Large-scale site formation for a residential development at Sheung Shing Street, Ho Man Tin

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Status of site as in May 2007

Stage 1 formation
Stage 2 formation
Stage 3 formation

Overall construction period
July 2005 – June 2009

+130m
+150m
+15m
+25m
+7m (street level)
+30m
+70m
The site, the former Sheung Shing Street Police Married Quarters, is designated for non-industrial purposes excluding godown, hotel and petrol filling station. It was sold to Volly Best Investment, a subsidiary company of the Cheung Kong Group in HK$9.42 billion in October 2004.

The size of the site is about 17,756 square metres with a plot ratio of 7.5 for residential development. It is located at the junction of Tin Kwong Road and Sheung Shing Street, Ho Man Tin.
The completed development is now called the "Celestial Heights". Total building area of the project is around 140,000 sq m with a total construction cost in US$380 million.

The site is developed into a deluxe residential estate with 9 high-rise blocks and 7 semi-detached low-rise blocks. Other facilities include a club house with an open swimming pool, landscape garden, covered carpark and some retail/commercial area along the street level.

Brief outline of the site formation works

- Demolish previous Police Quarters buildings
- Stage 1 formation by preliminary setting back of the slope along Kau Pui Lung Road and Sheung Shing Street, and forming of accessway for mobilization of equipment for onward stages of site formation works.
- Stage 2 formation including the forming of a series of bore-pile or pre-bore pipe-pile walls as part of the ground support for onward slope cuttings, as well as the forming of a vertical set-back for the positioning of the core structure for the future residential tower blocks. Excavation and construction of the basement and the main podium structure was carried out at the same time.
- Stage 3 formation, to be carried out at the same time with the remaining portion of basement and podium structures. These structures were used as part of the support system to stabilize slope during the cutting process.
- Stage 4 formation, the final touching up of the remaining slope, at the same time with the formation of the terrace platform, landscape garden, roadway and estate entrance.
Special features of the site formation work

- Relatively very large quantity of excavation with more than 80% rock-base subsoil (total volume about 150,000 Cu Meter)
- Provision of a number of temporary access way in various phases in steep and difficult ground to transport heavy equipment and to facilitate slope and site formation works especially to the upper level of site.
- Forming of large diameter bore-pile as foundation for the transfer structure at an elevated position
- Forming of a series of per-bore pipe pile as part of the cut-off provision for slope cutting.
- Forming of a series of vertical cut-back, average 35m high

Special features of the site formation work (continue)

- Cutting back of the slope in stages supported using
  - raking shore in universal beams
  - part of the completed transfer plate at podium level as the base for the shoring support
  - partially completed basement structure in advancing stage plus shoring
- Basement construction in complicated phases meeting with the slow advancement of the slope cutting.
- Preservation of trees by the use of a planter box formed by pre-bore H-pile wall; about 5m high.
Condition of site in mid 1960s

Site formation to provide land for the construction of a public housing estate (completed in early 1970s)

Stage 1 formation close to the end as seen in February 2006

The work set-up for the forming of large diameter bore-pile at an elevated temporary platform

Temporary roadway as access to facilitate slope work

Temporary leveled platform as work station

Police Staff Quarters and its neighborhood environment
Sequential progress and work set-up detail for Stage 1 Formation
Work platform erected for the forming of bore-piles which are used as cut-off wall for slope cutting as well as foundation for residential blocks seated on the terraced high-ground location.

First phase of excavation to form a set-back for the placing of the podium structure. Onward phasing of excavation.

Site layout condition at the completion of stage 1 formation as seen in January 2006.
Overview of the site from Kau Pui Lung Road in May 2006. At this moment, the stage 1 site formation work was basically completed.

Overview of the site from junction of Kau Pui Lung Road and Tin Kwong Road in May 2006. The temporary access arrangement to facilitate the slope cutting and site formation work can be observed.
Overview of the site from Lok Man Estate in May 2006

The forming of the cut-back using benching method

The first portion of basement excavation

Provision of cut-off wall using pre-bore pipe-pile to form a vertical cut-back for the placing of the core structure for the future residential tower block

Site entrance/exit

Directions/phases of basement excavation
Commencement of the excavation along Kau Pui Lung Road to prepare for the construction of the basement and podium structure

Foundation machine – the reverse circulation drill

Set-up of the boring equipment for the forming of a series of bore-piles as part of the future slope retaining structure and foundation for the podium/transfer structure
Sequential progress and work set-up detail for Stage 2 Formation

Overview of site as seen in October 2006 (Stage 2 formation).

Basement slab at its formation level along Kau Pui Lung Road constructed using usual bottom-up arrangement has just been completed.

Portion of slope to be excavated during the stage 3 formation due to its extraordinary height (vertical cut about 65m high).

Direction/phases of basement excavation
Direction of slope cutting
Overview of site from nearby Estate as seen in October 2006.
(basement extended while slope cutting-back was retracting)
Closer look of the work platform as part of the access arrangement to facilitate the basement construction as well as the 2nd stage of site formation works.

Another access arrangement by providing the 2nd site entrance from Tin Kwong Road to facilitate site formation works on the north-eastern corner of site. The temporary trimmed slope as seen in this photo will be cut away during the final stage of formation.
At the later period of Stage 2 formation -
The gradual progress of the podium structure before reaching the transfer plate.
Bore-pile and Pre-bore pipe-pile as cut-off walling provision

Construction of the basement along Kau Pui Lung Road as viewed from the side and top of slope.
Sequential progress and work set-up detail for stage 2-Stage 3 Formation

Stabilizing the slope by integrating the transfer structure to the bore pile wall
Excavation to expose the 2m-diameter bore-pile wall and the king post for the onward erection of the shoring arrangement.

Casting the first section of transfer plate as part of the advanced works to stabilize the slope on the side.
Podium structure extending close to the bore-pile wall and finally touching the toe of the wall as the permanent support at its base.

Core wall inside podium structure seated onto the vertical cut-back of slope formed previously.
Close-up look of the bore-pile wall at the top of slope and its shoring support arrangement.

Closer look of the shoring arrangement for the bore-pile wall and the commencement of the stage 3 formation.
Viewing towards the north-eastern corner of site from top of slope and observe the advancing of the basement and podium structure integrating with the toe of slope. The slope will be further cut-back coping with the progress of the basement.

Pre-bore pipe-pile wall installed at an earlier stage to facilitate the slope cutting during the Stage 3 formation.

Portion of slope to be cut during the later portion of Stage 3 formation.

Sequence and direction of slope cut.
The central part of the transfer plate situated on top of the podium completed in advance stage forming a stable anchor block to stabilize the slope on its side.

Portion of transfer plate to be completed at a later stage.

Transfer plate approaching the toe of bore-pile wall to form part of the permanent support for the slope.
Transfer plate approaching the toe of bore-pile wall to form part of the permanent support for the slope.

Onward progress of slope cutting.
Sequential progress and work set-up detail for Stage 3 Formation

Beginning stage of Stage 3 formation by erecting the first section of raking shore

Final extent of shore
The transfer plate integrating into the slope cut-off wall
Cutting into the remaining portion of slope near the Tin Kwong Road entrance.

Basement approaching the remaining slope portion.
Basement approaching the remaining slope portion

Sequential progress and work set-up detail for Stage 3-4 Formation
The advancing basement approaching the cut-off wall of slope finally forming a permanent supporting structure

Close-up look of the complicated shoring detail
Close-up look of the complicated shoring detail with the integrating detail to the approaching basement structure.
Close-up look of the complicated shoring system with the integrating detail to the approaching basement structure.

Working within congested space aside the closely placed shoring members.
Shoring detail working together with the basement construction process.
Shoring detail working together with the basement construction process

Shoring detail at slope junction between Stage 3 & 4 formation process

Bore-pile wall formed in Stage 1 formation process

Pre-bore pipe pile wall formed in Stage 2 formation process
The partially completed basement and residential block on the other side that support the slope.

Forming the permanent RC wall in front of the slope cut-off wall.
Latest status of site as seen in July 2008

Other features in the site formation process
Another feature for excavation near site entrance from Sheung Shing Street – commencement of Stage 3 formation

Exposed rock-head

Temporary work platform

Supporting to the vertical cut along Sheung Shing Street
Preservation of a protected tree species using soldier pile walling

The protected tree forming part of the landscape provisions near the entrance to the estate

Estate entrance at Sheung Shing Street
The project as viewed after its handing over
Final completed view

Estate entrance at Sheung Shing Street
End of presentation

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