#93.48

Letter Proposal

August 21, 2014

Kelly Jo Hoffmann, P.E., S.E.
Capital Programs, Engineer Planner
University of Illinois Urbana-Champaign
1501 S. Oak Street
Champaign, IL 61820

RE: Project #U15007, Request for Proposal

Illinois Height Modernization Program: Phase I, Acquisition of Airborne LiDAR Data for Bond, Clinton and Washington Counties in Illinois

Dear Ms. Hoffman:

The following proposal to the request for retainer services from Surdex for the Illinois Height Modernization Program (ILHMP), which is managed by the Illinois State Geological Survey (ISGS), to acquire leaf-off, airborne LiDAR data for Bond, Clinton and Washington Counties in Illinois. Surdex is planning to acquire the entire project in fall/early winter 2014. The total project area consists of 1,804 tiles sized 5,000' square which equals a total area of approximately 1,618 square miles, including a nominal flight buffer around the outside perimeter. Coverage and delivery will include full tile extents of data around the perimeter of the project, in some cases resulting in a full extra tile when necessary.

1. **Data Acquisition:** Project data acquisition of Light Detection and Ranging (LiDAR) data and initial processing and data quality assurance (QA) and quality control (QC) to validate the quality of newly acquired data and delivery of a pilot project. Acquisition will be planned and executed to conform to USGS LIDAR Base Specifications, version 1.0.

This proposal includes a detailed scope of work for the services required to complete data acquisition, the timeline for data acquisition through processing/QC, and itemized fees for proposed services. Surdex will complete all of the proposed work in Phase I using our own personnel and equipment.

PHASE I LIDAR ACQUISITION STATEMENT OF WORK

PROJECT AREA DESCRIPTION

LIDAR ACQUISITION SCOPE OF WORK

Surdex owns the Leica ALS-70HP SP3 aerial LiDAR system, providing rapid and accurate generation of digital terrain data and is the intended sensor to be used for data capture over this project in fall 2014 once sufficient leaf off conditions can be met and for completion of Phase I by January 15, 2015.

LIDAR capture will only begin upon receipt of a contractual notice to proceed. Surdex intends to dispatch ground survey crews before aerial acquisition, which will allow for crews to report adequate ground conditions prior to mobilization of aircraft to the project site. Crews will be checking for existence of dense foliage, flooding and significant snow or ice that would preclude optimal conditions for aerial capture.

The project area will be cloud free and fog free between the aircraft and the ground and the ground will be snow free. No unusual flooding or inundation is allowed on the floodplain and upland areas. The acquisition will occur during leaf-off ground conditions and will average 1.27 pts/sq meter. If ground conditions do not permit aerial acquisition in the proposed timeline, Surdex is willing to delay collection until late Winter/early Spring 2015 while still in leaf-off conditions.

The following parameters were utilized in preparation of the proposed flight plan over this three county area of interest (AOI). The most efficient layout of the flight lines is an east-west orientation without requiring artificial line breaks due to line length/time constraints with the IMU and includes a single perpendicular cross flight captured before and after each lift for quality assurance purposes. Final copies of all flight plans will be verified by a Certified Photogrammetrist prior to the beginning of aerial acquisition.

LiDAR Specifications and Flight Plan

Preliminary LiDAR Sensor Setting (ALS 70 SP3)	
Parameter	Planned LiDAR
Field of view	40°
Flying height (AGL)	2,777 meters
Max laser pulse rate	198.6 KHz
Full Swath width	2022 meters
Minimum side lap	30%
Average point density	1.27 pts/meter^2
Average point spacing	0.89 meters
Vertical accuracy	<12.5 centimeters
Flight Lines / nautical line miles	61 FL / 1564 nm
Estimated ground speed	150 knots

INITIAL POST PROCESSING

DATA VALIDATION

Upon completion of each data mission, raw data will be copied in the field for redundancy purposes during transit and delivered to the Surdex office for review by our Senior LiDAR personnel. Processed data will be georeferenced to IL Stateplane NAD83, West Zone, NAVD88 US Survey Feet. Surdex processes all LiDAR data through a custom designed post processing system consisting of commercial software products produced by TerraSolid and custom software tools developed in-house by Surdex. If reflight areas are identified, flight crews are notified of re-flights and given priority status to ensure that the areas are collected as close to the previous environmental conditions as possible. All flight lines and data coverage are initially verified for the entire project before we begin any de-mobilization from the project site.

FIELD SURVEY

Surdex Corporation will be responsible for all ground control surveying requirements. Surdex crews are supervised by our Director of Survey and UAV Technology, Mr. Jim Peterson. Surdex estimates surveying 60 hard surface points in flat, open areas to be used for control of the LiDAR data and an additional 100 points will be collected (20 in each of 5 ground cover classes) to be used as independent QA/QC of all data collected.

For each point, ground photos will be acquired for future reference. Points will be collected utilizing GNSS methods. A combination of static and RTK GNSS field data collection techniques will be utilized. Surdex experience gained on the Perry-Jackson-Franklin project in early 2014 discovered that some areas of Illinois have VRS base stations that have a less than optimal distance between them to produce accurate vertical/elevation solutions. Where IL VRS is not available due these circumstances, we will perform rapid static occupations and perform conventional total station traverses with side shots.

Deliverables will include a survey control report, XYZ coordinates and digital photos of each point.

PILOT PROJECT

Surdex will fully process and classify LIDAR points inside an area to be chosen with cooperation from ISGS. Additionally, Surdex will collect hydrographic breaklines and produce a full set of deliverable format data to be sent for review by ISGS before beginning Phase II.

PROJECT TEAM

The Surdex project team will consist of our key project personnel listed below.

Tim Donze – Business Development

Wade Williams – Project Manager

Tim Bohn – Director of Project Management

Steve Kasten – VP, Survey & Photogrammetry

Jim Peterson – Director of Survey & UAV Technology

John Boeing – VP Operations

Charles Meyers – LiDAR Manager

Brad Barker – Quality Assurance Manager

Paul Briggs – Chief Pilot

Kevin Eichelberger – Flight Operations Manager

PROJECT REPORTING & DELIVERY/FEE SCHEDULE

SCHEDULE

The intention is to complete data acquisition during the fall/early winter of 2014 during leaf-off vegetative conditions and subsequent data QA/QC sufficient to ensure high-quality data have been acquired.

PROJECT REPORTING

Surdex will report project progress as milestones and percentage of each milestone completed to every 2 weeks.

DELIVERY ITEMS

Phase I deliverables will be project wide. Data collected will pass to Phase II for full production through final delivery.

Bond, Clinton & Washington Counties: Geo-referenced to IL Stateplane NAD83, West Zone, NAVD88 US Survey feet.

1. **Project Reports**
    a. Flight acquisition and Processing report
2. **Ground Survey**
    a. Control points - XYZ coordinates, native IL Stateplane zone, NAD83, NAVD88 US Survey feet.
    b. Check points - XYZ coordinates, native IL Stateplane zone, NAD83, NAVD88 US Survey feet.
    c. Survey Report including ground photos of each point.
3. **Pilot Project**
    a. Unclassified swath data
    b. Classified LIDAR point cloud to ASPRS standards.
    c. Hydrographic breaklines
    d. TIN surface
    e. Hydroflattened DEM format.
    f. ESRI geodatabase
    g. FGDC compliant metadata

MILESTONE DESCRIPTION AND COMPLETION DATE

Approximate Schedule				
MILESTONE	**START DATE**	**FINISH DATE**	**PERCENT OF PHASE**	**FEE**
Phase I LiDAR Acquisition				
Notice to Proceed	10/1/2014	10/1/2014	--	$0
Finalize Project Plans/Mobilization	10/1/2014	10/31/2014	5%	$7,485
Ground Survey	11/3/2014	12/19/2014	25%	$37,425
Data Acquisition	11/3/2014	12/19/2014	55%	$83,895
Initial Data Processing/QC	11/5/2014	12/31/2014	10%	$14,970
Pilot Project	1/1/2015	1/15/2015	5%	$7,485

PRICING

The fee consists of data acquisition and QC of all data for Bond, Clinton and Washington Counties as well as the production of a representative pilot area. Neither additional fees nor reimbursable cost are expected. Fees are payable to contract terms and conditions.

Phase I TOTAL FIXED FEE: $151,260.00

Sincerely,

SURDEX CORORATION

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