Old Dezful city as an ingeniously-developed unique architectural entity based on the locally-made brickworks for a flourishing municipal culture

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Abstract

Brick and brickworks of various shapes, sizes and dimensions had constituted as an important design feature for construction of residential and commercial places in the ancient municipalities such as the Dezful City. One of the distinctive characteristics of this type of ceramic material is its heat convection properties. Clay-based-brick blocks consist of unique qualities that help maintain the internal cool ambient within the building confines during hot period and keeping them warm during cold seasons. This had been the criteria for selecting brick as the principal construction material to complement the mortar for enhancing the strength and durability of old structures particularly those elegantly-designed architectural monuments. The aim of this paper is to investigate the physical and aesthetic characteristics of the clay-based bricks incorporated in public and private architectural structures in the ancient Dezful municipality. The methodology involves using secondary data complemented by interviews and fieldworks. These were then interpreted within a qualitative analytical framework for data interpretation. Results show that brick makers had to follow systematic procedures for surveying the soil properties to identify the most appropriate clay type for brick-making. They had merely sought those categories that consisted of fine-grains needed to improve the brick quality. It was also found that brick manufacturers had to have a sound knowledge of the optimum mud-mixture quality for attaining optimum moulding and shaping of raw clay into right dimensions of brick blocks for subsequent processing. That necessitated a sound knowledge of the techniques involved in ‘de-moisturising’ the compressed block mass before proceeding to baking. The latter involved a delicate process of furnace management to regulate the temperature in a range of about 200-300 °C. It also involved an accurate time scheduling for drying, pre-baking and final baking of the raw materials with a minimum of damage to the kiln’s structure and the product itself. The raw mud-blocks had to get through ‘dehumidifying process’ by setting the temperature in the kiln in such a manner to ensure high quality products. Results show the high malleability (leniency, softness) and versatility (tatbeeqpaziri) of clay-burned bricks for a wide-ranging design features and environmental conditions. It was found that the Dezful-made bricks had provided sufficient structural strength, sound aesthetic and environmental-friendly qualities for a whole variety of the locally-executed architectural projects. Research shows the brick blocks’ compatibility in complementing the mortar mixture for a speedy construction of a wide-ranging water-mill projects that later became effective locomotives for economic prosperity of the Dez riparian (situated along the coastal lines of the river). Brick blocks proved to be a very effective ‘sound-proofing’ and ‘dump-resisting’ medium for architects to justify their incorporation in buildings. Brick architecture also proved to be a distinct ‘environmental-friendly’ concept for generating a desirable microclimate for surrounding vegetation cover. Brickworks had also had a widespread
application in water-mill construction along the River Dez, as well as constituting as the major material components of the ancient city bridge, which until recently was the only ancient monument of the kind still being operational. Architects had constructed this exquisitely-style, integrated, consolidated and rigidly-built bridge with the locally-made brick blocks complemented by a unique mortar mixture that had reportedly included metal chips to produce a solid structure. That had meant to reinforce the solidity and robustness of the bridge’s sub-structures to withstand shear stresses and kinetic energy associated with turbulent hydraulic flow of floods. Its architectural features provided the strength to serve as a firmly stable and reliable passage route on one hand and functioning as a rigid diversion weir on the other. The Dezful architects had supposedly modelled this integrated structure with the intention of acting as a re-regulating dam to channelize the flow for downstream command areas. Brick-making and brick-working practices seem to have become institutionalised as the part and parcel of the Dezful city’s architectural practice and culture. It seems to have been instrumental in rapidly-developing and spectacularly flourishing a unique colony of highly-compacted residential and commercial centres of civil and municipal excellence (taaalieh-madanee). The end products were later renowned for their unprecedented aesthetic quality, artistic novelty, architectural sophistication, exquisitely features, tasteful picturesque, charmingly old-fashion style, physical strength and durability.

1-Introduction

Dezful is arguably one of the exclusively unique ancient architectural creations in the form of the brick block-dominated municipal centre of the ancient Persia. The city itself was strategically placed along the coastlines of the permanently-flowing Dez River in a place now called Khuzestan in south-western Iran. The city was reportedly the first point of settlement in the southern foothills of the Zagross mountain ranges endowed with material abundance and climatic conditions suitable for a thriving community. It had been founded and was subsequently developed on a relatively highland overlooking the river. It was and still is a well-known place for its unique physical skeleton, the ways in which its constituting parts and the juxtaposition of its sub-settlements ensured easy defence against the potential intrusion of trespassers, aggressors, invaders and raiders.

The original places of settlement were along the coastal heavens of rivers. They initially settled mainly in the excavated caves dug horizontally into the cliff faces that composed of solidly cemented gravel materials known as the Bakhtiari conglomerates formed during various geological processes. These points had about three-four meters elevation from the normal river flow for people and their animals to be safe while have ready access to water. Residing by the river had the added advantage for the people to guard the water intake structures that diverted flow into their Kaareezes.

The climatic condition of the region suited the aspiration of people elsewhere and when they had arrived, the newcomers preferred to settle along the coastlines of the river. Such immigration trend seem to have had congested the area as the evidences of the two-tier or three-tier cave-construction systems suggest. The population explosion necessitated demand-management provisions on essential life-sustaining commodities like food and fibre and welfare-enhancing domestic appliances. Water supply had therefore, became vital for these purposes. On the basis such realities, the craftsmanship was absolutely vital for promoting the supportive infrastructures to fulfil the aforementioned objectives. In line with this strategic objective, numerous water intakes structures were designed and constructed on both coastal cliffs of the River Dez to divert the flow into the Kaareezes supplying water to downstream command areas. The first of these water intakes was built on the adjacent cliffs of the River Dez within the geographical enclosure of the current Dezful city. The subsequent northerly-growing Kaareezes stretched to a distance of approximately fifteen km in a place called ‘Kuppiteh’. This substantiate the argument that the availability of the architectural skills and rapidly-developing craftsmanship in conjunction with the general recognition of the public on the need to meet the increasing demand for water had motivated the stakeholders to inaugurate design and construction of the pioneering knowledge-based water conveyance system.

As the expansion had reached its peak, the new settlements emerged on the highlands overlooking the river creating what is currently called Dezful City. The horizontal development of the emerging municipality seems to have followed a fast process due to the availability of appropriate locally-produced construction materials. The gravels, lime stones and clay seemed to be abundant. The ancient architects had little problems with the robustness of structures they expected to design, as the regional terrain was unique in its physical and chemical features. The top soil in the vicinity of the ancient Dezful City was principally constituted of the layers of fine grains geologically structured to form a loosely-compact mass of aggregated particles on top of a thick layer of gravels below it. The clay had to be mined for manufacturing a whole variety of shapes and sizes of brick blocks required as an architecturally, practically and environmentally feasible construction material for development and growth of what subsequently emerged as the Dezful municipality.

The process of soil mining involved possessing some skilful knowledge of soil sciences and sophisticated excavation technology together with the expertise to complement it. The miners or ‘Moqanees’ had to be ‘eye-trained’ on qualitative aspects of soil chemistry and soil physics. It was only a certain soil quality that in their view had merited excavation operations and gravel removal. This had presupposed a meticulous and tedious process of surveying works and testing
the aggregate sizes and types in order to ascertain their suitability for subsequent processing and use in construction projects. Soil textures and soil structures were happened to be among the fundamental criteria for assessing whether or not a certain clay type would suit the intended purpose. Such elaborately-planned and executed exploration functions seem to have added an benefit for the miners to gain precious knowledge of the local hydrogeology (investigates the processes by which the processes by which water occurs underground and on the surface of the earth) and geomorphology (study of the physical features of the surface of the earth and their relation to its geological structures). They seem to have acquired such expertise that was not necessarily proportional to the limited resources available to them at the time. Their architectural and engineering ingenuity had presumably helped them in developing uniquely-innovative techniques and simple tools of effective utility to undertake their exploration and surveying works. They had seemingly succeeded in making endevour to use their limited resources optimally and cost-effectively. As civil expertise of architectures further developed, precious opportunities had then emerged for the initiation of plans and designs to construct hydraulic structures aimed for water abstraction and conveyance purposes. The performance quality of these subterranean galleries known locally as Qomesh had become a neatly blueprinted architectural scheme for subsequent development of the Kaareezes or Qanaats elsewhere within the then Persian dominated territory. It would be simplistic to argue that such a widespread development and outstanding advancement in underground structural engineering and architecture domains had happened in a vacuum. Because this had seemingly necessitated the development of effective tools and excavation techniques as the means of overcoming a whole variety of challenges involved in the excavation works. These were the laborious process of cutting through the cliff face constituted of the naturally-cemented Bakhtiari conglomerate geological formation. The excavations performed on both the horizontal axis of the gallery and vertical axis of the access shafts to complete the basic infrastructure of this integrated and interlinking underground watercourse. Various appurtenances and sub-elements had to be reinforced by incorporation of baked brick blocks and a locally-developed mortar mixture known locally as the 'shelleyeh-chitt-ahlahk' consisted of a predetermined mixture of fine sand aggregates, calcium carbonates powder, and clay processed with certain moisture content. Such mixture had to be subsequently matured and chemically cured. These were crucial to provide desirable slump (collapsing, falling) characteristics for an effective mortar’s adhesive. The latter was a prerequisite to improve the functional quality of the mortar mixture as a complementing material for brick blocks to finish the integrated Qomesh structure and make it ready to start its water supply functions. Research findings point at the crucial importance of readily available reliable water supply that the architect had to bear in mind for economic wellbeing and survival of the people who must have had unanimously welcomed and supported the construction of the ubiquitous service-provision Qomesh. It is a widely-held hypothesis that the combination of the regional economic, social and strategic expedienies had placed the aforementioned water supply system as the top hierarchy for municipal planning. The feasibility study of the architects was based on the philosophy that both food production and hygienic drinking water constitute as the principal objectives of constructing the welfare-providing aqueducts around Dezful. The design architects were aware of the ‘wealth-generating’ potentials of their designated scheme for water users who would be more than committed to plough back part of their income on an improved lifestyle that goes with higher income. Establishment of the Qomesh as a ‘life-sustaining’ and ‘wealth-generating’ architectural monument was seemingly instrumental in supplying irrigation water flow to croplands, the outcome of which would be to replenish the food-storage silos known locally as ‘Keraakhe’. The water-supplying Qomesh was also seen to be instrumental facilitating the rapidly-developing and flourishing industries that brought about economic prosperity and material security for the people using it. Such spiral growth had presumably made it necessary for the city planners to design and develop a physical marketing layout for easy commodity exchange. That in turn, had required specifically-made construction materials for the new scheme. Knowling the abundance of construction materials in the vicinity, it must have been the clay that had attracted the attention of architects and engineers for processing. Desirability of the then available soil type seem to have had convinced the pioneering architects to opt for making clay-based brick blocks to be subsequently incorporated into what later became as the fashionable ‘brick-dominated’ residential complexes. It must have taken centuries before the architects have had to go through a gradual evolutionary process of discovering the suitability of bricks as the sound materials for their civil structures. The architectural pioneers had had to employ some specifically-mined fine-sized soil consisted of predominantly clay particles in a mixture that had to have certain moisture to produce a mud aggregate for moulding into the predetermined mass block shapes and sizes. The mud mixture consisted mainly of soft earthy material when moist but got harder when it underwent dehydration to get dry. The clay material used for brick-making was chemically composed of aluminium silicates suitable also for making tiles and potteries. It consisted of a thick soil type possessing certain clinging (sticky, adhesive) properties. It some cases, the soil they employed contained other minerals which is reportedly and evidently undermined its purity and suitability for the purposes of manufacturing brick blocks. Under the circumstances where the clay aggregate contained certain proportion of chalky substances, known locally as ‘Chailloons’, the quality of finished product had suffered as a result. The baked brick blocks containing excessive proportion of Chailloons were vulnerable to disintegrate into fragments immediately after baking. If that did not occur immediately after the cooling process, it would have certainly fragmented into pieces at later stages. Regardless of whichever phases such incidence has happened to occur, the loss of precious construction materials, as well as the economic burden and the environmental consequences would be highly detrimental to both the manufacturers and users. It is for those fundamental reasons that the proper surveying of the soil type had been of paramount for the architects to consider in their feasibility studies. The brick-making process involved naturally-drying the moulded clay bricks for the subsequent baking in locally-
adopted furnaces or kilns. There were alternative materials for making blocks of bricks made up of a mixture composed of clay and sand. However, their quality was inferior relative to those made of pure clay material. The latter tended to produce a robustly-made compressed mass block of tiles in all varieties and dimensions that happened to suit civil and engineering contingencies as well as being adaptive to local environmental requirements. They were relatively light weight but somewhat robust possessing certain heat-conveyance and heat transfer qualities. The properties of these types of brick blocks enabled them to maintain the structures cool during hot periods and hot during winter season. Incorporation of such construction materials provided an added advantage of being malleable while being able to withstand relatively high pressure loads. The latter had proved to be important under the critical circumstances when the brick blocks undergo scraping and scoring to shape their surface and being modified using sharp or pointed objects like axe ‘teesheh’ or chisel to obtain desirable shapes and dimensions without the risks of cracking or breaking. It was to do with characteristic quality such as malleability associated with brick blocks that seem to render them aesthetically attractive for architectures to incorporate as appropriate construction materials in their municipal buildings. The importance attached to the aforementioned parameters warrants and justifies a critical empirical academic investigation. The present paper aims to investigate the background processes involved in selecting the materials and practical procedures for identifying appropriate clay type for brick making and brick baking. The particular emphasis is made on the application of these locally-made construction materials in developing the ancient Dezful City with its unique municipality that is predominantly made up of brick blocks.

2-Materials and Methods
The methodology involved application of secondary data from available literature, coupled with the primary data collected from the open-ended and structured interviews that were complemented with the extensive observations and field works. These were used to improve the reliability and validity component of the research findings. The collated data (texts, tables, information and sets of figures) were subsequently interpreted within the qualitative analytical framework to shed lights on various aspects of the issues in question. The major area of investigation consisted of the ancient and present Dezful municipalities including its various structural monuments that were designed temporally and spatially. The major focus was therefore, on various architectural and engineering works that had incorporated brick blocks as the major material ingredient in residential areas and market places. Some focus was also made on other consideration of importance such as the incorporation of unique stone work in construction of the hydraulic structures like the water mills.

3-Results and discussions
Results show the prevalence of systematic procedures that had followed in all phases of brick-making, involving an elaborately-conducted survey of soil properties as a means of identifying the most appropriate clay type for the purpose. The architects had to opt for those categories that predominantly consisted of fine-grains required for processing a mud aggregate mixture of cohesive quality that the ‘Geleh-mooch’, as known locally, could have exclusively offered. It was also found that the manufacturers had to have a sound knowledge of ‘optimum mud-mixture quality’ that could have optimally been processed and cured for easy moulding and shaping into blocks of desirable shape and dimensions for later baking. Fulfilling tasks of such nature had necessitated a sound knowledge of the techniques involved in ‘de-moisturising’ the compressed block mass before taking them to furnace. The latter involved a delicate process of furnace management to be able to regulate the kiln’s temperature. It had also involved accurately-setting the time schedule for drying (dehumidifying), pre-baking and baking of raw materials in such a manner to incur a minimum of potential damage to the kiln’s physical structure on one hand and improving the strength and aesthetic quality of the final product at the post-baking on the other. Results show the high malleability (leniency, softness) and versatility (tatbeeqpaziri) of the clay-based bricks for a wide-ranging structural design features as well as their adaptability to regional environmental conditions. It was found that the architects had every confidence in the quality and durability of the Dezful-made brick blocks for ensuring sufficient structural strength, aesthetic and environmental-friendly qualities considered to be crucial for local projects. The brick blocks were seen to be the finest construction material available for internal and external walls of the inner section of building as well as being suitable for the ceilings. Bricks were also seen to be appropriate materials to design the lattice-styled perforated walls consisting of bricks fastened together with square or diamond-shaped spaces left between erected around the walls on roof tops, used typically as a screen or fence to ensure privacy. The purpose of incorporating these perforated brickworks is to capture and physically manipulate the night flowing breezes during the hot season. These perforated walls had meant to generate a desirable aeration for comfort while simultaneously providing the residents with the luxury of heavenly coverage, without which they would have been unable to enjoy. It was found from the evidences that the locally-manufactured brick blocks had demonstrated a high compatibility with the locally made ‘melaate-gel-ahak’, a type of mortar similar to ‘saarouj’ to produce stable structures. The latter happened to prove as an effective complement to brick blocks in producing a wide-ranging integrated, rigid and robust structures like the water-mills (owssiow-ovwee). The latter were later to become an effective processing industry or as some would suggest, powerful locomotives for economic prosperity and welfare-enhancing of the neighbouring communities as well as the other beneficiary regions deriving advantage from the services they rendered. Their durability and longevity as manifested by their integrity and solidity attests their acclaimed ‘stress-resisting’ quality despite their exposure and vulnerability to the highly-potential environmentally-degrading turbulent steam flows.
Brick blocks proved as a very effective ‘sound-proofing’ and ‘dump-resisting’ medium for ancient architects to justify their application in a wide variety of ancient buildings. Brick architecture was therefore, proved to be a distinct ‘environmental-friendly’ concept, particularly in generating a desirable micro-climate for the surrounding environment especially the in-house vegetation cover. Brickworks had also had a widespread application in the water-mill construction along the River Dez, as well as constituting as the major material components of the ancient city bridge. The latter was designed and constructed in such a manner to have had the endurance in bearing the traffic loads of not the traditional types for which it was originally designed for, but also for much heavier ones it often became subject to. It was until recently that the ancient Dezful Bridge was thought to be the only remaining ancient monument that has stubbornly (sarsakhtaaneh) remained operational. Ancient architects had therefore, designed and constructed the multi-purpose Dezful Bridge with locally-made brick blocks of high-quality. The latter were used in conjunction with a unique mortar that was reportedly consisted of the calcium carbonate, clay, fine sand grains, water and some metal chips to complete the concrete mixture. This synthesized mixture known locally as ‘mellaat’ had evidently possessed a certain quality to chemically set in such a manner to have a desirable slump while being cured. Architects were aware of such mellaat quality, which in their view; would have produced an integrated solid structure when it is used in conjunction with the brick blocks to construct buildings for wide-ranging purposes, functions and environments. Due consideration in providing a desirable mellaat mixture to hold the brick blocks firmly and securely in the erecting structure, was meant to reinforce the solidity and robustness of the Dezful Bridge’s sub-structures and those of its upstream watermills. Both of these hydraulic monuments had necessitated some physical integrity and structural rigidity to withstand shear stresses and obstructly (obdurately, stubbornly) overcome the challenges posed by kinetic energies. It would have been crucial for the structures to retain a very high stability and stress-resisting quality to be ensured against the frequently-recurring turbulent flows during winter and spring floods. The ancient architects had little choices but to include certain features in their bridge design and construction concepts to enable the constructed hydraulic monument to serve as a rigid passage route on one hand, and to equip it with the appropriate appurtenances to function as a diversion weir on the other. The practical explanation for modelling this integrated structure by the architects was that they would have acted as a re-regulating dam intended to be able to feed the flow into streams supplying downstream command areas. They seem to have had certain provisions in the original design layout so that the intended damming up of such large river would have resulted in a minimum of adverse environmental degradation and eco-system disruptions. Such architectural design features would have made it possible for the water flowing in the river to remain hygienic and to ensure a productive eco-system in the surrounding environment. Research evidences further suggest that the architecture’s interventionist strategy in undertaking the supposedly ‘anti-environmental’ intrusive works on the river bed intended for constructing the ancient Dezful Bridge might after all , have had certain benefits for the communities benefiting from it. Some might now criticise the designers of the ancient bridge for their allegedly disrupting the natural flow regime across the river over the construction site. What seems to be missing in such argument is that the bridge in question had been designed with some exclusively unique in-built features to enable the structure to function as a temporary storage reservoir. That was meant to delay the passage of flow downstream in a sufficiently long period of time for it to be artificially drawn or recharged rapidly down to the underground reservoirs. This made it possible to carry a massive volume of water void of ‘non-point’ and ‘point-source’ pollution or the type of poisonous substances such as the oil, pesticides, herbicides, fungicides and similar pollutants with it into the deep layers. Instead of exacerbating process of ‘pollutant-generating’ activities associated with modern industries [Lanz 1995] and agricultural production system [Hedayat, 2005], the post-modern era has witnessed, the bridge-based water harvesting techniques pioneered by the ancient architects in Dezful, to have benefited rather than degraded the environment. The bridge seems to have had in-built provisions in its design for minimisation of disruptions in the deeper layers of enclosed water bodies in the Dez river basin. So much so, that such architectural approach has had the added advantages of replenishing as opposed to diminishing the adjacent underground aquifers. The architectural approach taken then was in stark contrast with current practices of water users who happen to think that they have the right to defy the morale codes of conduct and to jeopardise and plunder the long-established deep-laying water bodies estimated to be about 10,000 years old, the replenish process of which is painfully slow and very gradual [Lanz, 1995]. The architectural design configuration in the ancient bridge had also provided an abundant supply of unspoiled pristine surface water in its natural condition for the downstream command areas. That has had taken care of the water supply provision without incurring adverse impairment to the river system as reported to be the case for the River Thames, the Mersey the Elbe, the Ooze and the Rainines. Bricks, as the fundamental construction materials, had been readily available to ingenious municipal design architects who had incorporated them in residential and commercial structures being well-aware of their characteristic qualities. That had evidently attracted the attention of most of the then ‘well-to-do’ social classes who could have had afforded the luxury to settle and thrive in those attractively-built environments. The architectural style of the major urban centre of Dezful municipality, had by any standard, fitted the strategically-important defence requirements. This was achieved by encircling the city centre with the locally-made brickworks and mortar to establish an impenetrable enclosure. This design configuration, from architectural point of view, was indispensible for sealing the city dwellers and their precious possessions from potentially hostile threats. Within that meticulously-planed brick-wall confinement, the centre was safe to use its inter-connecting public ring-routes for daily activity. The design configuration and proper locations of the intersected junctions, on the other hand, had ensured fast-tracks for the commodity exchange and catered for a strategically important defence provision to protect the then burgeoning economic centres.
Research evidences suggest that the ‘comprehensively-devised’ integrated planning concept took account of the whole sorts of architectural, commercial, logistics, welfare and environmental aspects of the municipality culture into consideration. The specifically-designated locations, particular geometries, calculated scales, practically-assessed sizes and general physical appearances and features of the architectural design adopted, were considered meticulously and with a specific philosophical reasoning behind it. Some were considered for underpinning the structural foundations under circumstances where the structural strength of the intended monument was of crucial importance for architects who planned them. Incorporation of the interconnecting structures like Sabaats in design of some residential complexes was thought to be a part of structural utility to serve various practical and aesthetic functions. Their prime function was to connect the otherwise two or more independently-designed and built residential units of the same family in both sides of a public pathway to provide an adjoining neighbourhood, having a safe access for the occupants of the two wings. This integrated ‘security-conscious’ municipal planning by the architects ensured that the siblings could be in close communication with each other and be able to rise the alarm in emergencies. Alternatively, the architectural features like those incorporated in the uniquely-stylish Sabaats were incorporated to function as the observation towers. They were employed to supposedly protect the residences that would have had a clear view of the outside world from their impenetrable fortresses to raise the alarm on time and improve the defence preparedness.

The other function of the Dezful-styled Sabaats was in their design layout to separate the main residential places from the stable and barn. The latter were consisted of a building set apart and specifically designed and adapted to provide a suitable sheltering for animals. These types of architectural designs were demanded by the feudal and land-owning aristocracy who had flourished by the burgeoning economy of the post-Qanat modernisation era. They seemed to have sought a planning concept for their domiciles, homesteads and courtyards to be a separate entity to that of their stable and animal barns. The architecture stipulated that main residential complexes of the chieftain and his family being located on one side of the public pathway and the stable adjoining compounds for the servants and workforces with a ready access on the other. Such a holistic approach to the integrated municipal and civil architectural design concept was supposedly meant to establish a well-defined residential colony. It seems to have meant to project a powerful image of their influential occupiers and the status and wealth attached to them. So, the Sabaats can be said to have been the elitist’s symbols of power, status and prestige bestowed on the distinguished members of society. They seem to have had the objectives among other things to express a particularly innovatively designed and constructed an elegant architectural style with the outstanding attraction and aesthetic features. The Sabaats were therefore incorporated into certain residential complexes to function as the impenetrable defensive fortresses and effective stumbling block for the residences to deter and hinder the intrusive behaviour of uninvited trespassers into their privately-sheltered domiciles.

4- Conclusions and recommendations

Brick-making and brick-working seem to have become institutionalised as part of the city’s architectural culture. It had seemingly proved to be a unique construction material of uniquely desirable versatility with a wide variety of shapes and dimensions. These were made to complement other local materials like mortars for producing rigidly-built integrated structures for performing functions under various environmental and operational conditions. The brickworks had made it possible for the interaction and exposure of the built structures (like bridges and water mills) with the dump environments of the waterways and the like. The crucial importance of brick blocks in withstanding the critical pressure and stress loads under the circumstances of being exposed to flow turbulence should not be underestimated. That bricks possess general features in reinforcing the strength and rigidity of structures to maintain their integrity and stability under critical operational conditions. These render the brick-incorporated structures as uniquely desirable for all sorts of civil applications. That brick blocks are relatively cheap to manufacture, subject to the availability of raw materials and absence of clumsy legal sanctions governing the mining of clay given the aggressive environmental opposition to the prevailing degrading activities being carried out on the hitherto croplands for industrial rather than agricultural activities.

The brickworks had equipped the ancient architects in Dezful with sufficient material armament to inaugurate and initiate an innovative approach to municipal design that was unprecedented at the time and was to become a prototype for further refinement and modification in design concepts. These building materials happened to be the brainchild of the local architects who ensured their availability for use in all seasons and under any condition and in whatever spaces deemed (considered) necessary. It had been for these fundamental reasons that bricks and architects were the two sides of the same civil development coin. The architects could not have produced works of outstanding quality and character without bricks being readily available to be incorporated into their stylishly-designed civil monuments. So much so, that the active interaction of a thoughtful subject (architects) with the supposedly soulless and lifeless objects (bricks) had produced some majestic monuments of certain expressive elegance, possessing unique durability and functionality on one hand and the aesthetic and intrinsic values on the other. The theory which maintains that the aesthetic nature of the brickworks in buildings provide an inner satisfaction for their occupants is substantiated by the advocates who stress that exposure and access to the fine arts is intrinsic to a high quality of life. We desperately need the latter to sooth our souls under the stressful life-style of the post-industrial, post-modern and ‘high-tech-dominated’ era.
5- References
