CHAPTER 9

9 PEDAGOGIC METHODS AND REPRESENTATIONAL TOOLS IN KALYANI CHALUKYA TEMPLES.

It has been seen that the text/typology approach has limitations as they cannot give a complete set of tools for a temple that can actually be constructed. They certainly are helpful in classification and can give a broader direction but not a construction method. If it becomes too formulaic, all the structures shall lead to same form and rigid and if it allows freedom and flexibility, it will lead to too many interpretations and in the end unmanageable as a construction system. Looking at the precision of the details in temple architecture, where each course is interwoven into the others almost seamlessly, needs a very well laid conceptual and constructional system.

9.1 Missing links: Absence of drawings in the canonical texts

The parametric method of path and profile gives a very clear tools of developing a conceptual system to conceive a temple and also a method as described earlier and it is a precise constructional tool as well. However it is not correct to think that this parametric method was possible in 9th to 12th century AD as we deciphered it now with computer aided CAD tools, there must have been a simpler method of representation and instruction. It raises a doubt how such an obvious constructional system is missing in the traditional texts.

The missing link is that the text describes and interpretation of representational tool like drawings or recorded systems of geometry is absent or yet to be found. Therefore what could be deciphered is all from the field studies and is largely of interpretation that are the least indicative if not conclusive.

9.2 Fundamentals: The basic horizontal and vertical lines

We have observed elsewhere that there are some simple and geometrical bases of temple construction

a. Symmetry along cardinal lines with a vertical centrality.

b. Exact horizontal layering of stones
c. Division of lengths in multiples of 2 for the ease of measurements, especially along vertical talas.

d. Use of horizontal and vertical and horizontal lines as absolute baselines. Curves and slanted lines are secondary deviations from the basic geometry largely for decorative or aesthetic. Talas and moulded layers were absolutely horizontal and stambhas and walls were absolutely vertical.

These perhaps were the most basic rules on which the entire temples under this study were constructed. As all constructions are to be against gravity it is understandable that, like elsewhere buildings, these temples also used these basic rules to stand up. These rules were the basic understanding on which the expertise and execution of temples of this region and period were made and must have been taught from generation to generation. They were also the basic tenets of pedagogy. Line and plumb, as the later constructors understood and developed everywhere should have been used here as well.

9.3 Scaled Models

Scaled models or miniatures models might have been one method that must have been used as guides. We find scaled models in many temples and they were used as adecles in temples. It is logical to think that these scale models were training methods and instructional tools for later builders. For the details of construction mostly, by horizontal stacking of layers of stone, some kind of codified systems might have been formed as a detailed parametric method consisting of width and height or projections and deviations from path of a basic form. There might have been methods to terminate certain geometrical instances and might have been guidelines to start slightly different path.

9.4 Kampa or offsets along profiles

To investigate this one of the term 'kampa' defined in manasara is re examined.

"KAMPA / KAMPANA, is a fillet, a small flat band which occurs chiefly between mouldings to connect or separate them. ' Of all the rectangular mouldings it has the least height. Its projection, though generally equal to its altitude, frequently varies according to the position of the principal members, which it is employed, to connect
or to separate. It answers in every respect to the fillet." (Acharya.P.K) ref 9-1 images below

9-1 Identification of kampa by Manasara (from Acharya- encyclopaedia of Indian architecture vol-2) and image of kampa in a partially dismantled temple at Ittagi Mahadeva temple.

From the perspective of path and profile method these 'fillets' can be understood as the offsets that are generated by the path. Literally 'kampa' /'kampana' are synonyms' of vibrations or waves. In geometrical terms they can be represented as offsets generated by waves or vibrations. In the effect it is the offset of an outline of a path to suit at a particular position on the profile. To explain this pattern of form generative concepts at micro level, a partially dismantled temple at Ittagi Mahadeva complex is chosen. The partially dismantled temple's plinth shows many of the courses intact at its location with few courses missing. (this is an ideal example for study of each course and its related "kampa"

Figure 9-2 various stages of data processing showing mesh, solid dense surface, surface with photographic textures and sliced mesh both in vertical and horizontal levels to acquire paths and profiles.
9-3 Interpretation of *kampa* as offsets from one single path leading to paths of every other course refer the image above in which the main path (represented in blue) and all other lines are generated by offsetting them keeping as each mouldings "*kampa*"

Figure 9-4 course by course with their *kampas*
From the simulation of form generation of each course by extrusion by it's path, it automatically generates the 'kampa' or the path for subsequent profile of the course to follow. This gives to a very well calculated conjecture that each course's geometry is self generative and automated, thus there are very minimal chances for errors in execution of the work as there is only one way of joining (the upper kampa and lower kampa at their junction have to be identical) However the system also gives enough freedom to refine/ redefine the each course profile to allow ample variations in the different models. Perhaps this can be understood as a unique pedagogical way of form generation and even a communicative mode at constructional instructions.

Figure 9-5  screenshot image showing different coerces with their corresponding "kampa”s generated by subsequent courses.

Figure 9-6  Image to show the identical geometry of lower kampa of course 2 to correspond with upper kampa of course 3
9-7 image of the mesh highlighting the profile creating upper and lower kampa

This construction system generates a very tight interwoven course-wise geometry of masonry. Each course leads definite geometrical footprint to be followed by the subsequent course and thus creates a definite resultant form yet it allows possibilities to an artisan if he wishes to change the profiles to achieve a distinctly different form can be achieved (For example in the above plinth course no 4 has 3 floral offsets called thridala padma pattika, and if the artist intends he can even go for either four or five offsets). This would lead to another course that can get a new guiding path to follow.

The effectiveness of this can be seen in one of the plinth of kashivisvewara temple of Lakkundi in which some of the micro niches that seems to be explainable only by very faithful following of these constructional instruction systems. The example of Kashivisvewara temple of Lakkundi poses a very unique challenge as the outline of each and every course exhibits a wide range of changes and also many experimental details that are marked deviation from the courses below, yet following the same kampa truthfully.
Some of the micro level details like very small groves of 4 mm that are observed in the upana level ref image above, which otherwise cannot be explainable to match very precisely, which invariably prove that it is not merely coincidental. The changing geometrical configuration which rose by using the vedi as a path and with the vertical section as a profile. The varying geometry of each and every course is explainable with this similarities by path profile approach. In spite of these changes in design the geometrical derivation of the form shows a conclusive evidence of a system driven and a self generative geometrical approach by its builders.

9.5 Profile and path markings

The certainty of the entire complex three dimensional form being represented by just two lines encourages one to investigate such line representations in the contemporary drawings made by these artisans. A recent observation of line drawings made by the artisans at Ashapuri and Bhojpur are highly promising to look at them as path and profile awareness by the artisans. The majority of the drawings found show only sectional profiles and part plan paths rather than the entire scheme of plans, elevations or any other drawings or presentations (refer fig 9-9 Figure 9-10)
9-9 Line drawings of profiles found at Ashapuri site and an unfinished stone of plinth of Bankapur Nagareswara temple complex

Figure 9-10 Line drawings/ representation of profiles found at temples of Ashapuri.

Thus the method has a potential of a conceptualising tool as well as a precise execution tool. The simplicity of method of conveying is the entire concept is deducible to two simple lines which are often seen in the construction sites as markings shown in the photograph above. This shows how the combination of offsetting and profile as guides, the path and profile could be imagined without a computer in a codal format and executed tala by tala, course by course. The visualisation is in terms of the profile and is codified into a path by 'kampa'