**Work Method 02- Excavation and Backfilling**

(WM02-MCDC Template)



**Industry Based Project (CMGT 8800)**

**September 20, 2018**

**BCIT**

Faculty Advisor: Jim Turnham, P. Eng, MASc., ISO 9001 Lead Auditor

Prepared by: Behrouz Chehrehpardaz

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# SIGNATURE PAGE

As an Approver, with my signature, I confirm that this Work Method is the plan for construction of the work. If the plan changes, I will inform the Originator so that the Work Method can be revised. Alternately, I will make revisions myself and reissue to those that require copies.

As a Reviewer, my signature confirms that I have reviewed the document and any comments to the WM have been provided to the Originator and/or to the Approver.

MCDC Construction Manager

Name: Date: \_\_\_\_ \_\_ Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

MCDC Project Manager

Name: Date: \_\_\_\_ \_\_ Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contractor

Name: Date: \_\_\_\_ \_\_ Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Initial Reviewer

Name: Date: Title: Signature:

# Proponent and Project Description

**Company Name:** MC DEVELOPMENT CORP. (MCDC)

**Company type of service:** MCDC is a small construction company building Single Family Houses (SFHs) in North Vancouver, and the company’s vision is to be recognized as a model of quality excellence in construction.

**Project Description:** Under a Project Management/Design Build method, MCDC itself or on behalf of the owners manages construction projects to build new single-family houses mostly in North Vancouver.MCDC contract out all work activities in construction stage including excavation and earthwork activities.

**Work Method Activity Description:** This Work Method (WM) provides the required details of how the excavation is carried out, and it is also subject to a series of inspections, before the commencement, during the work, and after completion.

This Work Method will be used in order to ensure full compliance with MCDC’s quality policy and Quality Plan, drawings, specifications, and BC Building Codes.

**Work Method Scope:** This work method shall apply to all earthwork activities at MCDC’s construction sites, following the projects specs and drawings, and given that the soil has had prior surveying and inspection by geotechnical engineers and professionals, and the excavation permit had been issued by DNV.

**Limitation of liability:** Any organization engaged as a Contractor or Subcontractor (the Contractor) agrees to use this Work Method only under the condition that those that wrote and developed this Work Method are to be held harmless for any errors or omissions, any inaccuracies in content resulting in any damages to property or any injury to any personnel that may be involved. It remains the sole responsibility of the Contractor to review any and all items contained in the above Work Method and to make any changes that may be required in order to satisfy any project specification or any regulatory or statutory obligation. As well, the Contractor shall review any and all suggested methods as contained herein and shall make any changes required and shall reissue prior to commencement of construction in order to achieve the specified product or to provide a safe work site for all workers involved. Ownership and final responsibility for the use of all Work Methods remains with the Contractor.

# PURPOSE and SCOPE

**Purpose**: To define the responsibilities, describe methods and documentation to be used for earthwork activities in MCDC’s SFH projects.

**Scope**: This work method applies to all activities required for excavation at (the address of the project). Reference Standards include:

* British Columbia (or applicable province) Building Code 2012.

Note: Construction documents (design drawings and specifications) should be referenced as applicable and will govern over any procedure included in this document.

# DEFINITIONS

MCDC - MC Development Corp.

CM - MCDC’s Construction Manager

PM - MCDC’s Project Manager

QC - Quality Control

WM - Work Method (this document)

WP **-** Work Procedure

TS - Task Step

CL - Checklist

RM - Review Meeting

NCP - Nonconformity Procedure

ITP - Inspection and Test Plan

BI - Before the TS Inspection

DI - During the TS Inspection

AI – After the TS Inspection

DNV - District of North Vancouver

SWP – Safe Work Practice

SWRB – Solid Waste Removal Bylaw (DNV)

# RESPONSIBILITIES

* 1. **Construction Manager (CM)** is responsible for project scheduling, and final approving the inspections, tests, and changes. The CM is also responsible for preparation of drawings and sketches to support construction as required and all making any changes if required.
  2. **Project Manager (PM)** is responsible for; identifying necessary resources and assigning individual responsibilities to run and monitor the quality control procedure that defined by MCDC’s QP and this WM. He is responsible for overseeing the Quality Management Plan, enforcing project construction standards, assisting the CM in the creation of work method documents by providing appropriate sequence and task definitions, executing the project, scheduling and delegation of the roles of quality assurance inspections, safety, environmental items and Contractor coordination.
  3. The PM is accountable for the Site Superintendent’s all responsibilities as well. The PM, for each WM contemplated for use at the site, provides a review and makes changes if necessary to any clause so that it is consistent with best practice, consistent with the building code of the Province, and consistent with local conditions. Issues should be reviewed by email with the CM.
  4. **Site Superintendent** must work well with people and is responsible for:
  + Requesting copies of subcontractor’s liability insurance and workmen’s compensation certificate.
  + Overall site activities; applying project methodology and enforcing project construction standards; organizing field staff and ensuring they perform as required; and supervising Contractors and ensuring they perform as required
  + Assisting the PM and the Contractors in the creation and execution of work plans including revisions to these plans as necessary.
  + Assisting the PM in supervision of Contractors’ work quality.
  + Working closely with and support the Contractor to identify potential risks/opportunities, discuss necessary changes, and conduct the inspections.
  + Scheduling and monitoring each workday with appropriately resources.
  + Serving as the representative of and primary contact with the PM.
  + Attending review meetings.
  + Maintaining site logs and other documents in jobsite.
  + Ensuring the jobsite safety and ensuring that safety practices are followed.
  1. **Trade Contractor** (Contractor) refers to the company that is bound by contract to MCDC for a certain scope of work. For their scope, the Contractor is responsible for environmental control, safety controls, and quality control for self-performed work. The Contractor is responsible to write his/her Work Methods. However, if the Contractor cannot provide the required WMs, MCDC may assist, but the final WM will be reviewed, changes made to reflect project requirements, codes, laws, and resubmitted to MCDC and owned by the Contractor. The Contractor performs the work required by the contract documents and approved Work Methods to start and complete the Project and fulfill everything indicated by the contract documents. The Contractor shall perform activities described in this WM. If any revision is needed, the Contractor shall be instructed to revise and update this WM so that the WM reflects the intent and methods of the Contractor as well. The Contractor shall be fully responsible for his means and methods, and for the content of the revised WM. The Contractor shall assign a representative who will permanently attend at the job site when the job is being done. The Contractor’s site representative shall ensure following the guidelines and/or Standard Specifications outline on this work method.

# SAFETY AND ENVIRONMENT

* 1. All construction activities and job procedures shall conform to
* WCB Regulations and other applicable codes, regulations and acts
* DNV Street and Traffic Bylaw (Bylaw 7125)
* DNV Noise Regulation Bylaw (Bylaw 7188)
* DNV Environmental Protection and Preservation Bylaw (Bylaw 6515)
* DNV Tree Protection Bylaw (Bylaw 7671)
  1. Before any work takes place, the PM and Site Superintendent will ensure that all operators, laborers, and Contractors have been site orientated.
  2. Excavation procedures must comply with safe practices and with the requirements of the bylaw, codes and ordinances. Excavations with over 4’ vertical cuts require professional geotechnical field review for Item 7.1 – Excavation in the BCBC Letters of Assurance, to ensure worker safety. Excavations with a vertical cut more than 6’ over most of the length of the building are considered “Deep Excavations” by the DNV that may require underpinning to support adjacent structures during excavation and compacted backfill or permanent underpinning for long-term support of existing structures.
  3. All work process shall be fully consistent to DNV Bylaws, and Sediment and erosion control methods may need to be applied to eliminate or reduce the damaging effects of uncontrolled release of sediment to the environment. An Environmental Soil Permit is required when amounts of excavated soil materials are greater than 18 cubic metres (approximately two truckloads).
  4. If the excavation involves removal or deposit of soil within 5 metres of a tree(s) that is either on Project’s property or on an adjacent property (including DNV roads or boulevards), we may require additional submission requirements including Tree Location Sketch Plan, and Arborist Report. If the proposed work for the Soil Permit may impact a protected tree (as defined in the Tree Protection Bylaw 7671 or a tree inside a Streamside Protection or Natural Environment) the DNV may require that revisions to the proposed work are made to avoid impacts to protected tree(s).

# SUBMITTALS

The contractor submittals to MCDC:

* Contractor Quotation for doing the job described in MCDC’s RFQ package, including
  + Contract price and time (including the start time of work on site)
  + Declaration of accepting all contract terms and documents
  + Written promise to provide the required submittals (including Contractor’s Work Method and Checklists), 14 days prior to the work start
  + Documented processes and submittals to enable the PM review
  + Contractor’s initial Work Method, Checklists, and ITP for MCDC review
* The final revision of MCDC QP reviewed and confirmed by the Contractor
* Finalized WM, ITPs, Checklists, and any other documents required by the contract documents, not later than 7 days prior to the work start time, (MCDC CM written confirmation required)
* Any drawing, specs, and designing layout which is required for carrying out the work, and in order to satisfy any project specification or any regulatory or statutory obligation.
* Reports that identifies the Self inspection result and scope of work, before each MCDC scheduled inspection

All contractor submittals are stated in the Contract and include (but not limited to)

* Surveying equipment, and calculated depth of each excavation corner
* A crawler excavator EC140B prime, and a mini excavator
* Marking materials, measuring stick, and measuring tape
* Heavy duty Plastic Sheeting, enough to cover all edges of excavation
* Compactor, and Dump Truck

# PROCEDURE

## General Requirements

Consult the specifications and construction drawings to determine the requirements for any aspect of the work. This Work Method is a guideline used by MCDC to describe the work process and the process of quality control by conducting the specific Inspections and relevant Checklists. The Drawings, and Specifications as well as any code and by-law are the ultimate requirements. The PM and the Contractor shall review the Work Method and make any revision (prior to each use if necessary) so that any requirements will be identified and met.

The following Task Steps (procedures) TSs are included in this Work Method:

* 9.2 Planning and Preparation (TS1)
* 9.3 Excavation (TS2)
* 9.4 Operational Pause (TS3)
* 9.5 Backfilling (TS4)

Each TS comes with a Checklist and each Checklist is subject to three Inspections, before, during, and after completion of the TS. Each Checklist includes several checkpoints which must be controlled and verified by the MCDC’s PM or Site Superintendent. To continue the work and proceed to next step, the Contractor must obtain the approval of PM for all Inspections. The PM will give the approval only if all Checklist’s items are checked and passed.

The Inspections and Testing shall follow the instructions described in the Inspection and Testing Plan number 02(ITP02). The PM shall review the results of the ITP and Checklists, and check if the results are acceptable. The PM will communicate the acceptable results to the CM; and if the results are not acceptable, the PM will communicate this issue to the CM and the Contractor to evaluate the default and issue instructions for the corrective actions.

## Planning and Preparation (TS1)

* + 1. Acquire an excavation permit from the DNV for the specific lot and project.

Projects with deep excavations must include at least the following items under Letters of Assurance at the time of the Building Permit application:

* + - Backfill around perimeter drains
    - Geotechnical Temporary for Excavation and Underpinning
    - Geotechnical Permanent for Bearing capacity of soil, Backfill, and Permanent Underpinning

For sloping lots, geotechnical items, Construction dewatering, Structural considerations of soil including slope stability, and Permanent dewatering must also be included (refer to DNV MRLs SPE-104 and SPE-105),

A geotechnical engineer may require design and field review for items not mentioned above.

* + 1. Plan the Sewer and Drainage location. If drainage require additional considerations for pump-septic system, or we can take opportunity of natural slope.
    2. Do required erosion tests. If the depth of excavation goes below the natural water levels, additional steps must be taken to pump the water into a tank which the mud can settle and then the clear water can be pumped out.
    3. Conduct an investigation and acquire information about buried utility services. Services, wherever found shall be marked, protected, and if necessary moved as to not affect site activities.

* + 1. If the depth of excavations could cause risk for neighboring structures. Based on the professional engineer’s opinion and obtained design for shoring, either use the shotcrete and anchoring on the required wall, or the steel plates can be placed in required sides.
    2. If the excavation project is occurring during a period where substantial rain fall is forecast, tarping the walls and 2 meters back of the edges of the excavation will prevent the moisture content of the soil to increase. This will minimize the risk of soil destabilization around the edges of the excavation and increase workers safety.



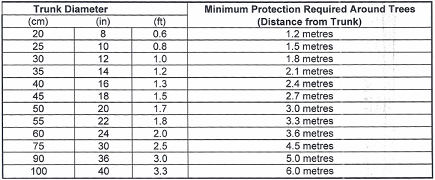
* + 1. Before the excavation starts, the excavation site must be free of standing water. If removal of excess water is necessary, additional settling tank may be required to allow the muddy water to settle, and clear water to be discharge into city’s storm drains. Depending on preexisting ground water and weather conditions the removal of excess water may need to be repeated during the excavation process.
    2. Excavation Slope Stability is to be reviewed by Geo Tech Engineers for safety, structural, and logistical reasons. All soil types require that excavation slope stabilization measures are implemented which includes excavation cut slope or installing temporary excavation support where there is insufficient space for sloping; and acting in accordance to the Geo Tech Engineering opinion and recommendation.
    3. A site survey would be conduct. The site survey would mark/stake-out the building lines and corners. It would also establish a Bench Mark to reference for the excavation elevations and to compare to the approved drawing.



* + 1. Place the hoarding, security fences, and tree protection for all excavation activities, adequate safety barriers, sign boards, and no parking signs would be used. In addition to the fences, the project information, adequate permits, and trucking bylaw route must be attached to be visible by people outside the site.
    2. Delivery of excavation equipment onto the site. Determining the proper site access and adequate position for extraction (this consideration becomes more important as depth of excavation increases). Also, consideration for adequate positioning for the dump trucks to stop for loading. Ensure safe work methods are used. Ensure, only short-term traffic stops are allowed, hence consider providing side access, rather than main road blockade, as permitted.
    3. Protect roadside catch basins with a silt control device designed specifically for catch basins.



* + 1. Tree protection is required for the "Critical Root Zone" of any tree where excavation works are to occur within 4 meters of the "Critical Root Zone" of a tree.



* + 1. Double check to ensure that lot building placement survey and markings are done correctly in accordance to the specs of the project. The area to be excavated shall be properly marked and clear before starting the works. Batter boards may be necessary so that building corners are not lost during excavation.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Checklist 02-1-1: **Planning (TS1-1)** | | | | | | | |
| MC Development Corp. | | Project: | Contractor: | | | | | |
| **Number** | **Checkpoints** | | | BI | DI | | | AI |
| **1** | List Permits and engineer Letters of Assurance that are needed | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **2** | Sewer and drainage locations | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **3** | Investigation the needs of dewatering (underground/rain water) | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **4** | Understand regulatory requirements for disposal of  excavation water | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **5** | Any risk for neighboring structures (by depth of excavation) | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **6** | Erosion/Slope control tests and plans | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **7** | Site surveying | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **8** | Evaluate Site access for excavation equipment and dump trucks | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **9** | Properly communicate with neighbours (excavation disturbances) | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **Quality Scores and Completion Sign-off** | | | | | | | | |
| **Inspection#**  Quality 5 4 3 2 1 Notes:  On-Time 5 4 3 2 1 Notes:  Sign and date\*: Cell # / ID #: Signed: Date:  Task has been verified complete and in compliance with contract drawings and specifications except for non-conformances and incomplete items reported above. | | | | | | | | |
| **BI=** Inspection **B**efore task begin **-----------DI=** Inspection **D**uring task in-process --------**AI=** Inspection **A**fter task completed  *Quality Score**5 = 100% NO problems 4 = 1 minor problems 3 = Hotspot or 2-3 minor 2 = 6+ or major problems 1 = Excessive problems*  ***On-Time Score*** *5 = On Time 4 = Late 3 = Late by 1 day 2 = Late by 2 days 1 = Late more than 2 days*  ***Safety Score*** *5 = 100% NO problems 4 = 1 minor problem 3 = Hotspot or 2-3 minor 2= 4+ or major problem 1= Injury* | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Checklist 02-1-2: **Preparation (TS1-2)** | | | | | | | |
| MC Development Corp. | | Project: | Contractor: | | | | | |
| **Number** | **Checkpoints** | | | BI | DI | | | AI |
| **1** | Applicable permit/approvals received and displayed as required | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **2** | Excavation/Trees Boundaries located and marked | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **3** | Security fences, and tree protection are installed | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **4** | Underground Services located and marked to prevent damage | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **5** | Protect vegetation from excessive adjacent soil buildup | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **6** | The excavation plan and Bench mark in place | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **7** | Tarping done properly and excavation site free of standing water | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **8** | Initial Erosion & Sedimentation BMP’s installed | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **9** | Review Site with Engineers if required, before Excavation | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **Quality Scores and Completion Sign-off** | | | | | | | | |
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## Excavation (TS2)

* + 1. Make sure all services (electrical, gas, water, telephone, and cables) are disconnected. Show where the storm and sanitation connection are located.
    2. The proper starting corner of the excavation is determined by the excavation management in accordance for future considerations. Plan where the trucks are going to be loaded and where the start of excavation going to be. So, once you start at the furthest point and work your way back to where the access to the job is which at the end of excavation excavator is going to be picked up.
    3. Starting the excavator operation by digging a corner as rough depth grade, slightly higher than the required excavation. This point will be used as an eye reference for expanding the excavation within the reference range. This elevation can be determined by the given elevation of bench mark by surveyor.

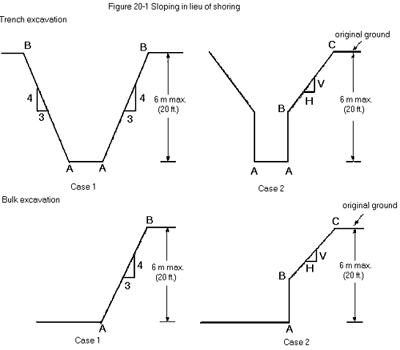
**Note 1**: During the rainy seasons in Vancouver, it is part of the procedure to cover the edges of excavation and excavated material by large tarps or plastic covering as shown in following Figure. Based on experience in BC, this step strongly helps the prevention of slope failure during heavy rains. As water content rises in the soil, the soil is weakened and susceptible to failure (and “failure planes” on the loaded side).



* + 1. As excavation progress, the depth of excavation shall be periodically checked by the onsite personnel with respect to the elevation of our rough depth digging.
    2. Pile all the excavated material so that the material cannot roll back or add to the risk of slope failure. The excavated material must never be placed near than three feet from the edge of the excavation. Ideally, the excavated material should be placed as far away from the edge of vertical excavation as the excavation height.
    3. Subject to WorkSafeBC requirements, before anyone enters any excavation over 1.2 m (4 ft) in depth, we must ensure that the sides of the excavation are

1. sloped as specified in writing by a qualified registered professional,
2. sloped at angles, dependent on soil conditions, which will ensure stable faces, but in no case may the slope or combination of vertical cut and slope exceed that shown in Figure 20-1.

Figure 20-1: Sloping in lieu of shoring



1. supported as specified in writing by a professional engineer,
2. supported in accordance with the minimum requirements of WCB section 20.85, **or**
3. supported by manufactured or prefabricated trench boxes or shoring cages, or other effective means.
   * 1. The excavated dirt is collected in a suitable corner that is reachable for dump truck position. Dirt removal can be done in stages or all at once, depending on the site logistics, when reaching the required excavation depth. Note: adequate amount of soil must be kept for backfill
     2. When required depth of the four main corners is reached, the surface shall be leveled and shall be compacted to 95 % of maximum dry density or MDD. The slightly higher elevation considered in “rough depth” allows leveling to be implemented by removing layers from the top as well as large boulders in soil, in order to have a proper compaction implemented on the base of the excavation.



* + 1. The Geotechnical Engineer will then do an inspection of the finished excavation. They will provide a report allowing the commencement of forming the foundation and ensuring safety of the site.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Checklist 02-2: **Excavation (TS2)** | | | | | | | |
| MC Development Corp. | | Project: | Contractor: | | | | | |
| **Number** | **Checkpoints** | | | BI | DI | | | AI |
| **1** | Applicable permit/approvals received and displayed as required | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **2** | All utility services are disconnected | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **3** | The Bench Mark and Excavation corners are properly determined | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **4** | Edges and walls of excavation are properly covered | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **5** | The depth of the excavation being checked periodically | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **6** | The excavated material piled safely and properly | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **7** | The edges slopes/supports comply with requirements and specs | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **8** | Excavator and dump trucks have proper maneuver spaces | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **9** | Leveling, grading, and compacting works being done properly | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **10** | Geotechnical Engineer do an inspection of the finished excavation | | |  |  | | |  |
| **Comment** |  | | | | | | | |
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## Operational Pause (TS3)

Allowing the required steps taken by other sub-contractors for completion of footings, foundation, drainage, damp proofing, basement gravel. In this stage the excavator, compactor and other equipment is removed from the site to attend other jobs. The excavator is scheduled to be back on site on date these tasks are scheduled to complete.

## Backfilling (TS4)

* + 1. After completion of the foundation (Footing, slabs, walls, and damp proofing) and passing the relevant inspections prior to backfilling, the drainage, damp proofing and insulation of foundation walls shall be inspected by the city.
    2. Arrival of preferably smaller excavator and compactor onsite.
    3. Backfilling shall commence using similar excavated material. The drain pipe may require drain rock. Care shall be taken to remove bolder, vegetation and any other unwanted materials.
    4. The sub-grade once approved, the excavated materials or any material source approved by the Engineer shall be placed in layers not more than 300 mm thick, followed by compaction. Then adding another layer and performing compaction accordingly. Compaction is needed to reduce the amount of settlement that occurs in time. Also, it ensures the healthy life time of foundation walls (quality work).
    5. Note: The compaction, using a small compactor (Vibratory Plate Compactor) must be performed carefully, avoiding the possibility of damaging the foundation damp proofing. It is advised that additional soil is shoveled on the edges of foundation wall, this creates a small protective slop/edge which reduces the risk of damaging the seal or pipes by operator performing the task carefully
    6. Backfilling followed with compaction shall continue until final required elevation is achieved.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Checklist 02-2: **Backfilling (TS4)** | | | | | | | |
| MC Development Corp. | | Project: | Contractor: | | | | | |
| **Number** | **Checkpoints** | | | BI | DI | | | AI |
| **1** | All draining pipes are placed and damp proofing is completed | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **2** | All relevant inspections are passed | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **3** | There are proper excavator and compactor onsite | | |  | |  |  | |
| **Comment** |  | | | | | | | |
| **4** | The filling materials are tested/checked and approved | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **5** | The drainage pipes are covered and protected properly | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **6** | Compaction is performed carefully every 30 cm | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **7** | No damage to damp proofing and pipes | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **8** | Backfilling completed to the level specified in drawings and specs | | |  |  | | |  |
| **Comment** |  | | | | | | | |
| **Quality Scores and Completion Sign-off** | | | | | | | | |
| **Inspection#**  Quality 5 4 3 2 1 Notes:  On-Time 5 4 3 2 1 Notes:  Sign and date\*: Cell # / ID #: Signed: Date:  Task has been verified complete and in compliance with contract drawings and specifications except for non-conformances and incomplete items reported above. | | | | | | | | |
| **BI=** Inspection **B**efore task begin **-----------DI=** Inspection **D**uring task in-process --------**AI=** Inspection **A**fter task completed  *Quality Score**5 = 100% NO problems 4 = 1 minor problems 3 = Hotspot or 2-3 minor 2 = 6+ or major problems 1 = Excessive problems*  ***On-Time Score*** *5 = On Time 4 = Late 3 = Late by 1 day 2 = Late by 2 days 1 = Late more than 2 days*  ***Safety Score*** *5 = 100% NO problems 4 = 1 minor problem 3 = Hotspot or 2-3 minor 2= 4+ or major problem 1= Injury* | | | | | | | | |

# Quality Assurance Approval

Only if all 9 required Inspections, associated with 4 TS Checklists mentioned in this WM, are approved by the PM and the CM as OK, the PM will carry out the final Inspection and issues the written approval if the results are OK.

If the results do not match the allowable tolerances, the PM will communicate this issue to the CM who evaluates the NCs and issues instructions for the corrective actions to be taken.

Any non-conformance shall be reported through the NCR procedure described in MCDC’s QP and is applicable to any and all phases of the Excavation and Backfilling activities.

# References

1. The Handouts and QMS sample documents provided by Mr. Jim Turnham (CMGT-7246)
2. Based on Behrouz Chehrehpardaz work experience
3. The Excavation WM by (Mark Burrill, Alireza Khalili, and Denise Reyes)
4. All pictures are taken during MCDC’s last project at 4438 Ranger Ave, North Vancouver
5. BC Building Code
6. WorkSafeBC Regulations
7. DNV Bylaws

# Construction Organization Chart

MCDC Board of Directors

Construct Manager/CEO

Project Manager

Site Super Intendent

Trade Contractor

# Flow Chart

Contract

Specs

Dwgs

WM/ITP

QP

END

Pre-Work WM Review Meeting

Certificate of Completion

NCP

Corrective Action

Planning

NO YES

Final Inspection

Passed?

NO/NCP

Inspection

Passed?

YES

Initial Inspection

NO/NCP

(BI & DI & AI) Inspections

Passed?

YES

Preparation

NO/NCP

(BI & DI & AI) Inspections

Passed?

YES

(BI & DI & AI) Inspections

Passed?

Excavation

NO/NCP

NO/NCP

(BI & DI & AI) Inspections

Passed?

Backfilling

YES Done

Completion of (foundation, drainage, damp proofing)

Operational Pause

# Inspection and Test Plan

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MC Development Corp | | Inspection and Test Plan # 02  **Excavation and Backfilling** | | | PM: MCDC Project Manager  C: Contractor | | | | | |
| Contractor: | | | Project: | | | | | |
| **#** | **Inspections** | **To Inspect Items listed in** | **Time of Inspection** | **QC**  **by** | **Acceptance Criteria** | **H/W/D** | | **Score &**  **(lowest)** | **Initials** | **Date** |
| 1 | Initial Inspection | QMP004b | Prior to any work | C | CM approval | H |  |  |  |  |
| 2 | Planning BI | Checklist  02-1-1 | Prior to TS1-1 | C | PM Approval |  |  |  |  |  |
| 3 | Planning DI | Checklist  02-1-1 | During TS1-1 | C | PM Approval |  |  |  |  |  |
| 4 | Planning AI | Checklist  02-1-1 | After TS1-1 | C | PM Approval |  |  |  |  |  |
| 5 | Preparation BI | Checklist  02-1-2 | Prior TS1-2 | C | PM Approval |  |  |  |  |  |
| 6 | Preparation DI | Checklist  02-1-2 | During TS1-2 | C | PM Approval |  |  |  |  |  |
| 7 | Preparation AI | Checklist  02-1-2 | After TS1-2 | C | PM Approval |  |  |  |  |  |
| 8 | Excavation BI | Checklist 02-2 | Before TS2 | C | PM Approval |  |  |  |  |  |
| 9 | Excavation DI | Checklist 02-2 | During TS2 | C | PM Approval |  |  |  |  |  |
| 10 | Excavation AI | Checklist 02-2 | After TS2 | C | PM Approval |  |  |  |  |  |
| 11 | Backfilling BI | Checklist 02-4 | Before TS4 | C | PM Approval |  |  |  |  |  |
| 12 | Backfilling DI | Checklist 02-4 | During TS4 | C | PM Approval |  |  |  |  |  |
| 13 | Backfilling AI | Checklist 02-4 | After TS4 | C | PM Approval |  |  |  |  |  |
| 23 | Final Inspection | List of NCs | After Completion | PM | CM Approval |  |  |  |  |  |
| ITP Accepted by ……………………… Signature ……………………………… Date ……………. | | | | | | | | | | |
| **(BI**: Inspection Before Task Begin----**DI**: Inspection During Task Work----**AI**: Inspection After Task Finished)  **(W**: Witnessed by CM---- **H**: Hold further work----**D**: Document) | | | | | | | | | | |