Contingency Analysis:

General:

The importance of project contingency assumptions is to prepare for unexpected changes to the project schedule in advance so that project manager can make appropriate adjustments, coordination and arrangements for the project to ensure the smooth completion of the project before finish milestone. The duration of certain activities will be assumed to be extended due to unexpected factors. The project performance may be affected by weather condition, change order, shortage of resource and other issues.

- **Assumptions:**
  1. Bad Weather Conditions: Heavy snow, continues rainfall, high temperature
  2. Shop drawings error.
  3. Change orders from Architect or Owner.
  4. Underestimate time of activities
  5. Low efficiency of subcontractors
  6. Procurement issues: Wrong model, delayed delivery, poor quality of materials

Assumption 1: Bad Weather condition – Heavy snow and continues rainfall (12/15/2019-01/14/2020)

Activity assignments: Tie rebar for first floor beam, Set up formwork for first floor beam, Pour concrete into first floor beam formwork and harden.

Contingency Analysis: Heavy snow weather is often accompanied by extremely low temperature, which will have a direct impact on equipment operation, material transport, material performance, labor performance and even life safety. Continuous rainfall is also a major factor affecting construction schedule, especially for foundation excavation and concrete construction causing construction delays

Contingency times: 30 days (Combined)

Assumption 2: Bad weather condition – High temperature (07/23/2020-07/25/2020, 08/10/2020-08/14/2020)

Activity assignments: Install electric water cooler, Install Hot Water supply piping, Install circulation piping, Install waste piping

Contingency Analysis: The high temperature which happens a lot in summer will bring sweltering construction environment, and the efficiency of workers will be significantly affected. If possible, heat stroke may also bring safety problems

Contingency times: 5 days

Assumption 3: Shop drawings error and Change orders from Architect or Owner (Could be anytime)
Activity assignments: Could be any activities especially relating to structure construction

Contingency Analysis: Almost every construction project will have shop drawings design errors affecting the construction schedule. The degree of impact depends on the number of design errors and the extent of modification. The earlier design errors are identified, the less impact they have on construction. If the construction has been done according to the wrong design the construction progress will often be significantly affected, and the cost will rise.

Different from shop drawings error, change order may be a design modification made by the

architect on the owner's own initiative. Depending on the changes, the amount of construction may increase or decrease. If increases, it may require more workers (in quantity and categories, to order new materials, to remove some of the previous construction and etc. These will cause project delay.

Contingency times: 18 days (Assumption)

Assumption 4: Underestimate time of activities (11/06/2019-11/8/2019)

Activity assignments: Excavate Foundation

Contingency Analysis: The time of excavation of foundation could be underestimated. The reasons could be that the actual geology is inconsistent with geological prospecting data, the estimation of underground water quantity is inaccurate, weather condition or other issues.

Contingency times: 2 days

Assumption 5: Low efficiency of subcontractors

Activity assignments: Could be any activities

Contingency Analysis: Construction schedules may vary from different subcontractors. This is more common in construction site. If there are two subcontractors building two identical buildings, and subcontractor A is slower than subcontractor B, subcontractor A is inefficient. This may be due to worker incapacity, the use of inappropriate construction equipment or procedures, lack of management or etc.

Contingency times: 3 days

Assumption 6: Procurement issues: Wrong model, delayed delivery, poor quality of materials

Activity assignments: Deliver the order for structure and envelop (10/15/2019-10/17/2019)

Contingency Analysis: Construction may be affected by the purchase of mismatched material models, insufficient material quantity or delayed delivery. For example, purchasing the wrong type of cement or insufficient amount of steel reinforcement may prolong the construction period of the main structure.

Contingency times: 2 days

Based on the above assumption of contingency, the completion date of the project has been postponed from 09/01/2020 to 10/30/2020. Although we cannot predict all the contingency perfectly, we can reduce the impact by preparing in advance. For example, steel structure can be selected at the beginning of design, and the construction of steel structure is almost free from the influence of bad weather factors. We can choose the long-term relationship contractor to ensure the quality of the construction team. CM can be involved early in the design phase to minimize design errors and modifications.