



January 19, 2021

Mr. Dean Mealy, II CPPO
Town Purchasing Manager
Town of Palm Beach
Purchasing Division
951 Old Okeechobee Road Suite D
West Palm Beach, FL 33401

Subject: Lake Worth Inlet Sand Transfer Plant Integrity Assessment

Dear Mr. Mealy:

In response to our discussion with Patricia Strayer and Rob Weber on December 2, 2020, and the Town's subsequent provision of relevant documentation regarding plant construction and improvements, provided to GHD on January 6, 2021, GHD is pleased to submit this Time and Materials – Not to Exceed proposal to the Town of Palm Beach (Town) to address the integrity assessment of the Lake Worth Inlet Sand Transfer Plant (Plant) and its key operational components. The scope of work and rates utilized to develop our cost estimate for the herein described services have been developed in accordance with the terms and conditions of the May 22, 2020 Professional Services Agreement between the Town and GHD Inc. (GHD).

1. Background and Introduction

Built in 1958 and subjected to numerous improvements in 2010, the Plant is located on the north side of the Lake Worth Inlet north jetty. The Plant pumps sand that impounds along the inlet north shoreline as a slurry. This slurried sand is conveyed through a pipe underneath the federal navigation channel and onto Palm Beach Island (Island) via a dual discharge line on a trestle located just east of the Island shoreline and approximately 200 feet south of the jetty cap. At this time, only one of the two discharge lines is operational.

The purpose of the Plant is to bypass a portion of the sand that is interrupted by the navigation channel, which acts as a sediment sink and a barrier to longshore sand transport. Maintenance dredging and disposal of beach-quality sand from the inlet channel onto the Palm Beach Island shoreline and other Town beaches downdrift of the inlet that are critically eroded because of the interruption in sand transport provides additional sediment supply to the Island.

The Florida Department of Environmental Protection (FDEP) Strategic Beach Management Plan update (May, 2018) includes a strategy to bypass an average annual volume of 202,000 cubic yards of sand to the beaches of Palm Beach Island through a combination of operating the Plant and beach placement of inlet navigation channel maintenance dredging. Each year the Plant pumps an average of 100,000 cubic yards of sand to the Town's Reach 1 shoreline.

Palm Beach County operates the Plant under contract with the Town, the Owner of the facility. The Town has financial responsibility for all repairs and upgrades. The Town has expressed



concern over the condition of the plant and some uncertainties associated with maintenance of plant components.

GHD proposes the following tasks to assist the Town with their assessment of continued operation of the Plant.

2. SCOPE OF SERVICES

TASK 1 - KICK-OFF AND REVIEW OF EXISTING INFORMATION

GHD will conduct a virtual meeting with the Town of Palm Beach (Town) and Palm Beach County (County) to discuss general plant operations, identified operational and performance issues, and to obtain available information pertaining to the Plant.

GHD will review existing information provided by the Town, to support the determination of the condition, performance, and operation of the Plant in advance of an inspection to be conducted by GHD (as described further in Task 2). Information provided to GHD by the Town on January 6, 2021 includes electronic versions of the following, all in Portable Document Format:

- Sand Transfer Facility Lake Worth Inlet, Palm Beach County Florida January 1956 (Drawing Numbers 665-1 through 665-8, inclusive; note Sheets 665-9 through -15 not scanned)
- Lake Worth Inlet Shoal Isopach drawing, September 9, 1988, prepared by Coastal Planning & Engineering, Inc. (1 sheet)
- Sand Transfer Plant Replacement Pipeline Lake Worth Inlet, Florida – Bid #95-14, prepared by Dames & Moore (9 sheets), issued for Bid Set dated July 17, 1995
- Record Drawing 33-19 (Dames & Moore Sheets C-1, C-2, C-5 and C-6) dated January 1997
- Lake Worth Inlet Disposal Site Pre-Const./Post-Const. Cross Sections (drawing sheet stamped December 7, 2000 and accompanied by a one-page Volume Report tabulation, prepared by Morgan & Eklund, Inc.
- Town of Palm Beach Palm Beach Inlet Sand Transfer Station Emergency Pumping Equipment, prepared by Four Jays Consulting, Inc., dated August 5, 2005 (3 sheets)
- Proposed Repairs to: Sand Transfer Plant, Sheets S-1 and S-2, dated XX-XX-05, by Bridge Design Associates, Inc. (Progress Set – Not for Construction) – contains walkway and door details
- Proposed Rehabilitation to: Palm Beach Inlet Sand Transfer Plant - BDA Project No. 08-572 (Bid Set 4/22/09), prepared by Bridge Design Associates – 50 sheets; and,
- Town of Palm Beach Sand Transfer Plant Conditions Assessment Report, prepared by Bolchoz Marine Advisors, Inc., dated June 19, 2020.

The above documents have been subjected to a cursory review to enable preparation of this proposal. Further review of the documents will be undertaken prior to the Condition Assessment, described further in Task 3 below. Any plant maintenance or additional upgrade records, operational procedures, or permit requirements that are available from the Town will also be reviewed.



Assumption

- The Kickoff Meeting will be attended by the Town and County Operations

Task 1 Deliverables

- One virtual 2-hour Kick-off Meeting
- Meeting Summary Memorandum (to be transmitted to the Town)

TASK 2 - INSPECTION AND PROFILING OF SAND TRANSFER PLANT PIPELINE

It is understood that only one of the two pipelines is used to transfer sand and that the second pipeline is inoperable due to being clogged or collapsed. Because the extent of the blockage and/or collapsed section(s) of pipe is unknown, and the level of effort to clear the blocked line (if feasible) cannot be determined at this time, GHD proposes to inspect the two pipelines first, and then profile the pipeline sections that can be accessed for ovality and wear. This will help in determining whether there are areas of pipe that may be at risk of buckling or collapse and will indicate the remaining sidewall thickness such that an assessment of remaining viable service life can be undertaken.

The operable pipeline will be thoroughly flushed prior to video inspection. The clogged pipeline will be video inspected from both the north and south. The video data and the lengths of insertion of the camera should provide sufficient information to make a determination as to the condition of the pipeline, and whether or not the line can be effectively cleared if the line still appears to be intact.

Since the extent and character of the blockage is unknown, clearing of the line is **not** included in Task 2. Clearing of the line can be performed under Task 5, Contingency.

GHD will work with the Contractor to develop a protocol to have the pipelines inspected. The protocol will rely on existing information and drawings provided to GHD. GHD will coordinate the work and provide onsite oversight during the inspection of the pipelines (and, when deemed appropriate and if and as approved by the Town, the clearing of the inoperable line). A Pipeline Inspection Report will be provided at completion of the inspection work.

The logical order of the video inspection work is recommended to progress as follows:

- Flush pipeline with water and leave idle overnight before continuing; this will allow any fines in the line to settle to the bottom and also allows the water to clear
- Inspect near surface of north pipeline between sand transfer plant and valve box
- Inspect both pipelines from the valve box south across the inlet to the outlet discharge point at the north end of Palm Beach Island
 - Complete inspection of operational pipeline from the north
 - Complete inspection of non-operational pipeline from the north
 - Complete inspection of operational pipeline from the south/discharge end to a point that ensures overlap between the inspection run from the north
 - Complete inspection of the non-operational pipeline from the discharge end to a point as far as possible to the north
- Determine if removal of noted obstruction(s) as may be observed from the video inspection in the non-operational pipeline should be pursued



- Profiling of the pipelines for ovality and wear following the same procedure and order of conduct as the flushing and video inspections detailed above

Assumptions

- GHD shall serve as the Town's advocate for coordination of the inspection services. The inspection services are assumed to be performed by a contractor retained by GHD. We have included a solicited fee proposal from Ballard Marine Construction. GHD's professional services support of this activity are included in our proposal.
- GHD will use existing drawings and information for the development of the protocols. Development of drawings are excluded from this scope.
- The Inspection Report will consist of narrative, photos, and logs of activities occurring onsite during the video inspection.

Task 2 Deliverables

- Draft and Final Protocol for inspecting pipeline
- One-hour virtual meeting to discuss draft Pipeline Inspection Report
- Draft and Final Pipeline Inspection Reports

TASK 3 - CONDITION ASSESSMENT & REPORT

GHD will create an asset register for the Plant and Sand Transfer Pipeline (Pipeline) based on the information received, reviewed and discussed in Task 1. This asset register will serve as the basis for the condition assessment performed under this task.

GHD will develop condition assessment protocols for Plant assets. The Level 2 Condition Assessment Protocols will be utilized in the field inspections carried out under this task. Table 1 gives an example of a Level 2 assessment protocol. All assets in the asset register will be assigned a condition rating score, from 1 to 5, as shown in Table 2.

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Table 1 – Example of Level 2 Condition Assessment Protocol

	Aspect	Distress Mode	Rating 1	Rating 2	Rating 3	Rating 4	Rating 5
CONDITION ASSESSMENT							
A	Structure appearance	Leakage	Appears as new.	Minimal moisture on seals/joints.	Water dripping from seals/joints.	Water pooling on floor	Water squirting/ running onto floor.
B	Structure appearance	Shaft, Supports, Bearing Deterioration	Shaft & supports sound - no shaft distortion or deterioration evident.	Minor shaft/ support deterioration evident, no impact on the structural strength or function.	Shaft distortion or bearing/housing wear evident, little impact on structural integrity or function.	Shaft distortion or bearing/housing wear evident and has impacted on asset integrity or function.	Significant shaft distortion or bearing/housing wear evident, high probability of fracture or failure.
C	Pump Casing	Wall Thickness, (Measured at location of highest erosion / corrosion)	Still has full wall thickness including corrosion allowance.	Still has full wall thickness but no corrosion allowance.	Loss of < 20% of design wall thickness.	Loss of > 20% of design wall thickness.	Loss of design wall thickness > 50%; loss of pressure retaining capacity
D	Pump Casing Internal	Corrosion / erosion (cavitation)	No visible deterioration. No sign of erosion / corrosion.	Minor signs of erosion / corrosion.	Erosion / corrosion progressing will require repairs at next shutdown.	Erosion / corrosion requires minor repairs.	Erosion / corrosion requires major repairs/ casing requires replacement
E	Use	Motor Hours Run	< 10,000	> 10,000	> 50,000	> 100,000	> 200,000
F	Symptoms	Vibration	No unusual vibration detectable	Minor vibration detected	Moderate vibration	Considerable vibration (wristwatch shakes)	Major vibration
G	Symptoms	Temperature	No unusual temperature detected / no burning smell	Minimal heat from casing using hand / no burning smell	Heat detected by hand / no burning smell	Heat detected by hand is uncomfortable / minor burning smell	Heat too high to assess by hand / major burning smell
H	Symptoms	Noise	No unusual noises detected.	Slight whine/rattle detected.	Moderate whine/rattle detected, easily heard over pump noise.	Loud whine/rattle.	Disturbingly loud operation/vibrations.

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Table 2 – Condition Rating Descriptions

Condition Score	Definition	Description	Probability of Failure
1	Very Good	Sound physical condition to meet current standards. Operable and well maintained. Asset likely to perform acceptably with routine maintenance for 10 years or more. No work required.	1
2	Good	Acceptable physical condition but not designed to current standard. Asset shows minor wear. Deterioration has minimal impact on asset performance. Minimal short-term failure risk but potential for deterioration or reduced performance in medium term (5-10 years). Only minor work required (if any).	2
3	Moderate / Fair	Functionally sound plant and components but showing some wear with minor failures and some diminished efficiency. Minor components or isolated sections of the asset require replacement or repair, but asset still functions safely at acceptable level of service. Work required but still serviceable. For example, bearing and gland wear becoming evident and some corrosion present.	3
4	Poor	Plant and components function but require a high level of maintenance to remain operational. Likely to cause a noticeable deterioration in performance in short-term. No immediate risk to health or safety but work required to ensure asset remains safe. Substantial work required in short-term, asset barely serviceable.	4
5	Very Poor	Failed or failure imminent. Asset effective life exceeded, and significant maintenance costs incurred. A high risk of breakdowns with a serious impact on component. No life expectancy. Health and safety hazards exist which present a possible risk to public safety, or asset cannot be serviced/operated without risk to personnel. Major work or replacement.	5

GHD will perform an onsite inspection of the Plant and above ground Pipeline. This onsite physical inspection will include items on the asset register and any additional items identified in the field. The following is an overview of the Plant components that will be assessed:

- General Building (walkways, doors, roof, platforms, guardrails, lighting, etc.)
- Structural concrete
- Structural steel
- Boom, pulleys, cables, and motor
- Water pump and drive, flexible water pipe, rigid water pipe, and jet head
- Sand pump and drive, flexible sand pipe, rigid sand pipe, and head
- Electrical switchgear, conduit, and wire
- Slurry pipe above ground (both north and south of the inlet)



GHD will prepare a Condition Assessment Report for the Town's review. This Report will include the results of the Pipeline Cleaning and Inspections Completion Report. A virtual meeting will be held to discuss the report and any comments the Town may have.

Assumptions

- Inspection to occur during low tide
- Town staff to accompany GHD personnel to Plant
- County staff will be available to open and allow access to GHD personnel
- County staff will start and operate the Plant during GHD's inspection

Task 3 Deliverables

- Draft Condition Assessment Report
- One 1-hour virtual meeting to discuss Draft Report
- Final Condition Assessment Report

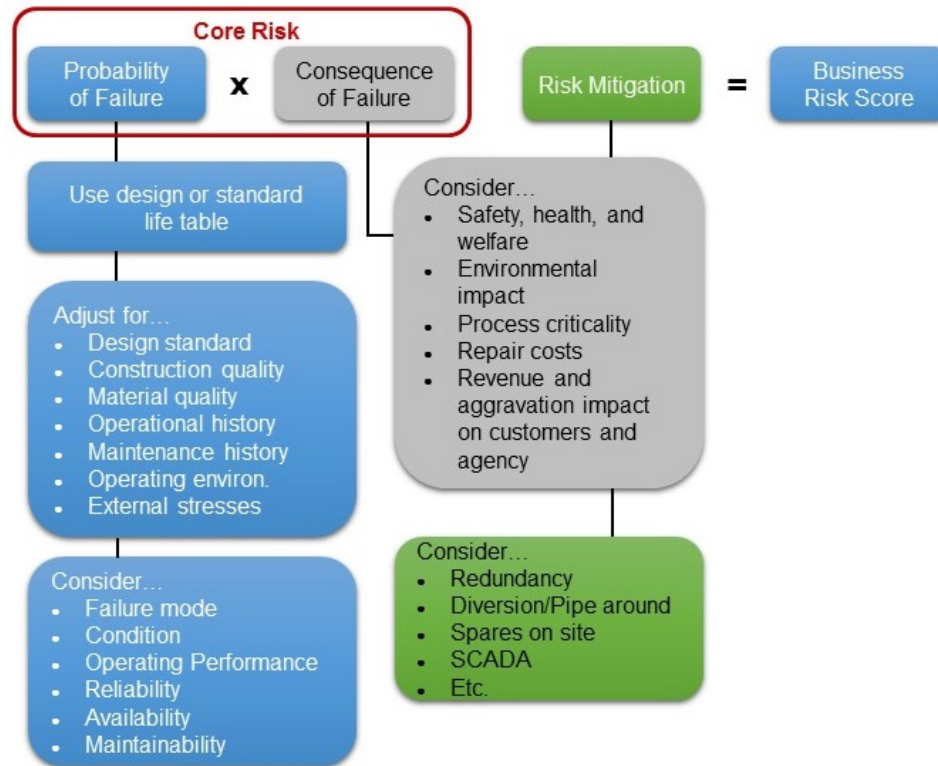
TASK 4 - BUSINESS RISK EXPOSURE, CORE RISK DEVELOPMENT, AND CIP

Based on the results from Tasks 2 and 3, GHD will develop a Business Risk Exposure (BRE) profile for all assets in the Sand Transfer Plant and Pipeline. The BRE is an advanced asset management methodology used to focus on high risk assets and issues. The BRE for an asset is the product of the asset's consequence of failure (COF) and probability of failure (POF), adjusted for any risk mitigation measures currently in place. **Figure 1** is a schematic representation of the key variables of BRE with components that address each variable.

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Figure 1 Business Risk Exposure Calculation



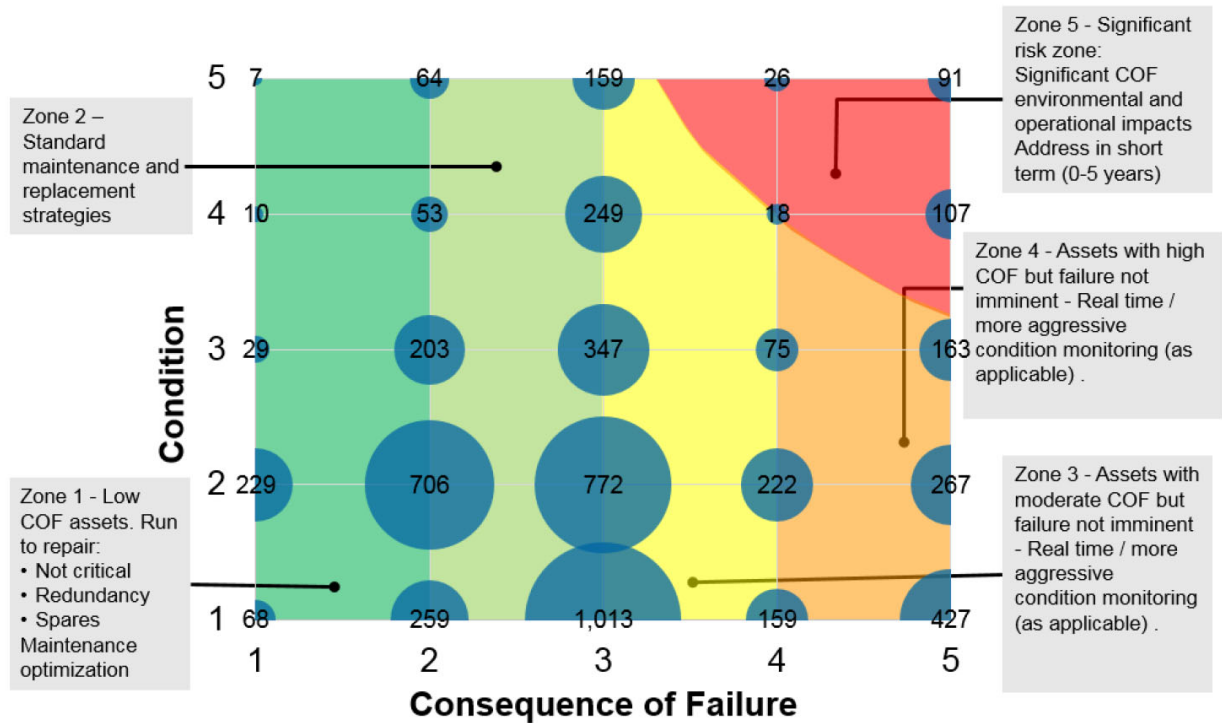
Core Risk is defined as the product of the consequence of failure and the probability of failure without adjusting for any available risk mitigation factors, as shown in **Figure 1**. Under GHD's approach, once the core risk has been calculated as a baseline measurement, risk mitigation and management strategies can be developed that can reduce the level of risk, in turn impacting the level and cost of service. Core Risk is the metric used to assign assets to risk management zones. Risk management zones and recommended strategies for each zone are illustrated in **Figure** . The risk management zone establishes the initial prioritization consideration (prioritization bucket) for immediate asset investment needs such as condition assessment, repair, rehabilitation, or replacement (i.e., a snapshot of current needs).

A Capital Improvements Program (CIP) will be developed for the Sand Transfer Plant and Pipeline based on the prioritized needs identified in the Core Risk matrix.

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Figure 2 Risk Management Zones



As shown in **Figure** , there are five risk management zones and associated high-level strategies. Zone 5 includes the highest risk assets and Zone 1 includes the assets with the lowest COF ratings.

GHD will conduct a 1-hour WebEx meeting to discuss the Town's existing risk logic.

Task 4 Deliverables

- One 1-hour virtual meeting to discuss existing risk matrix logic
- Updated (Final) Condition Assessment Report with core risk, BRE, and CIP (Excel format)
- One 2-hour virtual meeting to present results

TASK 5 - CONTINGENCY

This task will be used for work not included in Tasks 1 through 4, such as the clearing of the clogged/inoperable line. All work under this task will require written authorization from the Town prior to the start of work. The extent of work necessary to clear the line cannot be determined until the video inspection and profiling of the pipelines, as described in Task 2, is completed. A separate proposal with a scope, schedule and fee will be prepared as soon as practicable after the field work is completed.

Task 5 Deliverables

- To Be Determined



3. COMPENSATION AND SCHEDULE

GHD proposes to perform the scope of services on an hourly rate, time and materials – not to exceed basis in accordance with our Standard Fees as approved by the Town under the May 22, 2020 Professional Services Agreement for Coastal Engineering. The proposed fee estimate for the scope of services is \$141,710. A detailed description of estimated costs for this proposal is included in Attachment A.

The total fees provided herein will not be exceeded without written authorization from the Town of Palm Beach. GHD proposes to begin the scope of services as described above once we have received the Town's Purchase Order and written Notice to Proceed (NTP). The following is our proposed schedule:

- Kickoff meeting within 10 business days of NTP
- Site Inspection within 4-weeks of NTP
- Begin Pipeline Inspection and Profiling within 90 calendar days of NTP
- Pipeline Inspection Report within 21 calendar days of completion of the pipeline inspection field work
- Draft Condition Assessment Report within 14 calendar days of completion of the inspection
- Final Condition Assessment report within 14 calendar days of Draft Condition Inspection Assessment Report review meeting
- Complete draft and final business risk exposure, core risk and capital improvements program budget within 45 calendar days of completion of plant and pipeline inspection reports

4. CLOSING

GHD looks forward to providing the above-described services to the Town. Please do not hesitate to contact me at 251.300.1250 or via email at Michael.Barnett@ghd.com if you have any questions regarding this proposal.

Sincerely,
GHD Inc.

A handwritten signature in blue ink, appearing to read "Michael R. Barnett".

Michael R. Barnett, PE, D.CE
Coastal Engineering Services Lead

cc: Patricia Strayer, PE, Town of Palm Beach
Rob Weber, Town of Palm Beach
Dean Goodin, PhD, GHD Inc.

Encl. Attachment A – Fee Tabulation



Attachment A

Fee Tabulation

ATTACHMENT A

Town of Palm Beach Sand Transfer Plant Condition Assessment

Task Description	Personnel Hours											Budget				
	Principal	Project Manager	Senior Engineer (Civil)	Construction Oversight	Senior Scientist (Trenchless Pipeline Expert)	Senior Engineer (Coastal)	Senior GIS	Contract Management	Administration & Accounting	Senior CADD	Total Hours	Labor	Other Direct Costs	Subconsultant - Ballard Marine	Total Non-Labor	Total
Task 1: Kickoff Meeting Review of Existing Information																
1.1 Review Existing Information		2	8	8	2	8			-		28	\$ 5,550			\$ -	\$ 5,550
1.2 Kickoff Meeting		2	2	2	2	2					10	\$ 2,040			\$ -	\$ 2,040
Subtotal	-	4	10	10	4	10	-	-	-	-	38	\$ 7,590	\$ -	\$ -	\$ -	\$ 7,590
Task 2: Inspection and Profiling of Sand Transfer Pipeline																
2.1 Travel											-	\$ -			\$ -	\$ -
2.2 Site Visit and Inspection Oversight of Pipeline Inspection and Profiling - Field Work		2	24	80		-		2			108	\$ 20,400		\$ 57,300	\$ 57,300	\$ 77,700
2.3 Draft Pipeline Assessment Report	2	4	12	12	4	-	4		4	8	50	\$ 8,780	\$ -		\$ -	\$ 8,780
2.4 Review Meeting with Town for Pipeline Assessment Report		2	2	2	2						8	\$ 1,640			\$ -	\$ 1,640
2.5 Final Pipeline Assessment Report	1	2	4	4	2	-	2		2	2	19	\$ 3,400			\$ -	\$ 3,400
Subtotal	3	10	42	98	8	-	6	2	6	10	185	\$ 34,220	\$ -	\$ 57,300	\$ 57,300	\$ 91,520
Task 3: Sand Transfer Plant Condition Assessment & Report																
3.1 Travel											-	\$ -	\$ -		\$ -	\$ -
3.2 Site Visit		2	10	10		10		2			34	\$ 6,650			\$ -	\$ 6,650
3.3 Draft Condition Assessment Report	2	4	16	16	8	4	4		4	8	66	\$ 11,920			\$ -	\$ 11,920
3.4 Review Meeting for Condition Assessment Report		2	2	2	2						8	\$ 1,640			\$ -	\$ 1,640
3.5 Final Condition Assessment Report	1	2	4	4	2	2	2		2	2	21	\$ 3,800			\$ -	\$ 3,800
Subtotal	3	10	32	32	12	16	6	2	6	10	129	\$ 24,010	\$ -	\$ -	\$ -	\$ 24,010
Task 4: Business Risk Exposure, Core Risk Development, and CIP																
4.1 Virtual Meeting to Discuss Risk Logic	2	2	2	2	2						10	\$ 2,140			\$ -	\$ 2,140
4.2 Updated Condition Assessment Report with Core Risk, BRE, and CIP	8	4	32	16	4				4		68	\$ 13,540			\$ -	\$ 13,540
4.3 Virtual Meeting to discuss BRE, Core Results and CIP	2	2	4	4	2						14	\$ 2,910			\$ -	\$ 2,910
Subtotal	12	8	38	22	8	-	-	-	4	-	92	\$ 18,590	\$ -	\$ -	\$ -	\$ 18,590
Total	18	32	122	162	32	26	12	4	16	20	444	\$ 84,410	\$ -	\$ 57,300	\$ 57,300	\$ 141,710