

Santorini Feedback Session

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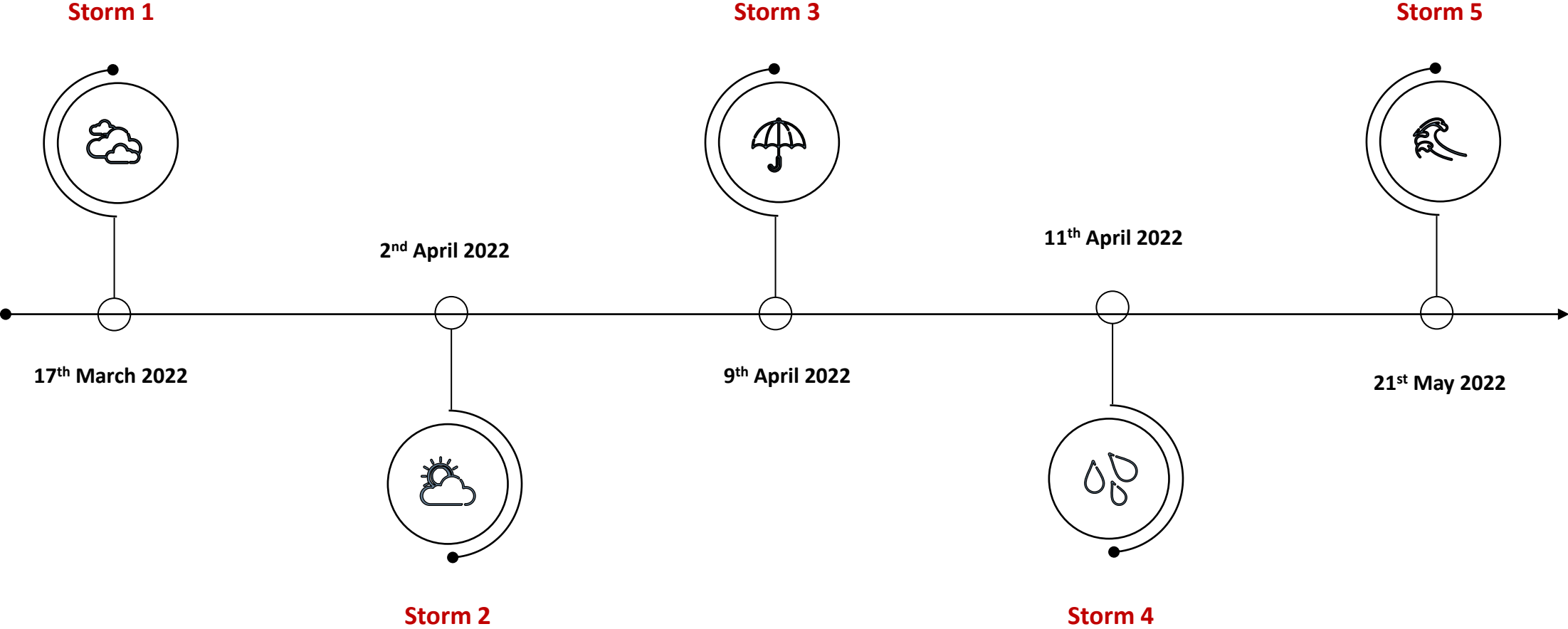
02.09.2022

Agenda

- ❑ Introduction
- ❑ Stormwater Timeline
- ❑ Infrastructure Status | Pre & Post Corrective Action
- ❑ Scope | One & Two
- ❑ Next Steps | Short & Long Term



Stormwater Timeline



11th April 2022 → 12th April 2022



Rain recorded over 24 hours as of
11th April 2022:

- 225mm | King Shaka airport
- 307mm | Mount Edgecombe
- 304mm | Virginia airport
- 435mm | KwaDukuza

This storm exceeded the mean 1:50 year rainfall measured over 24 hours of 236mm, as historically recorded at six local South African Weather Stations (SAWS) as well as the mean 1:100 year (280mm) and possibly the mean 1:200 year (329mm) rainfall.

Furthermore, consideration is to be given to the observation that the major intensity of the storm occurred over six hours where 230mm was measured in Kwa Dukuza. This is to be compared to the anticipated historically measured six hour rainfall for a 1:50 (181mm) a 1:100 (215mm) and a 1:200 (253mm) as at the six SAWS's.

The six local SAWS historical records, as measured for over thirty years, were sourced from Darnall Mill, Glenhow Mill, KwaDukuza, Groutville, Kersney and Chakas Kraal experimental farm.

The three storms preceding the evening of Monday 11th April 2022 would have contributed to a high ground water table being in place and would have resulted in significantly high volume of surface runoff taking place on Monday evening.

Infrastructure Status | Pre & Post Corrective Action

Pump House

Result | Washed Away



Action | Completed by Inhouse Team



Erosion of the riverbanks between the pump house and main access road

Result | Substantial Damage



Action | Completed by Inhouse Team



Tennis Court

Result | Substantial Damage



Action | Invited Tender Received – R570 800.00 incl

Adjacent Access Road

Result | Substantial Localised Damage



Action | Completed by Inhouse Team



Underground Stormwater Culvert

Result | Isolated Damage (Original)



Action | Invited Tender Received – R968 500.00 incl



Grassed Trailor Parking Area below the Tennis Court

Result | Two Isolated Sinkholes



Action | Completed by Inhouse Team



Boundary Wall next to Culvert Outlet onto Thompson's Bay

Result | Isolated Section Destroy



Action | Completed by Inhouse Team



Minor Embankment Erosion on the Top Trailer Park

Result | Isolated Embankment Failure



Action | Completed by Inhouse Team

Eastern Embankment Failures

Location | 14 Perissa Retaining Wall

Result | Total Failure



Action | Invited Tender Received – R846 700.00 incl

Eastern Embankment Failures

Location | 29 Akritiri

Result | Embankment Failure



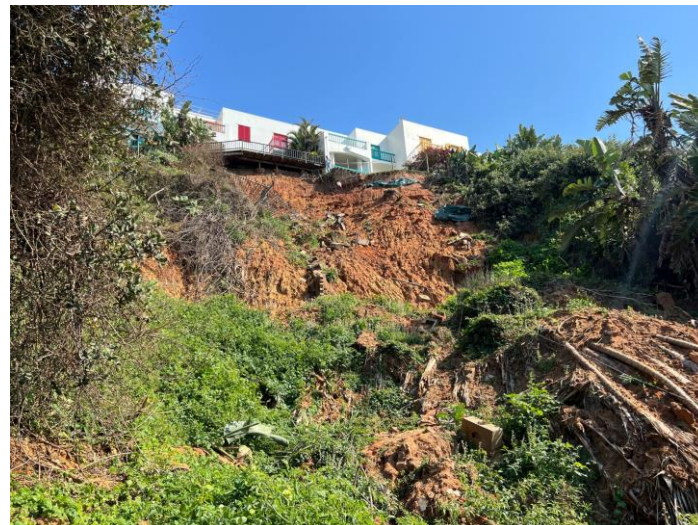
Action | Under Review

Eastern Embankment Failures

Location | 23 Akritiri

Result | Embankment Failure

Action | Under Review



Eastern Embankment Failures

Location | 18 Akritiri

Result | Embankment Failure



Action | Under Review

Eastern Embankment Failures

Location | 7 Thira

Result | Embankment Failure



Action | Private

Eastern Embankment Failures

Location | 11 & 25 Thira

Result | Embankment Failure



Action | Under Review

Eastern Embankment Failures

Additional

Note | Dry Stack Retaining Walls on the eastern side of Akritri & Thira → Potential Failure



Location	Action
Stormwater Controls to Akritiri & Thira	Under Construction
Dry Stack Retaining Walls on the eastern side of Akritri & Thira	Invited Tender Received – R93 900.00 incl

Tender Summary

NOTE : Tender prices are for Tender purposes only and are provisional.
The final Tender prices are to be confirmed on finalisation of each projects scope of work.

Santorini Stormwater Remedial Works							
All figures include 15 % contingencies and VAT.							
Contractor	14 Perissa Retaining Wall	Akrotiri Underpinning	Stormwater Culvert	Tennis Court	Total	Anticipated Start Date	Anticipated Project Duration
Cockerill Construction	R 846 684.34	R 93 897.50	R 968 486.59	R 570 816.79	R 2 479 885.22	12-09-2022	14 weeks
Jehcon Construction	R 1 227 508.13	R 411 958.75	R 1 739 021.38	R 892 480.86	R 4 270 969.12	05-09-2022	15 weeks
JC Builders	R 1 372 530.18	R 144 152.50	R 5 407 219.19	R 785 591.45	R 7 709 493.32	12-09-2022	16 weeks

Scope

Scope One



Date of appointment – 21-04-2022

- ❑ Undertake geotechnical Dynamic Probe Light (DPL) geotechnical readings at the base of the three proposed retaining structure founding footprints
- ❑ Design and Detail the following :
 - The Dry Stack Retaining Wall (DSRW) at 14 Perissa as required;
 - The new pump house foundations as required;
 - The new tennis court as required., and
 - Verify the stormwater design requirements for the stormwater culvert under the access road and tennis courts and submit stormwater interventions as required.
- ❑ Compilation of an associated Bill of Quantities (BOQ) and issuing of the BOQ to a minimum of three competent contractors for tender purposes;
- ❑ Project Management of the construction progress, including the facilitation of a JBCC contract document between the client and the appointed contractor;

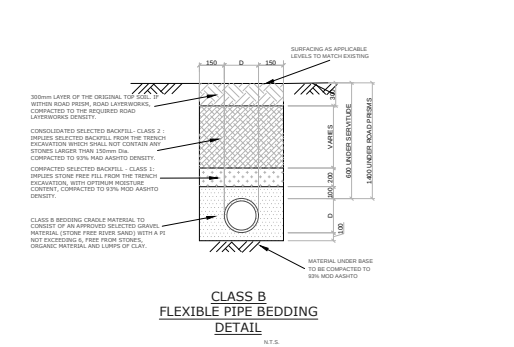
Scope Two



Date of appointment – 29-07-2022

- ❑ Undertake geotechnical Dynamic Probe Light (DPL) geotechnical readings at the base of the three proposed retaining structure founding footprints
- ❑ Design and detail the structural remedial works required to stabilize the three failed embankments within the property boundary of Santorini for tender purposes;
- ❑ Compilation of an associated Bill of Quantities (BOQ) and issuing of the BOQ to a minimum of three competent contractors for tender purposes;
- ❑ Project Management of the construction progress, including the facilitation of a JBCC contract document between the client and the appointed contractor;

MONOBLOCK EST 1968
CONCRETE PRODUCTS - CIVIL & STRUCTURAL DESIGN



THIS STORMWATER GENERAL DETAILS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SANTORINI STORMWATER PLAN LAYOUT.

The existing inlet valves and pipe sizes of the adjacent Sarners stormwater system are initially to be verified into installing every stormwater pipe to ensure that a new stormwater pipe leading into the Sarners stormwater system will be able to handle the increased flow rate and the increased capacity to accommodate the additional flow that will be shed into the system; the stormwater system will be designed to handle a 100 year return period flood area and regularly reviewed.

Each stormwater inlet within each unit area is then to be checked such that the fill has a minimum two percent fall to a new lowest point within the unit area.

Units that will not be able to drain to the north or southern end of the units layout, in addition, the eastern end of each unit is to be shed such that a 200mm high by 200mm wide stormwater pipe can be installed to drain the unit to the Sarners stormwater system.

The low point is to be set away from any existing pedestrian gage that will have a higher volume of water.

Once the fill is fully shapely, the fill is to be compacted to a minimum 95 to MOD A520 density. The stormwater pipe is to be installed to a minimum 100mm depth below the finished ground level through four passes of a "broom" roller or a "wacker" plate compactor.

The stormwater pipe is to be installed to a minimum 100mm depth below the finished ground level and a 600mm bore stormwater pipe is to be installed and a 100mm bore stormwater pipe at the first ground level end is to be installed, as per the engineers specification, that connect the stormwater pipe to the Sarners stormwater system.

A 250x250mm "Main-Drain" (or similar approved) stormwater pipe inlet and stormwater manhole is then to be installed at the lowest point of the unit and the stormwater pipe is to be connected to the Sarners stormwater system.

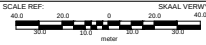
When the stormwater system is completed, the Sarners stormwater system will be checked for any specifications.

When the stormwater system is given to a visiting gage for the north, pipes, gages and manholes would channel the stormwater runoff to the new Sarners stormwater system.

Once the embankments have been secured through a suitably sized "soft" structure to an engineers specification the earth embankment above the structure is to be stabilized through either shaping the angle of the embankment back to 27 degrees or possibly 33 degrees with engineering interventions such as polypropylene tie backs, cement stabilization and Hysol cells.

TO THE PLACEMENT OF THE NEXT LAYER, THE UNTESTED LAYERS TO BE EXPOSED AT THE STATED NUMBER OF PLACES AND TESTS AS REQUIRED. SHOULD THESE TESTS INDICATE A FAILURE TO THE REQUIRED DENSITIES, THE CONSTRUCTOR SHALL AT HIS EXPENSE REMOVE THE UPPER LAYER AND REWORK THE FAILURE AREAS TO THE ENGINEER'S SATISFACTION.

CLIENT DWG. NO.	KLIENT TEK. N.
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MonoBlock Scope of Work

NOTE:
The 3.0m HIGH GEO-CONTAINER RETAINING WALL IS TO BE PLACED AT 60 DEGREES (4m MAX) TO THE HORIZONTAL.
The 3.0m HIGH DRY STACK RETAINING WALL IS TO BE PLACED AT 65 DEGREES (4m MAX) TO THE HORIZONTAL.
BLOCKS ARE TO BE INCISED BACK AT 3 DEGREES TO THE HORIZONTAL.
THE FIRST BLOCK IS TO BE SET IN WET CONCRETE.

NOTE:
THE FILL MATERIAL PLACED BEHIND AND IN FRONT OF THE DRY STACK RETAINING WALL IS TO BE SELECTED G-1 GRADE MATERIAL, COMPACTED IN LAYERS NOT EXCEEDING 150mm, TO 95% MOD AASHTO DENSITY.

PLACEMENT OF FILL MATERIAL:
STRIP & REMOVE EXISTING GRASS & TOPSOIL.
PLACE SELECTED FILL MATERIAL IN 200mm THICK LAYERS.
HOLDING GRADE OF SELECTED FILL MATERIAL TO BE OF G-1 QUALITY.
COMPACT EACH LAYER TO 95% MOD AASHTO DENSITY.
THE CONTRACTOR IS TO SUPPLY TROILER DENSITY TEST RESULTS BY AN INDEPENDENT LABORATORY AT 10.0m INTERVALS ALONG THE TOP OF EACH 200mm THICK FILL LAYER. SEE COMPACTION DENSITY TEST NOTES.

COMPACTION DENSITY TESTS:
TROILER DENSITY TESTS ARE TO BE PERFORMED AT 5m INTERVALS ON EACH LAYER BY AN INDEPENDENT APPROVED SOILS LABORATORY.

THE TEST RESULTS ARE TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THE PLACEMENT OF THE NEXT LAYER.
ANY AREA FAILING THE TEST IS TO BE REWORKED AND RETESTED TO ACHIEVE THE REQUIRED DENSITY.

THE COSTS OF THE TESTS ARE TO BE INCLUDED IN THE CONTRACTORS TENDER PRICE AND INDICATED AS SUCH AS A SEPARATE ITEM.

SHOULD THE CONTRACTOR FAIL TO SUPPLY TEST RESULTS PRIOR TO THE PLACEMENT OF THE NEXT LAYER, THE UNTESTED LAYER IS TO BE EXPOSED AT THE STATED NUMBER OF PLACES AND TESTED AS REQUIRED. SHOULD THESE TESTS INDICATE A FAILURE TO MEET THE REQUIRED DENSITIES, THE CONTRACTOR SHALL AT HIS OWN EXPENSE REMOVE THE UPPER LAYER AND REWORK THE FAILED AREA TO THE ENGINEERS SATISFACTION.

NOTE:
1.0 ALL RETAINING WALLS ARE TO BE SUITABLE SHORED DURING CONSTRUCTION SUCH THAT THE RETAINING WALL EXCAVATION AREA IS SAFE AND SECURE FOR PERSONAL AND ADJACENT STRUCTURES ARE NOT UNDERMINED.
2.0 IN ORDER TO ENHANCE ON-SITE SAFETY THE EXISTING EMBANKMENT IS TO BE CUT BACK SUCH THAT THE CUT EMBANKMENTS ANGLE TO THE HORIZONTAL DOES NOT EXCEED THE SOILS NATURAL ANGLE OF REPOSE.
3.0 SHOULD THE CUT MATERIAL BE OF G-1 OR BETTER QUALITY THE CUT MATERIAL TAKEN FROM THE EXCAVATION MAY BE USED AS COMPACTED FILL MATERIAL BEHIND THE DRY STACK WALL.

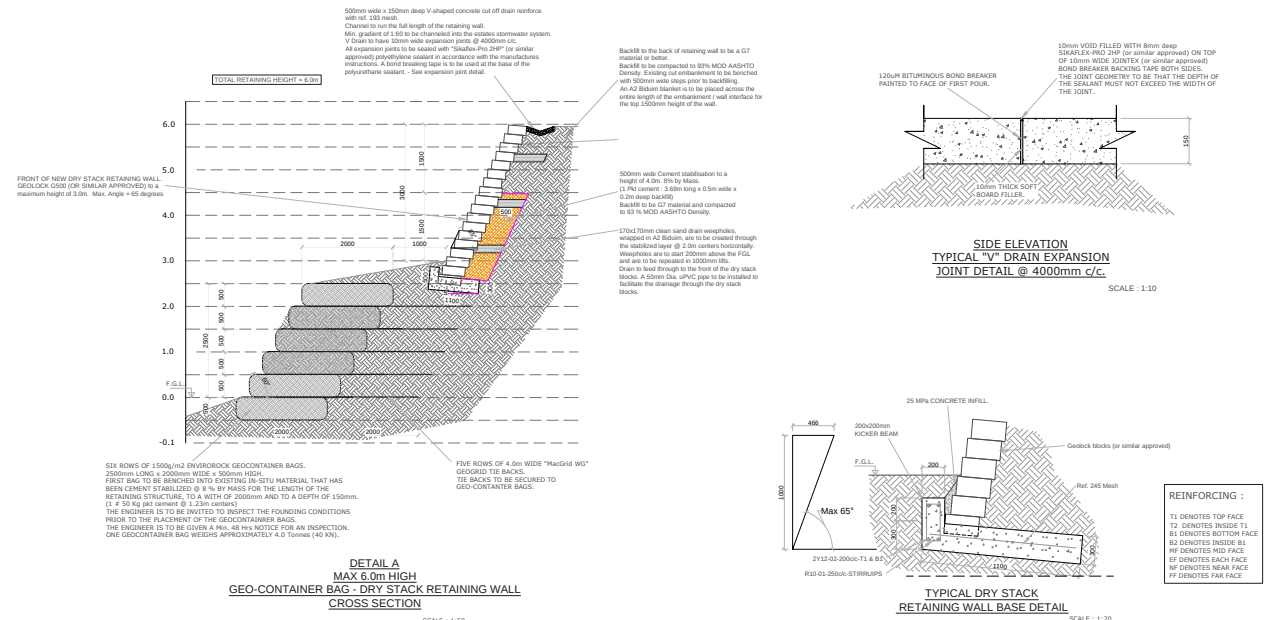
4.0 FILL MATERIAL IS TO BE COMPACTED AS PER THE FILL MATERIAL SPECIFICATIONS.
5.0 THE FINAL LENGTH AND POSITION OF THE RETAINING WALL TO BE VERIFIED ON-SITE BY THE ENGINEER.
6.0 EROSION PHOTOGRAPHS ARE TO BE TAKEN PRIOR TO THE CONSTRUCTION AND PLACEMENT OF THE DRY STACK BLOCKS ARE TO BE TAKEN FOR EVERY SECOND CUT OF THE WALL. PHOTOS ARE TO BE MARKED AND EMAIL TO THE ENGINEERS REPRESENTATIVE.

NOTE:
ALL DRY STACK RETAINING WALLS ARE TO BE PLACED AT 65 DEGREES TO THE HORIZONTAL.
BLOCKS ARE TO BE INCISED BACK AT 3 DEGREES TO THE HORIZONTAL.
THE FIRST BLOCK IS TO BE SET IN WET CONCRETE.
THE FILL MATERIAL PLACED BEHIND AND IN FRONT OF THE DRY STACK RETAINING WALL IS TO BE SELECTED G-1 GRADE MATERIAL, COMPACTED IN LAYERS NOT EXCEEDING 200mm, TO 95% MOD AASHTO DENSITY.
EXISTING CUT EMBANKMENT TO BE BENCHED WITH 500mm WIDE BY 500mm HIGH STEPS PRIOR TO BACKFILLING.

CONSTRUCTION NOTES:
THE CONTRACTOR IS TO NOTE THAT THE FOLLOWING QUALITY CHECKS ARE TO BE ADHERED TO DURING THE CONSTRUCTION PROCESS. THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES ON THE RIGHT HAND SIDE OF THE DRAWING:

FOUNDATIONS:
Foundations are to be founded min in situ soil and are subject to vibrations as excavations take place.
All foundations are to be inspected prior to the placing of any concrete or reinforcing.
The engineer is to be given 48 hrs notice for an inspection.
The minimum depth to top of foundations to be 200mm.
All foundations are to be compacted to 95% MOD AASHTO density prior to placement of concrete.
All excavations that exceed 1.5m depth are to be shored such that all embankments are stable and secure.
All foundations are to have a 50mm thick sliding layer.

CONCRETE:
All concrete to be cured for a minimum of 5 days.
3 to 28 day concrete cube tests to be taken for every concrete batch up to 50m3 and test results to be submitted to the engineer.
No structural concrete to be laid without express approval in writing by the engineer.
Cover to all reinforcing to be 50mm unless noted otherwise. (J.N.D.)
All reinforcing to be inspected and passed by the engineer prior to the placing of the concrete.
The engineer or his representative is to be given 48 hrs notice for an inspection of reinforcing.



NOTE:
IN TERMS OF THE BREVE COPYRIGHT CONVENTION THE COPYRIGHT OF THIS DRAWING IS VESTED IN MONOBLOCK.
THIS DRAWING MAY NOT BE APPROVED WITHOUT THEIR EXPRESS WRITTEN PERMISSION.
THIS DRAWING IS PART OF THE CONSULTING SERVICES PROVIDED FOR PROJECT (SANTORINI - 28 DOLPHIN CRESCENT, BALITO, APRIL 2022 - STORM DAMAGE) AND MAY NOT BE USED OR APPLIED FOR ANY OTHER PURPOSE WITHOUT PRIOR CONSULTATION WITH MONOBLOCK AND THEIR EXPRESS WRITTEN PERMISSION.

GENERAL NOTES:
1.0 ALL BUILDING WORKS TO BE IN ACCORDANCE WITH RELEVANT S.A.N.S. BUILDING CODES AND NATIONAL BUILDING REGULATIONS.
2.0 DRAWINGS MUST BE CHECKED BY THE CONTRACTOR, WHERE DISCREPANCIES IN THE DIMENSIONS ARE FOUND THESE MUST BE REPORTED TO THE ENGINEER BEFORE WORK COMMENCES.
3.0 ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE ARCHITECT'S DRAWINGS.
4.0 ALL SETTINGS OUT DIMENSIONS AND LEVELS ARE TO BE DONE AS PER THE ARCHITECT'S DETAILS.
5.0 THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL FORMWORK, DIMENSION & LEVEL CONTROL, GENERAL ON-SITE QUALITY CONTROL, AS WELL AS SITE SAFETY & SECURITY.
6.0 THE CONTRACTOR IS TO KEEP A CLEAN & COMPLETE SET OF CONSTRUCTION DRAWINGS ON-SITE AT ALL TIMES.
7.0 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER STRUCTURAL DRAWINGS.

FOUNDING:
1.0 FOUNDATIONS ARE TO BE FOUND INTO IN-SITU SOIL AND ARE SUBJECT TO ALTERATIONS AS EXCAVATIONS TAKE PLACE.
2.0 FOUNDATIONS ARE TO BE INSPECTED PRIOR TO THE PLACING OF ANY CONCRETE OR REINFORCING. THE ENGINEER IS TO BE GIVEN 48 HRS NOTICE FOR AN INSPECTION.
3.0 MINIMUM DEPTH TO TOP OF STRIP FOOTING FOUNDATIONS IS TO BE 500mm.
4.0 ALL FOUNDATIONS ARE TO BE COMPACTED TO 95% MOD AASHTO TO THE PLACEMENT OF CONCRETE.
5.0 ALL EXCAVATIONS THAT EXCEED 1.5m DEPTH ARE TO BE SHORED SUCH THAT ALL EMBANKMENTS ARE STABLE AND SECURE.
6.0 ALL FOUNDATIONS ARE TO HAVE A 50mm THICK SLIDING LAYER.
7.0 CONCRETE STRENGTH FOR FOUNDATIONS - 30 MPa @ 28 DAYS.

1.0 C. CONSTRUCTION:
1.0 CONCRETE WORK MUST CONFORM WITH THE CONDITIONS SET OUT IN S.A.N.S. SUB PART 5 AND S.A.N.S. 2001 C.C.
2.0 CONCRETE MAY NOT BE PLACED BEFORE THE ENGINEER HAS INSPECTED AND APPROVED THE FORMWORK AND REINFORCING. THE ENGINEER IS TO BE GIVEN 48 HRS NOTICE FOR AN INSPECTION.
3.0 COVER TO ALL REINFORCING IS TO BE 40mm.
4.0 CONCRETE STRENGTH FOR BLINDS - 30 MPa @ 28 DAYS.
5.0 CONCRETE STRENGTH FOR COLUMNS - 30 MPa @ 28 DAYS.
6.0 CONCRETE STRENGTH FOR BEAMS - 30 MPa @ 28 DAYS.
7.0 CONCRETE STRENGTH FOR SUSPENDED SLABS - 30 MPa @ 28 DAYS.
8.0 BEAMS ARE TO BE SUPPORTED A MINIMUM OF 300mm EACH END.
9.0 BEAMS ARE TO BE PROPPED A MINIMUM OF 31 DAYS.
10.0 PROJECT NOTES ARE TO BE READ IN CONJUNCTION WITH ASSOCIATED BIDDING SCHEDULE NOTES.
11.0 ALL EXPOSED CONCRETE EDGES TO HAVE A 20mm CHAMFER.
12.0 ALL CONCRETE IS TO BE CURED FOR A MINIMUM OF 5 DAYS AFTER PLACING.
13.0 ANY HAND MIXED CONCRETE IS FIRST TO BE APPROVED BY THE ENGINEER. HAND MIXED CONCRETE WILL NEED TO BE TESTED BY A SPECIALIST, 3 TEST CUBES BY SPECIALIST PER M3. MIN STRENGTH TO BE 30 MPa @ 28 DAYS.

STORMWATER DRAINAGE:
1.0 ALL R.W.P. TO FEED INTO STORMWATER SYSTEMS AS INSTRUCTED ON-SITE.
2.0 ALL SURFACE RUNOFF IS TO BE CHANGED INTO EITHER EXISTING STORMWATER CATCHMENTS OR INTO NATURAL DRAINAGE CHANNELS.
SHOULD NATURAL DRAINAGE CHANNELS BE UTILIZED FOR SURFACE RUN-OFF SUITABLE EROSION PROTECTION MEASURES ARE TO BE CONSTRUCTED.

02	30/07/2022	ISSUED FOR TENDER PURPOSES ONLY
01	27/05/2022	ISSUED FOR TENDER PURPOSES ONLY
02	24/05/2022	ISSUED FOR TENDER PURPOSES ONLY
REV	DATE	REVISION DESCRIPTION

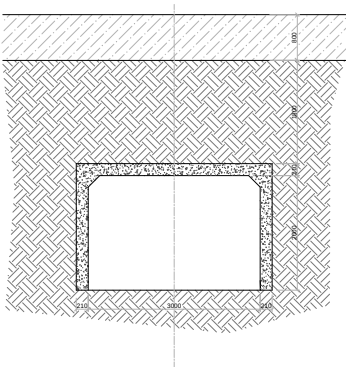
PROJECT: SANTORINI - APRIL 2022 STORM DAMAGE
CLIENT: SANTORINI BODY CORPORATE
ADDRESS: 28 DOLPHIN CRESCENT, BALITO
DRAWING TITLE: 14 PERISSA RETAINING WALL DETAILS

PROJECT NUMBER:					
DISPL	DATE	BY	NO.	STATUS	REV.
STR	30/07/2022	SANTORINI	02	T	2

DWG STATUS: 1 - Tender (Drawing issued for tender only)
2 - Construction (Drawing issued for construction)
CODING:

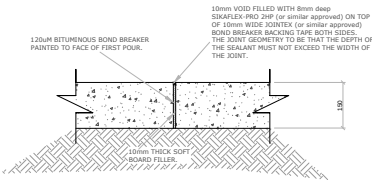
01	TENNIS COURT & STORMWATER CULVERT
02	14 PERISSA RETAINING WALL DETAILS
03	SANTORINI - STORMWATER REMEDIAL WORKS

MonoBlock Scope of Work



FRONT ELEVATION
3000 x 2000mm REINFORCED CONCRETE
STORMWATER CULVERT TO KALLISTI STREAM
(Total Length = 110m)

N.T.S.



SIDE ELEVATION
TYPICAL CONCRETE EXPANSION
JOINT DETAIL @ 4000mm c/c.

SCALE : 1:10

SANTORINI COMPLEX :
POST DEVELOPMENT STORMWATER FLOWS OF THE KALLISTI STREAM INTO THE
3.0 x 2.0m RECTANGULAR CULVERT UNDER THE TENNIS COURTS :
Urban Catchment Area = 5 318 000 m²
Run Off "C" value = 0.38
Time of Concentration = 1.49 hours.
1:50 year Point Rainfall = 96mm
1:50 year Peak Flow = 35 m³/sec
The existing 3.0 x 2.0 m Reinforced Concrete Box Culvert can accept a stormwater flow of
approximately 31.0 m³/sec

Required 3000mm wide x 2000mm deep Reinforced Concrete Culvert Repair Method Statement :

All joints that are damaged and not sealed in the base of the culvert are to be cleaned and then sealed, with a combination of "Sikacrete-214" (or similar approved) micro concrete and "SikaSeal-P-2003/2005" (or similar approved) active waterproofing system, strictly in accordance with the manufactures instructions.

All joints that are damaged and not sealed in the sides and soffit of the roof slab of the culvert are to be cleaned and then sealed with "SikaSeal-P-2003/2005" (or similar approved) active waterproofing system strictly in accordance with the manufactures instructions.

The base of the culvert is then to have a minimum 150mm thick "Xypex" (or similar approved) waterproofed concrete slab placed on the base. The base is to be reinforced with Red 102 mesh and is to have sealed expansion joints at 4000mm centers. At the junction of the new reinforced concrete base and the sides of the culvert a suitable sealed expansion joint is to be constructed.

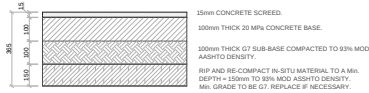
All joint repairs and sealing is to be done by a suitably skilled and experienced contractor.

All culvert joints that are displaced or where sink holes have been formed above the culvert due to piping taking place on the outside of the culverts walls are to be opened up from on top of the culvert if instructed by the engineer.
If instructed by the engineer the outside of the culvert joints as well as any cracks visible on the outside of the culvert are then to be sealed with "SikaSeal-P-2003/2005" (or similar approved) active waterproofing system strictly in accordance with the manufactures instructions.

On completion of the repairs to the cracks in the portal culvert the culverts are to be backfilled with G7 grade material compacted to 93 % MOD AASHTO density in 200mm layers.

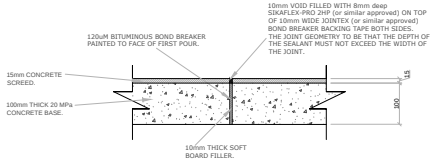
Required Tennis Court Repair Method Statement :

- The fall of the existing court surface is to initially be verified with all subsequent final court surfaces matching and meeting this fall such that ponding water is eliminated.
- Should the in-situ ground possibly have a high clay content the option of installing sub-soil drains to the engineers specification is to be verified with the engineer.
- The damaged areas of the court are to be cut such that square joints are established around the damaged area and with the joints being perpendicular or parallel to the existing joints and lines on the court.
- Within each repair area the court layerworks are to be re-established as per Detail A.
- All junctions between the existing and new court surface are to have an expansion joint as per Detail B.
- The colour pigment to be added to the 150mm screed is to match the existing colour pigment as closely as possible.
- All layers to be tested and passed by an independent laboratory with results submitted to and approved by the engineer prior to the placement of the subsequent layer.
- Prior to the placement of the concrete the top of the sub-base is to be leveled, without indentations and dampened.
- Concrete should preferably not be pumped due to the higher sand content, resulting in a higher probability of excessive bleeding / curling.
- Cement type to be used is to be CEM-11-B-S-42.5N or R (black).
- Critically, on completion of the placement of the 100mm thick base concrete the concrete is to be cured for a minimum of seven days. Similarly the 150mm screed is also to be cured for a minimum of seven days. Curing is to ensure that the surfaces are constantly moist.



DETAIL A
TYPICAL TENNIS COURT
CONCRETE WEARING COURSE
LAYERWORKS DETAIL

N.T.S.



DETAIL B
TYPICAL TENNIS COURT
EXPANSION JOINT DETAIL

N.T.S.

SANTORINI TENNIS COURT CONCRETE WEARING COURSE LAYERWORKS SPECIFICATIONS :

- 1.0 WEARING COURSE :
 - 150mm CEMENT : SAND SCREED - CONSISTENCY - 50 kg CLASS 42.5 N CEMENT TO 100 ltrns CLEAN, WELL GRADED COURSE RIVER SAND WITH PARTICLE SIZES < 5mm.
 - WATER VOLUME TO EACH MIX TO BE SUCH THAT A CONSISTENCY SIMILAR TO PLASTER IS OBTAINED.
- 2.0 BASE COURSE :
 - 100mm, 20 MPa CONCRETE - CONSISTENCY - 50 kg CLASS 42.5 N CEMENT TO 100 ltrns CLEAN, WELL GRADED COURSE RIVER SAND WITH PARTICLE SIZES < 5mm TO 100 ltrns CLEAN 10mm STONE.
 - WATER VOLUME TO EACH MIX TO BE SUCH THAT A WORKABLE MIX IS MADE.
 - SHOULD READY MIX CONCRETE BE IMPORTED THE SUPPLIER IS TO PROVIDE A MIX WITH A 100mm SLUMP.
 - ALL SAND AND STONES ARE TO BE FREE OF CLAY, ORGANIC MATTER OR ANY OTHER IMPURITIES.
- 3.0 SUB-BASE COURSE :
 - 100mm G7 COMPACTED TO 93% MOD AASHTO DENSITY.
- 4.0 IN-SITU :
 - 150mm THICK RIP & RECOMPACT IN-SITU MATERIAL TO 93% MOD AASHTO DENSITY MINIMUM GRADE OF IN-SITU TO BE G7. (CEMENT STABILISE TO 4% BY VOLUME IF INSTRUCTED BY THE ENGINEER).
 - ALL LAYERS TO BE TESTED AND PASSED BY AN INDEPENDENT LABORATORY WITH RESULTS SUBMITTED TO AND APPROVED BY THE ENGINEER PRIOR TO THE PLACEMENT OF THE SUBSEQUENT LAYER.

PLACEMENT OF FILL MATERIAL :

PLACE SELECTED FILL MATERIAL IN 150mm THICK LAYERS, MINIMUM GRADE OF SELECTED FILL MATERIAL TO BE OF G7 QUALITY.
COMPLY: EACH LAYER TO 93% MOD AASHTO DENSITY.
THE CONTRACTOR IS TO SUPPLY TROULER DENSITY TEST RESULTS BY AN INDEPENDENT LABORATORY AT 100mm INTERVALS ALONG THE TOP OF EACH 150mm THICK FILL LAYER. SEE COMPACTION DENSITY TEST NOTES.

COMPACTION DENSITY TESTS:

TROULER DENSITY TESTS ARE TO BE PERFORMED AT 5m INTERVALS ON EACH LAYER BY AN INDEPENDENT APPROVED SOILS LABORATORY.

THE TEST RESULTS ARE TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THE PLACEMENT OF THE NEXT LAYER.

ANY AREA FAILING THE TEST IS TO BE REWORKED AND RETESTED TO ACHIEVE THE REQUIRED DENSITY.

THE COSTS OF THE TESTS ARE TO BE INCLUDED IN THE CONTRACTORS TENDER PRICE AND INDICATED AS SUCH AS A SEPARATE ITEM.

SHOULD THE CONTRACTOR FAIL TO SUPPLY TEST RESULTS PRIOR TO THE PLACEMENT OF THE NEXT LAYER, THE UNTESTED LAYER IS TO BE EXPOSED AT THE STATED NUMBER OF PLACES AND TESTED AS REQUIRED. SHOULD THESE TESTS INDICATE A FAILURE TO MEET THE REQUIRED DENSITIES, THE CONTRACTOR SHALL AT HIS OWN EXPENSE REMOVE THE UPPER LAYER AND REWORK THE FAILED AREAS TO THE ENGINEERS SATISFACTION.

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GENERAL NOTES
1.0 ALL BUILDING WORKS TO BE IN ACCORDANCE WITH RELEVANT S.A.N.S. BUILDING CODES AND NATIONAL BUILDING REGULATIONS.
2.0 DRAWINGS MUST BE CHECKED BY THE CONTRACTOR WHERE DISCREPANCIES IN THE DIMENSIONS ARE FOUND THESE MUST BE REPORTED TO THE ENGINEER BEFORE WORK COMMENCES.
3.0 ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS.
4.0 ALL SETTING OUT DIMENSIONS AND LEVELS ARE TO BE DONE AS PER THE ARCHITECTS DETAILS.
5.0 THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL FORMWORK, DIMENSION & LEVEL CONTROL, GENERAL ON-SITE QUALITY CONTROL, AS WELL AS SITE SAFETY & SECURITY.
6.0 THE CONTRACTOR IS TO KEEP A CLEAN & COMPLETE SET OF CONSTRUCTION DRAWINGS ON SITE AT ALL TIMES.
7.0 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE OTHER STRUCTURAL DRAWINGS.

05 30/07/2022 ISSUED FOR TENDER PURPOSES ONLY
REV DATE REVISION DESCRIPTION
PROJECT: SANTORINI - APRIL 2022 STORM DAMAGE
CLIENT: SANTORINI BODY CORPORATE
ADDRESS: 28 DOLPHIN CRESCENT, BALLITO
DRAWING TITLE: TENNIS COURT & STORMWATER CULVERT

PROJECT NUMBER :					
DISPN	DATE	NAME	NO.	STATUS	REV.
STR	30/07/2022	SANTORINI	03	T	0

DWG STATUS: P - Preliminary (Drawing issued for information only)
T - Tender (Drawing issued for tender only)
C - Construction (Drawing issued for construction)
03 TENNIS COURT & STORMWATER CULVERT
02 1:4 PERISSA RETAINING WALL DETAILS
01 SANTORINI - STORMWATER REMEDIAL WORKS

NUMBER: REFERENCE DRAWINGS
MONOBLOCK CONCRETE PRODUCTS - CIVIL & STRUCTURAL DESIGN
DESIGNED: R.R.S.
DRAWN: R.R.S.
DATE: JULY 2022
SCALE: AS SHOWN
SIZE: A1
CK: 00000000
P.L. 000 100
4/00
The 000 947 0716
Fax: 000 947 0718
www.monoblock.co.za

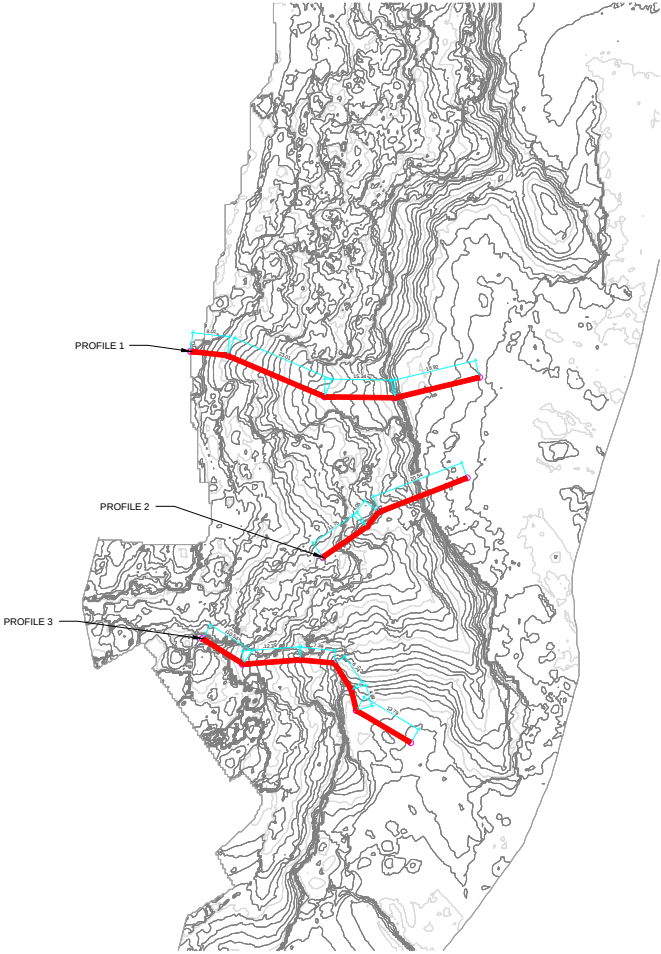
MonoBlock Scope of Work



COLLAPSED AREAS
AERIAL VIEW

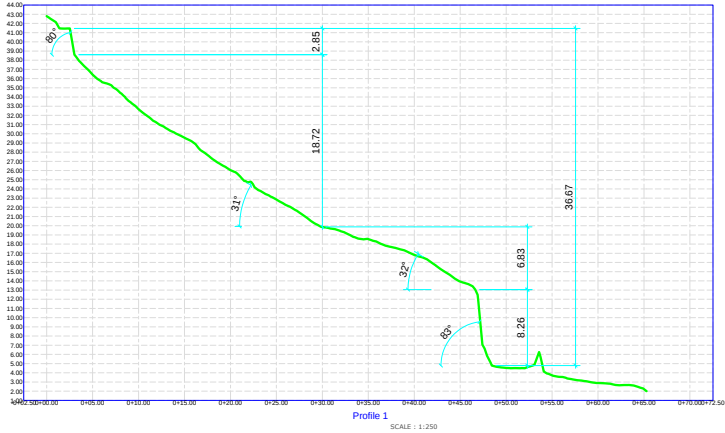
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REV.	DATE	REVISION DESCRIPTION							
PROJECT : SANTORINI									
CLIENT: SANTORINI									
ADDRESS: 28 DOLPHIN CRESCENT, BALLITO									
DRAWING TITLE :									
PLAN VIEW									
DRAWING NUMBER									
DSPLX	DATE	NAME	NO.	STATUS	REV.				
STR	14/07/2022	SANTORINI	01	P	0				
DWG STATUS:									
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05									
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COLLAPSED CLIFF SECTION VIEWS									
PLAN VIEW									
NUMBER									
REFERENCE DRAWINGS									
DESIGNED: R.B.S.									
DRAWN: T.S.									
DATE: JULY 2022									
SCALE: AS SHOWN									
SIZE: A1									

MonoBlock Scope of Work



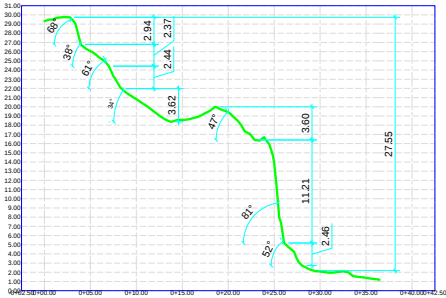
COLLAPSED AREAS
PLAN VIEW

SCALE : 1:500



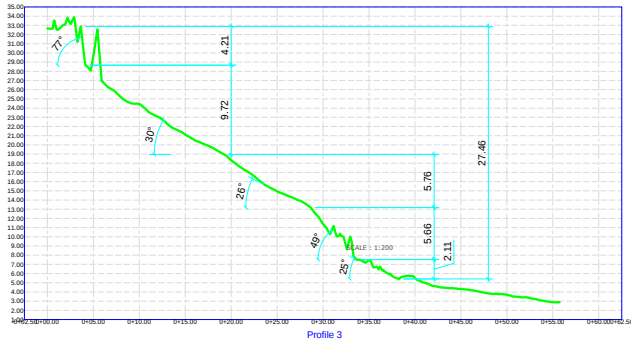
Profile 1

SCALE : 1:250



Profile 2

SCALE : 1:250



Profile 3

SCALE : 1:250

00 14/07/2022 ISSUED FOR INFORMATION PURPOSES ONLY

REV. DATE REVISION DESCRIPTION

PROJECT: SANTORINI

CLIENT: SANTORINI

ADDRESS: 28 DOLPHIN CRESCENT, BALLITO

DRAWING TITLE:

COLLAPSED CLIFF SECTION VIEWS

DRAWING NUMBER

DRAWN	DATE	NAME	NO.	STATUS	REV.
STR	14/07/2022	SANTORINI	02	P	0

DWG STATUS: P: Preliminary (Drawing issued for information only)
CODING: T: Tender (Drawing issued for tender only)
C: Construction (Drawing issued for construction)

06

05

04

03

02 COLLAPSED CLIFF SECTION VIEWS

01 PLAN VIEW

NUMBER REFERENCE DRAWINGS

DESIGNED: R.R.S.

DRAWN: T.S.

DATE: JULY 2022

SCALE: AS SHOWN

SIZE: A1





COLLAPSED
AREAS
AERIAL VIEW

00	25/07/2022	ISSUED FOR INFORMATION PURPOSES ONLY							
REV	DATE	REVISION DESCRIPTION							
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CLIENT : SANTORINI									
ADDRESS : 28 DOLPHIN CRESCENT, BALLITO									
DRAWING TITLE :									
PLAN VIEW									
DRAWING NUMBER									
DWPN	DATE	NAME	NO	STATUS	REV				
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DWG STATUS									
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1 - Tender (Drawing issued for tender only)									
2 - Construction (Drawing issued for construction)									
03									
05									
04									
03									
02		COLLAPSED CLIFF SECTION VIEWS							
01		PLAN VIEW							
NUMBER			REFERENCE DRAWINGS						
MONO:LOCK			DESIGNED : R.P.S.						
SPECIALISED CONCRETE PRODUCTS			DRAWN : T.S						
P.O. BOX 141			DATE : JULY 2022						
010 334 41 41			SCALE : AS SHOWN						
010 334 41 41			SIZE : A1						



Next Steps

Short Term

Implementation of the Tendered Designs :

- ❑ The adjudicating and appointment of the preferred contractor(s);
- ❑ Signing of the JBCC contract between Santorini and the contractor(s);
- ❑ Construction of the following components :
 - The two tier retaining wall in front of 14 Perissa;
 - The underpinning of the Dry Stack Retaining Walls in front of Akrotiri;
 - The stabilization of the stormwater culvert under tennis court; and
 - The reconstruction of the tennis court.

Stormwater controls on the Eastern side of Akrotiri and Thira :

- ❑ The principle of these recommendations is to ensure that stormwater run-off from the roofs and patios of the units as well as from the lawns is stopped from overtopping the eastern edge of the lawns. Should stormwater continue to flow over the eastern edge of these lawns into to the coastal dune forest below, the bases of the existing dry stack retaining walls, where applicable, as well as the existing dune forest will be undermined, specifically when one has a storm with a return period in excess of 1:50 years.
- ❑ Ideally a survey of the area is undertaken which includes all existing stormwater infrastructure;
- ❑ A detailed engineering design and drawing is completed and the construction is completed by the in-house team.
- ❑ Undertaking this important stormwater management control process will assist in addressing the principle cause of the erosion that has taken place in April and May 2022. In addition, it will minimize and ideally prevent future embankment failures on the eastern embankment taking place in the future.

Long Term: -Failed Eastern Embankments

Background

Government legislation has changed since 2007 when the existing embankment stabilization was done below Perissa. In 2009 new environmental legislation was introduced that prohibited the insulation of any hard structures within 100m of the high-water mark unless an applicable Environmental Impact Assessment (EIA) is done, submitted to the Department of Environmental Affairs and Forestry and approved by them. This process can take up to eight months and approval may still not be given.

- ❑ Any required stormwater or embankment remedial work may only be undertaken within one's property boundary. Working in a public area is not permitted;
- ❑ The proposed intervention needs to be a "soft" interventions. Hard concrete structures or retaining walls are not permitted but soft "Geo-container" bags may be used.
- ❑ Any remedial work that requires moving more than 5m³ of soil or is done within 100m of the High Water Mark will need to go through a Section 30A application process with the Provincial Department of Economic Development, Tourism and Environmental Affairs.
- ❑ If a Section 30A application is done successfully one can get approval within seven days.
- ❑ An alternative approach is to go through an Environmental Impact Assessment (EIA) process that could take up to 8 months for possible approval.
- ❑ If a Section 30A or EIA process is not followed and one possibly does the required remedial work without authorisation a work stop order could be issued as well as a fine.
- ❑ This application process should ideally be done by a local environmental specialist.

Design Approach

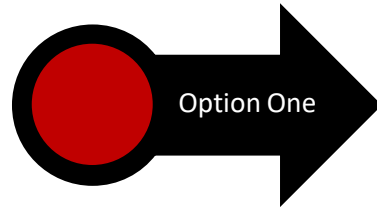
SANS 10400 – R – Section 4.2.2.2 *“Major and minor stormwater systems shall be designed for design flood recurrence intervals of 50 years and 2 years, respectively”*

Ideally design for a 1:50 year storm with all choke points designed for 1:100 or alternatively, design the whole system for 1:100 year storm. An increase of approximately 20 % in volume from a 1:50 year storm to a 1:100 year storm.

Importantly it is noted that should a suitable embankment protection system not be installed in front of 23 Akrotiri future storms will continue to erode the current exposed embankment that the unit is founded on. In addition the erosion of the embankment could continue, in a northerly direction, possibly similarly impacting the adjacent Akrotiri units.

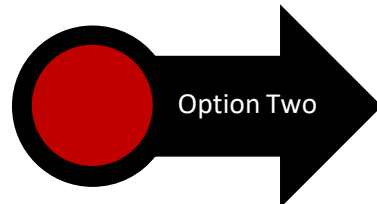


Design Approach



Embankment Stabilization from the Toe of the Failed Embankment:

The base of each failed embankment is the optimum position to stabilize a failed embankment. Where it is feasible, cost effective and will not contravening any environmental or municipality legislation, consideration is to be given to installing seven ton “Geo-container” (or similar approved) bags or gabion baskets filled with 70 kg “Geo-container” (or similar approved), designed to an engineers specification.



Embankment Stabilization Utilizing Piles:

An alternative option is to install piles on the boundary of the complex and establish a retaining structure on the boundary of the property. It is noted that this retaining structure would positioned on the slope of the embankment and would not be at its base. The piles would need to be socketed into bedrock to be structurally effective with effective embedment only feasible with a mechanical drilling rig. Hand augured piles would not be effective. Due to the locations of the sites it may not be possible or cost effective to use a mechanical drilling rig.

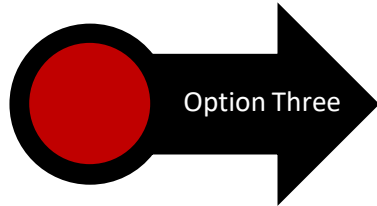
Design Approach

Embankment Stabilization Utilizing Protected Reinforcing Anchor Bars:

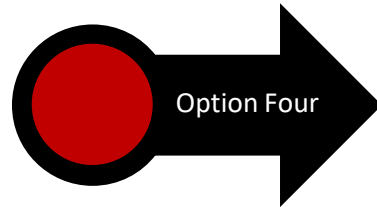
Consideration can be given to exposing the natural rock under the existing soil on the embankments, on the line of the property boundary, and installing suitably sized and protected reinforcing bars that are drilled and epoxied into the bed rock as anchor points, as was done by Mono Block to reconstruct the Thompsons Bay swimming pool in 2008.

This option is only feasible should the depth to bedrock below the current ground level be not more than 500mm. If the depth to bedrock is greater than 500mm the possibility of the soil above the embankment falling into the excavated trench during construction and injuring or killing personnel is high and has to be avoided.

Should it be safe and feasible to install protected reinforcing bars the anchored bars could then provide the anchor points for a suitably design retaining structure consisting of gabion baskets filled with 70 kg "Geo-container" (or similar approved), designed to an engineers specification.

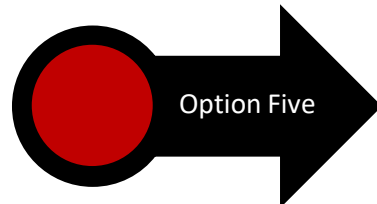


Design Approach



Embankment Stabilization Utilizing Soil Anchors:

A forth option to consider is the use of soil anchors, galvanized mesh / Hyson Cells and gunite being strategically placed across the failed embankments, up from the boundary line of the complex. Soil anchors do not require heavy machinery and coupled with the mesh and gunite, will offer a structurally sound solution.

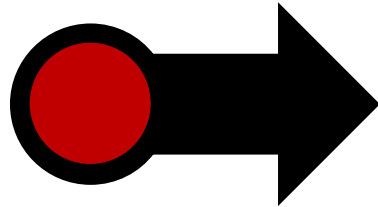


Embankment Vegetation and Protection:

The fifth option to consider is shaping the embankments to 27 degrees or, where feasible, possibly 33 degrees which can then be protected from further erosion through Hyson cells that are top soiled and vegetated or, alternatively, using a “BioMac” erosion control blanket that consists of coconut husk fibers layered between photosensitive polypropylene netting. Subsequently the embankment is to be vegetated with Vetiver grasses and indigenous plants and shrubs, under the guidance of a horticulturalist.

Options for Failed Eastern Embankments

Possible Embankment Stabilization Option:



Should the Provincial Department of Economic Development, Tourism and Environmental Affairs, through a Section 30A or EIA process, agree to the construction of a “hard structure” within 100m of the High Water Mark, consideration can be given to the following solution which is a combination of Options Four & Five discussed previously :

The use of soil anchors, galvanized mesh / Hyson Cells and gunite being strategically placed across the failed embankment where the inclination of the failed embankment is steeper than 33 degrees, specifically below the deck of Akrotiri # 23. For the balance of the embankment place Hyson cells that are top soiled and vegetated or, alternatively, using a “BioMac” erosion control blanket.

Subsequently the embankment is to be vegetated with Vetiver grasses and indigenous plants and shrubs, under the guidance of a horticulturalist.



KEY POINTS TO CONSIDER GOING FORWARD:

Adjudication of tenders for the four current remedial areas;
Installing an effective stormwater management system in front of Akriotiri & Thira;
Facilitating an effective long-term solution to the failed embankments, specifically in front of 23 Akriotiri.

THANK YOU



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