



**CHECKLIST FOR CARRYING OUT EXCAVATION AND PILING WORKS IN
CHANGI/SELETAR AIRPORT**

Objective: To locate and trace all underground services, both charted and uncharted, before commencement of ground works to ensure that all activities can proceed safely without damage or downtime to operating services.

Check boxes when
completed

Steps:

1. Before commencement of any works on site, the Work Party shall provide advance notification indicating the period and exact site boundary of intended excavation/piling works to the following parties:
 - CAG Engineering & Development Group, covering:
 - High Tension cables
 - Low Tension cables
 - Airfield lighting cables
 - Control cables
 - Water pipelines
 - Drainage subsoil pipes
 - Turf maintenance
 - Public and airside safety requirements
 - FOD control
 - CAG Airport Operations Division, covering
 - Horticulture requirements
 - Estate Management requirements
 - Other relevant agencies, including
 - CAAS Aeronautical Telecommunication & Engineering , covering:
 - Communications
 - Navigation
 - Surveillance Services
 - SingTel
 - StarHub
 - CAFHI
 - CityGas
 - PUB - Sewage pipes
 - Tenants concerned, where necessary

Check boxes when completed

2. The Work Party shall request for and obtain as-built services drawings from the parties above to serve as references in order to produce an excavation/piling work plan and to work out a services protection and/or diversion scheme.
3. The Work Party shall carry out services detection on site through engaging the services of a licensed cable detection worker (LCDW). The particulars of the licensed cable detector shall be submitted to the CAG project officer and consultants in charge for endorsement. The CAG project officer and consultants shall make necessary arrangements to ensure that all related electrical services are turned on to facilitate cable detection work.
4. Where advised by the LCDW or requested for by the services owners concerned, the Work Party shall provide trial pits that are manually dug under the close supervision of the LCDW to expose, identify and confirm the services detected. Trial holes shall be required to positively identify all communications cables, fibre optic cables, gas and water pipe location, as well as all other services within or in the proximity of the intended excavation/piling area that cannot be accurately located or easily detected. Detailed information shall be obtained from the appropriate party as to the possibility of such services being located within the proposed construction area. The Work Party shall take all necessary precautions to ensure that these “undetected services” are located and protected during the earthworks. Examples of “undetected services” are certain telecommunication/data cables, un-energized cables, CAFHI fuel pipes, fibre optic cables, co-axial cables and radar cables.
5. All trial holes must be carried out with caution and dug by manual means. Excavator or other machinery shall not be used for digging trial holes. The method statement for trial holes and trenches shall be submitted to CAG project officer one week in advance for approval before they are dug (Form A).
6. The LCDW will compile a comprehensive services layout report on information gained from existing services drawings provided by the relevant authorities and the trial holes dug on site. The LCDW report will recommend suitable measures to be taken to protect all services on site, based on sound industrial practice and recommendations by the services owners. The LCDW report showing exact locations of services found shall be submitted to relevant services owners for verification.

Check boxes when completed

- 7 The Work Party shall implement appropriate measures as required by the project consultant to protect the services found.
- 8 The LCDW report shall also highlight all discrepancies between the services layout indicated on plans versus their actual location found on site. CAG project officer shall coordinate a meeting to sort out such discrepancies with all relevant services owners concerned.
9. The Work Party shall make distinctive markings on site using the following color schemes:
- Green tape shall be used to demarcate the boundary within which services detection has been completed by the LCDW. No excavation/piling shall be allowed at all time outside the area demarcated by the green tape, i.e. where services detection has not been carried out.
 - Red tape shall be used to demarcate the areas where services have been detected and identified, including any safety buffer required in its vicinity. Sign-posting indicating the type of services found and barricades on the ground surface shall be prominently displayed by the Work Party to prevent any works from spilling into these protected areas and jeopardizing the services within.
- All workers on site shall be briefed on the above markings and warned against carrying out any excavation/piling works bounded within the red tape.
10. The Work Party shall install safety barriers to protect workers from falling into cable trenches or trial holes that are left exposed.
11. The Work Party shall be required to establish a continuous monitoring plan to ensure that no worker or equipment that could cause damage intrudes into the areas where services are found.
12. Upon completing items 1 to 11, the Work Party shall submit an updated excavation/piling work plan showing markings done on site, proposed work methods and services protection and/or diversion scheme to the CAG project officer, consultants and relevant service owners for approval at least 2 weeks before the planned commencement of actual excavation/piling work.

Check boxes when
completed

13. No excavation/piling works shall commence unless the CAG project officer is satisfied that all the above measures listed in items 1 to 12 above have been met and that other necessary precautions have been taken on site. A 'Permit to Excavate' (Form B) would then be issued to the Work Party.
14. Only Registered Excavator Operators (REO) or Probational Registered Excavator Operators (PREO) will be allowed to operate excavator machines within the work area.
15. Prior to commencement of works, the Work Party's safety manager shall conduct a briefing to all foremen and workers to highlight to them the services layout and to ensure that no works are to be carried out within the services area bounded by red tape unless under the direct supervision of the LCDW and with the explicit approval of the Work Party's project manager, consultants and CAG project officer.
16. In areas where it has been established that services are or may be present, no excavation is to be carried out by excavator. Trial holes are to be hand dug until services are successfully located or desired excavation depth is achieved.
17. Other than having the LCDW to provide standing supervision on site, a competent full-time excavation/piling supervisor shall also be deployed to monitor the site operations during the entire earthworks and to provide close guidance to the excavator operator.
18. The Work Party shall provide protective steel plates or conduits over exposed services positions so as to prevent damage due to movements of heavy vehicles or human traffic over them.
19. If the proposed works were to overcross comms cable ducts, the Work Party shall submit method of support and protection of these ducts to CAG, CAAS Air Traffic Services Division and NCS Communications Engineering Pte Ltd, Line Plant Operations Division for approval. They shall also be informed prior to the dismantling of supports and the backfilling of comms cable ducts.
20. Where the works would be carried out over the Approach Control Radar (ACR) cables, NCS Communications Engineering Pte Ltd shall be engaged for on-site standby to respond quickly to any problems.

Check boxes when completed

21. Excavation by machine shall stop once cable slabs are exposed. Only manual excavation is allowed after the cable slabs are removed. Protection slabs over HT cables shall not be tampered with and shall be remained intact unless authorised by CAG and the Work Party's PE to remove them.
22. If unknown services are unaccounted in the process of excavation, Work Party shall stop all works immediately at the affected area and inform the CAG project officer to help to identify these services found.
23. Where necessary, the Work Party shall plan for further cable detection checks to scan the work area for other undetected/ undetectable services. Given the technical limitations of the equipment currently available, investigative detection must be carried out at each stage of the construction process. Stage by stage detection of the underground services must be considered and incorporated within the construction schedule for deep excavation works. This procedure must be implemented until services are successfully located or the effective depth of the excavation is reached. In simple terms, detection is to be carried out during the excavation, at intervals in accordance with the limitations of the detection (typically every 2 to 3 metres), until services are precisely located or the desired construction depth is achieved.

File Ref: _____

Date: _____

To: See Distribution List



Dear Sir/Mdm

REQUEST FOR INFORMATION ON UNDERGROUND SERVICES FOR EXCAVATION/PILING WORKS

_____ is planning to carry out excavation/piling works for the following project:

PARTICULARS OF PROJECT

Project Title	
Contractor	
Consultant	
CAG Officer-in-Charge	
Contact No.	
Location of Works <i>(Please see site layout plan attached)</i>	
Description of Excavation/Piling Work Site	
Period of Excavation/Piling Works	
Remarks (if any)	

We hereby request for information of any underground services under your purview that could be affected by the above-mentioned works. We will carry out cable detection and trial holes and where necessary, contact your staff to verify the services identified on site.

We will seek your approval before commencing the proposed excavation/piling works.

Your reply with the required information within 2 weeks from the date of this submission would be appreciated.

Name & Designation: _____ Signature: _____

Contact No: _____

Distribution List

CAFHI

Attn: David Phoon (david.phoon@cafhi.com.sg)

Contact No: 91995175 / 65464311 (Fax: 6542 2655)

[Fuel Hydrant Pipeline & Emergency Cable]

CAAS (Aeronautical Telecommunication & Engineering)

Attn: Mohd Zaki Ariffin / Chan Kok Sunn / Md Nizam Kamasini

[Communications, Navigation & Surveillance Services]

CAG(Master Planning)

Chee Kay Hyang / Samuel Oh

[Airport Development]

CAG (Engineering & Development)

Ben Tan / Sim Hai Seng

[Control Cables]

CAG (Engineering & Development)

Chan Kim Hove / Tan Hwee Loo

[HT Cables]

CAG (Engineering & Development)

Loh Tick Boon / Anuar Ali

[External Airside & Landside LT Cables]

CAG (Engineering & Development)

Clarence Low / Wong Sou Chun / Jamal Juki

[Potable/Fire Hydrant/Industrial Water Pipelines & Drainage Subsoil Pipes]

CAG (Engineering & Development)

Andy Chin / Low Huay Huay

[Airfield Lighting Cables]

CAG (Engineering & Development)

Tan Eng Kim / Soh Ying Shan

[CCTV Services]

Note: The contractor(s) shall purchase the services plans for sewer, gas, communication cables for SingTel and Starhub as per these agencies requirements and seek separate approval from these agencies to commence excavation/piling works.



APPLICATION FOR PERMIT TO CARRY OUT TRIAL HOLE AND TRENCHING WORKS

CONSULTANTS:
WORK PARTY:
PROJECT TITLE:
LOCATION OF WORKS: (To attached plans)
REMARKS:
I/We hereby apply for a permit to commence trial hole/trenching works as stipulated in the above location and undertake to comply with the requirements as specified in the checklist and guidelines attached.
<u>APPLICANT:</u>
NAME OF PROJECT DIRECTOR/MANAGER: _____ <div style="text-align: center; margin-top: 10px;">SIGNATURE: _____</div> <div style="text-align: center; margin-top: 10px;">DATE: _____</div>

APPROVED

NOT APPROVED

Supported by Consultant:	Approval by CAG (Engineering & Development Group):
PROJECT MANAGER: _____	PROJECT OFFICER: _____
SIGNATURE AND DATE: _____	SIGNATURE AND DATE: _____



APPLICATION FOR PERMIT TO CARRY OUT EXCAVATION/PILING WORKS

CONSULTANTS:
WORK PARTY:
PROJECT TITLE:
LOCATION OF WORKS: (To attached plans and protection/diversion scheme)
REMARKS:
I/We hereby apply for a permit to commence *excavation/piling works as stipulated in the above location and undertake to comply with the requirements as specified in the checklist and guidelines attached.
<u>APPLICANT:</u>
NAME OF PROJECT DIRECTOR/MANAGER: _____ SIGNATURE: _____ DATE: _____

* Delete where inapplicable

APPROVED

NOT APPROVED

Supported by Consultant:	Approval by CAG (Engineering & Development Group):
PROJECT MANAGER: _____	PROJECT OFFICER: _____
SIGNATURE AND DATE: _____	SIGNATURE AND DATE: _____