Jones Professional Engineering

Overview

Jones Professional Engineering has performed land surveys for commercial and public works projects since its founding in 1963. The firm was founded in Seattle but now maintains offices in Denver, Phoenix, and Vancouver, British Columbia.

Civil engineering professionals at Jones Professional Engineering provide services from basic preemption survey through land management programs. Land surveys performed by Jones Professional Engineering support the following activities:

- Subdivision and community development
- Utility right-of-way and oil and gas wellsite development
- Land claims and land development
- Strata and leasehold development
- Mining claims
- Residential, commercial, and industrial construction

Although Jones Professional Engineering has invested in software for accounting and computer-aided design, it has not invested in information technology to support field survey work. Problems abound in the current manual system for tracking field survey work. Initial requests for survey work sometimes are lost or recorded incorrectly. Instructions for survey work sometimes are communicated by phone to compensate for incomplete survey request forms. During fieldwork, crews write technical data into field books, along with non-technical information such as dates and work descriptions. The field books are sometimes difficult to understand and not standardized in work descriptions. In addition, Jones Professional Engineering has no other record or index related to the field book entries, so information is

difficult to retrieve. Difficulty of information retrieval leads to excessive cost to respond to fieldwork questions, sometimes six to nine months after work is completed.

Because of the deficiencies in the current tracking of field survey work, Jones Professional Engineering needs a database to support field survey work. The database should provide the following benefits:

- Improved consistency and completeness of survey requests
- Reduced time to schedule work crews
- Improved communication between requestors and field crews
- Support for standard reports and ad hoc query of survey requests, field work results, and work scheduling
- Improved consistency between field work records and field books
- Future support for digitized data collection and storage of field books as well as integration of field books with the field work database

The field work database ideally should interface with the accounting software. The accounting software handles timesheet records for employees, contract details, billing, and payment for services performed. Integration with the accounting database would enable retrieval of the job number and other data about contracts as well as sending data about work crews to the accounting database. However, due to centralized administration of the accounting system in Seattle office, integration will not be attempted in the first phase implementation of the survey work database.

Workflow

Figure 1 depicts the survey process from request to final report. Customers request a survey either by faxing a form or by telephone. The new system should support web-based

submittals, faxes, and telephone requests. A request is processed by creating a written survey plan to instruct the survey crews about the data to collect during the survey work. The survey plan is forwarded to the Survey Manager to schedule survey crews to do the job. Once a survey crew is on the job, they record the requested data into field books that are later transcribed into a survey report for the customer.

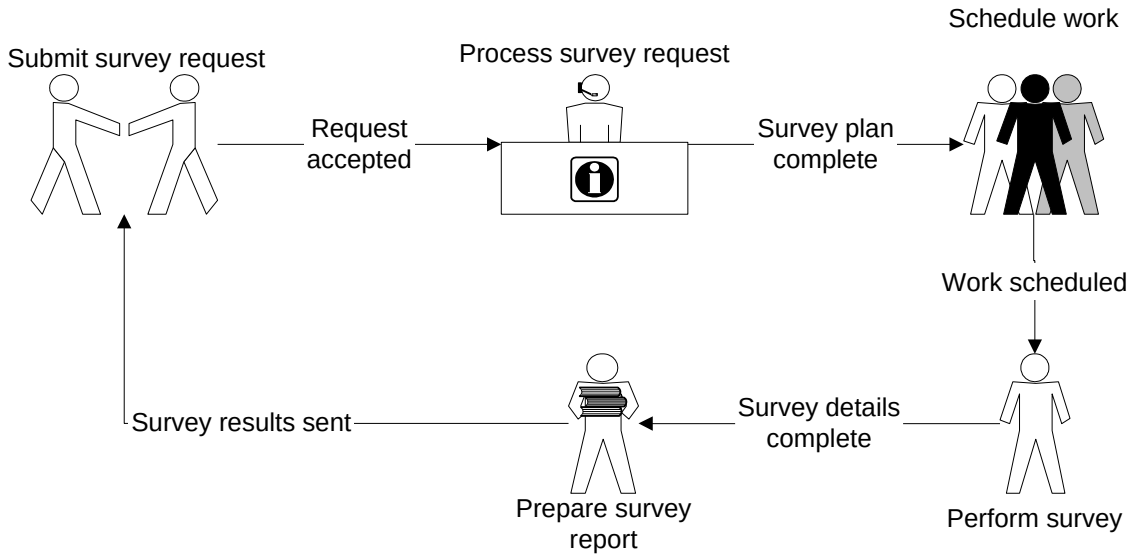

Figure 1: Workflow for a Typical Survey Job

Supporting Documents

Figure 2 depicts the current manual Survey Request form. This form is completed by the requestor who takes an order for a survey request. The job number is provided by the accounting system. The top part of the form identifies the client and survey location. The request details indicate the date requested, the requestor, and the completion date. The instruction details include the unique task number, the task description, and the notes specific to performance of the task for the client. Jones Professional Engineering maintains a list of standardized tasks that can be requested on survey work. In the current manual form, errors are common on task identifiers and descriptions. The manual survey request form should be revised with a computerized data

entry form to standardize the data. The new form should also replace the written survey plan that provides the instructions for the survey crew.

Survey Request			
	Job No.: 87077213		
Development: Timberline		Client: Lane County	
Contract Date: 05/23/2003			
Location: 14th and Pine	Range: AA	Section: 14	Township: T.05S
Request Detail			
Date Requested 06/01/2003	Requested by: Lane Company	Completion Date: 06/15/2003	
Instructions			
Re-stake: 1	2 sets of drawings: X		
Task No.	*Task Description*	*Notes*	
1001	Survey	Property corners	
1010	Drainage certification		

Figure 2: Survey Request Form

After completion of a survey request, the survey manager schedules a crew to perform the work. At present, the survey manager must shuffle through written requests to determine the schedule. It would be helpful if items from the Survey Request form could be transmitted via the new database to the survey manager to assist with scheduling. In addition, it would be beneficial if the survey manager had a way to search for unscheduled jobs as well as locate all available jobs.

The survey manager's current schedule form appears in Figure 3. After it is completed, copies are sent to notify appropriate crew members of the pending job. Currently, scheduling is done for the entire survey request, not by individual tasks on a survey. Jones Engineering would like the flexibility to schedule by crew and task.

Schedule Form

Job No.: 87077213

Development: Timberline	Timberline	Scheduler: E100	
Client: Lane County			
Location: 14th and Pine	Range: AA	Section: 14	Township: T.05S
Date scheduled: 6/2/2003	Re-stake: 1		

Crew Assigned	**Work Date**	**Notes**
05	06/03/2003	Start on both tasks
06	06/04/2003	Complete both tasks

Figure 3: Schedule Form

The survey manager performs scheduling on a weekly basis, one week in advance. Therefore, it would also be useful if, every Monday, a weekly schedule could be printed from the schedule form to announce the survey schedule to field crews. Figure 4 depicts a sample schedule report.

Schedule Report for 6/3/2003

Crew	**Job No**	**Development**	**Notes**	**Re-stake**	**Tasks**		
					Task No	**Task Desc**	**Task Notes**
5	87077213	Timberline		1	1001	Survey	Property corners
					1010	Drainage	
6	87077114	Highlands		0	1010	Drainage	
7	87550611	Sundance		1	1133	Easement	

Figure 4: Sample Schedule Report for Crew Assignment

Before leaving for their assigned work, survey crews retrieve the instructions provided on the schedule form. The schedule form is augmented with a fieldwork record for each task as shown in Figures 5 and 6. The top part of the fieldwork record is completed before the crew begins the work. During a survey work, the survey crew makes entries to their field books to record the data acquired from the survey. Field books record survey drawings, measurements, and notes made by the survey crew members. After the survey crew return from a job, the bottom part of the fieldwork record

includes the work date, completion status, field book reference (book number and page number), and employee performing the work.

Fieldwork Record

Fieldwork No.: 110222 Job No.: 87077213
Development: Timberline Timberline Client: Lane County
Contract date: 05/23/2003 Date scheduled: 06/2/2003
Location: 14th and Pine Range: AA Section: 14 Township: T.05S
Work Description:
Task No.: 1001 Task Description: Survey Notes: Property corners
Work Date: 06/03/2003 Completed: X Book No: 350
Employee: Graham Crew: 05 Beginning Page No.: 10
Re-stake: 1

Figure 5: Sample Fieldwork Record Form

Fieldwork Record

Fieldwork No.: 110222 Job No.: 87077213
Development: Timberline Timberline Client: Lane County
Contract date: 05/23/2003 Date scheduled: 06/2/03
Location: 14th and Pine Range: AA Section: 14 Township: T.05S
Work Description:
Task No.: 1010 Task Description: Drainage certificate Notes:
Work Date: 06/03/2003 Completed: X Book No: 351
Employee: Smith Crew: 05 Beginning Page No.: 11
Re-stake: 1

Figure 6: Second Sample Fieldwork Record Form

The new system should support ad-hoc search of fieldwork records. To help a survey manager grasp the overall status of survey jobs, a search could be done to locate uncompleted field work. To support search of past fieldwork records, a survey manager or the surveying crew supervisor should be able to query the fieldwork records by book and/or page number.

An important future enhancement is to integrate the field book details into the field work database. Currently, Jones Professional uses a two-dimensional drawing program to store digitized maps and surveys. This enhancement will require hardware for crews such as a tablet computer or personal digital assistant. The data recorded should be transmitted to the fieldwork database. The field work database could record the digitized information or provide a pointer to

an external file. Object relational database technology supports storage and manipulation of field book details directly in the field work database.

Glossary of Document Fields

This section provides a brief description of the fields found on the documents presented in this case. The field names are the captions from the associated document.

Survey Request Form

- *Job No.:* unique integer value that identifies a survey request
- *Development:* name of development where the survey job is to be performed
- *Client:* who requests the survey
- *Contract Date:* date when survey requested and documents signed consenting to the survey
- *Location:* street intersection nearest to the survey location
- *Range:* horizontal map coordinates for survey location
- *Section:* vertical map coordinates for survey location
- *Township:* township in which survey is located
- *Date requested:* date that the customer made the request
- *Requested by:* name of person requesting the survey
- *Complete Date:* survey completion date according to contract
- *2 Sets of Drawings:* this box is checked if two sets of survey drawings are requested
- *Task No:* unique number that identifies a task
- *Task Description:* standardized task description
- *Notes:* instructions specific to performance of the specified task for the client
- *Re-stake:* is this job being re-done/how many times so far?

Schedule Form

- *Job No.:* unique integer value that identifies a survey request
- *Development:* name of development where the survey job is to be performed
- *Client:* who requests the survey
- *Scheduler:* employee number of the scheduling employee
- *Date scheduled:* date when schedule was made
- *Location:* street intersection nearest to the survey location
- *Range:* horizontal map coordinates for survey location

- *Section:* vertical map coordinates for survey location
- *Township:* township in which survey is located
- *Re-stake:* is this job being re-done/how many times so far?
- *Crew Assigned:* name or code of crew to perform the work
- *Work Date*: date to begin the assigned survey job
- *Notes*: comments, if any, to the crew by the survey manager

Schedule Report

- *Date:* specified period the survey crew is scheduled for
- *Crew Assigned:* crew number that is assigned to a survey job
- *Job No.:* unique integer value that identifies a survey request
- *Development:* name of development where the survey job is to be performed
- *Notes:* comments to survey crew if necessary
- *Re-stake:* is this job being re-done/how many times so far?
- *Task No:* unique number identifying a task
- *Task Desc:* description of survey work to be performed
- *Task Notes:* comments about the task to perform

Fieldwork Record Form

- *Fieldwork No.:* unique integer value that identifies a fieldwork record
- *Job No.:* unique integer value that identifies a survey request
- *Development:* name of development where the survey job is to be performed
- *Client:* who requests the survey
- *Contract date:* date when survey requested and documents signed consenting to the survey
- *Location:* street intersection nearest to the survey location
- *Range:* horizontal map coordinates for survey location
- *Section:* vertical map coordinates for survey location
- *Township:* township in which survey is located
- *Date scheduled:* date that the survey job was scheduled
- *Task No:* unique number identifying a task
- *Task Description:* description of work performed

- *Re-stake:* is this job being re-done/how many times so far?
- *Work date:* date the work was performed by the crew
- *Completed:* check this box if work was completed
- *Book No.:* survey crew's field book number
- *Beginning Page No.*: survey crew's field book page number for the survey record
- *Employee*: who entered the record in the field book
- *Crew*: code of crew assigned to do the work