MINISTRY OF SECONDARY AND HIGH EDUCATION OF THE REPUBLIC OF UZBEKISTAN

URGENCH STATE UNIVERSITY NAMED AFTER AL-KHOREZMI

FACULTY OF "TECHNOLOGY"

DEPARTMENT OF "CONSTRUCTION AND ARCHITECTURE"

EXPLANATION LETTER

ON GRADUATE PROJECT FOR THE DEGREE OF BACHELOR

Theme of Graduation Project: **"Designing Museum and Library of Urgench State University"**

Graduate:	Hamdam Azamatovich Hodjaniyazov
Chief of Department:	dotc. Rakhmanov.B.S.
Supervisor of Diploma Project	dotc. Rakhmanov.B.S.

Consultants

1. **Architecture**	Bayjanyov A.
2. Structural engineer	dotc. Rakhmanov.B.S.
3. Organization of Construction Technology	Saidov Q.
4. Economcic Feasibility Assessment	Tojiyev Yu.
5. Labor and Environment Safety	Ahmedov Q.

Urgench- 2016

URGENCH STATE UNIVERSITY
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ASSIGNMENT

TO PERFORM GRADUATION PROJECT FOR THE DEGREE OF BACHELOR

Hodjaniyazov Hamdam Azamatovich
(full-name of graduate)

1. Theme of Graduation Project **"Designing Museum and Library of Urgench State University"**

was confirmed by order number____ of Urgench State University on _____________ 2015

2. References to implement diploma project: _*Site plan to lay purposed building out. Scale:* *1:1000,1 :2000,* __________________

3. References determined in explanation letter to *(hand-writing manuscript consisted of 70-80 A4 format pages):*

a) Architecture section is consisted of *site plan, master plan, architectural design concept, architectural composition, conclusion.*

b) Structure engineering section *assesses and designs fragments of structural elements of projecting building (separated component), walls, overlap,* *foundation, stair, beam, column, girder and so on (its volume is defined by assigned adviser)*

c) Organization of Construction technology section *comprises affairs of constructional assembly of purposed-erected building and its construction technology. Guidelines regarding the nomenclature and application of structural installations, work volume, expenditure on labor and mechanism in building site are also involved.*

d) Economic Feasibility Assessment *involves the prominent factors to erect the desired object as seen in the following:*

a) Expenses of salary;

b) Expenses of mechanism and technology used in and out site;

c) Expenses of main construction materials and structural component;

d) as well as the calculation of expensees of requisite equipments and identifying an estimate of total expenditure on construction works. As a result, estimating the economical effectiveness of investment expended to build the object is advisable. Economical feasibility and assessment is to great extent achieved with the assistance of so-called specialized software "Qurqiymatasos" 2005, which was launched in 2005 by "Uzadvarxitekqurilish" 2005.

d) Labour and Environmental Protection section: *Task for labour safety in graduation work should be assigned to student with an emphasis on the location of projecting building, the mode of its function and an exact specific condition of manufacture. In order to complete this section, the factors that should be given more prominence are:*

- *An analysis of technical solutions to labor protection and sanitarian – service rooms, fire-extinguishing equipment as well as labor protection in the duration of construction in Legal and Project Documents.*
- *legal frames of Labor Safety and the provision of safe and healthy working condition and labor.*
- *regulations of the sanitaria and hygiene on site:*
- *safety-related matters;*

- *considerable heed to measures averting fire in construction and solutions to egress from the building while fire occurs.*

e) List of References *analyzes the studied sketches, figures, references, legal documents, scientific articles and external collected resources in detail. Gathered information should be concisely expressed. Graduate is eligible to write the manuscript using the pages of the Internet and personal card index.*

f) Content: *Work order of Graduate Project and Construction have to be demonstrated.*

4. List of Courtesy Images of Diploma Project (Either model or four pages in A1 format adhered to 90x80 cm in board required):

a) Architectural drawings *should illustrate site plan, wind direction, general plan, floor plans, front elevation, left and right elevation, three-dimensional image (perspective), interior design of particularly selected room, section and explication with the volume and square of internal spaces.*

b) Construction drawings *–should consist of the structure and locations of 18 beams (according to the mission assigned by adviser)*

5. Assigned consultants on the sections of Graduation Project.

	Sections of Graduation Project	Start Date	Completion Date	Signature	Full name of consultant
	Architecture				Boyjanov A.
	Construction				doc. Rakhmanov B.S
	Organization of Construction Technology				Saidov Q.
	Economic feasibility assessment				Tajiev Y.
	Labor and Environmental Protection				Ahmedov Q.

Note: In accordance with the proposal of Supervisor of Graduation Work, the department that produces young specialists may invite external consultants on the particular sections of Graduation Work within allocated time limit

6. Assigned time ____

7. Expired time to submit Graduation Project ______________________

Supervisor: **doc. Rakhmanov B.S**

(signature)

Degree Project accepted by **H.A.Hodjaniyazov**.

(signature)

Chief of Department
of "Technology" **doc. Rakhmanov B.S**

(signature)

CONTENT

INTRODUCTION

MUSEUM

General glance at museum and history thereof

The purpose of modern museums is to collect, preserve, interpret, and display items of artistic, cultural, or scientific significance for the education of the public. The purpose can also depend on one's point of view. To a family looking for entertainment on a Sunday afternoon, a trip to a local history museum or large city art museum could be a fun, and enlightening way to spend the day. To city leaders, a healthy museum community can be seen as a gauge of the economic health of a city, and a way to increase the sophistication of its inhabitants. To a museum professional, a museum might be seen as a way to educate the public about the museum's mission, such as civil rights or environmentalism. Museums are, above all, storehouses of knowledge. In 1829, James Smithson's bequest, that would fund the Smithsonian Institution, stated he wanted to establish an institution "for the increase and diffusion of knowledge.

Museums of natural history in the late 19th century exemplified the Victorian desire for consumption and for order. Gathering all examples of each classification of a field of knowledge for research and for display was the purpose. As American colleges grew in the 19th century, they developed their own natural history collections for the use of their students. By the last quarter of the 19th century, the scientific research in the universities was shifting toward biological research on a cellular level, and cutting edge research moved from museums to university laboratories. While many large museums, such as the Smithsonian Institution, are still respected as research centers, research is no longer a main purpose of most museums. While there is an ongoing debate about the purposes of interpretation of a museum's collection, there has been a consistent mission to protect and preserve artifacts for future generations. Much care, expertise, and expense is invested in preservation efforts to retard decomposition in aging documents, artifacts, artworks, and buildings. All museums display objects that are important to a culture. As historian Steven Conn writes, "To see the thing itself, with one's own eyes and in a public place, surrounded by other people having some version of the same experience can be enchanting.

Museum purposes vary from institution to institution. Some favor education over conservation, or vice versa. For example, in the 1970s, the Canada Science and Technology Museum favored education over preservation of their objects. They displayed objects as well as their functions. One exhibit featured a historic printing press that a staff member used for visitors to create museum memorabilia. Some seek to reach a wide audience, such as a national or state museum, while some museums have specific audiences, like the LDS Church History Museum or local history organizations. Generally speaking, museums collect objects of significance that comply with their mission statement for conservation and display. Although most museums do not allow physical contact with the associated artifacts, there are some that are interactive and encourage a more hands-on approach. In 2009, Hampton Court Palace, palace of Henry VIII, opened the council room to the general public to create an interactive environment for visitors. Rather than allowing visitors to handle 500-year-old objects, the museum created replicas, as well as replica costumes. The daily activities, historic clothing, and even temperature changes immerse the visitor in a slice of what Tudor life may have been.

Early museum

Early museums began as the private collections of wealthy individuals, families or institutions of art and rare or curious natural objects and artifacts. These were often displayed in so-called wonder rooms or cabinets of curiosities. The oldest such museum in evidence was Ennigaldi-Nanna's museum, dating from c. 530 BC and devoted to Mesopotamian antiquities; it apparently had sufficient traffic as to warrant labels for the ordered collection, although there is no source for this information.

Public access to these museums was often possible for the "respectable", especially to private art collections, but at the whim of the owner and his staff. One way that elite men during this time period gained a higher social status in the world of elites was by becoming a collector of these curious objects and displaying them. Many of the items in these collections were new discoveries and these collectors or naturalists, since many of these people held interest in natural sciences, were eager to obtain them. By putting their collections in a museum and on display they only got to show their fantastic finds but they also used the museum as a way to sort and "manage the empirical explosion of materials that wider dissemination of ancient texts, increased travel, voyages of discovery, and more systematic forms of communication and exchange had produced."

One of these naturalists and collectors was Ulisse Aldrovandi, whose collection policy of gathering as many objects and facts about them was "encyclopedic" in nature, reminiscent of that of Pliny, the Roman philosopher and naturalist.[21] The idea was to consume and collect as much knowledge as possible, to put everything they collected and everything they knew in these displays. In time, however, museum philosophy would change and the encyclopedic nature of information that was so enjoyed by Aldrovandi and his cohorts would be dismissed as well as "the museums that contained this knowledge." The 18th century scholars of the Age of Enlightenment saw their ideas of the museum as superior and based their natural history museums on "organization and taxonomy" rather than displaying everything in any order after the style of Aldrovandi.

Design planning

The design of museums has evolved throughout history, however, museum planning involves planning the actual mission of the museum along with planning the space that the collection of the museum will be housed in. Intentional museum planning has its beginnings with the museum founder and librarian John Cotton Dana. Dana detailed the process of founding the Newark Museum in a series of books in the early 20th century so that other museum founders could plan their museums. Dana suggested that potential founders of museums should form a committee first, and reach out to the community for input as to what the museum should supply or do for the community. According to Dana, museums should be planned according to community’s needs:

"The new museum…does not build on an educational superstition. It examines its community’s life first, and then straightway bends its energies to supplying some the material which that community needs, and to making that material’s presence widely known, and to presenting it in such a way as to secure it for the maximum of use and the maximum efficiency of that use."

The way that museums are planned and designed vary according to what collections they house, but overall, they adhere to planning a space that is easily accessed by the public and easily displays the chosen artifacts. These elements of planning have their roots with John Cotton Dana, who was perturbed at the historical placement of museums outside of cities, and in areas that were not easily accessed by the public, in gloomy European style buildings.

Questions of accessibility continue to the present day. Many museums strive to make their buildings, programming, ideas, and collections more publicly accessible than in the past. Not every museum is participating in this trend, but that seems to be the trajectory of museums in the twenty-first century with its emphasis on inclusiveness. One pioneering way museums are attempting to make their collections more accessible is with open storage. Most of a museum's collection is typically locked away in a secure location to be preserved, but the result is most people never get to see the vast majority of collections. The Brooklyn Museum's Luce Center for American Art practices this open storage where the public can view items not on display, albeit with minimal interpretation. The practice of open storage is all part of an ongoing debate in the museum field of the role objects play and how accessible they should be.[47]

In terms of modern museums, interpretive museums, as opposed to art museums, have missions reflecting curatorial guidance through the subject matter which now include content in the form of images, audio and visual effects, and interactive exhibits. Museum creation begins with a museum plan, created through a museum planning process. The process involves identifying the museum's vision and the resources, organization and experiences needed to realize this vision. A feasibility study, analysis of comparable facilities, and an interpretive plan are all developed as part of the museum planning process.

Some museum experiences have very few or no artifacts and do not necessarily call themselves museums, and their mission reflects this; the Griffith Observatory in Los Angeles and the National Constitution Center in Philadelphia, being notable examples where there are few artifacts, but strong, memorable stories are told or information is interpreted. In contrast, the United States Holocaust Memorial Museum in Washington, D.C. uses many artifacts in their memorable exhibitions.

Types of Museum

Types of museums vary, from large institutions, covering many of the categories below, to very small institutions focusing on a specific subject, location, or a notable person. Categories include:

- fine arts
- applied arts
- archeology
- anthropology and ethnology
- biography
- history
- cultural history
- science and technology
- natural history
- botanical
- academic

LIBRARY

Glance at libraries

A **library** is a collection of sources of information and similar resources, made accessible to a defined community for reference or borrowing.[1] It provides physical or digital access to material, and may be a physical building or room, or a virtual space, or both.[2] A library's collection can include books, periodicals, newspapers, manuscripts, films, maps, prints, documents, microform, CDs, cassettes, videotapes, DVDs, Blu-Ray Disc, audiobooks, databases and other formats Libraries range in size from a few shelves of books to several million items. In Latin and Greek, the idea of bookcase is represented by *Bibliotheca* and *Bibliothēkē* (Greek: βιβλιοθήκη): derivatives of these mean *library* in many modern languages, e.g. French *bibliothèque*.

The first libraries consisted of archives of the earliest form of writing—the clay tablets in cuneiform script discovered in Sumer, some dating back to 2600 BC. Private or personal libraries made up of written books appeared in classical Greece in the 5th century BC. In the 6th century, at the very close of the Classical period, the great libraries of the Mediterranean world remained those of Constantinople and Alexandria.

A library is organized for use and maintained by a public body, an institution, a corporation, or a private individual. Public and institutional collections and services may be intended for use by people who choose not to—or cannot afford to—purchase an extensive collection themselves, who need material no individual can reasonably be expected to have, or who require professional assistance with their research. In addition to providing materials, libraries also provide the services of librarians who are experts at finding and organizing information and at interpreting information needs. Libraries often provide quiet areas for studying, and they also often offer common areas to facilitate group study and collaboration. Libraries often provide public facilities for access to their electronic resources and the Internet. Modern libraries are increasingly being redefined as places to get unrestricted access to information in many formats and from many sources. They are extending services beyond the physical walls of a building, by providing material accessible by electronic means, and by providing the assistance of librarians in navigating and analyzing very large amounts of information with a variety of digital tools.

Types of Libraries

Many institutions make a distinction between a circulating or lending library, where materials are expected and intended to be loaned to patrons, institutions, or other libraries, and a reference library where material is not lent out. Modern libraries are often a mixture of both, containing a general collection for circulation, and a reference collection which is restricted to the library premises. Also, increasingly, digital collections enable broader access to material that may not circulate in print, and enables libraries to expand their collections even without building a larger facility.

- **Academic libraries** - are generally located on college and university campuses and primarily serve the students and faculty of that and other academic institutions.
- **Children's libraries** - are special collections of books intended for juvenile readers and usually kept in separate rooms of general public libraries.
- **National libraries** - serve as a national repository of information, and has the right of legal deposit, which is a legal requirement that publishers in the country need to deposit a copy of each publication with the library.
- **Public lending libraries** - service to the general public. If the library is part of a countywide library system, citizens with an active library card from around that county can use the library branches associated with the library system.
- **Research libraries** - are a collection of materials on one or more subjects

- Special libraries - All other libraries, including Digital Library, fall into the "special library" category. Many private businesses and public organizations, including hospitals, churches, museums, research laboratories, law firms, and many government departments and agencies, maintain their own libraries for the use of their employees in doing specialized research related to their work.

ARCHITECTURE

Consultant: A.Q.Bayjanov

Graduate: H.A.Hodjaniyazov

The desired and intended steps toward the statue of sovereignty in the Republic of Uzbekistan and announcement thereof resulted in ensuring that considerable attention and schemes assigned was directed to the study of traditional architectural styles, accustoming to the local condition and responding to international recognized and adopted standards and regulations in the context of civil engineering and construction.

Upon announcement of Independency of Uzbekistan,in 1995, Decree of the Republic of Uzbekistan “about Architecture and Civil Engineering” was initially adopted in the history of the country. Scientific opportunities and facilities was appeared in the duration of applying and implementing the decree, which was the stew towards the adoption of “Construction regulations and standards” in 148 countries, which had recently proclaimed their independency, in accord with the study of history and enlightening heritages, climate, earthquake frequency and other relevant features of country territory. Further important factor that should be taken into consideration is that considerable attention of the government has been paid to the context of civil engineering since the first year of sovereignty, especially over the last three years

In addition to these mentioned above, the construction tradition and architecture of Khorezm is extensively developing and flourishing. In current days, Khorezm architecture has been harmonized with contemporary architectural traditions. As a result of master projects made by specialized organizations, regions, cities and towns are becoming more and more attractive and modern.

The context of my graduation project is “Designing Museum and Central Library of Urgench State University.

As there are improvements in a number of fields of the country, construction context is being developed further, which can easily be seen where present-growing young generations have been fully provided with technologies and facilities that enable them to fortify the acquaintance of field they have chosen. As an example of this evidence, since the announcement of independency the multitude of education institution and building have been erected to create sufficient facilities for them.

Furthermore, measures to modernize existed libraries and construct new ones for young ones that have a burning tendency of contributing to the international reputation of their nations have been taken by state runners, which have, in turn, encouraged them to be an integral part of this development of country. Eventually, the key factor to create museums in the campus of schools, colleges and universities is to wake a sense of loyalty and faith toward the community by making young layouts of the society fully become aware of difficulties and obstacles as well as prides, were seen in the history of country.

Scientific substantiation of the urgency of project

Urgench State University has long-period history, has coped with challenges and gained achievements in a wide range of fields for a century. There is no separated and special space for the evolution of university in the reference period, which is a root cause of obstacle to motivate students to become fully aware of this evidence. Bringing designed building to the life will form a sense of pride and love toward the university in the mind of students and motive them to add their name to the wall of museum that is going to be erected. What is more, the fact that main library of university is located in the building of the faculty of "History" results in the disadvantage of creating an appropriate space for its functionality. Erecting the projected premise will provide students with comfortable, contemporary and aesthetically pleasant academic atmosphere where they have opportunity to fortify and exchange their knowledge and practical experience with each other. Encouraging them to considerably contribute to the reputation and development of community is an integral part of governmental commitments and schemes.

Target and function of the project

The key factor to construct the Museum and Library of Urgench State University is to raise the spirit of not only students but also professors-tutors and employees to love and be proud of university, which, in turn, involves insisting them to play a huge role in taking university to the stage where it is internationally recognized. In addition, a further targeted purpose of building the General Library of University is to create suitable and pleasant environment that encourages current and future students to be active in their studies and ensure that they will strive for gaining work-related experiences and be ready to cope effectively with upcoming obstacle and challenges in the real working environment.

The object and matter of the project

The primary object of the project t is to design Museum and Library of Urgench State University that is of similarly high international adopted and recognized standard.

To build the project, the area that is opposite to university cafeteria and behind the faculty of "History" of University, to be more precisely, the northern-eastern wing of the campus.

The tactic and form of the project

Museum and Library of Urgench State University is classified as commercial premise. The contemporary design of the building (called architectural bionic) harmonized with traditional style of local area. The building is three stories, one of which is semi-underground floor.

Demonstration of design stage

Museum and Library of Urgench State University is able to fully response to the requirements of architectural-aesthetic appearance and structural stability and durability. During the stage of designing, the area that was selected for the building has been harmonized with the landscape of the university.

The projected building is made up of semi-underground floors and two ground floors and the rooms are the following.

№	Name of rooms	Square in meters
	Underground floor: Personnel	
1	Electric currents and electrician	
2	Book stacks (Applied science)	
3	Book stacks (Nature science)	
4	Book stacks (Engineering Science)	
5	Printing, copying and repairing room	

6	Furniture-repairing room	
7	Book stacks (Foreign languages)	
8	Book stacks (Humanitarian science)	
9	Book stacks (magazines and newspapers)	
10	Computer room	
11	Toilet (Staff)	
12	Registration room	
13	Corridor	
14	Lift (Books and Museum equipment)	
First floor: Library		
15	Registration room	
16	Staff room	
17	Reading room (Applied science)	
18	Reading room (Nature science)	
19	Reading room (Engineering science)	
20	Vestibule	
21	Wardrobe	
22	Security	
23	Resting area	
24	Reading room (Foreign languages)	
25	Reading room (Humanitarian science and magazines…)	
26	Computer room	
27	Toilet (women)	
28	Toilet (men)	
29	Corridor	
First floor: Museum		
30	Meeting room	
31	Storage room	

32	Exhibition room (History of University)	
33	Exhibition room (Prides of University)	
34	Exhibition room (International relationships of University)	
35	Exhibition room (Achievements of University)	
36	Corridor	
37	Balcony	

General shape of floor plans is semi-circle and its appearance looks like the shape of beehive, which is based on the architectural bionics.

Underground floor: The stair down to the basement floor is located in the north wing of vestibule and the end of east corridor. Books stacks classified by the type of science, electric current and electrician room, staff resting room and toilets are designing in the west and east corridors. In the south part of basement floor there are rooms that are specialized repairing furniture, which are partially damaged in the duration of their life time, and printing, copying and repairing books that are waded out because of over-use. The easy wing of the floor is a main room, so-called registration, where ordered building are transformed to the ground floor to be handled and employed by students. The mode of transformation would be executed with the help of person or technological lift.

Ground floor

Main entrance door to the building is designed in the centre of west-south thereof. The vestibule connects main entrance area with main functional rooms of the building. The west wing of vestibule consists of wardrobe and security and resting or waiting area is laid out in the opposite wing thereof. In the center, monuments dedicated to Al-Khorezm is planned to be erected. Classified reading rooms according to sciences – Finite, Nature and Mechanic Sciences and staff room with toilet are located in the eastern corridor while the western corridor involves reading rooms dedicated to humanitarian and foreign languages science as well as computer room. In the end thereof toilets are available for women and men respectively and evacuation door. The central part of ground floor is designed for the purpose of registration room where students order the books that they want to read and study and tied with corridors in the west and east side thereof. Electron and handle catalogs are lined with corridors and available in the registration room.

The third floor is dedicated to the museum of Urgench State University. The path to museum from the ground floor is in the center of vestibule or the finishing point of eastern floor (also called evacuation stair). In the west and east edge of building storage rooms are laid out for the exponents, items and equipments related to the floor function. Along western corridor there are exhibition rooms dedicated to the History and Prides of University, whereas illustrations and items determining bonds of University with foreign universities and achievements gained by students are designing in the eastern one. The central space of third floor is specialized to convene meetings with its facility that enables participants to derive pleasure from fresh air and spectacular view of university, that is, balcony is available and three doors are access to there. The first one is located in the south and the rest are in the west and easy wing of the floor.

The external appearance of Museum and Library of Urgench State University is almost similar to natural shape of beehive. In turn, this form gives an extraordinary beauty and appearance in comparison to locally ones. The cladding of exterior wall and construction is consisted of glass and its stability is reinforced with steel structure.

Discussing the results of project

The design stage of Museum and Library of Urgench State University comprises the requirements on its functionality, literal-aesthetic, architectural bionics, sanitaria-hygiene, fire and earthquake resistance as well as economical feasibility.

Area for the project is selected from the master plan of university, opportunities and facilities have been created for them to study and exchange their knowledge. As seen in the layout plan, university cafeteria is opposite to projected building and in order to increase the effectiveness of using lands, in the rear thereof there is a stage where a wide range of events may be organized and conducted. The main reason seems to be that summer stage is not available yet in the campus, but closed ones are located in the west direction of the faculty of “Pedagogy”. Green land is purposed around the building, where fruit and scenery tree that are endurable and compatible with the climate of Khorezm are expected to seed. Tiles are used for the paths of front, side and rear of building.

In the selection of three-dimensional composition of building the factors that have been taken into account are the size and dimensions of area chosen, the complexity of structure, its harmony with landscape and align with determined axis in the project and so on.

Library is like 24 meter radius semi-round circle, its wall is built up of bricks that are locally produces and floors are overlapped with reinforced concrete. Decoration works are based on granite stones in order to make the building more attractive. The material to paint exterior wall is high-quality lime.

In order to create an appropriate and excellent space for study-related performances reading rooms are aesthetically designed well enough. Shapes like beehives is applied to the wall of reading rooms, which gives used to put their belongings to that holes on the wall.

Structural requirements. The appearance of Museum and Library buildings would be different on condition that their main functionality remains such required rooms and facilities for various purposes. The important components of structure of building is made up of steel and reinforced concrete. Glaze cladding stability has been provided steel arc and structure and the distance between them is 5.5 meters. The part of building that loads act upon is constructed of steel, referred to as reinforced concrete.

As a purpose of overlapping the floor and the top of the building, plate reinforced concrete is deployed and in order to build the wall buried brick are mainly used although this construction is uneconomical.

The total height of building that is consisted of floor is 7.5 meters and the total with steel arcs and ring structure is 10.5 meters. The weight of exterior wall is 38 centimeters while interior partitions are 25 and 14 centimeters.

Sanitaria – hygiene requirements. It is of great important to design comfortable sanitaria-hygiene facilities for its occupants during its life-cycle. The atmosphere of room where students perform reading activities and museum exponents should be soft and fresh with an emphasis on regular air circulation. Natural lighting and acoustic and thermal isolation should be provided to these areas of building.

Natural lighting is essential to have access to all rooms of building, especially reading rooms should be response to regulations and amount determined in construction documents adopted by government. If it is not present, it causes damage to the eyesight of readers. General Service, book-repairing, warehouse and storages are allowed to be illustrated with artificial light. Rooms and structure of the project I design is totally based on regulations and standards mentioned above.

Fire-resistance requirements. Application and implementation of fire safety to the projected building is a main target of design phase. Fire-resistance measurements have been taken in a constructive and detailed way. These are extricable linked with the intense of fire-durability of building.

All horizontal and vertical circulation are considered as evacuation scheme. It takes occupants 10 and 15 minutes to quit from the building in normal situation, however, people inside the building should get out of the building in 2-3 minutes in case of fire occurrence.

Determining egress paths are based on the number and flow of occupants when building is fully filled with people. The wide of paths should be between 3 and 4 meters for museum and library buildings.

Earthquake-resistance requirements. This prerequisite mainly depends on the structural features of the building. The elements of building structure and choosing foundation and basement is governed by the types and dimensions of wall and load-bearing components and magnitude of earthquake that has been monitored in the desired area.

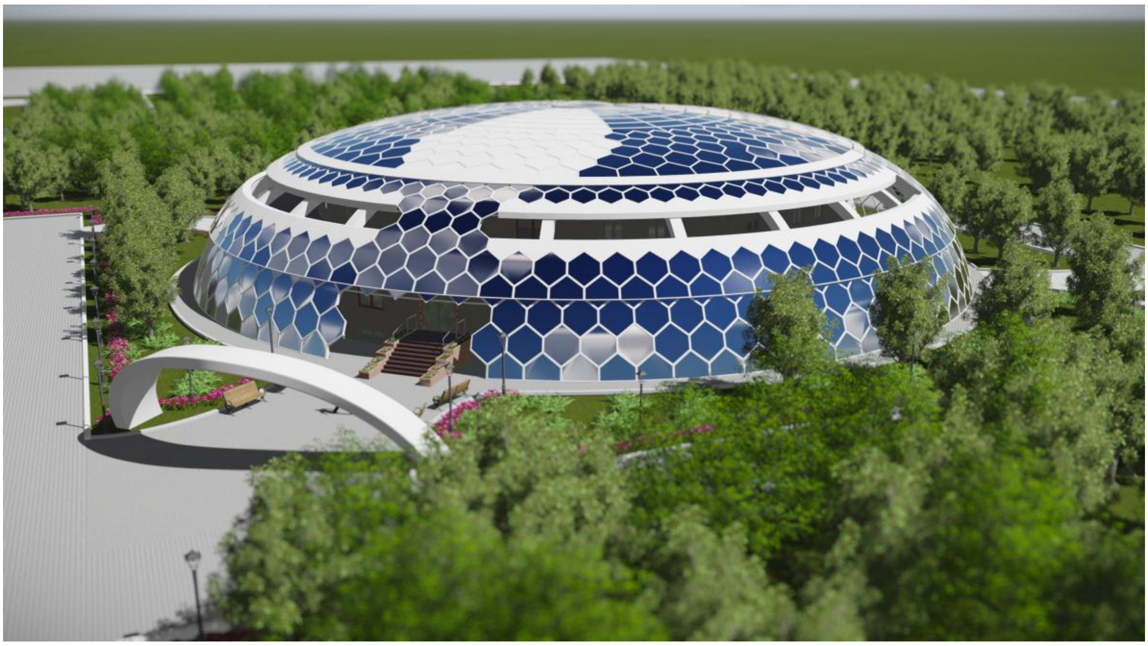
The façade of building is designing in a mix of contemporary and traditional architectural style. Main entrance is asymmetric and the top of structure of building is made up of steel construction. Grey is used of the painting of evacuation door. The slope path for disabled people is decorated with contemporary brown granite plates. Natural lighting is a central focus of design phase.

Museum and Library of Urgench State University is able to perform its function in all seasons of year. The composition approach of building is suitable for the area that has been selected in the campus of university. Composition shows the interactive connection of building with traditional patterns. The shape of building as beehive shows its compatibility with the environment that surrounds the library and museum I have designed.

Figure. 1.1. Desired location of Urgench State University that is purposed to be constructed.

Figure 1.2. Selected area within the campus of Urgench State University.

Figures below illustrates the shape and appearance of Museum and Library of University.



STRUCTURAL ENGINEERING

Consultant: B.S.Rakhmanov

Graduate: H.A.Hodjaniyazov

Geodesic Dome (Beehive-like dome construction)

The geodesic dome was in vented by R. Buckminster (Bucky) Fuller (1895-1983) in 1954. Fuller was an inventor, architect, engineer, designer, geometrician, cartographer and philosopher . In Figure 1 is illustrated a fairly complex version of a dome that' s composed of small triangles that are approximately equal, and such that the vertices of the triangles all lie on the surface of a sphere. On the right of the figure is a recently-released postage stamp honoring Fuller.

In this article, we'll look at the mathematics that lies behind geodesic domes, but we'll also talk a little about why they make good engineering sense and how they might be constructed from real materials.

There are plenty of resources on the web on geodesic domes, but one that' s particularly helpful, especially if you have any desire to build one of your own, is here: www.desertdomes.com, which includes a dome calculator that does many of the calculations for you.

Engineering Considerations

A sphere is the mathematical object that contains the maximum volume compared to its surface area, so if a structure of large volume is to be constructed for minimum cost, it makes sense to look at structures whose shape approaches a sphere. But most construction materials come as ————————at or straight pieces, so forming the curves that would be necessary to make a perfect sphere might increase the expense considerably .

But structures like the one illustrated in Figure 1 closely approximate spheres, but are composed of straight struts or of ————————at triangles, depending on the construction method.

If the structure is composed of struts, there is another consideration; namely , that it should be composed completely of triangles. If it consists of any quadrilaterals or more complex polygons, they can ————————ex if the connections at the ends are not completely rigid. If the pieces, for example, are just connected with a bolt through a number of struts, it is almost impossible to make the joints rigid. But if the structure is completely composed of triangles, it can be made completely rigid, even if the individual joints are not.

One final engineering consideration is that if the triangles of which the structure is composed are all as close to equilateral triangles as possible, then the stresses will be approximately the same on all the struts, so there is very little wasted strength. Note that in the model at the beginning of this article, all of the triangles appear to be approximately equilateral.

Finally, in very large structures, it is a bad idea to have very long unsupported struts. The longer the struts, the easier they are to bend if shear forces are applied.

Perfect and Imperfect Solutions

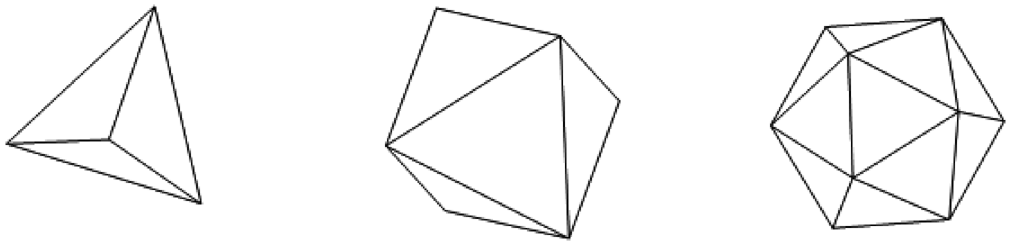


Figure 2.1 Platonic Solids

A perfect solution will be composed of triangles that are all equilateral, all the same size, and all making equal angles with each other . Unfortunately, this can only be achieved with three mathematical forms: the tetrahedron, the octahedron and the icosahedron. Figure 2.1 illustrates all three.

These so-called platonic solids are approximations to the sphere, but only the icosahedron is very close, and to make a large structure from it would require very long struts.

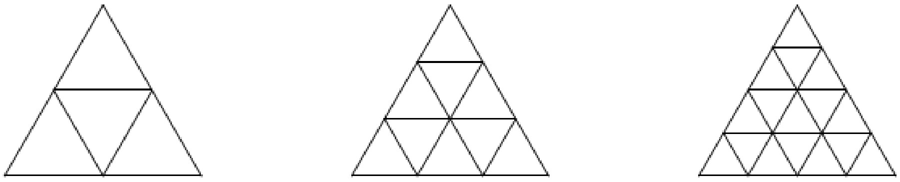


Figure 2.2. Uniform Triangle Subdivision

One way to proceed is simply to subdivide the triangles in one of the regular platonic solids, and this is how a geodesic dome is constructed. Any of the three solids could be used, but as we shall see, there are some serious problems if this is done beginning with a tetrahedron, and less-serious problems (but problems, nonetheless) if we begin with an octahedron.

We'll begin by describing the standard construction of domes of various complexity beginning with an icosahedron.

It is easy to subdivide an equilateral triangle into 4, 9, 16, or any perfect square number of sub-triangles, as is illustrated in Figure 2.2.

But if we simply subdivide the triangles of an icosahedron, although the vertices of the original icosahedron will lie on the surface of a sphere, the vertices that we need to add to subdivide the triangles will lie in the planes of those triangles and will be physically inside the sphere. This sort of subdivision will also tend to be a lot weaker structurally , since to maintain perfectly flat surfaces, the strengths of the joints would have to be infinite (see the “found” poetry from a physics text, below).

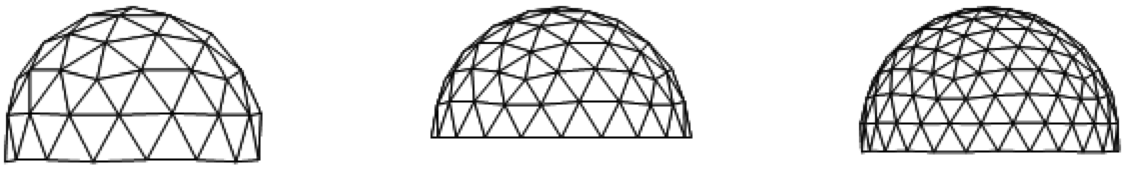


Figure 2.3. 3V, 4V and 5V Domes

Our solution will be simply to “push” those points out to the surface of the sphere from the center, but to do that we'll need to be able to work with three-dimensional vectors and coordinate systems. First, we'll look at some of the tools that are needed to work with three-dimensional vectors and then we'll begin by looking closely at the icosahedron.

Figure 2.4. 3V, 4V and 5V Domes

The names, “3V”, “4V” and “5V” refer to the number of subdivisions that are made to the original triangles in the icosahedron before they are pushed out to the surface of the sphere. In Figure 1, you can also see a 6V dome. Notice that the domes of odd degree, the 3V and the 5V domes are slightly larger than a half sphere. That's because when there are an odd number of triangles in the subdivision, there is no center line or “equator” at which to divide it, so we have to pick a version that is a little larger or a little smaller than a half sphere. In the examples in Figure 2.3, the larger versions were displayed. In Figure 2.4 appear the smaller versions of the 3V and 5V domes. You may find it useful to see images of the original spheres from which all of the dome models above were cut. Those appear in Figure 2.5. It' s clear from these images that the 4V and 6V spheres have an equator and the others do not. If every vertex of the 3V sphere represents a carbon atom, then the sphere represents the molecule called “Buckminsterfullerine” which really exists, and has some very useful chemical and physical properties.

All the domes displayed in Figures 2.4 and 2.3 are fairly complicated to build; the easiest that can reasonably be called a geodesic dome is the 2V version. Figure 7 displays the 2V dome (a half-sphere) and the corresponding 2V sphere.

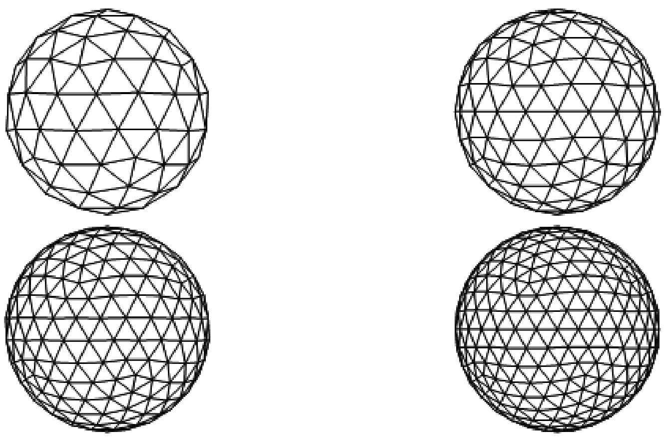


Figure 2.5. Dome Spheres: 3V, 4V, 5V and 6V

Figure 2.6. The 2V Dome and Sphere

It is obvious if you think about it, but if you look closely at the spheres in Figure 6, you can see that almost all the vertices on larger domes have six struts that meet at each. In every case, there are exactly 12 of the 5-strut vertices (on the entire sphere). This is, of course, the number of 5-strut vertices there are in the original icosahedron.

Vector Tools

We are going to do all of our work in a three-dimensional coordinate system. This is very similar to the two dimensional systems that are introduced in every high-school algebra course with an x and a y axis, but we will add a third, the z axis, which is perpendicular to the other two. If we start at the origin of such a system, we can give directions to every point in space by giving three numbers: the distance to travel parallel to each of the axes (with negative distances meaning to move in the opposite direction).

One tool we will need is a method to find the distance between two points, but this can be obtained as a simple extension of the Pythagorean theorem. If the two points have coordinates $P_0 = (x_0, y_o, z_o)\ and\ P_1 = (x_1, y_1, z_1)1)$, then the distance D between them is given by the formula:

$$D(P_0, P_1) = \sqrt{(x_0 - x_1)^2 + (y_0 - y_1)^2 + (z_0 - z_1)^2}$$

Of course I f one of the points is the origin O, this reduces to:

$$D(O, P_0) = \sqrt{x_0^2 + y_0^2 + z_0^2}$$

Notice also that if you have the coordinates that describe an object then you can uniformly scale the object by multiplying all the coordinates by a constant. So if you have the coordinates for a geodesic dome with diameter 1 foot and you want to build a dome with diameter 20 feet, you can just take all the coordinates for your 1 foot dome and multiply them by 20 to obtain coordinates for the new one. Similarly, all the strut lengths will be 20times as long, et cetera.

For this reason, we will work in coordinates that are easy to use, and if we ever desire to build a real dome, all we need to do is nd the appropriate factor once and multiply all of the numbers by that.

The Icosahedron

An icosahedron is a regular polyhedron with 20 sides, each of which is an equilateral triangle, and at each vertex, 5 triangles meet (see Figure 2.7). If you view an icosahedron with one vertex on top and another at the bottom, you can see that there are two rings of five vertices each, making a total of 12. There are 20 triangles, since 5 touch the top vertex, 5 touch the bottom and there are 10 in the band around the center .

It' s also easy to count edges: there are 30. This is because if you cut the entire figure into triangles, each of the 20 triangles would have 3 edges making 60 (after cutting), but when assembled, every pair of adjacent triangles shares an edge so the uncut version would contain half that many , or 30.

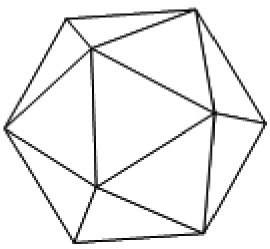


Figure 2.7. Icosahendron

Let $\emptyset = \frac{\left(1+\frac{\sqrt{5}}{2}\right)}{2} \approx 1.61803398875$ be the golden ratio. Then the following 12 points, A,B…,L are the three-dimensional coordinates of a regular icosahedron centered at the origin.

$A = (0,1,\emptyset)$	$B = (0,-1,\emptyset)$	$C = (0,-1,-\emptyset)$	$D = (0,1-\emptyset)$
$E = (\emptyset,0,1)$	$F = (-\emptyset,0,1)$	$G = (-\emptyset,0,-1)$	$H = (\emptyset,0,-1)$
$I = (1,\emptyset,0)$	$J = (-1,\emptyset,0)$	$K = (-1,-\emptyset,0)$	$L = (1,-\emptyset,0)$

Here are the 2 triangles connecting the vertices above that make up the surface of icosahedron

AIJ *AJF* *AFB* *ABE* *AEI*

BFK	*BKL*	*BLE*	*CDH*	*CHL*
CLK	*CKG*	*CGD*	*DGJ*	*DJI*
DIH	*ELH*	*EHI*	*FJG*	*FGK*

Finally, here are the 30 edges of those triangles.

AB	*AE*	*AF*	*AI*	*FJ*	*BE*	*DF*	*BK*	*BL*	*CD*
CG	*CH*	*CK*	*CL*	*DG*	*DH*	*DI*	*DJ*	*EH*	*EI*
EL	*FG*	*FJ*	*FK*	*GJ*	*GK*	*HI*	*HL*	*IJ*	*KL*

It is a bi tedious to check, but the length of all 30 of the segments in the list above is 2. For example, the length of AB is given by:

$$|AB| = \sqrt{(0-0)^2 + \left(1-(-1)\right)^2 + (\emptyset - \emptyset)^2} = \sqrt{4} = 2$$

Another typical calculation yields the length of the segment AE:

$$|AE| = \sqrt{(0-\emptyset)^2 + (1-0)^2 + (\emptyset - 1)^2} =$$

$$= \sqrt{\frac{1+2\sqrt{5}+5}{4} + 1 + \frac{\left(1-2\sqrt{5}+5\right)}{4}} = \sqrt{\frac{12}{4} + 1} = \sqrt{4} = 2$$

Notice that all the vertices of our icosahedron lie on the surface of a sphere centered at the origin. That's obvious because in every case, the coordinates, in some order, have a 0, a 1 and a $\emptyset$, the last two possibly preceded by a negative sign. But, to calculate the distance from the origin to that point, we just square all three numbers (which will eliminate any influence from any negative numbers) add the three together (yielding the same sum in every case) and take the square root of the result.

For the particular coordinates that we have chosen, the radius of the sphere in which the icosahedron is inscribed turns out to be about 1:90211303 units. This isn't a particularly nice number, but it is worth it to have particularly nice and relatively uniform coordinates for all the vertices.

Strut Lengths

If we consider the 2V dome, each of the equivalent equilateral triangles from the icosahedron is subdivided into 4 triangles and then the inner three vertices are pushed out to the surface of the inscribing sphere. Each of the original sides of each triangle will become two equal pieces on the surface of the 2V dome, and three additional pieces are added to form the inner triangle. The three struts that make up the inner triangle are of equal length, as are the six struts that were made by subdivision and pushing out of the original edges of the icosahedron. It is easy to verify by calculation that the two lengths are different, but that all of the struts in the final dome or sphere are one of those two lengths.

A similar, but slightly more complex analysis shows us that in the 3V dome, exactly three different strut lengths are required.

Thus if you're making a 2V dome, there are only two different strut lengths required for the dome, not the sphere, exactly 30 of the shorter length and 35 of the longer length are required. Since the dome can be arbitrarily scaled, it is possible to find the optimal lengths for the two struts, given that you can purchase the raw material in fixed lengths.

A standard construction material for domes is steel electrical conduit that comes in 10-foot lengths in the United States. If you would like to purchase the minimum number of these and yet make a dome of maximal size, you simply need to cut each length into two pieces that are in the proper ratio. With 35 10-foot pieces, you can make the 35 long and 30 short struts and have 5 extra short struts at the end. (It is probably a good idea to get a few more than 35, in case there' s a manufacturing error, and so that you will have at least a couple of spare of the longer length.) If holes are drilled in the ends of the struts, the problem of optimization is only a tiny bit more complicated.

So let’s see how to calculate the strut lengths, beginning with the 2V dome. We'll consider the original triangle AI J of the icosahedron listed in the previous section. The approximate coordinates of A, I and J are (0; 1; 1:618), (1; 1:618; 0) and (1; 1:618; 0), respectively .

There are many ways to proceed, but one approach is this. We noted earlier that the radius of the sphere in which the icosahedron is centered is $\sqrt{(1+\emptyset^2)} =$ 1.902. Thus if we divide all the coordinates by 1:902 we will have all the vertices on the surface of a sphere of radius 1. Using the same names for the vertices, this will give us the following sets of coordinates: $A = (0.5257, .8507)$, $I = (.5257, .8507, 0)$ and $J = (-.5257, .8507,)$.

The lengths of segments AI, IJ and JA are all equal to

$$\sqrt{(0.5257^2 + (.8507 - .5257)^2 + .8507^2} \approx 1.0515$$

To find the midpoint of segment AI, we simply need to find the average coordinates of vertices A and I: (.5257/2, (.5257 + .8507)/2, .8507/2) = (.2628, .6882, .4254). A similar computation gives the midpoint of I and J as (0, .8507, 0). Both of these vectors have the same length, namely .8507, so to push them to the surface of the sphere, we need to divide all the coordinates by .8507, yielding M = (.3089, .8090, .5) and N = (0, 1, 0), respectively, where M and N are the locations of the midpoints of the segments after they have been pushed out to the surface of the sphere.

The two strut lengths required to make a dome or sphere of radius 1 are thus equal to the lengths of AM and MN, which we calculate to be: |AM| = .5465 and |MN| = .6180.

Suppose we wish to construct an optimal 2V dome, using 10-foot pieces of electrical conduit, where we plan to flatten the ends and to drill holes one inch in from each end to attach the struts together. Basically, there are 4 “wasted” inches because we will need four holes after cutting the struts. Thus, the original piece of conduit is effectively only 9 feet 8 inches, or 9.66666 inches long. This has to be divided in a ratio of |AM|/|MN|, so the pieces will have lengths 4.536 feet and 5.130 feet

Similar calculations can be made for any dome. With the kind permission of Tara Landry who constructed and maintains, we include the strut length information for subdivisions for 1V through 6V domes. Figure 9 shows the different lengths required for each triangular subdivision, and the associated tables display the ratios of the various lengths, assuming you want to build a dome with radius 1.0. In Figure 2.8, the struts are only labeled in the horizontal direction. The labels can be rotated to obtain the lengths in the two other directions.

In addition, the number of struts of each of the lengths are shown to make a dome (or, in the case of an odd-V dome, both the smaller and the larger version) or a sphere. For example, if you want to make the larger 5V dome of radius 1.0, you will need 30 of the "A" struts having length 0.198147430801, 60 of the "B" struts, et cetera.

Strut	Length	D1	D2	Sphere
A	1.05146222424	10	25	30

Strut	Length	D1	D2	Sphere
A	0.348615488820	30	30	60
B	0.403548212335	40	55	90
C	0.412411489310	50	80	120

Strut	Length	Dome	Sphere
A	0.546533057825	30	60
B	0.618033988750	35	60

Strut	Length	Dome	Sphere
A	0.253184595784	30	60
B	0.294530833739	60	120
C	0.295241808844	30	60
D	0.298588133655	30	60
E	0.312868930080	70	120
F	0.324919696233	30	60

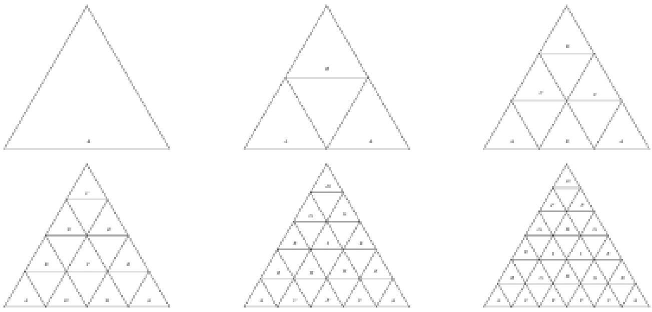


Figure 2.8. Strut Subdivision Lengths

Strut	Length	D1	D2	Sphere
A	0.198147430801	30	30	60
B	0.225685786566	60	60	120
C	0.231597595641	30	30	60
D	0.231790251268	30	30	60
E	0.245085783201	50	80	120
F	0.245346420565	10	20	30
G	0.247242909849	60	70	120
H	0.255167012309	50	70	120
I	0.261598097465	30	35	60

Strut	Length	Dome	Sphere
A	0.162567228883	30	60
B	0.181908254598	60	120
C	0.187383400570	30	60
D	0.190476861168	30	60
E	0.198012574234	60	120
F	0.202819695856	90	180
G	0.205907734855	130	240
H	0.215353730111	65	120
I	0.216628214422	60	120

If the dome is an even-V form based on the icosahedron, the midpoints of the original triangles on the "equator" all lie exactly on the equator, so any subdivisions of those equatorial lines will also lie in the plane of the equator. When those points are pushed out to the surface, they will lie on a mathematically perfect plane, and a dome so constructed will lie perfectly on perfectly flat ground.

For odd-V domes of degree 3 or greater, there are no point on the equator, so we have to decide whether to go up a "half rank" or down a "half rank" from the true equator to make our dome. In either case, the points up one rank are not in a perfect plane, but they are close enough that it often does not matter. As the odd degree gets larger and larger, the error becomes less and less.

How Many Struts Are Required?

Consider first the problem of determining the number of struts required to make a sphere for each different size.

The initial icosahedron is made up of 20 triangular faces and 30 edges. When a single one of the triangles is subdivided into 1, 4, 9, 16, . . . smaller triangles, the number of internal edges can be seen to be from the figures: 0, 3, 9, 18, 30, 45. This seems to satisfy the formula $3(n^2 - n)/2$, where n is the number of subdivisions ofach side. The number of edge struts will obviously be $3n$.

We can see that the formulas above are true, since if we were to cut up the original triangle into n2 smaller triangles, there would be $3n^2$ edges, but each is double-counted except for the $3n$ outer edges. The makes a toatl of $(3n^2 - 3n)/2$ inner edges, matching the formula we obtained from a direct count of the 6 smallest

For the sphere, there are 20 faces and 30 edges of the original icosahedron. Each face will generate $3(n^2-n)/2$ internal struts and each of the 30 edges will add 30n more struts, for a total of 30n2 struts, and this agrees with the values in the tables.

For the even-V domes, we cannot quite cut this number in half, since there is the line of struts that lie along the ground. If we cut the number in half, we will only include half of the struts lying along the ground, so we need to adjust for that.

If n is even, then an n-V dome will have 5n struts on the ground. Thus, the total number of struts required for an n-V dome, where n is even, is given by the formula: $30n^2/2 + 5n/2$. This formula is in agreement with the values in our tables for 2V, 4V and 6V domes.

For the odd-V domes, the calculation is not too hard. We make an upper (smaller) odd-V dome by slicing an odd-V sphere in half, but not on a rank.

In fact the cut will slice 10n struts, so the total number of struts in the smaller odd-V dome is given by $(30n^2 - 10n)/2$ which again agrees with the values in the tables.

Finally, for the larger odd-V dome, we need to add to that value the struts we sliced: 10n of them, plus the new bottom struts: 5n of them, for a total of 15n2 + 10n.

Tetrahedron and Octahedron-Based Domes

There is no reason that you cannot begin with a tetrahedron or octahedron, subdivide the triangles and push the vertices out to the inscribing sphere, and make successively better approximations to a sphere.

With a tetrahedron, a major problem will arise if you wish to have a dome rather than a complete sphere, since the tetrahedron has no natural "equator" as does the icosahedron when its triangles are divided into an even number of sub-triangles or as does the octahedron with any type of triangle subdivision.

In a sense, then the octahedron might seem to be a better candidate for geodesic domes than the icosahedron, since the 1V, 2V, 3V, . . . domes based upon it will all have a flat base. The problem arises from the fact that more subdivisions are required, and thus more different lengths are required. For the icosahedron-based domes, the 1V, 2V and 3V domes require 1, 2 and 3 different strut lengths, respectively. It's nice to have lots of struts of the same length, since then it's easy to have a small number of spares, in case there is damage, and the manufacturing process would require a smaller number of jigs.

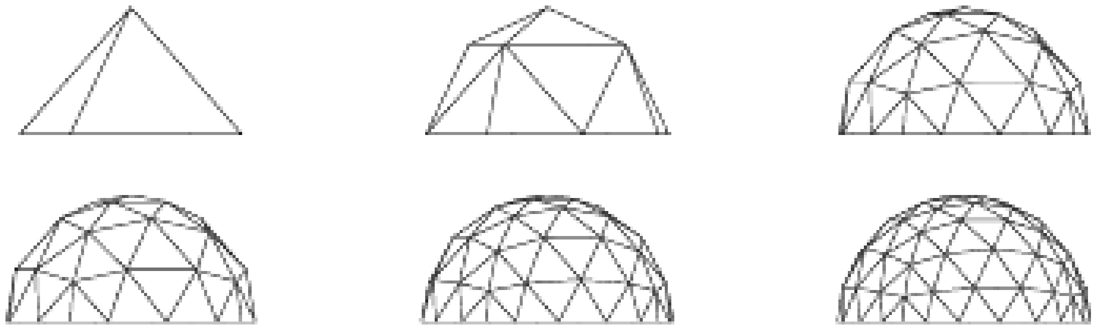


Figure 2.9. 1V through 6V octahedral Domes

Figure 2.10. 4V dome at Burning Man 2004

ORGANIZATION OF CONSTRUCTION TECHNOLOGY

Consultant: Q.Saidov

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Guidance for construction.

1. Grubbing and clearing. Grading. Virtually all building construction is accompanied by at least some form of earthwork during construction. On undeveloped sites, construction may begin with grubbing and clearing, in which tree and plants, stumps, large roots and other surface materials are removed with heavy machinery. Next, organically rich topsoil may be scraped away and stockpiled to one side, to await reuse at the end of construction. Grading and compacting require various types of power equipment, such as bulldozer (D-257), compactor and tractor (T-75).

2. Excavations. Any of a wide variety of machines such as bulldozer, backhoes and bucket loaders may be used to loosen and lift the soil from the ground. If the must be mover more than a short distance, dump trucks come into use. The excavation work that machines are unable to do is finished by builders.

3. Basement installation. The pre-fabricated reinforcements and its frame of foundation is laid out on the excavated trenches and on place. Reinforcement installation are performed by three 4^{th} and 2^{nd} category workers. Protective layout is remained before bar frames are installed.

Pre-made boxes are aligned with the main axis of building, where the trenches for the basement are excavated, and fastened to each other with screws and other necessary items.

Concrete is casted with a special machinery, transit-mix truck. Before the commence of this stage of construction, in-depth investigation on the condition of pre-made reinforcements and when any defects such debris, rubbers or muds are detected, they are washed down and kept clean. As long as the concrete is casted in to the box, it is compacted with depth vibrators. After the concrete reaches the desired stiffness boxes are removed and the status and stability of foundation is investigated at intervals.

Ahead the construction of separated foundations, benches are pointed with levelling instrument and then clenches and piles are rapped, eventually signs showing the condition of building axes are adhered.

Before concrete for foundation is laid out, the dimensions and the condition of bottom lines of this are painted and investigated. The process is ceased in 10-cm height and its places is clarified and made clear and put into the place determined in the documents.

4. Waterproofing. Waterproofing is obviously the most important consideration for basements. For the walls, it is applied on the outside, for the floor, it is applied under it so that it forms a continuous, unbroken barrier to the entry of water. In earlier times, the use of layers of hot coal-tar pitch or hot asphalt alternating with fiberglass felt to yield a 3-to5-ply membrane was the most common basement-waterproofing technique – a technique identical to that used for built-up roofing today.

Although a hot-tar or asphalt system is easily applied on a horizontal surface, its application on a vertical surface is difficult. Safety concerns are critical in underground waterproofing because of the limited working space available. Therefore, a hot-applied waterproofing system has largely been replaced by cold-applied system.

Commonly used cold-applied, below-grade waterproofing systems are similar to single-ply roof membranes and consist of rubberized asphalt or thermoplastic sheets. The sheets, usually 60 mils (1.5mm) thick, are available in self-adhering rolls with a release paper. Before the sheet are applied, the basement walls and floor surfaces are cleaned and primed with the manufacturer's primer. Because the sheets are self-adhering, they form a continuous waterproof membrane.

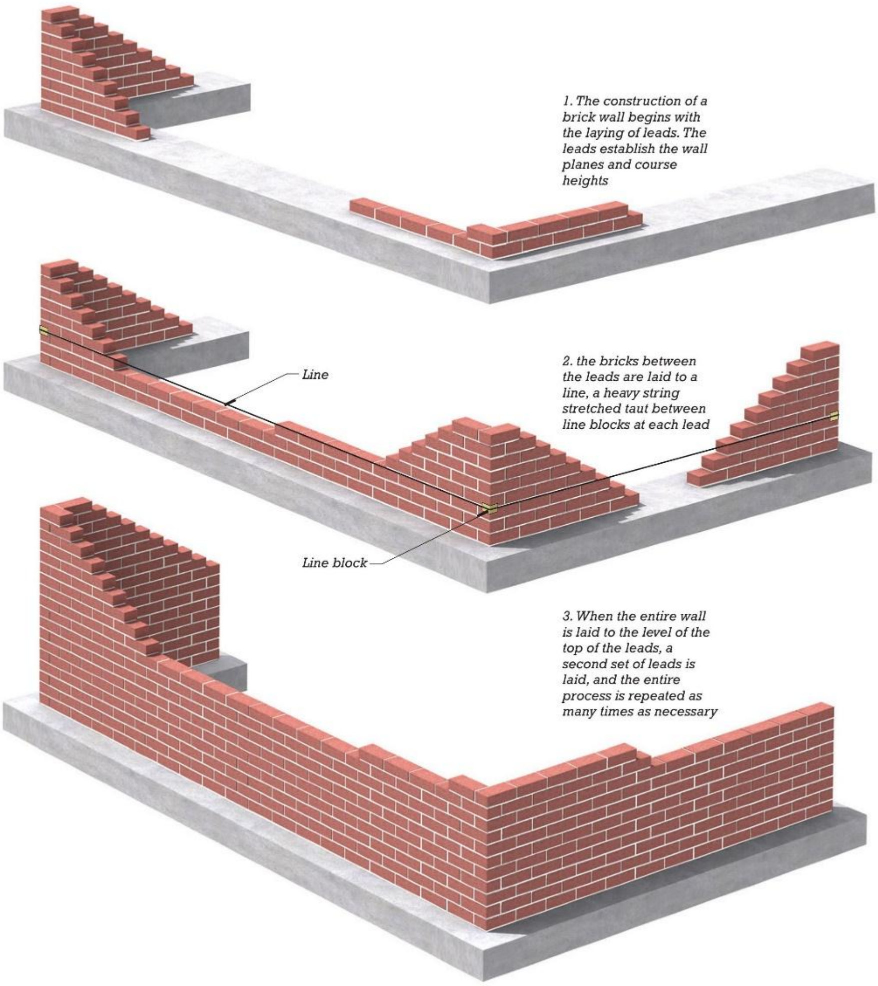
In place of membrane waterproofing, liquid-applied elastomeric compounds may be used, which can be sprayed on, rolled on or brushed on. They are particularly attractive for complex surface formations but are prone to application errors.

5. Column installation. The dimension of columns is specified with steel tape measure in order to prepare them for installation. The further process involves drawing the glass to the bottom of column and axis to the top thereof. There are two type of lifting this structure.

- pulling
- rotating.

Solid layer is laid inside the glass-shape foundation before its installation. With the help of crane machinery columns are carefully installed in accordance with regulations and drawings defined in the documents. Whether or not column are vertically mounted properly is specified with specific equipment, so-called theodolite. Joints between the columns is fastened and filled with concrete in order to increase their stability.

6. Masonry. These structural elements are constructed by four second-category-worker and the four of their assistants. Main part of masonry wall is performed by second-class workers while putting brick at the angle of 45 over the working zone is performed by assistance masonry workers.



Choosing brick. Color, size and other aesthetic qualities such as durability and appearance uniformity may also be important to brick selection. Brick grade establishes minimum requirement for compressive strength and water absorption. The overall durability of the brick and its resistance to weathering can the be related to a map of weathering indices derived from data on winter rainfall and freeze-thaw cycles.

7. Monolith to overlap floors.

8. Stair construction. Stair elements construction progress should concide with that of overlapping floor. The first is to identify the location of stairs and then the steps thereof are structured.

9. Application of cladding materials to roof. Where wrapped material is applied and laid over the surface of roof should be comprehensively examined in order to ensure that there is applicable and responsive to the determined requirements. It is important to insulate the roof with these construction materials and hence, it is recommended to insulating concrete. Where concrete insulating is used over a steel deck, the use of a slotted, deck is recommended. The perforations in the deck allow the moisture in the concrete to gradually vent out from the underside of the deck by the building's heating and cooling system. Therefore, the roof membrane can be installed as soon as the concrete has become sufficiently hard to hold the fasteners, even though it may not have fully dried.

After the insulating concrete has hardened (typically after 3 to 5 days), an asphalt-treated base sheet (preferably a mineral-granule-faced base sheet) is fastened to the concrete as a substrate for a built-up or modified bitumen roof. Special fasteners have been developed by the industry to fasten the base sheet, which can simply by driven into the insulating concrete, which can simply be driven into the insulating concrete.

After the base sheet has been fastened, the built-up roof or modified bitumen membrane is mopped to the base sheet. Single-ply membrane may also be installed over insulating concrete, but the manufacturers of insulating concrete recommend consulting with the manufacturers of single-ply membrane for compatibility, and so on

10. Flooring. The bottom of floor is compacted with the help of stone at the consolidation of 40-60 mm by special machinery and hand-equipment. For this sub-floor, Type V-10 insulating concrete layout is applied and it is hardened and fastened to the basement line of 3 meter with vibrating screed. Required temperature allowing to commence this stage of construction is 5 ^{0}C and above.

An appropriate type and feature of wood to flooring is selected and their surface is smoothed in order of preparation for use. The dimensions of basic pillar, ground slipper and noise insulation is labelled to selected wood, which, in turn, allows this process to commence and upon completion plinths is installed.

11. Painting. Painting the surface of walls is started as soon as plaster is fully hardened and reach the point of drying. Painting station is applied and is performed by specialists.

12. Glazing and Glass. This progress consists of cutting and installing glasses. Glasses are put into the windows with fillets and 5-class glazing-workers are responsible for this stage of construction.

Technology of plastering and cladding

Plaster is the layer that provide the interior and exterior walls of building with pleasant appearance, particular and specific form. Plasters are classified as wet and dry ones. Construction aggregates are applied to the wet of plaster for use. Dry plasters are in pre-fabricated lists, manufacture in the factories and transformed to the seat of construction and adhered to the purposed surface by separating it zones. This plaster is recommended to apply to the wall of rooms where the percentage of humidity is up to 60%.

Wet plaster is grouped as mainstream and scenery according to external decoration. Simple wet plaster is applicable to where painting or wallpaper is adhered. Scenery wet plaster is the layer that has a pre-painted color and given appearance.

The classification of wet plasters may be also in accordance with the category of building and its allowance as well as quality prerequisites, as the following:

- low quality (warehouses, underground floors)
- average quality (residential and industrial buildings)
- high quality (public buildings)

Sample plaster is laid over the surface as a sample and one-layer sand whereas average quality plaster comprises only a layer of soil and decoration. High quality plaster is, in turn, made up of several layers of soil, decoration or scenery layouts.

The main function of sample layer is to stick a plaster to the surface of wall. The thickness thereof is 9mm for wood surfaces and up to mm for concrete and masonry surfaces.

Soil is a primary level of plaster and allow to identify the thickness thereof determined in the specification. The width of each layers of soil should be 7 for a lime or lime-gypsum mixtures and 5 mm for cement solutions.

High quality is provided to the surfaces that are plastered by decoration layout (smoothness and external view)

In the context of construction these layers are general referred to as “coat”, 12 mm thickness for low quality plaster and 15mm for average quality as well as 20 mm for high quality is accepted and adopted.

During the life-time of constructed building, they are pargetted with specific plasters: acoustic, x-ray protector, moisture-proof and so then.

Manufacture and application of stucco mixture. Fine aggregates (cement, lime, production of simple plaster mixtures, gypsum aggregate, liquid glass and others) and coarse aggregates (sand and decomposed glass) as well as water and other various active minerals.

The structure of mixture is determined in accordance with the project. Plaster that is made up of cement or cement and lime is highly advisable to use for rooms where high moisture is present, for example bathroom, bath and swimming pool, whereas average-humidity rooms consisted of masonry wall is plastered with lime, lime-gypsum and lime-mud mixtures stuccoes.

For compound production, even its transformation or application stucco stations are deployed.

The admixture of special stuccoes involves several aggregates. As an example, liquid glass for waterproofing plaster, barium sand or dust for x-ray protective stucco layer, 3-5 mm large porous fillers (pumice, slag and bloating clay aggregate) for acoustic layer is applied.

Preparation of stuccoes for use. Before plastering walls begins, all construction works such as projected openings installation, filling the left open spaces between wall and box, smoothing small holes and sanitary and technological equipment set should be completed.

Dust, contamination, oil and bitumen spot detected on the surface of bricks, concrete and other surfaces need to be removed. 10-mm thin strips is braced to the wood structures in order to increase their stability and, hence, 45x45 mm in cells are made. Metal structures are wrapped with steel carcasses (cells). Surfaces that is going to be plastered is examined with plummet according to vertical and horizontal longitudes.

Plastering surface. As long as structural elements reach the highest peak of settlement and dry plastering stage begins. In this context, the stiffness of mixture used for internal layer of stucco should be high in comparison to that used for nakrivka. Virtually, solution should be sprayed to the divided zones of wall with the special mechanism as a mean of mechanization. The distance between sprayer and desired wall should be between 0.6-1.0 meters.

Mainstream stucco compounds is plastered on the following order. The first ceilings is pargetted and then the top and bottom of wall and is completed. The next process is to lie protective layer over the floor to ensure that surface is not polluted by next stage in which the slop of opening top is identified. Eventually, as long as the bottom of wall is plastered, decorative layer is laid down and fastened.

Stucco layers should be undertaken at certain intervals. The interval should be between 7 and 15 minutes for lime-gypsum admixtures, 2 and 6 hours for cement solutions and, however, as for lime mixtures, plastering should be finalized before the mixture is fully dry and hard.

Technology of cladding

The object and function of decoration is similar that of plastering, preventing building from external impact, strengthening life durability and thermal protection. The beginning of this stage is dependent on the completion of internal construction works (such as roofing, partition wall, openings installation and plumbing)

Internal decoration involves the usage of a wide range of materials such as cafels, glass, cement plates and natural stones. In-depth investigation is conducted to make sure that wall is ready for the stage of decoration. It is important to wash dust or mud from the surface and there should not be any spots on it.

Complex decoration process involves the following stages: grouping the material of decoration, mixture, making glue, fastening tools, ensuring vertical smoothness, gypsum installation; zoning the surface that is decorated and decoration with slab and detalls.

The room where is decorated should be at the temperature of 10^0C and its surface should be at the humidity of 8%.

The back of ceramic cafels is wet before it adheres to the wall. If glue is used for this purpose, the desired surfaces is freed from dust and glued twice. The first layer should be 0.2 mm in thickness and the second is 0.5mm. At the same time, 2mm in width glue is rubbed and cafel is sticked to the surface 10-15 minutes hence.

Estimation table of work volume of construction

No.	Type of Work	Volume (in units)
1	Grading	2992 м^2
2	Excavation of trenches.	305,64 м^3
3	Lying stone down foundation	339,6 м^2
4	Horizontal waterproofing	339,6 м^2
5	Installing box for basement construction	509,8 м^2
6	Removing box basement construction	509,8 м^2
7	Installing reinforcements	3,41 тонна
8	In-cast concrete foundation	280,17 м^3
9	Vertical waterproofing	679,2 м^2
10	Re-buried with hand	25,47 м^3
11	Masonry	593,3 м^3
12	Installing columns	40 шт (40x40x8,7)
13	Overlapping (monolith)	493,7 м^3
14	Reinforcement (overlapping)	4,78 тонна (AIII d=12мм)
15	Seismic belt	46,28 м^3
16	Vapor-proof	189,97 м^2
17	Heat-proof	189,97 м^2
18	Sand-cement layering	189,97 м^2
19	Metal arch	12
20	Metal fortifiers	5,1 тонна (50x5)
21	Installing glass-sheet	2500 м^2
22	Wood-flooring	1800 м^2
23	Lying marble	650 м^2
24	Window installation	160 м^2
25	Door installation	120 м^2
26	Plastering wall	5300 м^2
28	Smoothing ceilings	2000 м^2
29	Smoothing the surfaces of wall	5300 м^2
30	Water -painting ceilings	2000 м^2
31	Water-painting walls	5300 м^2
32	Oil-painting walls	1590 м^2
33	Painting doors	120 м^2
34	Painting windows	160 м^2
35	Wall Decoration	5300 м^2
36	Glazing windows	160 м^2
37	Other	
38	Blind area	120 м^2

ECONOMIC FEASILIBTY ASSESSMENT

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LABOUR AND ENVIRONMENT PROTECTION

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Main electric protective tools

Electrical Safety

Electrical equipment

Electrical hazards are different from other types of hazard found in construction work because the human senses provide no advance warning, whereas an approaching vehicle may be heard, the prospect of a fall may be seen, or escaping gas may often be smelt.

About one in every 30 electrical accidents is fatal. The great majority of electrical accidents result in electric shock and burns. Fire and explosion from sparks in flammable atmospheres and radiation from electric arc welding or microwave heating are also possible causes of injury.

Electric shock

The danger from electric shock is directly related to the amount of current that passes through the body and to the time that it takes to pass. At lower levels, the effect may be no more than an unpleasant tingle, though perhaps sufficient to throw a worker off balance and cause a fall from a scaffold or ladder. Medium amounts cause increasing muscular tension, so that anything in the grasp can scarcely be released – a condition which can quickly become dangerous. Higher amounts can cause fibrillation of the heart (irregular contractions of the muscles), which is almost invariably lethal. The passage of current can also cause burning of the skin at the points of contact. Severe burns can occur, too, from exposure to an electric shock without actual bodily contact. Damp and wet conditions greatly increase the danger of electric shock. It is the voltage that determines the current through the body. Since reduced voltage reduces the severity of electric shock, it is common sense to use reduced voltage of 110 V wherever possible. The main causes of electric shock are as follows:

– the earth or ground wire becomes disconnected from its plug terminal and touches a live terminal so that the metal case becomes live;

– wrong connections are made to terminals on the plug or the equipment;

– damaged or missing covers on fuse and terminal boxes, or on socket outlets, expose bare live conductors;

– flexible cables are damaged when they are dragged over sharp surfaces or run over;

– makeshift repairs are made to flexible cables with insulating tape alone.

Treatment for electric shock

Switch off the current, but if this is not possible free the victim by using something that is non-conductive, long, clean and dry such as a piece of wood or rubber, or a piece of cloth such as a jacket. Stand on non-conductive material such as a dry piece of wood when carrying out this effort. Do not touch the victim before the current is turned off. If the victim is not breathing, start artificial respiration, send for help and call a doctor. Continue artificial respiration until the doctor or ambulance arrives (figure 43).

Existing supplies

On any site, power supplies may exist below ground or overhead., contact should be made with the appropriate local or electricity authority at the planning stage of the job to determine the route and depth of any underground cables and the safety clearances advised, or if the finished job necessitates their rerouting, for this

to be carried out before work commences.

Artificial respiration: Continue mouth-to-mouth resuscitation until medical help arrives

Electrical installations

Electrical installations should be dealt with and serviced only by competent electricians. All forms of electrically operated equipment should be regularly checked and maintained in accordance with the manufacturers' printed instructions. If equipment appears faulty, do not tamper with the electrical part but send for an electrician. Wires and cables to fixed machines should be attached to walls or ceilings, and should not trail over the ground where they are particularly susceptible to damage and to moisture. Do not tie power cables in knots which can cause short circuits and shocks; loop the cable instead. If you are operating a fixed machine, an emergency stop device should be located within your reach. Before using electrical equipment:

- inspect it for any defects;
- check that the correct plug and fuse have been fitted
- never use makeshift connections to equipment, or to plugs, by sticking bare wires into sockets or contacts;
- check that the insulation covering wires and cables is not worn or broken;
- check that there is a good electrical connection at each joint of the earthing system.

Points to remember:

- If an accident is caused by contact with electricity, switch off the current immediately
- Never work on live wires or cables

Portable electrical tools and equipment

Double-insulated and all insulated tools are safer than ordinary tools because they incorporate layers of protective insulation to prevent external metal parts from becoming live. If you use portable power-driven tools, you need to be properly trained in their maintenance and use. Before operating a portable tool, check it to ensure that:

– there is no damage to the portable leads and plugs – they are subject to heavy wear on construction sites (figure 44);

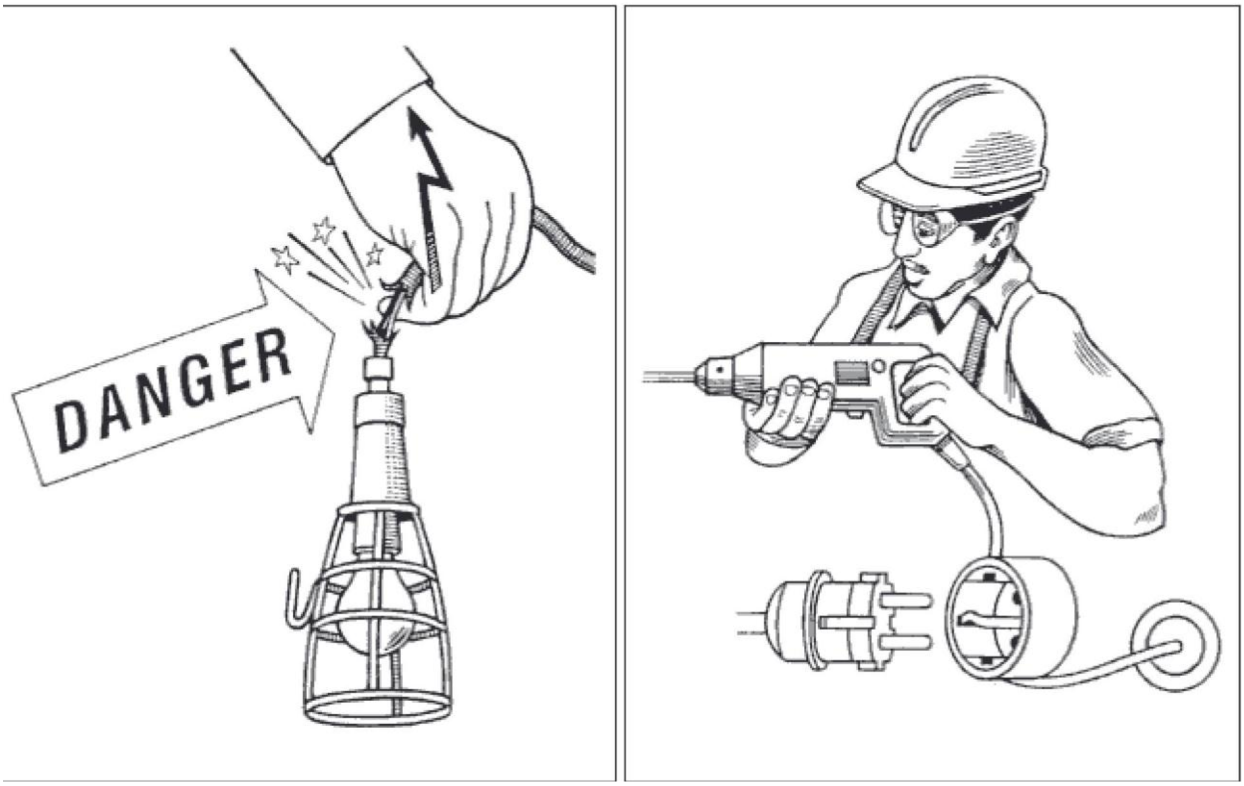
– there is a correct fuse;

– the tool is set at the right speed for the job;

– leads and cables are kept out of the way of other workers and are not in contact with water.

When you finish using the tool, make sure that the moving part is fully stopped before you put it down.

Electrical installations – pay special attention to the condition of temporary or portable electrical equipment and its cables



Welding and cutting

The welding and cutting of metal, using both the electric arc and oxyacetylene methods, is a process widely used in construction.

Electric arc welding

Danger from welding is not only to the welder doing the job but also to those working nearby. The risks include eye damage, skin injuries, burns and the inhalation of toxic gases.

The following precautions are necessary:

– The welder and anyone assisting should wear suitable protective goggles or use a face mask or shield to protect the eyes and face from invisible ultraviolet and infrared rays given off by the welding arc.

– Goggles must also be worn when carrying out weld chipping to protect the eyes from flying pieces of slag.

– The welder should wear protective gloves long enough to protect wrists and forearms against heat, sparks, molten metal and radiation. Leather is a good insulator.

– The welder should wear high-top boots to prevent sparks from entering footwear.

– Precautions should be taken against starting fires from sparks from the work area: burning particles are capable of starting a fire 20 m away. Good practice in electric The work area should be screened off with sturdy opaque or translucent materials so that other workers cannot see the arc.

– The workpiece should be well earthed, and all equipment should be earthed and insulated. starting a fire 20 m away.

Good practice in electric arc welding is shown in figure 45.

Points to remember:

• It is not enough to protect the welder – think of others working nearby who can see the arc.

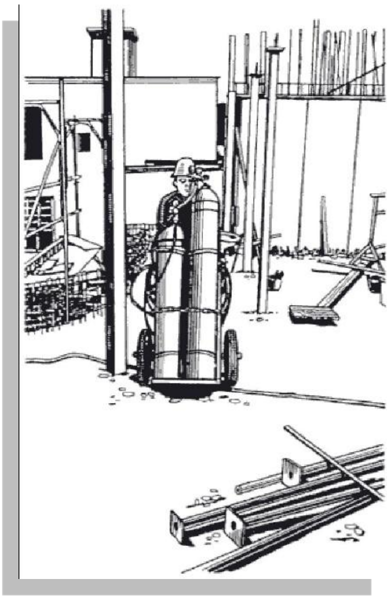
• Always switch off the current to the electrode holder when you put it down.

- Remove matches and lighters from your pockets.

Figure 45. Arc welding – workplace earthed, welder wearing personal protective equipment, workplace screened

Gas welding

Acetylene and oxygen are normally used in gas welding. The cylinders should be stored separately since any mixture from gas leakages could be highly explosive. They should be kept away from any source of heat and shielded from direct sunlight. If not stored outdoors, the store must be well ventilated. The cylinders in use should be retained upright in a rack or trolley and not left free-standing (figure 46). Flashback arresters should be fitted to the cylinder regulators



and non-return valves fitted in the hose connectors at the torch end.

Figure 46. Gas cylinders moved around the site in a trolley in which they are secured upright

The gas hoses should be in good condition and easily distinguished. They should be protected against heat, sharp objects and dirt, especially oil and grease. These substances can, even in small amounts, cause an explosive ignition in the event of a leak in the oxygen hose. All joints, especially on the cylinders, should be kept tight. If an acetylene cylinder becomes accidentally heated, shut off the valves, raise the alarm, clear the area of personnel, apply water (if possible, totally immerse) and send for the fire brigade.

Points to remember:

- Turn off all valves on completion of work.
- Never use oxygen to blow dust from clothing.

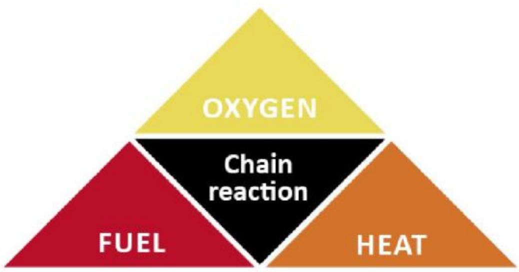
Fumes

Welding in a confined space, the use of some types of welding rod, or welding on certain painted metals may cause an accumulation of toxic gases and fumes. If local ventilation cannot be arranged, the welder should be provided with respiratory protection and a supply of fresh air. Welding carried out on metals covered with alloys of lead, cadmium, mercury or zinc may lead to a build-up of dangerous fumes requiring exhaust ventilation. Fumes may also be produced from paint and plastic on the surface being welded, and they should first be cleaned off.

Fire-safety

Fire theory

Fuel, heat and oxygen must be present in the right proportions for a fire to occur. This is often described as the "fire triangle." The addition of a fourth component, a chemical chain reaction, creates what is called the "fire



tetrahedron." Once a fire has started, the resulting chain reaction sustains the fire until at least one of the elements is removed. Below are some of the common causes of fires at construction sites.

OXYGEN	FUEL	HEAT
Normal atmosphere is 21% oxygen Additional oxidizers	Combustible waste Building materials Flammable gases/liquids Packaging materials	Smoking materials Open flames Electrical equipment Light fixtures Grinding/cutting metal

Heat Transfer

Heat from a fire can be transferred by three methods: radiation, conduction and convection. In a typical building fire, solid and liquid matter are converted to gases by heat, and additional heat (thermal energy) is released as the volatile gases are consumed through the process called burning.

Radiation

Thermal energy in the form of electromagnetic waves is called radiation. Hot solid, liquid or gaseous materials radiate heat that is absorbed by other materials. Radiation is probably the most typical method of heat transfer from building to building. Radiated heat can result in ignition of surface materials at some distance from the originating fire, causing what is called an exposure fire.

Radiation can also be the main driver of "flashover" in a room or compartment – that is, the transition from localized burning (for example, of a single object) to the burning of all fuel surfaces in a room or compartment. This most often occurs when the heat in a layer of smoke and gases near the ceiling radiates to all other surfaces in the room. When the amount of radiation reaches a critical point, all exposed fuel surfaces ignite.

Conduction

In conduction, heat is transferred molecule to molecule through the length of a solid conductive material, such as metal. The fire may follow the heat, or conducted heat may cause another fire to ignite. Conduction does not typically cause fires to spread between buildings, but it can sometimes contribute to spreading a fire within a building.

Convection

Convection is the most typical heat transfer method when it comes to spreading fires within a building. Convection is the transfer of heat from one place to another by the movement of fluids or gases. In the case of a building fire, heat is transferred by the movement of air, including the fire-generated smoke and other gases.

Radiation as well as convection can prevent firefighters from getting close to the seat of a fire.

Fire types

Fires are classified according to the nature of the material being burned (the fuel), and whether live electrical equipment is present. The primary purpose for classifying fires is to identify the type of material required to extinguish them.

Fire types are grouped below based on fuel sources:

- Class A: Ordinary combustibles such as paper, wood, cloth, etc.
- Class B: Flammable and combustible liquids and gases
- Class C: Electrical fires
- Class D: Combustible metals
- Class K: Flammable cooking oils

Firefighting methods

The method of fighting a fire depends on the fuel and on the presence of electrical hazards. In general, there are three approaches to putting out a fire:

- Starvation: Cutting off the fuel supply, such as by removing combustible materials;
- Smothering: Separating the fuel from the oxidant, such as by using a fire-retardant blanket to smother flames; and
- Cooling: Lowering the temperature below the material's ignition temperature, such as by applying water.

Fire extinguishers tend to either smother or cool the fire, depending on the type of fire. Small fires can also be smothered by fire blankets or by sand or earth, which are often in good supply at construction sites

Fire Extinguisher Types

The nature of the fuel source and its reaction to extinguishing agents dictate the type of extinguisher to be used. It is important to understand the different types of extinguishers, because using the wrong agent – such as putting water on a flammable liquid fire or electrical fire – can be highly dangerous and can even help spread the fire.

Extinguisher Class/Type	Extinguishing Agent	Extinguishing method	Remarks
A	Water	Cooling	Lower Temperature
	Foam	Smothering	Blankets cuts off air from fuel
	ABC dry powder	Smothering	
B	ABC dry powder	Smothering	Blanket cuts off air
	Foam CO_2, BCF	Smothering	Possible re-ignition
C	ABC dry powder	Smothering	Blanket cuts off air
	Foam CO_2, BCF	Smothering	Possible re-ignition
	Water fog	Smothering	Special equipment
D	Special dry powder or sand	Smothering	Water would produce H_2 and an explosion
K	Wet chemical	Smothering	Special fire risk based on cooking oils

Remember: If you have used an extinguisher, it MUST be recharged. Also, follow your local fire code requirements for servicing fire extinguishers. Typically, most require annual servicing.

CONCLUSION

At the end of summer and the beginning of autumn in 1991, unforgettable occurrence, which is ever kept and recorded in the pages of our country history, transpired, given that the official name of our country was shifted to the Sovereignty Republic of Uzbekistan from Soviet Union Uzbekistan. Independence Declaration was proclaimed on 31th August of 1991 and 1^{st} September was marked as the Independence Day. Announcement of the Sovereignty, in turn, resulted in the appearance of several issues in front of State Executives and this was due largely to the relaxation of State Policy and Administration Committee and System, lower spirit of the people. In order to eliminate this circumstance and flourish the life actualities of population, the President, Islam Abduganievich Karimov, paid special attention to every fields and sectors of society and the implement of several measures improving social, economic and political situation and these activities are still on effect. Twenty-five years have elapsed since then and current appearance of our country has altered so that it is difficult to recognize and compare to that was 25 years ago, facilitating new buildings as a purpose of education for all age groups and creating the special leisure places for the older layout of community.

As we all know, every holidaymaker visiting a particular country prefer to capture the image of themselves in front of attractive and extraordinary premises or sight-sighing places. Our country can be included in the list of countries where historical places and remainder are available and should be prevented from their disappearance and so the streets of our country is crowded with visitors. This point of view ensured that the focus of government policy has been on the context of construction, measures to designing much more complex and attractive building, increasing the extent of their complexity the application of advanced construction materials as well as technology to the stage of construction in the country. As Amir Temur put it like “If you would like to feel how much power we have, see the premises we erected”. These expressions and quotes may be used for the definition of our country because mesmerizing buildings based on the traditional style of architecture are being constructed day after day.

Present-growing young generation are the central focus of measures taken by the state runners. As the President always says on the conventions “The future of society depends on growing young people”, which means this layout of community should be multidisciplinary intelligent and powerful as a results the society will be ever unbreakable.

Hopefully, the building of Museum and Library of Urgench State University I designed for the degree of Bachelor will contribute to the opportunities facilitated to young people by government. This is because it is based on the shape of natural structure, beehive, as a purpose of making the building more attractive and encouraging. Designing these types of building is referred to as “***architectural bionics***” in the context of Architecture. The object of applying this shape to the appearance of Museum and Library Building of University is to define students as hardworking and studious as well as those who tend to contribute to the development of country as do bee for their family and themselves, which, in turn, encourage them to have the ability to compete with not only students of other universities in my country but also those of international universities/

The further function and preference of erecting Museum and Library building of Urgench State University I designed is to provide students with deeper insight the history and revolution of the university, given that there are small and separated in-built spaces at university that function as do the building projected and are not enough to give detailed information about university history and as a result purposed building will wake up a sense of pride and love in the mind of young people who are studying at university.

I realized that I fortified the acquaintance of architecture that I had picked up during the study at university at the end of project. The reason for that is the complexity of structure of building that had posed some challenges. Another important point that should be highlighted is that the desired museum and library has to be a comfortable for student’s use and functions of museum and library should not interrupt to each other’s functions and space. Notwithstanding, I was able to reach the destination that the project has been perfectly performed and completed – an appealing and natural shape of building (beehive) with the help of guide from my tutors and knowledge I had gained for half and four years at university.

The project I designed for the degree of Bachelor in the field of Architecture will pave the way for bringing more complex structural building to the life in the future. As the President, Islam Abduganievich Karimov, put it "We are never weaker than others, and will not be so forever", I will starve for becoming one of famous architects and make the name of my country well-known in terms of architecture. I am sure that designing this building was the first step on this road.

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Note: *All information extracted from aforementioned references have been rendered into English from its native language as well as those in English have been paraphrased.*