STATEMENT OF WORK

1. PROJECT DATA

1.1.PROJECT TITLE AND LOCATION: LiDAR Acquisition, Processing and GIS Formatting in the area West of Lake Success Dam to the Tulare Lake Bed.

1.2. PROJECT NUMBER:

1.3. CONTRACTOR DATA:

Towill, Inc.
444 Natoma Street
San Francisco, CA 94103-2909
POC: Mr. Ken Meme
Tel: (415) 243-4384 (ext 219)
Fax: (415) 243-8264
e-mail: ken.meme@towill.com

1.4. GOVERNMENT POINTS OF CONTACT:

Project Manager:
Paul Zianno
1325 J Street, CESPK-ED-PM
Sacramento, CA 95814-2922
Phone: (916)557-7245
Email: Paul.Zianno@usace.army.mil

Sacramento District A-E Contract Specialist:
Harold Williamson
CESPK-CT-A
1325 J Street
Sacramento, CA 95814-2922
(916) 557-5196
Harold.Williamson@usace.army.mil

1.5. CONTRACT NO: W91238-07-D-0002

1.6. AUTHORIZATION:

1.7. SCOPE: The A-E shall acquire new LIDAR data and perform professional mapping services necessary to provide GIS mapping in the area downstream from Lake Success Dam in the area of Porterville, CA. The area of interest is approximately xxx miles in length and is sub-divided into three areas: Area A (124457 acres), Area B (223082 acres) and Area C (170776 acres). The study areas and mapping limits are shown in Attachment 1.

1.8. CRITERIA:

1.8.1. CBBS at http://cbbs.spk.usace.army.mil/ae.html

1.8.2. MAPPING STANDARDS:

- Products shall conform to NSSDA (National Standard for Spatial Data Accuracy) Standards for LIDAR datasets.

- For 1000 ft Wide Swath, High Resolution, product shall meet standard resolution consisting of vertical accuracy of 95% at 0.6' (18.5cm) and 90% at 0.5 (15 cm), horizontal accuracy of 1' (30cm), 1 sigma.

- Ground Services shall be provided by A-E
- All grid lines shall match to adjacent sheets on the manuscript, if produced, and the final drawings, to within one hundredth (1/100) of an inch. Features crossing from one sheet to the next shall agree at the match line to within one hundredth (1/100) of an inch.

- All control points shall be so plotted that their position on the map does not vary more than one hundredth (1/100) of an inch from their computed coordinate position.

- The mapping standard shall comply with the "CADD-GIS Technology Center AEC Standards" found in the "hot link" http://tsc.wes.army.mil/products/standards/aec/.

2. BACKGROUND

LiDAR derived topographic data and new orthophotography (optional) provided under this contract will be used for interpretation, analysis and mapping of floodplains below Lake Success Dam to Highway 99, area A from Highway 99 to, area B and theTulare Lake Bed, area C.

3. DESCRIPTION OF WORK AND SERVICES

Mission goal A: LiDAR acquisition for areas A, B and C as shown in exhibit A sufficient to support 2 foot contours and aerial photography for QC/QA purposes. Photography recommended flight height to produce quality sufficient to identify small features for mapping. Survey under 22 bridges sufficient to characterize channel.

- Plan and conduct a LiDAR acquisition mission to collect topographic data with sufficient density to achieve project goals. The consultant is responsible for all aspects of the LiDAR mission including operation of GPS base stations during the flight mission.
- The consultant shall process the LiDAR data and classify the data-set to derive a "bare-earth" terrain model. The consultant will generate topographic contours with an interval of 2ft.
- The consultant will plan and conduct an aerial photo mission encompassing the study area for purposes of producing color orthophotography at a scale of 1"-200' with a pixel (ground) resolution of 1ft .
- The consultant will provide the survey ground control necessary to meet the project's objectives.
- Horizontal control will be referenced to the California Coordinate System (CCS) Zone 5 NAD83. Survey control must be tied where possible into existing Corps of Engineers control network utilized for the Lake Isabella aerial survey project.

- Vertical control will be referenced to the North American Vertical Datum of 1988 (NAVD88) and units will be U.S. Survey Feet.
- All grid lines shall match to adjacent sheets on the manuscript, if produced, and the final drawings, to within one hundredth (1/100) of an inch. Features crossing from one sheet to the next shall agree at the match line to within one hundredth (1/100) of an inch.
- All control points shall be so plotted that their position on the map not vary more than one hundredth (1/100) of an inch from their computed coordinate position.

Task 1 – Mission Planning
Detailed planning of the LiDAR and aerial photography missions will be performed. Flightlines will be designed to ensure complete coverage of the study area and collection of LiDAR data of sufficient density. Locations of GPS base stations operating during the flight missions and ties to the geodetic network will also be determined.

Task 1.1 – LiDAR Mission Mobilization
Equipment necessary to conduct the mission, such as aircraft, LiDAR system, and GPS base stations, and the associated personnel will be mobilized to the project site.

Task 1.2 – LiDAR Data Acquisition and Processing
The study area(s) will be flown and LiDAR data collected. GPS base stations located near the study area will be operating for the duration of the LiDAR mission. The LiDAR data will be processed and classified to derive a "bare-earth" terrain model. The LiDAR derived terrain model will be superimposed onto the aerial photography and reviewed for accuracy if the aerial photography option is authorized.

Task 1.3 – Contour Generation
The terrain model derived from the LiDAR dataset will be used to form a triangulated irregular network (TIN) model and topographic contours with a 2ft interval will be generated from the TIN. Index contours will be annotated with text indicating its elevation.

Task 2 – Aerial Photography & Orthophoto Generation
New color photography will be flown sufficient to support digitizing planemetric data collection at 1"=100' scale for area A and at a larger scale for areas B and C.

Task 3 – Digitize planemetric features
3.1 Bridges, railroad tracks, (centerline only), water features (creeks & ponds), drainage features, Vegetation +/- 200 feet from each side of stream channel, tree groups, bank lines, levees – top and toe
3.1.1 Railroad center lines shall be continuous and unbroken. They shall have their names attached as an attribute
3.1.2 Vegetation outlines shall be delineated as closed polylines and shall be on a separate layer

3.2 Digitized features shall be delivered in AutoCADD, Intergraph, and ESRI Shapefile formats.
3.3 Digitized GIS features shall be complete points lines and polygons.
3.4 Lettering shall be entered at a size that will produce text one-tenth inch in height at the final map scale.

Task 4: Bridge Survey: Perform surveys of bridge crossings for the bridges in Area A. Survey should be of sufficient detail to include in HEC RAS model. It should include detailed information on bridge deck elevation, bridge soffett elevation, pier location thickness.

Task 5: Hydrographic Survey:

5.1 Hydrographic surveying will consist of collecting hydrographic data oriented along cross sections at a nominal spacing of about 1000 feet between sections of sufficient detail to support the HEC RAS model. Additional cross sections at break points and features of interest will be taken at and adjacent to major channel structures and stream channel junctions. The hydrographic data will be processed into a seamless surface and incorporated into the photogrammetric-based terrain surface and DTM. The cross-sectional data will also be provided as point data in DGN and ASCII formats. Hydrographic surveying work shall meet or exceed standards for Class 2 survey.

4. MATERIALS TO BE DELIVERED

4.1 LiDAR derived DTM in xyz format at a scale sufficient to generate 2 ft contours for Area A. DTM at a scale sufficient to generate larger scale contours for Area B and Area C.

4.2 Color aerial photography at 1in = 200 feet for Area A and at larger scale for Area B and Area C.

4.3 Planimetric features for areas A, B and C

4.4 Bridge Survey for Area A only

4.5 Hydrolic cross sections for Area A only, 1000 ft apart.

5. SUBMITTAL SCHEDULE

Complete work within 90 calendar days after award of the task order. All materials developed as a result of this Task Order will be delivered within 120 calendar days after award of this task order.

6. OVERALL PERIOD OF PERFORMANCE

All work and services shall be completed within 120 calendar days after the effective date of the contract action.

7. AUTHORITIES STATEMENT

No person other than the Government Contracting Officer has the authority to make any changes to this contract action that impact cost or schedule. Authority from the Contracting Officer to the contractor to make changes that impact cost or schedule will be in the form of an official, signed modification.

8. PAYMENTS STATEMENT

The contractor shall submit invoices on ENG Form 93, available from A-E Administration Section. A separate ENG Form 93 must be submitted for each task order. Multiple task orders or contracts may not be invoiced on the same ENG Form 93. Invoices shall be submitted no more often than monthly. Each line item on an invoice shall give a detailed description of the work item, its negotiated amount,

percentage of work completed, and earnings to date. Upon receipt, the Corps Project Manager will certify that the requested earnings are appropriate before payment will be made. The completed ENG Form 93 shall be mailed to the following address:

District Commander
Sacramento District U.S. Corps of Engineers
ATTN: CESPK-ED-SA, A-E Administration Section
1325 J Street
Sacramento, California 95814-2922

_____
Paul Zianno

Attachment 1 – Map of Study Area

Attachment 1 – Kern Canyon Fault Study Area, Tulare County, CA

** precise mapping limits provided in ESRI shapefile format