SCOPE OF SERVICES

CITY OF HOLLYWOOD
PROJECT # 19-11052

STORMWATER PUMP STATIONS CONDITION ASSESSMENTS
AMENDMENT #1

I. PROJECT DESCRIPTION

Originally, the City of Hollywood requested that Tetra Tech provide this scope of services to provide visual condition assessments for nine (9) of the ten (10) stormwater pump stations (SW-##) throughout the City. These engineering services will be provided under the General Engineering Consulting Services contract (City Project No. 17-1325). After approval of the original Work Order TTH 20-01, the City requested additional services, including addition of evaluation of the discharge piping and pumping limitation for SW-06. This scope of services is for visual condition assessments of the following nine (9) stormwater pump stations, evaluation of the discharge piping and pumping limitation of SW-06 and other additional scope items:

Station	Location	Pump Size	Pump Capacity
SW-01	800 S. North Lake Drive	2-24" Axial (40 HP)	12,000 GPM
SW-02	802 N. South Lake Drive	2-36" Axial (60 HP)	21,200 GPM
SW-03	2921 Arthur Street	1-24" Axial (30 HP)	13,000 GPM
SW-04	2940 Hollywood Boulevard	2-30" Axial (40 HP)	18,000 GPM
SW-05	2851 Washington Street	2-4" Submersible (10 HP)	400 GPM
SW-06	520 N 14 Avenue	40 HP	12,000 GPM
SW-07	1236 Wiley Street	2-24" Axial (30 HP)	11,100 GPM
SW-08	1601 S 14 Avenue	2-30" Axial	16,400 GPM
SW-09	1201 South Lake Drive	2-4" Submersible	400 GPM
SW-10	South Regional WWTP	Unknown	6,700 GPM

II. SCOPE OF SERVICES

D. Meetings and Presentations

Tetra Tech will attend various meetings and presentations in support of this project. Meetings are assumed to last up to three hours. This task includes up to 10 meetings with the City and/or other entities or persons. In addition, Tetra Tech will develop or assist with the development of presentations to be provided by the City and/or Tetra Tech. Two presentations are included in this task.

Deliverables:

- Meeting agenda and/or notes, and
- Presentation materials.

E. Pumping Discharge Analysis

Tetra Tech will utilize the information collected during the visual condition assessment, along with information available pertaining to the discharge conditions of each pump station, to evaluate each pump station's discharge capacity. The following information will be obtained and utilized for this purpose:

- Pump manufacturer data,
- Pump control levels,
- Discharge piping and fittings, and
- Tailwater conditions.

Utilizing the information described above, Tetra Tech will calculate estimated pumping capacities of each pump station, for existing high water (King Tide) conditions and a future condition to be discussed and decided upon by the City and Tetra Tech. In addition, Tetra Tech, with assistance from the City, will conduct a pump drawdown test, if applicable, to estimate each station's pumping capacity.

F. Permitted Discharge Analysis

Tetra Tech will obtain, from Broward County and/or the South Florida Water Management District, permit information for each pump station. Tetra Tech will meet with Broward County to discuss permitted discharge revisions due to sea level rise and other considerations. This information will be used to identify the permitted discharge from each pump station. Tetra Tech will then coordinate and confirm with Broward County, the SFWMD, and/or other permitting agencies to confirm this permitted discharge, including discussion of contribution of pumping of groundwater and surface waters which have overtopped seawalls in the vicinity.

G. Pump Station SW-06 and SW-08 Piping Configuration Analysis

Tetra Tech will obtain information related to the discharge piping for SW-06 and SW-08, which will include AutoCAD drawings and GIS information. Utilizing pump information, suction and discharge piping configurations, tailwater conditions, and other information, Tetra Tech will conduct a desktop evaluation of pumping limitations and recommended piping configurations for SW-06 and SW-08.

H. Electrical Testing Support and Allowance

Tetra Tech will coordinate efforts with a subconsultant certified technician trained in the thermal analysis of the electrical equipment for eight pump stations. The subconsultant and/or Tetra Tech will, with assistant from City staff, remove/open the covers from the electrical equipment and take thermal scans of the equipment. Visible hot spots will indicate a potential failure that may require corrective action. Test results will be provided in the form a report with recommended corrective action. Tetra Tech will evaluate the report and provide a summary prioritizing the recommended

corrective actions. Tetra Tech will also provide an opinion of probable cost for the corrective actions associated with each pump station. Subconsultant fees are not included in this task, but can be funded by the Miscellaneous Allowance.

Tetra Tech also recommends testing the generators at pump stations 1, 2 and 4. Tetra Tech will review available maintenance records provided by the City and provide recommends for additional testing and maintenance. Additional maintenance recommendations are likely to include a full analysis of each generator by the manufacturer of the equipment.

I. Structural Testing (Optional)

Tetra Tech recommends performing structural testing only on one of the existing concrete buildings that will be kept for improvements, because of the similarity of their designs. Apart from other technical and economic factors, one measure that could support the need to keep an existing concrete building is the finished floor elevation. Should the City decide to provide a Level of Service (LOS) for the drainage system that keeps the building's finished floor above the flood waters, then the City may choose to keep the structure. This could affect the concrete structures located at Stormwater Pump Stations SW-01, SW-02, SW-04, or SW-06.

With approval from the City, Tetra Tech will provide structural testing to identify the existing conditions beyond the visual inspection and quantify the improvements and cost for building a resilient structure, including:

1. Concrete core strength
2. Masonry prism strength
3. Concrete or concrete masonry unit (CMU) wall rebar scanning.
4. Footing excavation to verify size/type, utilizing vacuum excavation.
5. Petrographic testing of concrete if corrosion/deterioration is observed

   This helps to understand whether the concrete is worth saving. A chemical analysis is performed on the existing concrete to identify the level of salt content collected within the voids of the concrete.
6. Inspection of the existing roof and structure.
7. Inspection of the existing roof to verify code compliance (i.e. roof strapping, etc.)

These structural tests will help better assess the scope of work necessary for rehabilitating or modifying the existing buildings. Testing costs are not included in this task, but can be funded as part of the Miscellaneous Allowance.

J. Preliminary Pump Station Planning

The city seeks to establish an interim solution to improving the capacity of its stormwater pump stations. Over the last years, flow conditions for the City's stormwater pumps have been fundamentally altered by changes in the surrounding hydrologic conditions such as rising

groundwater, sea level rise and tidal conditions, for instance king tides. Under the original design, most of the flow through the pumps was from stormwater runoff. However, the characteristics of the flow has substantially changed as groundwater and other contributing factors have significantly reduced the operational capacity of the pumping systems to convey stormwater.

Estimate Impacts of Groundwater and Sea Level Rise on Pump Flows

The objective of this task is to maximize pump flows to acceptable rates by the SFWMD. This will require the City to provide justification to SFWMD for allowing the pump capacities to be increased beyond the permitted rates. Using the results of Task E above, we will conduct a preliminary analysis of the five (5) costal pump stations to ascertain what impact groundwater (GW), tidal conditions and sea level rise (SLR) are having on the pumping capacities. We propose the following:

- Based on assumed groundwater conditions from existing geotechnical data, or other indicators in the field, we will attempt to approximate the potential impact of Infiltration and inflow based on estimates accounting on pipe (gravity and pressure) age, depth of ground water, and pipe depths.
- Using SLR estimates from NASA and the NOAA, we will estimate the impact from the completion of construction of the pump stations until now. We will also anticipate the impact of SLR on pump capacities, under current conditions, out to 2050.
- We will also estimate the impact of tidal conditions in combination with the conditions above.

Preliminary Calibration of Model to December 2019 Unnamed Storm

Using the City's existing calibrated and operational hydrologic model, we will preliminarily develop simulations of the unnamed storm that occurred in December 2019. We will conduct a preliminary calibration of the model to the unnamed storm using data from the following sources:

- One-foot LiDar data from the County
- Rain gauge data provided by the city,
- The drone footage provided by the city will be used to compare the aerial extents of flooding against the lidar data to establish approximate flood elevations.
- Other data that maybe available such as watermarks on structures or other above ground infrastructure within the limits of flooding.

The preliminary model calibration will consist of the following steps:

- The City’s existing model was completed using ICPR version 3. This version of ICPR is no longer supported by the software developer. We will use the ICPR upgrade feature to convert the files to ICPR version 4, the latest version of the software.
- Our next step will be to run the ICPR version 4 input files by the City to verify the results against the output results in the City’s 2010 SWMP Update to check the accuracy of the version upgrade from version 3 to 4.

- Upon verifying the results above, we will transfer them, using a Tetra Tech proprietary App, into a GIS data analyzer allowing spacial illustration of the flood levels on an aerial with an overlay of the one-foot LiDar data.
- Using the drone video coverage, we will compare the limits of flooding to the ICPR modeling results for the 25-year/24-hour, 100-year/ 24-hour storm, and 25-year/3-day storms as modeled in the SWMP update.
- Whichever of the modeled storms above having the spatial flood limits matching the closest to the limits of flooding observed on the drone video will be utilized for the alternatives analysis below.

Alternatives Analysis and Preliminary Opinions of Probable Construction Costs

With this model, we will analyze the depth and duration of flooding for the areas served by the five (5) costal pump stations to preliminarily determine the impact of increasing pump capacities determined above in this task. We will also analyze two (2) other alternatives to preliminarily assess potential enhancements that may be made to the City's stormwater pump stations to lower flood levels and reduce the duration of flooding. For each alternative analysis, we will calculate a preliminary engineer's opinion of probable construction cost. The scenarios run for the alternatives analysis will be illustrated on four (4) 11" x 17" exhibits.

K. Summary Report

Tetra Tech will compile the memorandum completed as part of Task C, for each pump station, into a comprehensive summary report to include sections as follows:

- Introduction and Executive Summary
- Section 1 – SW-01 Condition Assessment and Recommendations
- Section 2 – SW-02 Condition Assessment and Recommendations
- Section 3 – SW-03 Condition Assessment and Recommendations
- Section 4 – SW-04 Condition Assessment and Recommendations
- Section 5 – SW-05 Condition Assessment and Recommendations
- Section 6 – SW-06 Condition Assessment and Recommendations
- Section 7 – SW-07 Condition Assessment and Recommendations
- Section 8 – SW-08 Condition Assessment and Recommendations
- Section 9 – SW-09 Condition Assessment and Recommendations
- Section 10 – SW-10 Condition Assessment and Recommendations
- Section 11 – Recommendations and Summary

Deliverables:

- Draft report, electronic and five hardcopies

- Review meeting minutes
- Final report, electronic and five hardcopies

L. Grant Funding Applications Support

Support for Grant funding applications from up to four agencies will be provided. Some of the possible agencies include FEMA, SFWMD, and others. Supporting documentation will be developed for submittal by the City. Because of the uncertainty related to the application requirements related to figures and other supporting documentation, this task includes preparation of two supporting figures for each application. If additional figures or other information is required, the Miscellaneous Allowance will be utilized.

M. Miscellaneous Allowance

A miscellaneous allowance of $27,500 is included as part of this task. Use of this allowance requires a written request and approval by the City's Project Manager. The written request should outline the services and allowance amount being requested, including subconsultant proposals, if applicable.

N. Reimbursable Expenses

A reimbursable expenses amount of $3,500 is included as part of this task.

III. ASSUMPTIONS AND SERVICES NOT INCLUDED

A. Design, permitting, or construction administration or inspection services are not included in this proposal.

B. Site visits to the nine pump stations will occur on the same day.

C. Design of rehabilitation for pump stations or sea walls is not included.

D. Permitting.

E. The City will operate and assist with providing access to the pump stations, pumping down of wetwells and system isolations to facilitate visual assessment of wetwells, control structures, overflow structures, or other submersed structures. The City will provide any maintenance of traffic and any equipment necessary to pump down or isolate the system.

F. Construction or calibration of hydraulic/hydrologic models is not included. The City will provide the existing stormwater model to be used, which is assumed to be in a usable condition.

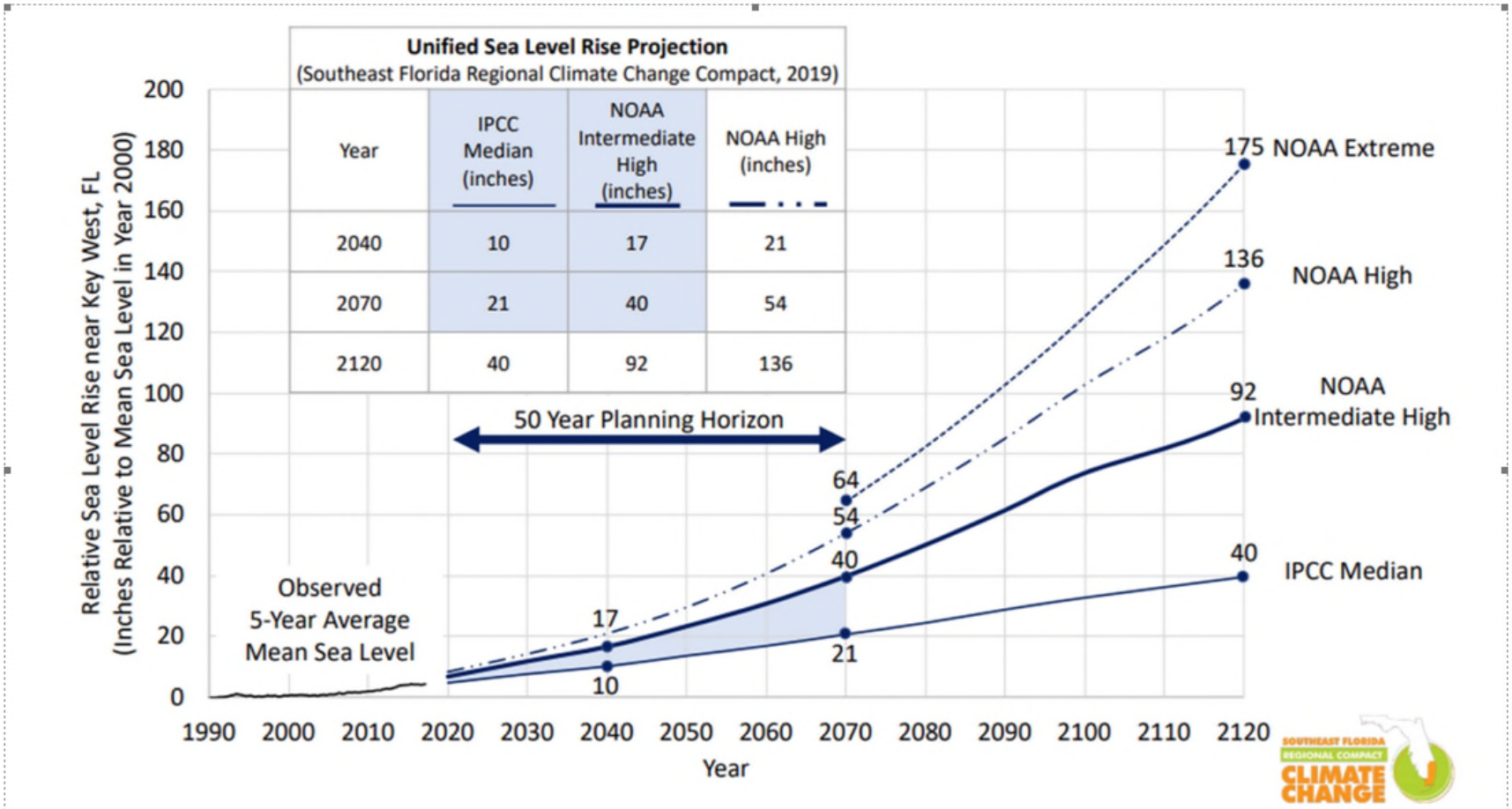
IV. COMPENSATION SUMMARY

The total Lump Sum compensation for the Scope of Additional Services described is $152,057. The compensation for the Scope of Services by task is summarized below.

Task No.	Task Description	Total
D.	Meetings and Presentations	$25,368
E.	Pumping Discharge Analysis	$20,304
F.	Permitted Discharge Analysis	$5,812
G.	Pump Station SW-06 and SW-08 Piping Configuration Analysis	$8,935
H.	Electrical Testing	$12,112
I.	Structural Testing	$11,918
J.	Preliminary Pump Station Planning	$21,305
K.	Summary Report	$11,612
L.	Grant Funding Applications Preparation	$3,692
M.	Miscellaneous Allowance	$27,500
N.	Reimbursable Expenses	$3,500
	Total Lump Sum	**$152,057**

V. SCHEDULE

Tasks A through C of this project are to be completed within four months. Tasks D through N are to be completed by August 31, 2020.



Scientists with the Southeast Florida Regional Climate Change Compact updated 2015 sea level rise predictions for 2019. These projections guide development in the counties. *SOUTHEAST FLORIDA REGIONAL CLIMATE CHANGE COMPACT*

Price Proposal

Stormwater Pump Stations Evaluation

Evaluation of 10 stormwater pump stations

Submitted to: City of Hollywood

Contract Type: Lump Sum

Labor Plan

18 Resource

	Bill Rate >	253.36	209.25	96.01	151.37	247.57	108.19	104.84	107.76	93.00	180.05	120.71	186.90	133.39	187.33	95.54	171.99	97.31	91.39
	Proj Area >																		
Project Phases / Tasks	**Total Labor Hrs**	Sr Project Manager	Sr. Engineer	Engineer III	Engineer IV (Civil)	Sr. Engineer (Civil)	Engineer II (Civil)	Engineer II (Civil)	Sr. GIS Analyst	Eng Designer III	Sr. Engineer (Structural)	Sr. Eng Designer (Structural)	Principal Architect	Architect	Sr. Engineer (Electrical)	Engineer II (Electrical)	Sr. Engineer (MEP)	Engineer II (MEP)	Project Administrator
	736	83	26	226	41	127	94	10	20	-	48	15	-	-	18	23	-	-	5
Task D Meetings and Presentations	**113**	**47**	-	**19**	-	**47**	-	-	-	-	-	-	-	-	-	-	-	-	-
Task E Pumping Discharge Analysis	**143**	**10**	-	**100**	-	**33**	-	-	-	-	-	-	-	-	-	-	-	-	-
Task F Permitted Discharge Analysis	**31**	**6**	**6**	**11**	-	**8**	-	-	-	-	-	-	-	-	-	-	-	-	-
Task G Pump Station SW-06 and SW-08 Piping Configuration A	**51**	**4**	**2**	**24**	-	**21**	-	-	-	-	-	-	-	-	-	-	-	-	-
Task H Electrical Testing Support and Allowance	**53**	-	-	**12**	-	-	-	-	-	-	-	-	-	-	**18**	**23**	-	-	-
Task I Structural Testing	**70**	-	**7**	-	-	-	-	-	-	-	**48**	**15**	-	-	-	-	-	-	-
Task J Preliminary Pump Station Planning	**166**	**6**	-	-	**26**	**10**	**94**	**10**	**20**	-	-	-	-	-	-	-	-	-	-
Task K Summary Report	**79**	**7**	**8**	**36**	**15**	**8**	-	-	-	-	-	-	-	-	-	-	-	-	**5**
Task L Grant Funding Application Preparation	**30**	**3**	**3**	**24**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Task M Miscellaneous Allowance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Task N Reimbursable Expenses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	**736**	**83**	**26**	**226**	**41**	**127**	**94**	**10**	**20**	-	**48**	**15**	-	-	**18**	**23**	-	-	**5**

Price Summary / Totals

Task Pricing Totals	152,057
Specify Add'l Fees on Setup	0
Technology Use Fee	
Total Price	**152,057**

Pricing by Resource

	Labor	Subs / Allowance	ODCs	Task Pricing Totals
	115,667	32,890	3,500	**152,057**
Task D Meetings and Presentations	**25,368**	-	-	**25,368**
Task E Pumping Discharge Analysis	**20,304**	-	-	**20,304**
Task F Permitted Discharge Analysis	**5,812**	-	-	**5,812**
Task G Pump Station SW-06 and SW-08 Piping Configuration A	**8,935**	-	-	**8,935**
Task H Electrical Testing Support and Allowance	**6,722**	**5,390**	-	**12,112**
Task I Structural Testing	**11,918**	-	-	**11,918**
Task J Preliminary Pump Station Planning	**21,305**	-	-	**21,305**
Task K Summary Report	**11,612**	-	-	**11,612**
Task L Grant Funding Application Preparation	**3,692**	-	-	**3,692**
Task M Miscellaneous Allowance	-	**27,500**	-	**27,500**
Task N Reimbursable Expenses	-	-	**3,500**	**3,500**
Totals	**115,667**	**32,890**	**3,500**	**152,057**

Proposal to Perform a Qualitative Infrared Thermographic Survey

Issue Date: April 2, 2020	**Reference No:** 20200402TT
Client Information ("Client"): Tetra Tech **Attention:** Banks Wason, PE **Email:** Banks.Wason@tetratech.com	**Project Information:** City of Hollywood 10 Stormwater Pump Stations

Description of Work

To perform a qualitative infrared thermographic survey of selected electrical switchgear, controls and lighting panels as directed by Client staff or employees at the above Project Information buildings.

As outlined below and will provide the following:

1. The infrared survey will be performed by an Infraspection Institute Certified Infrared Thermographer® using a FLIR ThermaCAM S60 or better thermal imager.

2. The infrared survey will be carried out on regular weekdays, Saturdays, between the hours of 8:30 AM – 4:00 PM. Modifications are acceptable as long as agreed to by both parties.

3. All work to be performed by currently accepted industry practice and the Infraspection Institute Standard for Infrared Survey of Electrical Systems and Rotating Equipment.

4. An electrical infrared report will consist of:

a) Bound report notebook with data log (a list of items inspected), thermographic reports of anomalies, a summary of findings, recap, and repair guide listings (See a sample report).

b) Electronic download with project files. The files contain all written/photographic information of the report for records-keeping, documenting repair work that has been completed, and for generating work orders and arranging for planned outages so that equipment can be repaired.

Price Option 1

$1,685.00 - This rate includes all expenses such as travel, report preparation, printing, etc. The price is based on one (1) stormwater pump station fieldwork.

Price Option 2

$2,450.00 - This rate includes all expenses such as travel, report preparation, printing, etc. The price is based on ten (10) stormwater pump stations and one (1)-days fieldwork.

Terms

Net 10 days - Add 5% Net 30
100% cancellation fee applies to any project canceled with less than one business days' notice for reasons other than weather.

To be provided by the Client

The Client will provide a minimum of one qualified assistant to accompany the thermographer during the infrared survey. This qualified assistant will: guide the thermographer through the facility; provide access to and maintain the security of facility areas; and notify affected personnel of survey activities.

During the survey, Client to provide Electricians or qualified assistants as necessary to open/close electrical panel covers and enclosures required for the survey; create electrical loads as needed, and measure electrical loads when requested by thermographer to provide a thorough survey.

Qualified assistants and electricians shall meet requirements for designation as qualified persons as outlined in OSHA 1910 and NFPA 70E standards.

Preparation of and access to areas to be inspected are the Client's responsibility.

Other

Thermographer meets requirements for designation as qualified person(s) as outlined in OSHA 1910 and NFPA 70E standards.

All personnel provided by Weller Infrared Services, Inc. shall meet safety training requirements as required by OSHA. Site-specific training is not included in the above price and is to be provided by the host facility. Man-hours for such training are not included in the above price and billed at an hourly rate of $62.00.
Proof of insurance coverage and policy limits provided upon request.

Typographical errors and omissions are subject to correction.

The proposal is valid for one month from the issue date.

The proposal may be accepted by signing below and returning one copy to our office. Purchase Orders may be issued instead of this proposal; however, they must incorporate this proposal by reference.

Proposal submitted by:

Mark Weller

Proposal accepted by:

_____
Name & Title

_____
Date

INFRASPECTION INSTITUTE
CERTIFIED
Level III
Mark Weller
No: 8339
INFRARED THERMOGRAPHER

Weller Infrared Services also performs:

Building Infrared

Roof Infrared

Building Testing

Drone Roof IR Surveys