ADDENDUM NO. 1

PROJECT: **2014-15 SAW GRANT PROJECT STORM SEWER STRUCTURE INVENTORY BENCHMARK SURVEYING AND MAPPING**
ISSUED: **Wednesday, December 03, 2014**
FROM: **Timothy J. Lodge, PE, City Engineer**

This addendum is to amend the Request for Proposals for the above referenced project as follows:

Background:

The City has a GIS Mapping System which was established using control surveys. A portion of the following reports are provided for background:

1. GPS Control Survey for Photogrammetric Mapping Project Report July 9, 1997, Gourdie Fraser & Associates, Inc.
2. GPS Control Survey for GIS Mapping Project Report July 14, 2002, Gourdie Fraser & Associates, Inc.

Project Scope:

The City has budgeted up to $40,000 for completing this work. If the budget is found insufficient, then the number of Storm Structures and Benchmarks will be adjusted accordingly, with the intent to collect as much data as possible. Several inquiries have been made in regard to the use of GPS for collecting vertical data. GPS is not considered adequate for higher order elevations where differential leveling shall be used for vertical data collection. However, recognizing that there is not sufficient budget to complete differential leveling of all of the 760 Storm Structures and 270 benchmark locations, we have added a work item "Primary Vertical Control Survey". For this item, the Surveyor shall establish a network of Primary Vertical Control Survey points by differential leveling throughout the study area from NGS control points and then use this data to create an average conversion factor for vertical data collected using GPS. A minimum of two control points shall be used for each day of data collection. The number of Primary Vertical Control Points and methodology for the data collection horizontally and vertically shall be described by the Surveyor in their proposal under the methodology section of their proposal. In addition to the conversion of the benchmarks from NGVD 1929 to NAVD 1988, the intent of the work is to identify incorrect benchmarks in the current data created by factors such as hydrant replacement and correct them.

Submission of Proposals:

To allow adequate time for preparation of the proposals and incorporate the items in this Addendum #1, the time for receipt of the proposals has been changed to be **2:00 PM December 17, 2014**.

ADDENDUM NO. 1

PROJECT: **2014-15 SAW GRANT PROJECT STORM SEWER STRUCTURE INVENTORY BENCHMARK SURVEYING AND MAPPING**
ISSUED: **Wednesday, December 03, 2014**
FROM: **Timothy J. Lodge, PE, City Engineer**

Proposal Sheet:

A revised Proposal Sheet is attached and shall be used for submission of the proposal to the City on or before **2:00PM December 17, 2014**.

Addendum Acknowledgement:

This Addendum No. 1 shall be attached to and shall become part of the RFP. Consultants must acknowledge this Addendum in the spaces provided herein and it must be included with the RFP submittal provided to the City. FAILURE TO ACKNOWLEDGE RECEIPT OF THIS ADENDUM MAY CAUSE REJECTION OF PROPOSAL.

ACKNOWLEDGED:

Consultant: _____
By: _____
Title: _____
Date: _____

PROPOSAL SHEET

TITLE: **2014-15 SAW GRANT PROJECT STORM SEWER STRUCTURE INVENTORY BENCHMARK SURVEYING AND MAPPING**

DUE DATE: **2:00 p.m., Wednesday, December 17, 2014**

Having carefully examined the attached R.F.P. and any other applicable information, the undersigned proposes to furnish all items necessary for and reasonably incidental to the proper completion of this proposal.

The undersigned understands and agrees that they must be licensed to do business as Professional Surveyors in the State of Michigan.

The undersigned submits this proposal and agrees to meet or exceed all requirements and specifications listed on the R.F.P., unless otherwise indicated in writing and attached hereto.

The undersigned certifies, as of the date of this proposal, not to be in arrears to the City of Traverse City for debt or contract or is in any way a defaulter as provided for in Section 152, Chapter XVI of the Charter of the City of Traverse City.

The undersigned understands and agrees, if selected to be awarded this work, to enter into an agreement with the City to supply this work.

The undersigned understands that the City reserves the right to accept any or all proposals in whole or in part and to waive irregularities in any proposal in the interest of the City. The Proposal will be evaluated and awarded on the basis of best value to the City. The decision criteria to be used, but will not be limited to, is price, accessories, options and overall capability to meet the needs of the City.

The undersigned agrees that the proposal may not be withdrawn for a period of 60 days from the actual date of the opening of proposals.

Item No	Est Qty	Unit	Description of Items	Unit Price	Total Price
1	1	LSUM	Primary Vertical Control Survey		
2	760	EACH	Storm Sewer Structure Inventory		
3	270	EACH	Benchmarks		

Total Cost **$_____**

Submitted by:

_____ _____ _____
(Signature) (Name & Title - print) (Telephone Number)

_____ _____
(Company Name) (Company Address, City, State, Zip Code)

GPS CONTROL SURVEY FOR PHOTOGRAMMETRIC MAPPING

PROJECT REPORT

CITY OF TRAVERSE CITY, MICHIGAN

JULY 9, 1997

Prepared for:	Air-Land Surveys, Inc. P.O. Box 326, 7990 M-15 Clarkston, Michigan 48348
Prepared by:	Gourdie/Fraser & Associates, Inc. 124 West State Street Traverse City, Michigan 49684
Project Manager:	Gary G. Wilson, P.S. Phone: (616) 946-5874

GPS CONTROL SURVEY FOR
PHOTOGRAMMETRIC MAPPING
PROJECT REPORT

TABLE OF CONTENTS

I. INTRODUCTION

This report details GPS survey work completed by Gourdie/Fraser & Associates, Inc. for the City of Traverse City, Michigan and Air-Land Surveys, Inc.

Gourdie/Fraser & Associates provided results on (23) photo control points which were established using Global Positioning System (GPS) technology. The GPS portion of this survey was accomplished using GPS relative positioning techniques. The intended relative positional accuracy of First Order Class C (1:10000,10ppm) was met in all cases and the intended vertical accuracy of Third Order was also met in all cases. It was felt that the results were appropriate to meet the goals of the project.

Gourdie/Fraser & Associates, under direction of Gary G. Wilson, was responsible for all the GPS planning, scheduling, network design, and observations. All data processing and adjustments were performed by Gary Wilson.

II. PERSONNEL AND EQUIPMENT

A. Personnel

Gary G. Wilson . . . . . Project Manager & G.P.S. Operator/Processor

Gourdie/Fraser & Associates personnel assisting:

Mike Rademaker . . . . . Crew Chief & G.P.S. Operator
Kevan Newman . . . . . G.P.S. Operator

Equipment

Gourdie/Fraser & Associates. Inc. used its own receivers, computers, printers, software and miscellaneous items required during the processing phase of the project. These include:

1 - Pentium 75 MHZ Computer

1 - Cannon BX-210 Ink Jet Printer

3 - Trimble 4000 SSE G.P.S. Receivers
S/N= 3236A0/372
S/N= 3236A01397
S/N= 3315A02948

III. METHODOLOGY

A. Control

The methodology used to obtain the results needed were: Horizontal Control was brought in from (3) NGS First Order points, Czubak, TVC L, and V-27. Vertical control was transferred from (4) NGS First Order Class 2 bench marks, D-87, G-87, X-27, and V-27. With this control adjusted XYZ coordinates were established.

B. Observations

All GPS observations were made to the block I and II satellites 01, 04, 05, 06, 07, 09, 12, 15, 16, 17, 18, 20, 21, 23, 24, 25, 26, 28 and 31. Simultaneous data was logged at 15 second epochs for a period generally exceeding 15 minutes. In order to obtain the data needed, 15 sessions were used.

The observers were responsible for getting to their stations at the scheduled time and proceeding with observations. The height of the antenna (HI) was measured from the mark or monument to a common mark on the antenna. All antenna height measurements are slant distances which are later corrected to the phase center of the antenna in the postprocessing.

All pertinent information such as station number, HI, rapid static start times, position and monument heights were recorded in a data log which was used to verify the information entered into the receiver, before the processing began.

C. Office Computations

Upon completion of the observations, the receivers were returned to a central location where the data was downloaded to the computer. The information entered into the receiver at the time of observation is then checked against the data logs and any discrepancies resolved. Next, the baseline computations are performed using Trimble Navigation's GPSurvey Ver. 2-2 suite of programs. These programs result in a computed solution (baseline) and its associated variance-covariance matrix between every station simultaneously occupied.

The vectors are next combined into a minimally constrained adjustment which fixes one station in the data set. This allows evaluation of the internal quality of the network observed. The adjustments were performed using the Trimnet least-squares adjustment package.

Once the internal consistency of the network of vectors is verified, through the minimally constrained adjustment and loop closures, the network is next constrained or fixed to the existing NGS control.

D. Conclusion

Horizon Control: Vector closure between control stations resulted in a ratio of (0.08 ppm)/1:12,500,000 for Czubak, V27, and GFA base. Note GFA base was previously established using Czubak, V27, and TVC L with Vector closures greater than 0.05 ppm/1:20,000,000 ratio. Vector closure between photo control points exceeded 4.75 ppm/1:210,526 which exceeds the minimum requirements.

Vertical Control: Holding GFA base fixed the maximum error to other known bench marks was 0.06 feet to station V27 which is a distance of over 10 miles. The maximum vertical error in this network connecting the control points was 0.05 feet, both of which exceed the minimum requirements.

Gourdie/Fraser
& Associates, Inc.

Consulting
Engineers
Surveyors
Planners

124 West State St.
P.O. Box 927
Traverse City, MI
49685-0927

GPS CONTROL SURVEY FOR GIS MAPPING

PROJECT REPORT

CITY OF TRAVERSE CITY, MICHIGAN

JULY 14, 2000

Prepared for: City of Traverse City
Engineering Department
400 Boardman Ave.
Traverse City, Michigan 49684

Prepared by: Gourdie/Fraser and Associates Inc.
124 West Front Street
Traverse City, Michigan 49684

Project Manager: Gary G. Wilson, P.S.
Phone: (231)-946-5874

Tel: (616) 946-5874
Fax: (616) 946-3703

GPS CONTROL SURVEY FOR
GIS MAPPING
PROJECT REPORT

TABLE OF CONTENTS

GOURDIE/FRASER & ASSOCIATES, INC.

I. INTRODUCTION

This report details GPS survey work completed by Gourdie/Fraser and Associates Inc. for the City of Traverse City, Michigan.

Gourdie/Fraser and Associates, Inc. provided results on (10) control points, which were established using Global Positioning System (GPS) technology. The GPS portion of this survey was accomplished using GPS relative positioning techniques. The intended relative horizontal positional accuracy of First Order Class 1 (1/100,000,10 ppm) was met in all cases. It was felt that the results were appropriate to meet the goals of the project.

Gourdie/Fraser and Associates, Inc., under the direction of Gary G. Wilson, was responsible for overseeing all the GPS planning, scheduling, network design, and observations. All data processing and adjustments were performed by Michael J. Rademaker.

II. PERSONAL AND EQUIPMENT

A. Personal

Gary G. Wilson .....Project Manager

Gourdie/Fraser and Associates personal assisting:

Michael J. Rademaker.....G.P.S. Processing
Tim Mitchell.....G.P.S. Operator
John Wilson.....G.P.S. Operator

Equipment

Gourdie/Fraser and Associates, Inc. used its own receivers, computers, printers, software and miscellaneous items required during the processing phase of the project. These include:

1 - Pentium 300 MHZ Computer

1 - Hewlett Packard LaserJet III

3 - Lieca SR530 Dual Frequency G.P.S. Receivers
S/N= 30636
S/N= 30655
S/N= 30675

III. METHODOLOGY

A. Control

The Methodology used to obtain the results needed were: Horizontal Control was brought in from (5) NGS Horizontal Order B points, TVC L, 83102, W27, L88, and FORTPORT. Vertical Control was also transferred from these same (5) NGS points, which have First Order Class II ellipsoidal heights determined by G.P.S. observations and was referenced to NAD 83 datum.

B. Observations

All observations were made to the block I and II satellites. Simultaneous data was logged at 5-second intervals for a period generally exceeding 15 minutes for baselines of less than 10 Kilometers, 30 minutes for baselines of 10 –20 Kilometers, and 120 minutes for baselines exceeding 20 Kilometers.

The observers were responsible for getting their stations at the scheduled time and proceeding with observations. The height of the antenna (HI) was measured with height hooks designed by Leica to eliminate the possibilities of introducing slant reduction calculation errors. The height of the antenna was measured from the mark or monument to a common mark on the height hooks. All antenna height measurements are vertical distances, which are later corrected to the phase center of the antenna in the post-processing by using a constant offset for the antenna model in use.

All pertinent information such as station identification, HI, rapid static start times, position, and monument descriptions were recorded in the data log which was used to verify the information entered into the receiver, before the processing began.

C. Office Computations

Upon completion of the observations, the receivers were returned to a central location where the data was downloaded to the computer. The information entered into the receiver at the time of observation is then checked against the data logs and any discrepancies resolved. Next, the baseline computations are preformed using Lieca Geosystem's software Version 1.1. These programs result in a computed solution (baseline) and its associated variance-covariance matrix between every station simultaneously occupied.

The vectors are next combined into a minimally constrained adjustment, which fixes one station in the data set. This allows evaluation of the internally quality of the network observed. The adjustments were performed using the lieca's MOVE Version 3.0 least-squares adjustment software.

Once the internal consistency of the network of vectors is verified, through the minimally constrained adjustment and loop closures, the network is next constrained or fixed to the existing NGS control.

D. Conclusion

Horizontal Control: Vector closure between control stations resulted in a ratio of (0.42 ppm)/>1:1,000,000 for TVC L, W27, CZUBAK, and 83102. Horizontal closures between the newly established GIS control points exceeded (6.8 ppm)/1:147,000 which exceeds the minimum requirements.