EMERGENCY EARTHQUAKE REPAIRS TO THE TALEJU TEMPLE

ANNEX TO THE PROJECT PROPOSAL | NOVEMBER 2011

SUBMITTED TO

THE PRINCE CLAUS FUND: CULTURAL EMERGENCY RESPONSE PROGRAM

Kathmandu Valley Preservation Trust

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Cover image
Mul Chowk courtyard photograph by Robert Polidori, 2007

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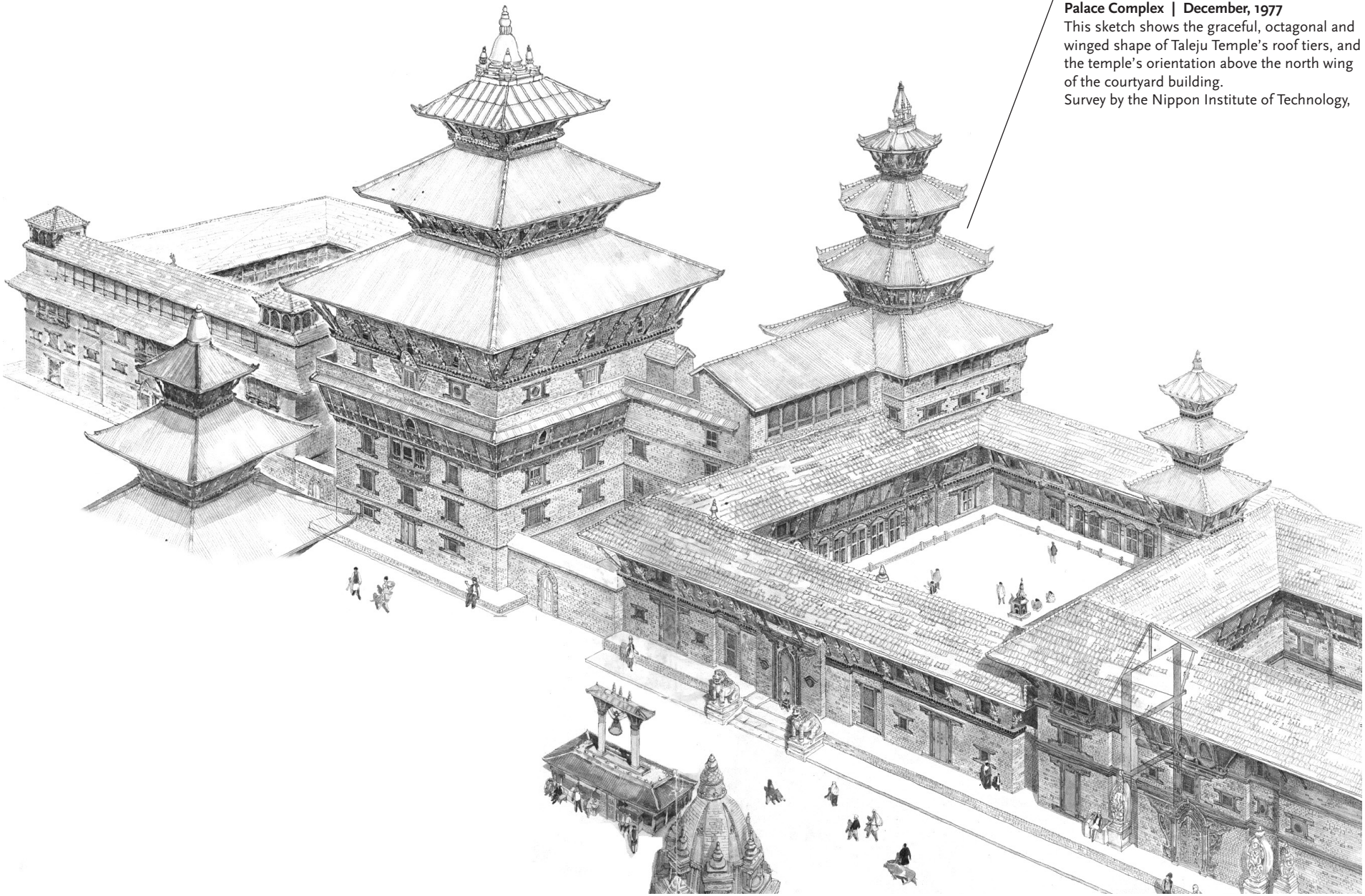
Taleju Temple
The four-tiered rooftops of the Taleju Temple soar above the buildings of the Royal Patan Palace Complex. Here the "floating" nature of the temple is easily seen.

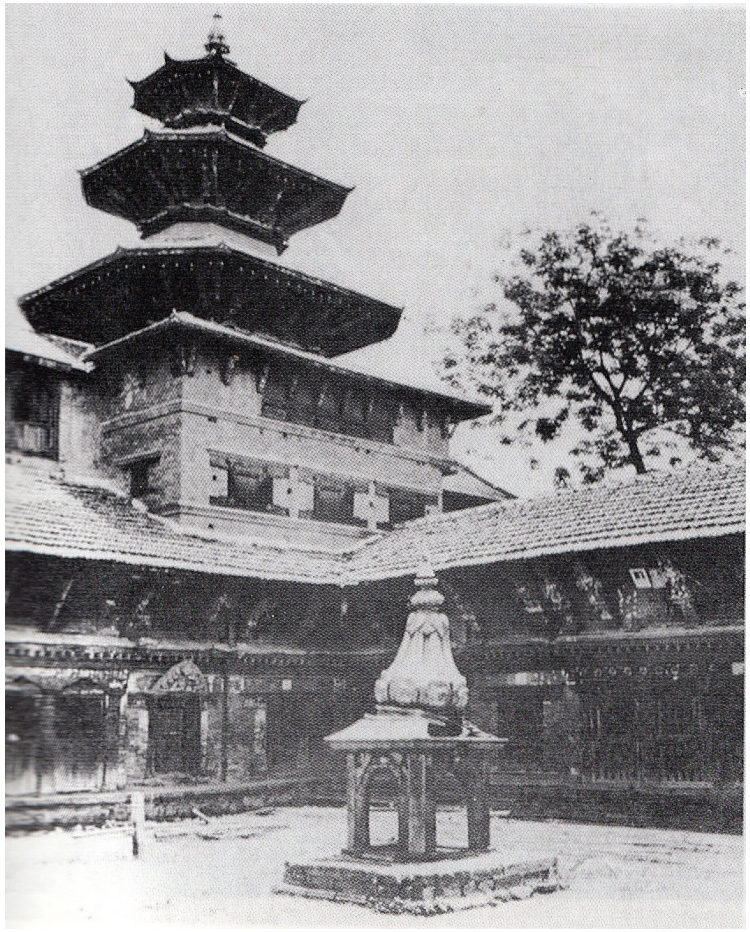
Mul Chowk North Wing
The north wing of Mul Chowk, Nepali for "main courtyard", upon which the Taleju Temple was built as an addition to the courtyard by King Shrinivas Malla in 1671 BCE.

Aerial view of the Patan Royal Palace Complex | July 2005



Taleju Temple in Axonometric View of the Palace Complex | December, 1977
This sketch shows the graceful, octagonal and winged shape of Taleju Temple's roof tiers, and the temple's orientation above the north wing of the courtyard building.
Survey by the Nippon Institute of Technology,

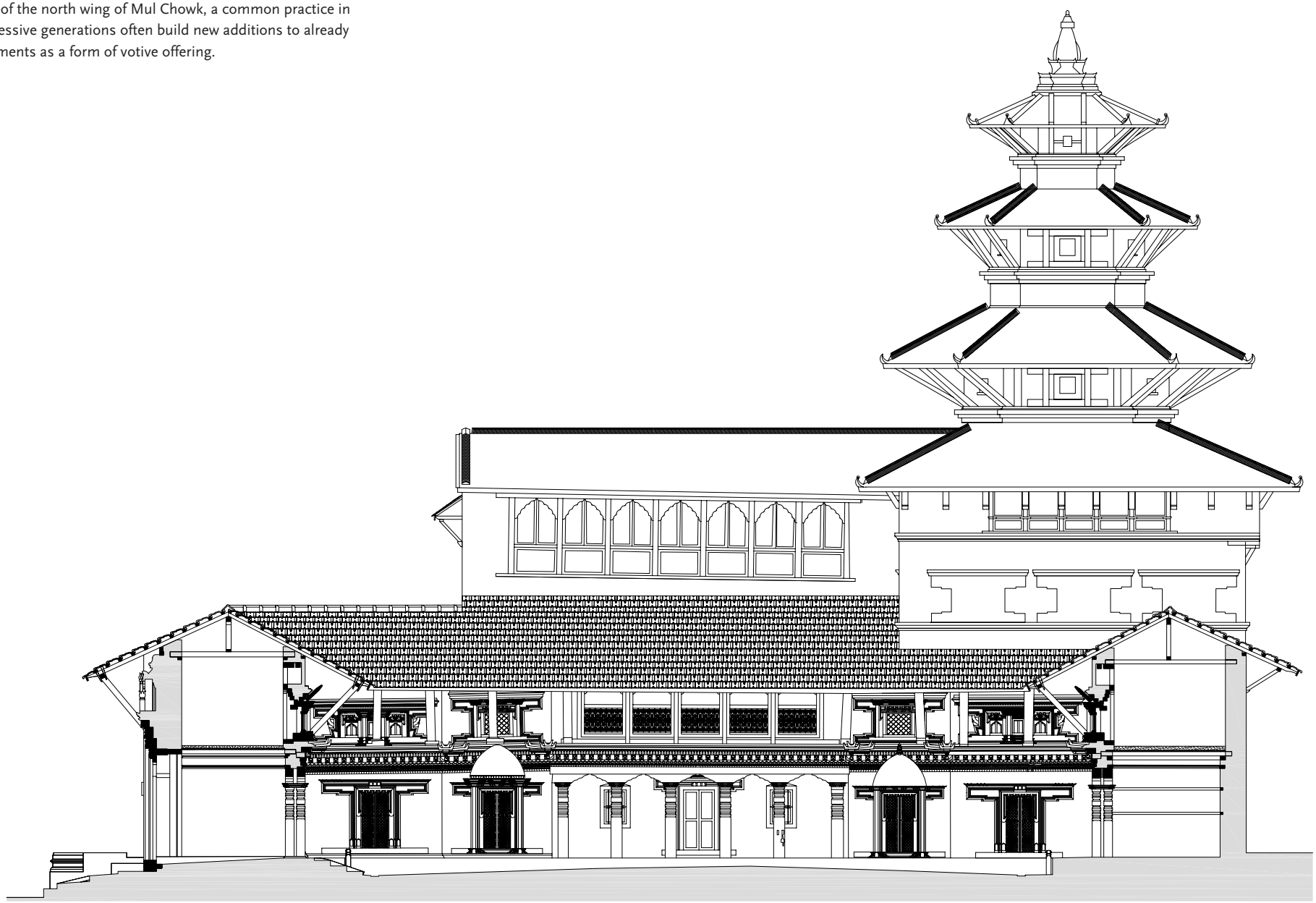
Mul Chowk's west facade with Taleju in background
The tower of Taleju elegantly floats behind Mul Chowk's main entryway off of Patan's Durbar Square. The smaller temple in the foreground is now called the "Lost Tower of Mul Chowk", as it was destroyed in the 1934 earthquake and was never again rebuilt.
Photograph by Perceval Landon, 1924

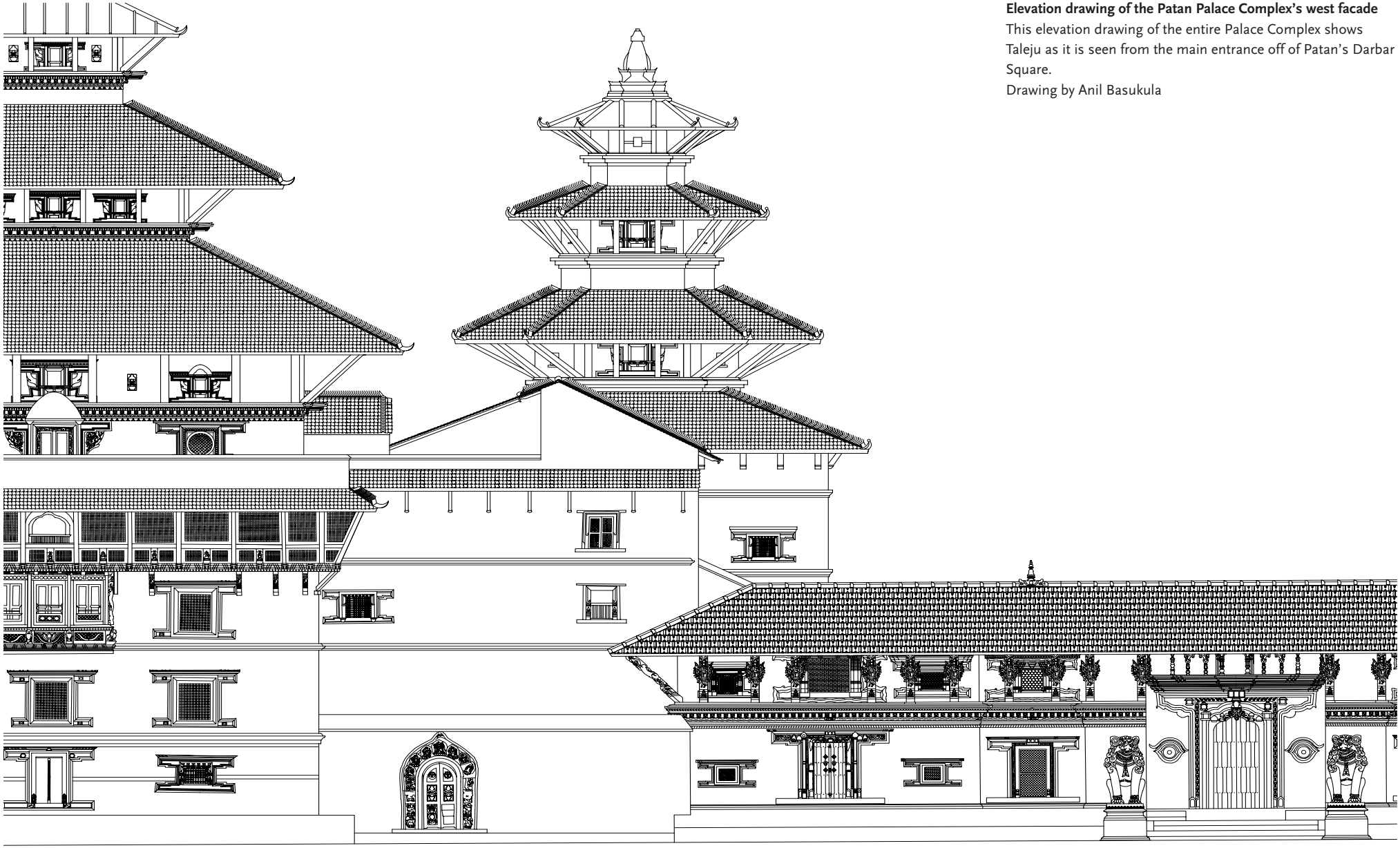


Historical view of the northeast corner of Mul Chowk
Taleju temple can be seen in this photograph taken circa 1966, looking much like it does to this day. The small, ground-level shrine in the foreground is devoted to Taleju's companion goddess, Yantaju.
Photograph by Mary Slusser, 1966

Remnants of Taleju Temple after the 1934 earthquake
This photograph vividly documents the devastation the 1934 earthquake wrought upon the Patan Royal Palace Complex. The remnants of the Taleju Temple's tower can be seen in the background, while the Degutale temple in the foreground collapsed completely.
Photograph circa 1934

Elevation drawing of Mul Chowk's north wing and Taleju Temple
This elevation drawing shows how the Taleju Temple was constructed directly on top of the north wing of Mul Chowk, a common practice in Nepal, as successive generations often build new additions to already existing monuments as a form of votive offering.





Elevation drawing of the Patan Palace Complex's west facade
This elevation drawing of the entire Palace Complex shows Taleju as it is seen from the main entrance off of Patan's Darbar Square.
Drawing by Anil Basukula

A: Crack on interior north wall | Nov. 2011
This large crack on the interior north wall was present before the recent September earthquake, but grew in width as the two walls moved farther apart.

A: Detail of interior north wall crack | Nov. 2011
The crack now measures up to 8 centimeters in places, and damages the wall's masonry fabric. A crack such as this, located close to the corner and significant in size, cannot be repaired in-situ and requires partial re-building of the wall.

B: Crack on the west-facing exterior facade of Taleju | Nov. 2011
This severe crack on the exterior of the building was present prior to the earthquake, and was likely the result of a lack of proper wall joining techniques. The crack grew significantly wider after the recent September earthquake, and now measures up to 10 centimeters in some places.

B: Detail of west-facing exterior facade crack | Nov. 2011
This detail shows the wide gaps now present between the bricks as they have further separated after the recent earthquake. The crack now takes up the height of the wall, and is in urgent need of repair.

C: Crack on interior south wall | Nov. 2011
After the recent earthquake several small cracks occurred where the south wall meets the ceiling. The crack shown in the photo at left is the largest, and runs diagonally through the wall.

D: Cracking between wall and timber frame, interior south wall | Nov. 2011
Before the earthquake, there was minor cracking between the timber window frame and surrounding brick wall. After the earthquake, the gap between the frame and the bricks grew considerably wider.

C: Detail of interior south wall crack | Nov. 2011
This detail shows the freshness and severity of the crack. Such a crack will be repaired by careful extraction of the affected and surrounding bricks, and replacement with traditional, high-fired "ma-apa" brick.

E: Cracking in southeast corner and fissure between walls | Nov. 2011
The southeast corner suffered some very minor cracks which are seen here. A small fissure occured between the two walls, which are not properly joined and are therefore prone to break apart in the event of seismic movement.

Door and window frame strengthening | Nov. 2011
This detail of a timber window pane separated from the surrounding brick wall exhibits the poor condition of the temple's timber elements, which suffer from rot due to water leakage and are therefore structurally weakened.

Stainless steel wall anchoring | Nov. 2011
These two walls in the southwest corner have pulled apart from one another, creating a massive 14 centimeter gap. The Trust proposes to install new, stainless steel wall anchors for seismic strengthening purposes. These anchors will unit the walls as one unit, allowing the walls to move together in the event of an earthquake, rather than pulling apart.

Weight redistribution | Nov. 2011
This photo demonstrates the bowing of Taleju's lower level roof beams, as they are inadequately bearing the heavy load of the tower above. The Trust recommends introdcing additional support beams to properly and safely transfer the weight to the structure below.

Emergency vertical support | Nov. 2011
The Trust has already installed emergency vertical support structures, shown here, to retain the floors of Taleju's shrine room above. The implementation of a sound structural system is imperative and urgent, as the floors will not currently withstand any seismic movement.

Taleju Temple's lower level & Mul Chowk's north wing | Sep. 2011
From this view it is seen how Taleju was built directly on top of Mul Chowk's north wing. This third level room, with its long arcade of wooden windows un-historically added after the 1934 earthquake, is the "puja" preparation room where priests prepare for the daily worship ceremony in the Taleju Temple.

Carved roof struts | Nov. 2011
This detail of Taleju's tiered roof shows the intricate craftsmanship of the carved roof struts. Though beautiful, they are loosely and improperly fitted, and barely support the roof above. The Trust proposes to strengthen the struts at the base adjoining the structure, and at the top of the strut adjoining the roof.

Taleju Temple Repair & Seismic Reinforcement

Kathmandu Valley Preservation Trust

Cost Estimate

November 9, 2011

S.n.	Descrption of Works	Amount in US Dollars
1	Scaffolding and shoring	1,500
2	Removal of heavy mud floors and rotten timber components	1,250
3	Disassembly of seriously damaged wall fabric and re-building with historic brick	2,650
4	Repair of doors and windows	1,500
5	Replacement of damaged wooden joists	3,800
6	Hard wood planking above joists	2,300
7	Water proof plyboards above planking for horizontal rigidity	1,400
8	Water proofing membrane in flooring of main shrine room	600
9	Floor tile (6"x6") finishing above brick soling on lime mortar	900
10	Seismic strengthening and anchoring of walls by means of stainless steel ties and braces	1,500
11	Strenghtning of timber joinery (roof strust, purlins, wall plates) by means of stainless steel plates and braces	1,250
12	Installation of concealed drainage system	1,350
13	Trash disposal / site clearance	1,500
	Total	**21,500**

Implementation Team

1	Documentation	1,800
2	International Structural Engineer @ $250/day X 6 days + airfare (@$1,500)	3,000
3	Architect @ $200/day X 7 days	1,400
4	Site supervision 3 mm @ $350	1,050
	Total	**7,250**
	US DOLLAR GRAND TOTAL	28,750
	EURO GRAND TOTAL	22,115

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