

Excavation, Backfill & Compaction within the Swamp Area

(SOIL IMPROVEMENT)

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Method Statement for Earth Works within the Swamp Area

1.0 Purposes:

This method statement describes a work explanation of the method to be carried out during an execution stage of working within the swamp area for Site Preparation Works ,PTT Phenol Project , to ensure that during the entire execution stage the work is done in line with good engineering practices and is compliance with engineering standard practices , nation & local codes.

2.0 Scope of Works

The method statement also includes all necessary temporary works such as dewatering, slope protection, precaution barricades, temporary access and related activity etc. Details is as follows,

- Safety Policy
- Precaution Barricade
- Preparation of the Works
- Survey Setting Out Procedure
- Dewatering
- Excavation in the muddy soil.
- Backfill & Compaction on suitable soil with compaction test 95 % of the maximum dry density to be done simultaneously upon a completion of compaction layer by layer.
- Temporary Stockpile for mud drying prior to transportation to dumping area.
- Reinstatement.

and all incidentals necessary to complete the entire work.

3.0 Safety

One of the main aspects of this procedure is Safety and Health Control. This is to control occurrence of injuries as well as damage to equipment and properties during the entire construction period. In order to ensure a safe working environment during the entire construction work is obtained, the safety measures will be implemented as follows.

- Barricades/Signs will be provided sufficiently and maintained, as precautionary measures during the entire stage of construction, to protect the work, workmen and safety of the public. In case of precaution against failure of lights, barricades will be equipped with suitable reflecting material. Barricade will be made to indicate the construction boundary
- Prior to using any machines/equipment at site, ensure that they will be inspected and certified by qualified person.
- Periodic Preventive Maintenance will be made on all equipment and machines.
- Operators and drivers are to be equipped with valid driver's/operator's license or permit from concerned government agency. Working in the night time and/or during rain will not be allowed.
- Only authorized drivers or operators will be allowed to operate machines or equipment.
- Only authorized signalman will be assigned together with the operator or driver.
- Lifting equipment as well as its accessories such as sling wire, nylon sling, shackles, chain blocks crane hook and latch will be inspected prior to using.
- Places great emphasis on all matters of health, safety, and environmental both in the workplace and to the public during the execution of their works.
- Personal Protective Equipment (PPE including mask gas filter type) will be issued to all workers such as safety shoes, hardhat, working gloves, safety goggles (if required) .
- Wearing of the basic PPE shall be fully enforced.
- Regularly check that safe working condition is obtained prior to working.
- Construction waste will be disposed of in an appropriate manner. There will be no dumping of garbage, waste, construction debris, motor oils, etc., on the site or on the adjoining vegetated areas. Ensure that all damages accompanying transportation of the excavated material will be at Contractor responsibility. The transportation path from site to the dumping area will always keep clean and free from soil , waste matter that may falling down during transportation.
- Any potentially dusty material being transported from work sites will be securely contained. Transporting vehicles, etc., will be monitored to prevent overloading and over-filling.
- To relocate/Transport the excavated material outside Eastern Industrial Estate will not be allowed.

- Weight of dump truck containing the excavated material will not be exceeded the limited weight allowed by the nation, local, traffic law.
- Prior to relocating/transportation of excavated material to the designated dumping area a work permit by Eastern Industrial Estate shall be obtained on the day when transportation is to be done.
-

4.0 Work Method

The method statement includes safety aspects during the work, preparation of the work such as arrangement of precaution barricades and protection, main tools and equipment utilized, dewatering, survey, excavation, backfill & compaction and all related necessary to complete the entire work.

4.1) Preparation of the Works

- All existing facilities, which are within the construction site radius considered to obstruct any work activities, will be removed or be provided with protection against damage, dust and dirt. Enclose the site construction area to control material equipment as well as to avoid any incident/ accident.
- Investigate both underground hindrance and aerial facilities.
- Works should start confirmation of the permission and the handing over area of the work.
- Prepare, check and submit verified construction drawings of excavation areas to be attached as addition to this method statement distribute & details to all concerned parties as required.

4.2) Main Tools & Equipment

- Backhoe
- Dump Trucks
- Compactor
- Extension cable
- JCB
- Submersible pumps
- Generator
- Gas detectors depending on the depth of excavation

4.3) Survey

The setting out will be made at the beginning stage of the work by referring to the construction drawings. All reference points will be made as necessary for the entire work, develop method and cross-checking all setting-out shall be operations. When

principal lines and levels have been set out, it would be advised to the relevant persons. Therefore the following measures will be carried out,

- ITD will seek direction from CTCIT where naturally occurring cavities , water course or cesspools , etc. are likely to obstruct the work.
- Prior to proceeding with the works , the existing ground elevations will be surveyed and the cross sections will be drawn and submitted for approval.
- On the approval of the survey report this will be used for calculation of actual volume for the cross-sections after a completion of the work.
- CTCIT will give an instruction indicating the swamp removal boundary (Area & Depth)
- The actual cross-sections will be agreed by ITD and CTCIT prior to the commencement of the work.
- The checked cross section sheets including plans indicating existing terrain will be mutually signed by ITD and CTCIT.
- In case that bad smell of the excavated mud is encountered , it should be stocked temporarily for drying exposing to sun within the project boundary prior to transportation to the dumping area. In this case stocking area within the project site will be nominated by CTCIT.

4.4) Dewatering

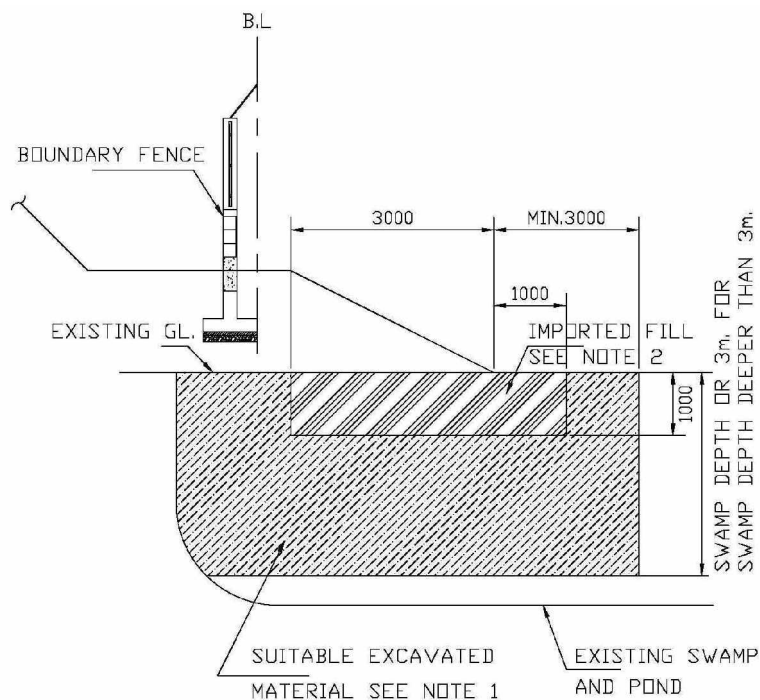
- EIE permission will be obtained prior to dewatering.
- ITD will take the proper steps to ensure that all water disposal is done in line with good engineering practices and is in compliance with national & local laws , rules , codes.
- ITD will take the proper steps to ensure that the backfilling works are kept free from water until completion of works. This can be achieved by continually dewatering water from our working area to the adjacent public drain.
- The submerged pumps will be arranged sufficiently so that the excavation and removal of the mud can be proceeded with no obstruction.
- Excavation and removal of the mud will be done by backhoes and dump trucked working simultaneously.

4.5) Excavation

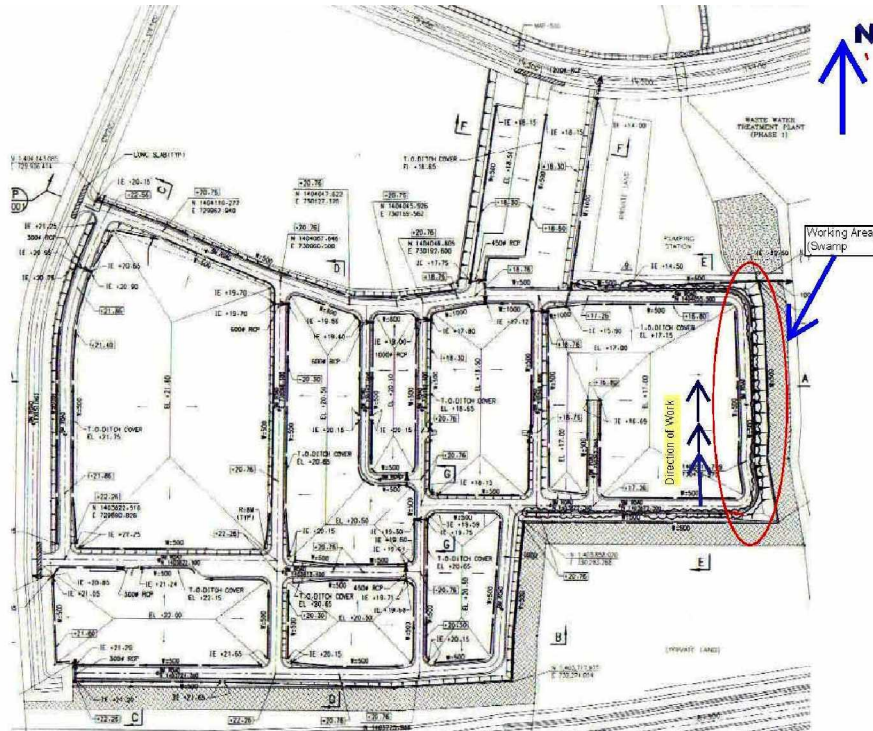
4.5.1 Excavation Criteria

- The excavated material at the swamp area will be justified by CTCIT whether it is suitable or unsuitable material.

- In case it is justified by CTCIT that the excavated material is suitable, the dumping area will be at CTCIT direction.
- In case it is justified by CTCIT that the excavated material is unsuitable, the dumping area will be at ITD responsibility. In case that bad smell of excavated material is encountered they will be temporarily stocked at the area nominated by CTCIT to dry prior to relocation to dumping area.
- Upon a completion of dewatering work the excavated mud will be removed by backhoes and Tractors.
- From the bottom of the excavated swamp area the fill material will be imported fill material.
- Removal of the excavated mud to the designated area will be done by the operation of dump trucks.
- Once the unsuitable materials are all disposed and removed from the swamp , CTCIT and ITD will mutually re-check / inspect the excavated elevations and the cross-sections will be made by ITD.



Elevation View : Swamp Removal Criteria



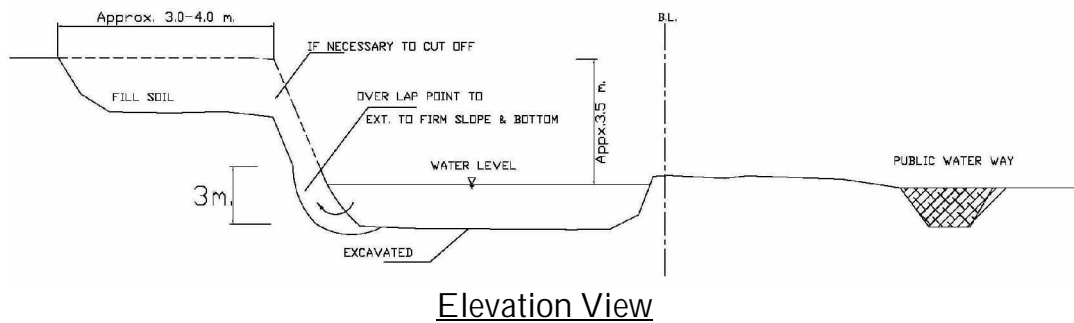
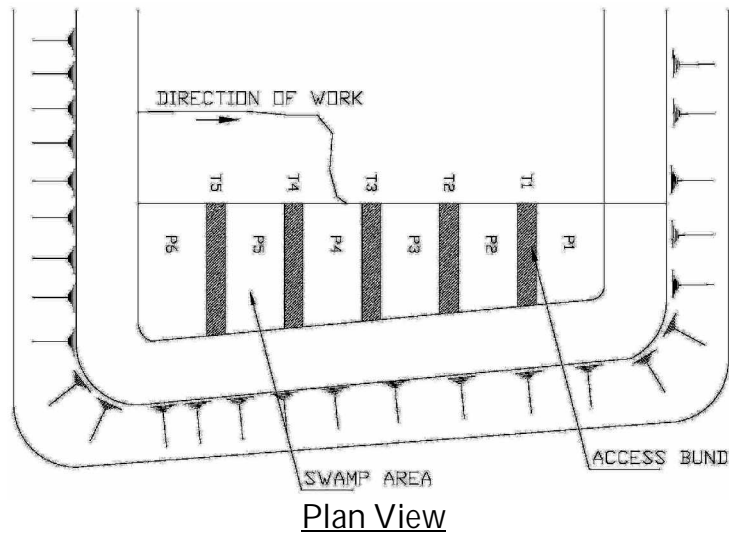
Plan View : Direction of Working within the Swamp Area

The access bunds will be made to control/ separate area of working. The width of the excesses will be sufficient for equipment working. They will be well compaction and can withstand weight of equipment (backhoe)

The subsurface improvement (replacement mud with the suitable material) will be done and finished area by area by the above direction

Upon the approval of the volume the backfilling works will be carried out by the following steps.

1



Outline of Working Sequence: Begin excavating at area P6 until the required bottom elevation is reached. Fill the bottom with imported fill material approximately 30 cm. thick then cut at area T5 as shown in the elevation view to backfill at P6. The volume of cut and fill should balance level of both side. The flow diagram is as follows.

Ex P6 – Ex T5 – Fill P6 – move backhoe to next path – Ex P5 – Ex T4 – Fill P5 – move backhoe to next path - Ex P4 – Ex T3 – Fill P4 – move backhoe to next path - Ex P3 – Ex T2 – Fill P3 – move backhoe to next path etc.

¹ *The excavation will be begun from the left end towards the right end as shown on the sketch.

** The previous fill soil (left side shown in the elevation view may be trimmed /sloped as necessary subject to subsurface condition.

*** This will be done simultaneously whilst the backfill in the swamp progresses.

4.5.2 Excavation, Backfill and Compaction Procedure

Considering the present condition of the site there is the public canal located approximately 5 meters eastside from the Phenol boundary. The present level of the swamp area is EL. 13.00, therefore the approximated bottom elevation is EL 10.00.

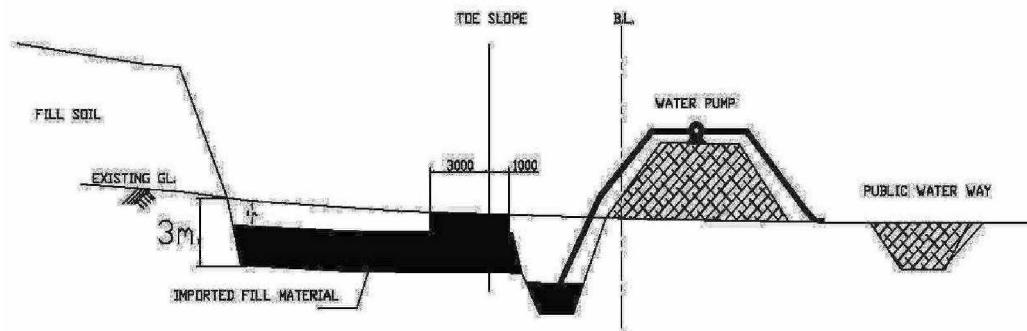
As the previous location of the existing boundary bund is onto the boundary line where the retaining wall for fence is to be cast. The other working bund will be made adjacent to the existing bund as shown in the above sketch.

It should be aware the making this bund will not affect to flowability of the water existing public canal. In case that the new bund has some part onto the public canal , the detour for water will be made to ensure that all time during an execution stage no blockage of water path will be experienced.

The new bund will be made by backhoe working with the dump trucks. The backhoe will be working on the existing bund as shown above. The new bond will be made parallel to the existing bund with the same length.

Replace the soft subsurface with imported fill material with approximately 30 cm. depth. This can be done by backhoe, dump trucks and compactor working simultaneously. The replacement must be done in a timely manner once the soft subsurface is removed.

The excavated material will be transported to stock at the designated area, within the project boundary or outside subject to CCTIT decision.

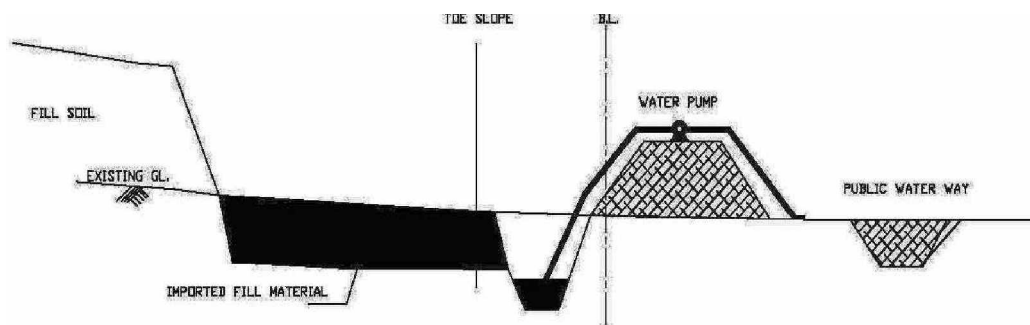


Backfill the next layer with suitable excavated material. This will be done layer by layer in horizontal direction. The thickness of each fill layer shall not exceed the value stated in the Engineering Standard, Specification for earthworks.

Compact the fill layer by vibrating rollers

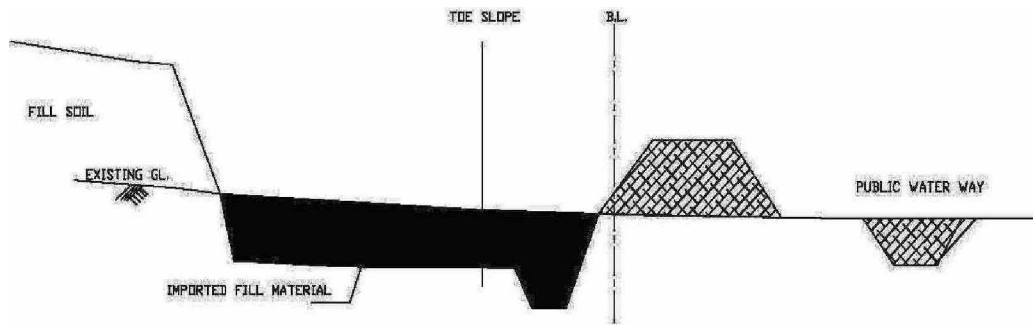
Compaction test for each layer will be obtained prior to backfill next layer.

The dewatering pits/gutter will be filled with granular material follows behind whilst the backfill progress. But its bottom level will be always lower than the associated fill.



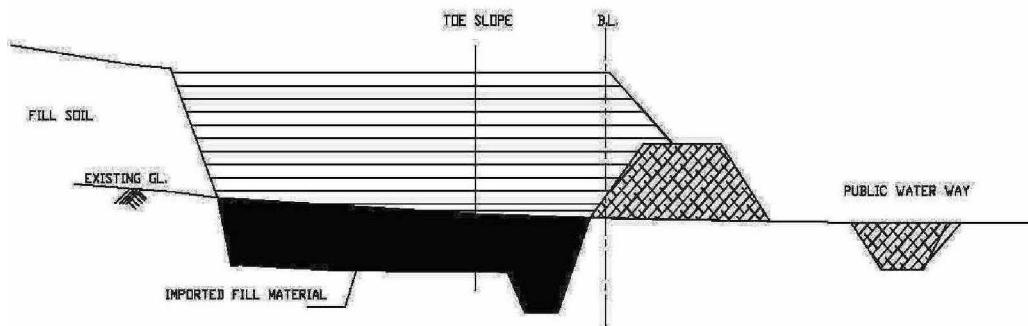
At the right side of excavation shown above the bund will be made to control the backfill boundary.

The bund will be made of import fill material and well compaction.



Fill the remaining area with suitable excavated material and compact with vibrating rollers.

Conduct the compaction test.



Reinstatement

Remove the submerged pumps and their accessories to keep outside the working boundary.

Fill The dewatering pits/gutter (pumping pit)

Continue backfilling work layer by layer until the required level is reached.

Reinstatement.

Job Safety Analysis

(Developing a habit of analyzing methods to identify hazards & unsafe work practices, then developing solutions that control, minimize or eliminate the hazards)

PTT Phenol Co., Ltd.

| | | | | | |
|--|--------------|---|-------------------------|--|-----------|
| Task : Survey | | | | | |
| Prepared by: | | Reviewed by: | | Approved by: | |
| Original Dated: | | Revised by: | | Revision Date: | |
| Revision: | | | | | |
| Goggles | Gloves | Face Shield | Barricade needed | Lock out Tack out | Dust Mask |
| Safety Harness | Long Sleeves | Hearing Protection | MSDS needed/Review(Y/N) | Ground Fault Interrupter | Others: |
| Other Safety Equipment Required : | | | | | |
| Remarks : | | | | | |
| Describe Job on General : Survey Works | | | | | |
| List of All Job Steps (ขั้นตอนการทำงาน) | | List all Known Hazards (อันตรายที่อาจเกิดขึ้นได้) | | How to eliminate Hazards (วิธีป้องกันอันตราย) | |
| 1.Survey Instrument | | <ol style="list-style-type: none"> Instrument falling down and hit the workmen. Camera dropping to ground by accident | | <ol style="list-style-type: none"> Area where the instrument is to be set must be well-compaction. Be concentrate all time during work execution | |
| 2.Rod Man & Chain man | | <ol style="list-style-type: none"> struck to the muddy Falling down into the deep excavation Pegs splatters into eye. Air Quality (>19.5%) | | <ol style="list-style-type: none"> Always bewares and walk on the designated access Always arrange the proper barricade with precaution board. Always wear safety Glass. Air test is required prior to entry. Gas detector will be provided if necessary | |

Note : I have identified all known Hazards and passed this information to those who will do the job.

CTCI (Thai) Signature : _____

Dept:_____

Reviewed by CTCI (Thai) Safety Dept. Signature_____

Suggestion:

Job Safety Analysis

(Developing a habit of analyzing methods to identify hazards & unsafe work practices ,then developing solutions that control, minimize or eliminate the hazards)

PTT Phenol Co. ,Ltd.

| | | | | | |
|---|--------------|--|-------------------------|---|-----------|
| Task : Excavation | | | | | |
| Prepared by: | | Reviewed by: | | Approved by: | |
| Original Dated: | | Revised by: | | Revision Date: | |
| Revision: | | | | | |
| Goggles | Gloves | Face Shield | Barricade needed | Lock out Tack out | Dust Mask |
| Safety Harness | Long Sleeves | Hearing Protection | MSDS needed/Review(Y/N) | Ground Fault Interrupter | Others: |
| Other Safety Equipment Required : | | | | | |
| Remarks : | | | | | |
| Describe Job on General : Excavation within the Swamp Area. | | | | | |
| List of All Job Steps (ขั้นตอนการทำงาน) | | List all Known Hazards (อันตรายที่อาจเกิดขึ้นได้) | | How to eliminate Hazards (วิธีป้องกันอันตราย) | |
| 1. Equipment (Backhoe & Dump truck | | 1. Equipment attack the people due to lack of watch and a proper precaution | | 1. Ensure that during the all time execution stage the watchman always in duty and a proper precaution such as warning board will be arranged sufficient. | |
| 2. During excavation | | 1. Equipment damages the existing utilities. 2. People falls down to the deep excavation. 3. Soil collapse during the work execution | | 1. All related drawings will be studied and must be cleared prior to excavation. 2. Ensure that during the entire execution stage a proper precaution such as warning board will be arranged sufficiently. 3. Proper side slope (e.g. 1:1) must make. Working during rain will not be allowed. Heavy equipment will be moved outside swamp area when encountering heavy rain. | |

| | | |
|--|-----------------------------|--|
| | 4. Emergency Communication. | 4. Assign a stand-by man with radio to coordinate when the emergency action is required. Rescue team will be provided. |
|--|-----------------------------|--|

Note : I have identified all known Hazards and passed this information to those who will do the job.

CTCI (Thai) Signature : _____

Dept: _____

Reviewed by CTCI (Thai) Safety Dept. Signature _____

Suggestion:

Job Safety Analysis

(Developing a habit of analyzing methods to identify hazards & unsafe work practices ,then developing solutions that control, minimize or eliminate the hazards)

PTT Phenol Co. ,Ltd.

| | | | | | |
|--|--------------|---|-------------------------|--|-----------|
| Task : Dewatering | | | | | |
| Prepared by: | | Reviewed by: | | Approved by: | |
| Original Dated: | | Revised by: | | Revision Date: | |
| Revision: | | | | | |
| Goggles | Gloves | Face Shield | Barricade needed | Lock out Tack out | Dust Mask |
| Safety Harness | Long Sleeves | Hearing Protection | MSDS needed/Review(Y/N) | Ground Fault Interrupter | Others: |
| Other Safety Equipment Required : | | | | | |
| Remarks : | | | | | |
| Describe Job on General : Dewatering | | | | | |
| List of All Job Steps (ขั้นตอนการทำงาน) | | List all Known Hazards (อันตรายที่อาจเกิดขึ้นได้) | | How to eliminate Hazards (วิธีป้องกันอันตราย) | |
| 1. Submergible pumps | | 1. Flooding throughout the working area due to insufficient draw off water. 2. Flooding due to submergible pump is out of order. | | 1. Arrange sufficient submergible pump to maintain water level in the dewatering pits always be lower than the working level. 2. Always check and maintenance the pump to ensure their workability. | |

Note : I have identified all known Hazards and passed this information to those who will do the job.

CTCI (Thai) Signature : _____

Dept: _____

Reviewed by CTCI (Thai) Safety Dept. Signature _____

Suggestion:

Emergency Plan Flow Chart

