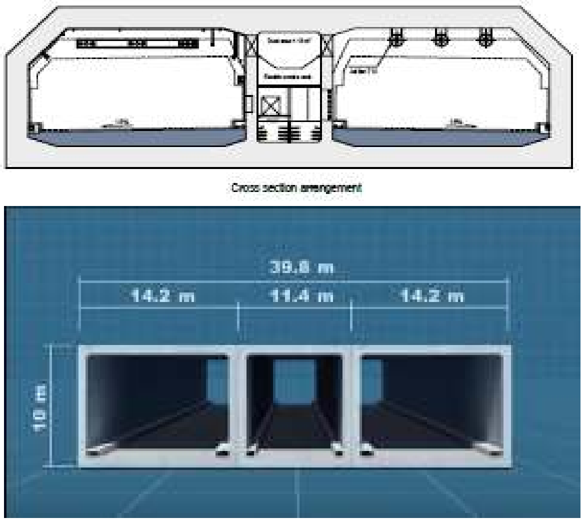


Figure 4: Cross Section & Longitudinal segment of shaft

DESIGN OF SHAFTS FOR THE TUNNEL

The shafts were designed with retaining walls of secant piles penetrating well into the limestone. From the feet of the piles down, the retaining structure was made by sprayed concrete lining (SCL) technique, which was also used for the TBM launch and receipt chambers at the bottom of the shafts. To avoid decomposition of the wooden piles forming the foundation for numerous historic buildings groundwater tables were not loweredduring the works

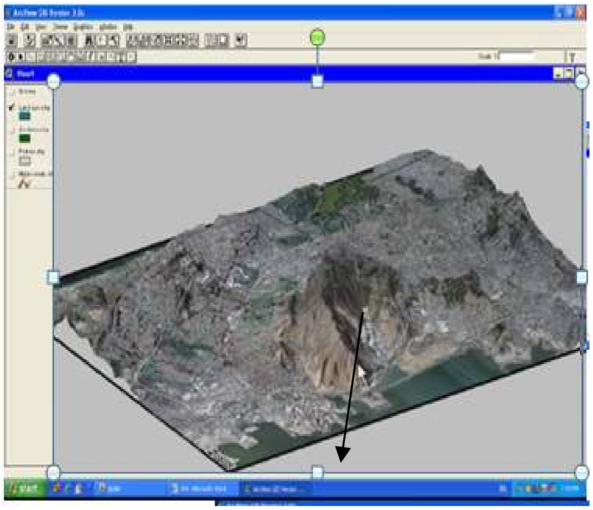
Despite of this insulation, the surface temperature of the steam heating pipes reach 100°C and ventilation is required to keep a uniform operation temperature of around 50°C in the tunnel. Prior to maintenance, the ventilation can be increased to further reduce the temperature to around 35°C. The tunnels were constructed by four tunnel boring machines (TBMs) of 39.75 metres external diameter. The TBMs were earth pressure balance machines and it required a double screw conveyor to balance the maximum pressure of 8 bar. The tunnels are lined with bolted segmental linings of 1,650 mm width and 400 mm thickness. Each ring consists of 6 segments plus a key.At each 250 metres cross-passages are located connecting the two tunnels. The cross-passages were constructed using spheroidal graphite cast iron (SGI) rings, each 600 mm wide consisting of 18 elements

FEATURE EXTRACTION

In machine learning, digital pattern recognition and in image processing, feature extraction starts from an initial set or from a reference set or an adequate set that we used of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning techniques and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction and to get the clear dimension of the applied texture classifier. When the input data to an algorithm is too large to be processed and it is suspected to be then it can be transformed into a reduced set of features (also named a feature vector). Determining a sparseset of the initial features is called feature selection. The selected features or the template features are expected to contain the relevant information from the input data, so that the desired task can be performed by using this input image of finite data instead of the complete initial data. Feature extraction involves reducing the amount of resources required to describe a large set of data. When performing analysis of complex data one of the major problems stems from the number of variables involved. Analysis with a large number of variables generally requires a large amount of storage register and computation power, complexit operations also it may cause a classification algorithm to overfit to training samples and generalize poorly to new samples. Feature extraction is a general term for methods of constructing combinations of the variables to get around these problems while still describing the data with sufficient accuracy.

GIS DATA IMPLEMENTATION

After making the remote sensing algorithm it is to be feed in the GIS and CAD software to get the 3-D elevation model of the image and also the mapematics involved to get the image seperability. And finally we use the Digital Elevation Model(DEM) and got the elevated data and is to be fed to the ArcGIS and AutoCAD software and finally got the clear and accurate data for the above input image also by the mapmatics and martian dustorms that has been taken from NASA.gov we formed the map and dust sedimental greeny layer (Fig 5, 6 & 7)



Tunnel to be laid here

Figure 5: Elevated view of reference image using DEM IN GIS

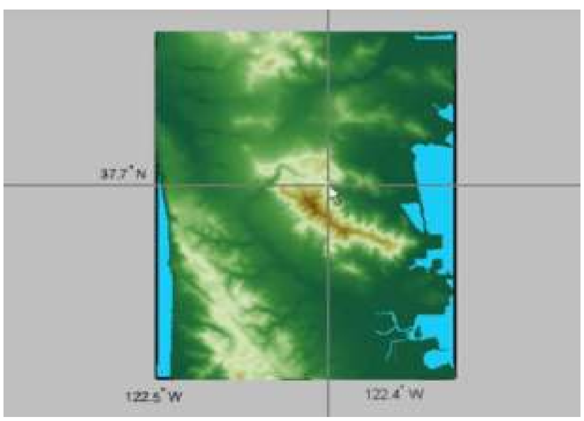


Figure 6: Formation of Map after intercepted by new factor derived from NASA's geologists

Matitude(Like Latitude)

Monitude with equator with respect to all directions

Figure 7: Political Map shows Classified image

INNOVATIVE NEW METHODOLOGY TO EXTRACT WATER FROM MARS

From the input image it is very clear about the water sedimentation and it is in rocky state and it is not in usable form and the biggest mission of NASA is to extract the water from the martian planet(MARS).Here our methodology is for extraction of water is mainly through FRASCH process. In the Frasch process, three concentric tubes are introduced into the water deposit in a rocky form. Superheated water (443k,165 °C, 2.5-3 MPa) is injected from the new mission rover of NASA into the deposit via the outermost tube. Water (m.p. 55 °C) melts and flows into the middle tube. Water pressure from the mars rover alone is unable to force the water into the surface due to the molten sulfur's greater density, so hot air is introduced via the innermost tube to froth to the water rock, making it less dense, and pushing it to the surface in aliquify form. The water obtained can be very pure (99.8-99.9%)... The Frasch process can be used for deposits 50–800 meters deep. 3-38 cubic meters of superheated water are required to produce every litres in ton of water, and the associated energy cost is significant. (Fig 8)

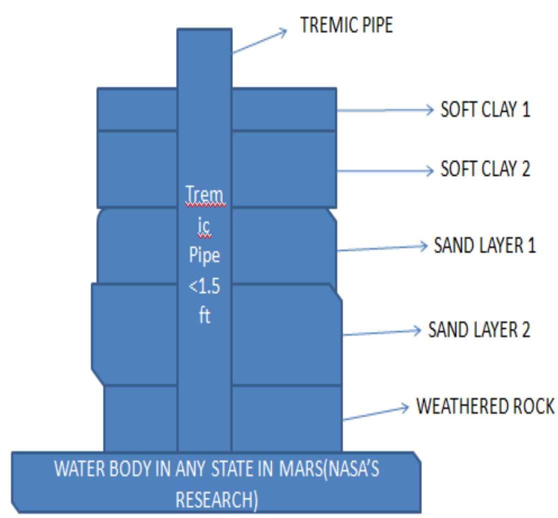


Figure 8: Layers of Mars & induction of pipes by drilling

Actual Layer of Martian Planet in which how the tremic pipes of FRASCH process should be given as input will be described in following diagram (Fig 9)

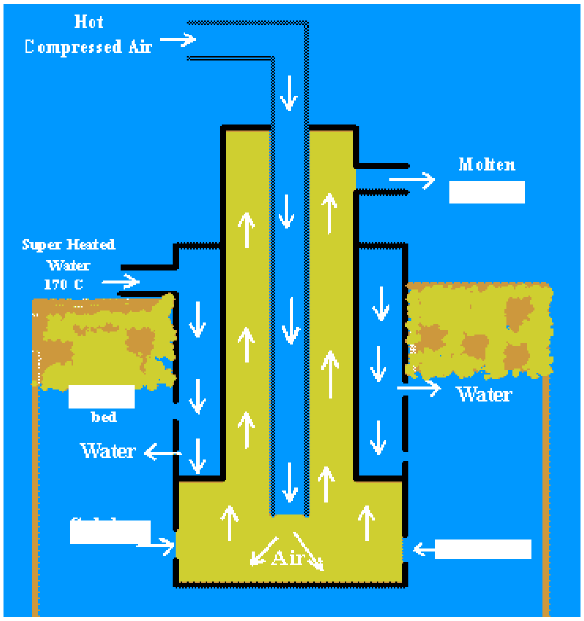
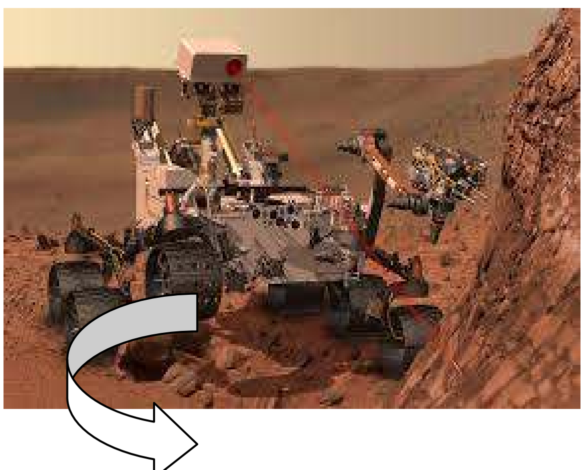


Figure 9: Frasch processs in extraction of water



Here the two inlets(one for hot compressed air and other for hot compressed water

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

(taken from mars environment) and third outlet of extracted water

Here we describes the NASA's 2020 mission of sending robots to investigate about establishment of lives in Martian Planet has one of the attributes is about extraction of water and it is almost done by our project and these process carrying rover or robots has to be launched by NASA in 2020.Also we proposes algorithm for 'MARS'quake(similar to earthquake) resistant building

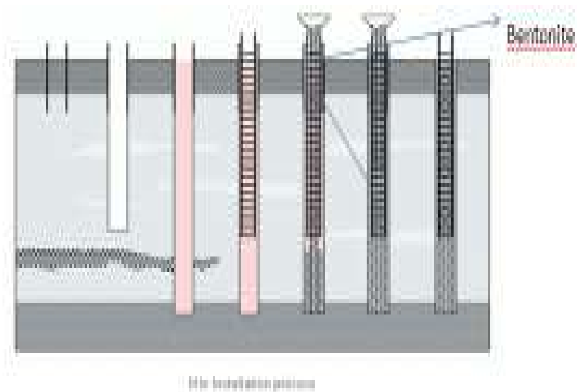
MARSQUAKE RESISTANT BUILDING

Generally because of earthquake we experience the roof top will be uplifted also the pressure variation will be there from bottom to top and in the top the pressure might may low and it will lower the rooftop and because of this impact the building will get collapsed. During the blast the nonstructural elements are also subjected to damage. As the initial pressure wave makes contact with the building facade, windows usually shatter and the building's walls and columns deflect under the immediate pressure. When the blast intensity is too great, the walls and facade may suffer permanent displacements as the strain causes plastic deformation, or even structural collapse. If the facade does not remain intact during the blast, the pressure waves may cause upwards and downwards pressure on the floor slabs and columns. These pressures may produce loading reversals that the slabs and columns Here in mars for construction of a building by 2020 we should remember that the gravity of MARS will be(1/3)rd of earth so we suggests that the foundation must be done upto 15^{ft} (3 times that of earth) and for this we prefer pile boring (Fig 10)

Figure 10: Layers of Mars(NASA.GOV)

LAYER IN MARS

Based upon the information from the image ,not only the deviations but also the layers have been found out now our next plan is to construct bore well but with the gravity must be considered .Considering the layers top soil comprises two layers of clay and now with the help of robot rover drilling must be done to the maximun depth of 2 feet (max feet is not required as the gravity according to the scientific research of nasa is about $1/3^{rd}$ of the earth (Fig 11 & 12)



Steel pipe pile φ406.4mm, t=9.5mm, L=10.0m		
Section area	A (m²)	0.011846
Geometrical moment of inertia	I (m⁴)	0.000233
Geometrical moment of area	Z (m³)	0.001149
Young modulus	E (kN/m²)	2.1 x 10⁸
Bending rigidity	EI (kN/m²)	4901.1

Figure 11: Pile boring techniques in MARS

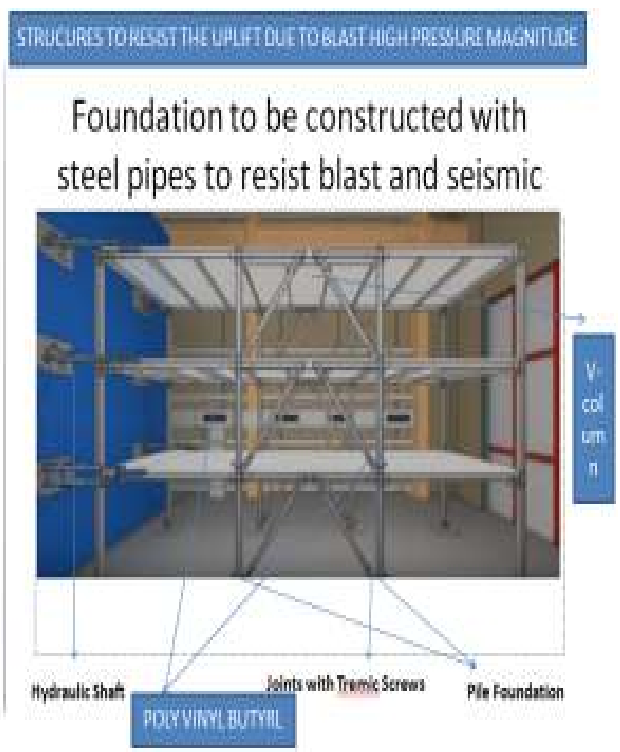


Figure 12: Marsquake resistant structure

Finally the patent hurricane and earthquake building with that of 12 ft foundation is to be chosen to be built over the surface of MARS and that building is as follows also for tunnel employment underneath (Fig 13)

Figure 13: Future smart marsquake building in mars

CONCLUSION

As from our research we could be able to solve the problem for extraction of water and establishment of tunnel that could be done by frasch process and with the help of Remote Sensing and GIS applications with respect to that of Auto CAD we developed the civil smart structures in MARS with MARS quake resistant All the above engineering establishment could be done by rover or by 2020 MARS exploration robots.

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