Like in every business the driving factor of any bottom line is the proficient handling of costs. For utilities, true numbers come from the physical placement of network infrastructure in the field, and the labor that creates the infrastructure. In the past, materials were staged, usually in overabundance, and then what was left over from a job was returned. The difference accounted for the actual material cost of any project. To balance and check materials used in a work order, poorly filled staking sheets were employed. Often, the checks and balances never correlated to actual material usage, and precious time was spent tracking down the errors. Often this time was spent at an inopportune time, during budget or audit time. Labor, itself, was usually calculated from timesheets, which never were an exact allocated number, and often projects were shortchanged labor time, or worse added to the total cost. On the whole, the practice of building utility infrastructure for a small utility, caused countless man hours just tracking down work orders, poor field inventory and trying to balance the books.

Some of the more specific issues found in previous experiences have been:

1. The inability to understand or obtain all relative information on a work order from one location. It has been possible to proceed or closed work orders without a collection of all fees or costs.

2. Inability to manage or separate multiple work projects under the same blanket work order.

3. Incomplete knowledge of field activity, including:
   a. Poorly filled out staking sheets, not accounting for all used material
   b. Incomplete or inaccurate time sheets on a per job basis.

4. Lack of historical information of completed work orders for audits.

To solve this problem, Truckee Donner PUD is developing a fully integrated system, linking the accounting, warehouse, and engineering departments, as well as the field crew itself.

*Creating and Tracking a Work Order*

The program starts with the creation of the Work Order. At this utility, five types of work orders are common: Developer Agreements, Capital Projects, District Projects, Service Orders, and Emergency Work. The work orders are then reclassified based on two criteria: Costs and Engineering requirements. Projects with high costs and required engineering designs make one group, where those projects with low costs and no required engineering designs make another.
Group 1 includes Developer Agreements, Capital Projects, and District Projects. These are large, high cost projects that need planning, surveying, and engineer designs before they ever are built. Often there are conditions with must be met before these projects and proceed to their next lifecycle stage.

Group 2 includes Service Orders, and Emergency Work. These projects, due to their inherent nature, normally do not require any pre-engineering, and are typically low in cost.

Each group will follow a different path through the process of managing their work.

Group 1, once created within the accounting software, waits for transfer to Miner & Miner’s Work Flow Manager software, a utility that acts as a one stop shop for all work orders, allowing all permissible personnel to query any work order currently in the system or those of past. The work orders’ entire lifecycle will reside in this software before being returned to the ERP accounting program for closing. Group 1’s lifecycle begins with the original transfer by the Contract Administrator position. Holds are then placed on each Work Order and can only be released when certain conditions are met. Conditions may include fees, EIRs, or signed contracts. As these conditions are met, the work order can then be moved to the next stage.

Managing Blanket Work Orders
Group 2 work orders are often performed under what is known as a blanket work order. These work orders are opened at the beginning of each year, and closed at years end. Within that time period, hundreds of different work functions can be performed.

Within the Work Flow Manager software, individual projects can be created under the same work order. What results is the ability to query a blanket work order by year, with results showing all individual jobs created under that work order. Construction Units and costs can now be calculated as a whole, or broken up individually based on district area, type of work performed, or crew performing the job.

The root of this ability lies in the District’s implementation of its mobile GIS application.

Improved Field Data
In each field vehicle, electronic staking sheets, electronic time sheets, and construction unit diagrams are all incorporated in the mobile GIS application. As construction for each particular job, large or small, progresses each electronic application is filled out using quick entry formats built within each application.

For example in the staking sheets, CU and Quantity can be picked from a pull down list, and sketches of the drawing are put into a pen tablet sticky note. The electronic staking sheets can then be uploaded to the server to aid design as-built drawings and update the GIS with current field upgrades.
Time sheets have improved by adding a start/stop work icons in the application. As a vehicle with a pre-defined crew begins their journey, they would depress the start job button and pick one of the work orders assigned to their vehicle. If the button is not depressed, the GPS/GIS application detects movement, and the button has not been activated, it will prompt the driver to do so. At the end of each job, the button is depressed to signify the end of the job. The total time is then added to each crew member’s time sheet individually.

**Monitoring Historical Data**
As each work order or individual job within a blanket work order is closed, actual CU / material information is passed back to the ERP accounting software. The accounting now has a very good record of what materials were claimed to have been used, with what material is returned to the warehouse. Discrepancies are quickly accounted for and tracked down before auditing season.

Most accounting software is built for a fiscal year, but by managing the work order in the Work Flow Manager software, each closed work or job performed is kept indefinitely as historical data. Years down the road, jobs of similar cost or size can be analyzed against previous years, and data is always on hand for eventual audits.

What this intensive program has promoted, is not just better tracking and management of work orders, material and personnel time, but improved a GIS system, desperately trying to keep up with the explosion of work in the Truckee region.

The program automatically incorporates engineering designing into the work order, pre-defining materials and costs estimated for each project, either during the planning/engineering/as-built process, or at the timely conclusion of service or emergency work. Because the Work Flow Manager software works in unison with Miner & Miner’s Designer software, to obtain costs and materials, the job, as performed in the field, must be drawn in the GIS first, with spatial and non-spatial CU objects. This unequivocally ensures that the GIS is not only up to date with field changes, but acts as an integral part of ensuring a better accounting system.