

APPENDIX B
Project Cost Abbreviated Risk Analysis Report

MT. SINAI MEDICAL CENTER, CONTINUING
AUTHORITIES PROGRAM (CAP)
SECTION 14, PROJECT

DRAFT INTEGRATED FEASIBILITY
REPORT
AND ENVIRONMENTAL
ASSESSMENT

September 2016



**US Army Corps
of Engineers**®
Jacksonville District



**US Army Corps
of Engineers®**

**Mount Sinai Medical Center
CAP Section 14 – Emergency Streambank and
Shoreline Protection
City of Miami Beach, Florida
Project Cost Abbreviated Risk Analysis Report**

Prepared by:

**U.S. Army Corps of Engineers,
Jacksonville District**

August 2016

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EXECUTIVE SUMMARY

This Abbreviated Risk Analysis (ARA) Report has been completed by the US Army Corps of Engineers (USACE), Jacksonville District. The ARA was developed with tools provided by the Cost Engineering Mandatory Center of Expertise (MCX) for Civil Works. The ARA was reviewed internally by Jacksonville District Cost Engineering before being presented for Agency Technical Review (ATR). This report presents a recommendation for the total project cost contingency for cost certification of the MT. Sinai Medical Center for Emergency Streambank and Shoreline Protection. In compliance with Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008, an abbreviated risk analysis study was conducted for the development of the contingency to be applied to the total project cost. The purpose of this risk analysis was to establish a project contingency by identifying and measuring the cost impact of project uncertainties with respect to the estimated total project cost.

Specific to Mount Sinai, the most likely total project cost (at current price level) is at approximately \$5.8 million. Based on the results of the analysis, the Jacksonville District recommends a contingency value of approximately \$1,254,703 or 35% for construction costs; \$84,684 or 17% for Planning, Engineering, and Design costs; and \$62,863 or 22% for Construction Management costs. An ARA was developed to model the remaining work concerning scope growth, potential for mods and claims, and other concerns as seen in the risk register.

The Jacksonville District Cost Engineering Section performed the risk analysis for this project and it has been reviewed, as required, via the ATR process.

MAIN REPORT

1.0 PURPOSE

This report presents a recommendation for the total project cost contingencies for the cost certification of the Mount Sinai Medical Center Project.

2.0 BACKGROUND

This estimate is primarily based upon the August 2016 Final Feasibility Report, for assistance on the emergencies streambank and shoreline protection to protect the Mount Sinai Medical Center located in the City of Miami Beach, Florida.

The Mount Sinai Medical Center is a private non-profit hospital and is considered an eligible facility for Section 14 according to ER 1105-2-100, Appendix F, page F-30. **Furthermore, the Center's facilities have been properly maintained but are in imminent threat of damage by natural erosion processes on the shoreline.**

The project area is located in the City of Miami Beach, Florida, on a barrier island bordered to the east by the Atlantic Ocean and to the west by Biscayne Bay. The study area is the property of Mount Sinai Medical Center, located directly north of Julia Tuttle Causeway and extending approximately 0.57 miles along the bayside of the island. Refer to main report for more information.

The estimate is based on the waterside sheet pile to higher elevation alternative known in the Feasibility Report as alternative 2. The project is under the Continuing Authorities Program Section 14 with the intent of protect the property of Mount Sinai Medical Center.

3.0 REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost contingency at the 80 percent confidence level using the risk analysis processes, as mandated by U.S Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for cost risks for all remaining project features. The study and presentation does not include consideration for life cycle costs.

3.1 Project Scope

Scope of Work: The recommended plan consists on the construction of 3,070 FT long of Seawall along alignment of the existing Seawall on the water side. At the land side the recommended plan consist on the construction of 300 FT long concrete T-wall.

A. Sea Wall:

- a. 3,070 L-FT of Steel Sheet Pile (PZC-13):
- b. Driven 16 FT of 25 FT Long Sheet piles.
- c. 3 FT offset between existing wall and new sheet pile to be filled with stone.
- d. 2 FT x 1 FT concrete cap. Elevation of 4.0 FT (NAVD88).
- e. Assumed to be install 100% from land.
- f. Backfill – #57 Limestone.
- g. Drainage features.

B. Raise Concrete Cap of Existing Sea Wall:

- a. 1.5 FT concrete lift:
- b. Add 1.5 FT concrete lift to a 130 L-FT of newer existing seawall segment.

C. T-wall:

- a. 300 L-FT of concrete T-wall at the North East of the property.
- b. Clearing and Grubbing.
- c. Landscaping.
- d. Excavation.
- e. Concrete work.
- f. Debris Removal – Site clean-up.

Project Assumption used for the cost estimate: Any deviations from these assumptions will impact costs. The magnitude of those impacts will vary.

- A. The estimate assigns a Heavy Civil contractor as the Prime. The markups shown below are standard assumptions.
- B. Unusually lengthy distances for mobilization/demobilization will not be necessary.
- C. Assumed that the wall will be built from Land.
- D. Contractor will dewater.
- E. Only one (1) pipe, assumed clay, needs to be extended through the sheet pile. Max diameter assumed as 12”.

4.0 USACE ABBREVIATED RISK ANALYSIS METHODOLOGY / PROCESS

The risk analysis process for this estimate is intended to determine the probability of various cost outcomes and to quantify the required contingency needed in the cost estimate to achieve the desired level of cost confidence. In simple terms, contingency

is an amount added to an estimate to allow for items, conditions or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

Contingency for the cost estimate has been developed using materials provided by the USACE Cost Center of Expertise located in Walla Walla District. The cost estimator assigned risk factors based upon the project Work Breakdown Structure. The contingency was developed using a condensed format since the total project cost is below the threshold for completing a Cost and Schedule Risk Analysis. The contingency was primarily affected by the weight of mostly likely and possible risks with regards to utilities, ramps, and levee work. Their impacts ranged from marginal to significant.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results are provided in Section 5.

4.1 Identify and Assess Risk Factors

Identifying risk factors is considered a qualitative process that results in establishing a risk register that serves as the basis for the resulting contingency percentage. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule. A risk brainstorming session was conducted April 1, 2015, to discuss all possible risks and impacts. The Project Delivery Team (PDT) attendees are listed on the PDT Involvement tab of the ARA spreadsheet.

Contingency is analyzed using formulas within the spreadsheet, as opposed to the more complex analysis of the Crystal Ball software's *Monte Carlo* simulations used in a formal cost and schedule risk analysis. Contingencies are calculated according to the likelihood and impact of each factor identified in the risk register.

5.0 KEY ASSUMPTIONS AND LIMITATIONS

Key assumptions and limitations are those that are most likely to significantly affect the determinations of contingency presented in the CSRA. The key assumptions and limitations are important to help ensure that project leadership and other decision makers understand the steps, logic, and decisions made in the risk analysis, as well as

any resultant implications on the use of outcomes and results.

6.0 RESULTS

The cost risk analysis results are provided in the following sections. In addition to contingency calculation results, sensitivity analyses are presented to provide decision makers with an understanding of variability and the key contributors to the cause of this variability.

6.1 Risk Register

An abbreviated risk register, provided in Appendix A, is a tool commonly used in project planning and risk analysis. It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Specific to this abbreviated risk register, it should be noted that there are events reported in the register, but not included in the calculations. That is, the risk register shows the risk events, but they do not contribute to the contingency calculations. In a formal risk analysis, such a practice is commonly used on risks/opportunity events with a Low Risk Level (typical for cost and schedule events with some combination of, for example, Very Unlikely/Unlikely Likelihoods and Negligible/Marginal Impacts). These are documented, but excluded from the calculations in order to better prevent skewed results. Under Risk Level, these show with a Zero (0).

As mentioned in the Executive Summary, tools/materials from the MCX were used throughout the process of acknowledging this risk, trying to account for it, running into the calculation issue, and coming up with the resolution.

6.2 Cost Contingency

The contingency was calculated based off the likelihood and impact of the risk concerns. Some of the major areas of concern were seen under the Construction Elements and External Project Risks categories. For example, the risks for Utilities could have a significant impact on the cost, as there has been a history of issues pertaining to Utilities for this project area.

Table 1 provides the raw construction cost contingencies calculated based upon the factors assigned in the risk register.

Table 1.1 Abbreviated Risk Analysis

Abbreviated Risk Analysis

Project (less than \$40M): **Mount Sinai Medical Center (MSMC) - CAP - Section 14**
 Project Development Stage/Alternative: **Feasibility (Recommended Plan)**
 Risk Category: **Moderate Risk: Typical Project Construction Type**

Alternative: **Alt A**

Meeting Date: **26/8/2016**

Total Estimated Construction Contract Cost = \$ **3,612,536**

CWWBS	Feature of Work	Contract Cost	% Contingency	\$ Contingency	Total
01 LANDS AND DAMAGES	Real Estate	\$ 921,180	15.00%	\$ 138,177	\$ 1,059,357
1	10 BREAKWATERS AND SEAWALLS [10009902] Site Work - Sea Grass Restoration	\$ 25,000	7.04%	\$ 1,759	\$ 26,759
2	10 BREAKWATERS AND SEAWALLS [100001] Mob. Democ & Preparatory Work	\$ 58,897	5.00%	\$ 2,945	\$ 61,842
3	10 BREAKWATERS AND SEAWALLS [100047] Seawalls (New Seawall)	\$ 3,153,904	37.65%	\$ 1,187,523	\$ 4,341,427
4	10 BREAKWATERS AND SEAWALLS [10004703] Concrete (New Seawall)	\$ 289,090	12.96%	\$ 37,477	\$ 326,567
5	10 BREAKWATERS AND SEAWALLS [10004703] Concrete Cap only for the repaired wall	\$ 12,550	13.03%	\$ 1,635	\$ 14,185
6	11 02 FLOODWALLS [1102] Floodwalls - T wall to extend protection	\$ 73,104	31.96%	\$ 23,364	\$ 96,468
7			0.00%	\$ -	\$ -
8		\$ -	0.00%	\$ -	\$ -
9		\$ -	0.00%	\$ -	\$ -
10		\$ -	0.00%	\$ -	\$ -
11		\$ -	0.00%	\$ -	\$ -
12	All Other Remaining Construction Items	\$ (10)	0.0%	\$ -	\$ (10)
13	30 PLANNING, ENGINEERING, AND DESIGN Planning, Engineering, & Design	\$ 505,755	16.74%	\$ 84,684	\$ 590,439
14	31 CONSTRUCTION MANAGEMENT Construction Management	\$ 286,835	21.92%	\$ 62,863	\$ 349,698
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)			\$ -	

Table 1.2 Project Cost Contingency Summary

Totals	Contract Cost	% Contingency	Contingency	Total
Real Estate	\$921,180	15.00%	\$138,177	\$1,059,357
Total Construction Estimate	\$3,612,536	34.73%	\$1,254,703	\$4,867,238
Total Planning, Engineering & Design	\$505,755	16.74%	\$84,684	\$590,439
Total Construction Management	\$286,835	21.92%	\$62,863	\$349,698
Total	\$4,405,126	32.00%	\$1,401,249	\$5,807,375

APPENDIX A – RISK REGISTER

DRAFT

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth						75%
PS-1	[10009902] Site Work - Sea Grass Restoration	• No concerns		Negligible	Unlikely	0
PS-2	[100001] Mob. Democ & Preparatory Work	• No concerns		Negligible	Unlikely	0
PS-3	[100047] Seawalls (New Seawall)	• Investigation sufficient to support design assumptions?	There is a possibility of have to increase scope of work of the assumed project access due to the limited information on hand. It could change the construction method due to possible site restrictions. The impact could be moderate due to the possible change of operation from the water versus from the land. It can be mitigate during the design phase along with additional site visits.	Moderate	Likely	3
PS-4	[10004703] Concrete (New Seawall)	• No concerns		Negligible	Unlikely	0
PS-5	[10004703] Concrete Cap only for the repaired wall	• No concerns		Negligible	Unlikely	0
PS-6	[1102] Floodwalls - T wall to extend protection	• Project accomplishes intent?	There are not enough information on the Hospital property limit where the T-wall is planned to be build. The design is suggesting the construction of a T-wall in the perimeter of the Hospital and residences. There is the possibility of encounter utilities along the projected T-wall foundation. The impact is moderate.	Moderate	Likely	3
PS-7	0	None	None	Negligible	Unlikely	N/A
PS-8	0	None	None	Negligible	Unlikely	N/A
PS-9	0	None	None	Negligible	Unlikely	N/A
PS-10	0	None	None	Negligible	Unlikely	N/A
PS-11	0	None	None	Negligible	Unlikely	N/A
PS-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
PS-13	Planning, Engineering, & Design	<ul style="list-style-type: none"> Potential for scope growth, added features and quantities? 	Impacts here are dependent upon magnitude of design changes needed, input from outside parties, and what is uncovered during basic investigations needed to complete plans and specifications.	Marginal	Likely	2	
PS-14	Construction Management	<ul style="list-style-type: none"> Potential for scope growth, added features and quantities? 	If scope is increased, this item will be impacted.	Negligible	Unlikely	0	
Acquisition Strategy						Maximum Project Growth	30%
AS-1	[10009902] Site Work - Sea Grass Restoration	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
AS-2	[100001] Mob. Democ & Preparatory Work	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
AS-3	[100047] Seawalls (New Seawall)	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
AS-4	[10004703] Concrete (New Seawall)	<ul style="list-style-type: none"> Requirement for subcontracting? 	Depending on the size of the project, the prime contractor may or may not subcontract this work. Estimate assumed that the prime contractor will perform the job. Subcontracting this work may increase costs, as that would be, at the very least, an additional layer of mark-ups. Historically the small business contractor subcontract at least 50% of the project.	Marginal	Likely	2	
AS-5	[10004703] Concrete Cap only for the repaired wall	<ul style="list-style-type: none"> Requirement for subcontracting? 	Depending on the size of the project, the prime contractor may or may not subcontract this work. Estimate assumed that the prime contractor will perform the job. Subcontracting this work may increase costs, as that would be, at the very least, an additional layer of mark-ups. Historically the small business contractor subcontract at least 50% of the project.	Marginal	Likely	2	
AS-6	[1102] Floodwalls - T wall to extend protection	<ul style="list-style-type: none"> Requirement for subcontracting? 	Depending on the size of the project, the prime contractor may or may not subcontract this work. Estimate assumed that the prime contractor will perform the job. Subcontracting this work may increase costs, as that would be, at the very least, an additional layer of mark-ups. Historically the small business contractor subcontract at least 50% of the project.	Marginal	Likely	2	
AS-7	0	None	None	Negligible	Unlikely	N/A	
AS-8	0	None	None	Negligible	Unlikely	N/A	
AS-9	0	None	None	Negligible	Unlikely	N/A	

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
AS-10	0	None	None	Negligible	Unlikely	N/A	
AS-11	0	None	None	Negligible	Unlikely	N/A	
AS-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A	
AS-13	Planning, Engineering, & Design	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
AS-14	Construction Management	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
Construction Elements						Maximum Project Growth	25%
CON-1	[10009902] Site Work - Sea Grass Restoration	<ul style="list-style-type: none"> Special equipment or subcontractors needed? 	The work required special equipment and specialized personnel. The impact is marginal because the work have been performed in other project and the process are already established.	Negligible	Unlikely	0	
CE-2	[100001] Mob. Democ & Preparatory Work	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
CE-3	[100047] Seawalls (New Seawall)	<ul style="list-style-type: none"> High risk or complex construction elements, site access, in-water? 	Site survey during the design phase will mitigate the concern by determining the current obstruction and access to the projected seawall. If the heavy equipment can not get access from land it will required to complete the seawall portion from the water. It will impact more seagrass, require more equipment, and more time. Estimate assumed that job will be perform from land, Cost can increase up to 20% if it perform from water (barges and tugboat).	Significant	Possible	3	
CE-4	[10004703] Concrete (New Seawall)	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
CE-5	[10004703] Concrete Cap only for the repaired wall	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
CE-6	[1102] Floodwalls - T wall to extend protection	<ul style="list-style-type: none"> Traffic control while work along the Hospital main access to build the T-wall. Encounter utilities along the T-wall foundation no previously identified. Limited space between road and residencies property lines. 	Most of the utilities will be identified during the design phase. The survey will allow to adjust the T-wall foundation base on the Hospital property line. The concern is not going to be completed eliminate but it will be reduces to the minimum.	Marginal	Likely	2	
CE-7	0	None	None	Negligible	Unlikely	N/A	
CE-8	0	None	None	Negligible	Unlikely	N/A	

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
CE-9	0	None	None	Negligible	Unlikely	N/A
CE-10	0	None	None	Negligible	Unlikely	N/A
CE-11	0	None	None	Negligible	Unlikely	N/A
CE-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A
CE-13	Planning, Engineering, & Design	• No concerns		Negligible	Unlikely	0
CE-14	Construction Management	• Accelerated schedule or harsh weather schedule?	The contractor may have to work overtime in order to compensate for lost time.	Marginal	Likely	2
Specialty Construction or Fabrication					Maximum Project Growth	65%
SC-1	[10009902] Site Work - Sea Grass Restoration	• No concerns	The work required special equipment and specialized personnel. The impact is marginal because the work have been performed in other project and the process are already established.	Negligible	Possible	0
SC-2	[100001] Mob. Democ & Preparatory Work	• No concerns		Negligible	Unlikely	0
SC-3	[100047] Seawalls (New Seawall)	• No concerns		Negligible	Unlikely	0
SC-4	[10004703] Concrete (New Seawall)	• No concerns		Negligible	Unlikely	0
SC-5	[10004703] Concrete Cap only for the repaired wall	• No concerns		Negligible	Unlikely	0
SC-6	[1102] Floodwalls - T wall to extend protection	• No concerns		Negligible	Unlikely	0
SC-7	0	None	None	Negligible	Unlikely	N/A
SC-8	0	None	None	Negligible	Unlikely	N/A
SC-9	0	None	None	Negligible	Unlikely	N/A
SC-10	0	None	None	Negligible	Unlikely	N/A

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
SC-11	0	None	None	Negligible	Unlikely	N/A	
SC-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A	
SC-13	Planning, Engineering, & Design	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
SC-14	Construction Management	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
Technical Design & Quantities						Maximum Project Growth	30%
T-1	[10009902] Site Work - Sea Grass Restoration	<ul style="list-style-type: none"> How much the new sea wall will impact the seagrass? 	The current alternative proposed the construction of a new seawall with an offset of the current seawall. The bigger is the offset the digger is the impact on the seagrass.	Negligible	Possible	0	
T-2	[100001] Mob. Democ & Preparatory Work	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
T-3	[100047] Seawalls (New Seawall)	<ul style="list-style-type: none"> Possibility for increased quantities due to loss, waste, or subsidence 	Change in design assumption will increase the length of the sheet piles	Marginal	Likely	2	
T-4	[10004703] Concrete (New Seawall)	<ul style="list-style-type: none"> Sufficient investigations to develop quantities? 	Change in design assumption will increase the size of the concrete cap.	Marginal	Possible	1	
T-5	[10004703] Concrete Cap only for the repaired wall	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
T-6	[1102] Floodwalls - T wall to extend protection	<ul style="list-style-type: none"> Sufficient investigations to develop quantities? 	Change in design assumption will increase the length and dimensions of the T-wall.	Marginal	Possible	1	
T-7	0	None	None	Negligible	Unlikely	N/A	
T-8	0	None	None	Negligible	Unlikely	N/A	
T-9	0	None	None	Negligible	Unlikely	N/A	
T-10	0	None	None	Negligible	Unlikely	N/A	
T-11	0	None	None	Negligible	Unlikely	N/A	
T-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A	

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

Risk Level					
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
T-13	Planning, Engineering, & Design	<ul style="list-style-type: none"> Change on design or requirements 	Design changes due additional studies will impact the labor cost	Marginal	Possible	1
T-14	Construction Management	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0
Cost Estimate Assumptions					Maximum Project Growth	35%
EST-1	[10009902] Site Work - Sea Grass Restoration	<ul style="list-style-type: none"> Potential for construction modification and claims? 	If the % of sheet pile installation from the water increase the sea grass impact will increase.	Marginal	Possible	1
EST-2	[100001] Mob. Democ & Preparatory Work	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0
EST-3	[100047] Seawalls (New Seawall)	<ul style="list-style-type: none"> Assumptions regarding crew, productivity, overtime? Reliability and number of key quotes? 	If the % of sheet pile installation from the water increase the cost will increase.	Moderate	Possible	2
EST-4	[10004703] Concrete (New Seawall)	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0
EST-5	[10004703] Concrete Cap only for the repaired wall	<ul style="list-style-type: none"> Potential for construction modification and claims? 	If further investigation determine that the current concrete cap on the resent improved seawall in not in the conditions to support the additional concrete on top the estimate will change drastically.	Marginal	Possible	1
EST-6	[1102] Floodwalls - T wall to extend protection	<ul style="list-style-type: none"> Potential for construction modification and claims? 	If the design phase change and add utilities to the scope of worth the estimate will need to be modified.	Marginal	Possible	1
EST-7	0	None	None	Negligible	Unlikely	N/A
EST-8	0	None	None	Negligible	Unlikely	N/A
EST-9	0	None	None	Negligible	Unlikely	N/A
EST-10	0	None	None	Negligible	Unlikely	N/A
EST-11	0	None	None	Negligible	Unlikely	N/A
EST-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A
EST-13	Planning, Engineering, & Design	<ul style="list-style-type: none"> Potential for construction modification and claims? 	If further investigation determine that the current sheet pile design is not the adequate and they need additional studies the cost will increase.	Moderate	Possible	2

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level	
EST-14	Construction Management	<ul style="list-style-type: none"> Potential for construction modification and claims? 	Any modification involving time extension will change the assumed construction management cost.	Marginal	Likely	2	
External Project Risks						Maximum Project Growth	40%
EX-1	[10009902] Site Work - Sea Grass Restoration	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
EX-2	[100001] Mob. Democ & Preparatory Work	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0	
EX-3	[100047] Seawalls (New Seawall)	<ul style="list-style-type: none"> Potential for severe adverse weather? Potential for market volatility impacting competition, pricing? Unanticipated inflations in fuel, key materials? 	<p>1) The project may be subject to weather delays in the form of flooding events, seismic action, and/or storm events. The area is near the water, making it vulnerable to impacts due to sea level rise. There are also risks involving potential delays in deliveries due to strikes, material shortages, or shipping issues.</p> <p>2) In addition, the potential for market volatility could impact the cost of the material like concrete and reinforcement.</p> <p>3) Unanticipated inflations in fuel will impact the construction operation of the heavy equipment and the cost of key materials.</p>	Marginal	Likely	2	
EX-4	[10004703] Concrete (New Seawall)	<ul style="list-style-type: none"> Potential for severe adverse weather? Potential for market volatility impacting competition, pricing? 	The project may be subject to weather delays in the form of flooding events, seismic action, and/or storm events. The area is near the water, making it vulnerable to impacts due to sea level rise. There are also risks involving potential delays in deliveries due to strikes, material shortages, or shipping issues. In addition, the potential for market volatility could impact the cost of the material like concrete and reinforcement.	Marginal	Possible	1	
EX-5	[10004703] Concrete Cap only for the repaired wall	<ul style="list-style-type: none"> Potential for severe adverse weather? Potential for market volatility impacting competition, pricing? 	The project may be subject to weather delays in the form of flooding events, seismic action, and/or storm events. The area is near the water, making it vulnerable to impacts due to sea level rise. There are also risks involving potential delays in deliveries due to strikes, material shortages, or shipping issues. In addition, the potential for market volatility could impact the cost of the material like concrete and reinforcement.	Marginal	Possible	1	
EX-6	[1102] Floodwalls - T wall to extend protection	<ul style="list-style-type: none"> Potential for severe adverse weather? Potential for market volatility impacting competition, pricing? 	The project may be subject to weather delays in the form of flooding events, seismic action, and/or storm events. The area is near the water, making it vulnerable to impacts due to sea level rise. There are also risks involving potential delays in deliveries due to strikes, material shortages, or shipping issues. In addition, the potential for market volatility could impact the cost of the material like concrete and reinforcement.	Marginal	Possible	1	

Mount Sinai Medical Center (MSMC) - CAP - Section 14 Alt A

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: 26/8/2016

		Risk Level				
Very Likely	2	3	4	5	5	
Likely	1	2	3	4	5	
Possible	0	1	2	3	4	
Unlikely	0	0	1	2	3	
	Negligible	Marginal	Moderate	Significant	Critical	

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
EX-7	0	None	None	Negligible	Unlikely	N/A
EX-8	0	None	None	Negligible	Unlikely	N/A
EX-9	0	None	None	Negligible	Unlikely	N/A
EX-10	0	None	None	Negligible	Unlikely	N/A
EX-11	0	None	None	Negligible	Unlikely	N/A
EX-12	Remaining Construction Items	None	None	Negligible	Unlikely	N/A
EX-13	Planning, Engineering, & Design	<ul style="list-style-type: none"> No concerns 		Negligible	Unlikely	0
EX-14	Construction Management	<ul style="list-style-type: none"> Potential for severe adverse weather? 	If the contractor get delay in the construction due to weather the Construction Management will need to extend their time in the project.	Moderate	Likely	3

APPENDIX B – COST CERTIFICATION

DRAFT