

Irrigation Notes

California State University, Fresno

Purchasing an Irrigation System

by Edward Norum¹

The selection and purchase of an agricultural irrigation system can be a manic blend of both elation and dread. All of the analyses and engineering directed toward designing, installing and operating the optimal system for the site must fall within budgetary and time constraints.

This investment represents the future growth and success of your agricultural enterprise. The better organized and comprehensive your approach, the more likely your success in specifying and purchasing the best products and services for the application.

Ed Norum, with California State University, Fresno's Center for Irrigation Technology (CIT), leaves the financing facet of a new irrigation system purchase to you the consumer. However, his guidance through design philosophy, critical site data and installation criteria helps you to manage this transition by procuring the proper equipment and after-sale assurances. Following is a thought process check list that should help in purchasing decisions. Copies of sample contract documents are available from CIT.

A. System design philosophy considerations

- Common local practices
- Economic limitations
- Land or water limiting
- Water, labor and equipment cost tradeoffs
- Land tenure (lease/rent/buy)
- Service requirements (spare parts, warrantor follow-up)
- Tax implications

B. System designer options

- Direct copy of neighbors
 - May copy bad features also (root intrusion, air venting, inefficiencies)
- Grower design
 - May not take advantage of latest technology (ring filters, plug-resistant emitters)
 - Limited technological capability (errors in design)
- Dealer or manufacturer design
 - Practical design
 - Limits equipment options
 - Limits competition
- P.E./consultant design
 - Optimized design
 - Permits competitive bidding
 - Highest design cost

C. Background information required

- Crops – present and future
- Water supply – quantity and quality
- Soils – texture and structure
- Terrain – slope
- Climate – ET_o, wind, temperature
- Hydrogeology – water table, drainage
- Field maps – tax maps
- Fertilization practices
 - Chemical injection
 - Backflow prevention
- Related cultural practices – avoid conflicts
- Operating labor availability and qualifications
 - Consider automated controllers (soil moisture sensors)
- Theft and vandalism – consider buried systems
- Pest problems – gophers, coyotes, rabbits

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- Service considerations – on farm, dealer
- Spare parts availability – on farm, dealer, manufacturer

D. System Installation (or material procurement)

- Grower
 - Close control
 - Responsibility
 - Broad technical capabilities required
 - Competitive pricing
 - Time consuming
 - Coordinate sub-contracting and materials delivery
- Dealer
 - Dealer responsible
 - Product warranty
 - Performance guaranty
 - Service and spare parts
 - Relies on dealer reputation
 - Preventative maintenance follow-up
- General contractor
 - Competitive bidding (probably lowest cost)
 - Timely installation
 - Professional workmanship
 - Performance guaranty
 - Materials meeting applicable standards (ASAE,ISO) and/or tests (Center for Irrigation Technology)
 - Requires independent service arrangements

E. Elements common to materials quotations (RFQ)

- System design
- List of potential vendors
- Prepare quotation documents
 - 1) Cover letter
 - 2) Instructions to vendors
 - When/where to submit quotations
 - Delivery and payment terms
 - 3) Bill of quantities
 - 4) Specifications (including or approved equal, with or without drawing)
- Award to lowest quotation, giving consideration to other factors such as delivery, special payment terms, alternative materials offered, etc.

F. Elements common to formal contracting (IFB) using a professional engineer

- System design by professional engineer or certified irrigation designer
- List of prequalified contractors
- Prepare bid documents including the following:
 - 1) Cover letter of announcement
 - 2) Instruction to bidders
 - When/where to submit bids
 - Bid disqualification
 - Bid content and acceptance
 - Award to lowest responsive, responsible bidder
 - 3) Form of tender
 - Actual bid details
 - Work deadlines

- Liquidated damages

- Payment schedule

4) Bill of quantities

- Entire scope of work item by item
- On-site, installed, and operational
- All-inclusive rates

5) Form of agreement

- Legal document defining contractual details

6) Conditions of the contract – All pertinent legal considerations, for example:

- Termination/default
- Local laws and ordinances
- Insurance
- Change orders
- Force majeure
- Definitions
- Terms of payment
- Liquidated damages
- Performance guaranty

7) Specifications

- General scope and listing of drawing numbers
- Ref.: codes, standards, regulations, permits, etc.
- All general engineering requirements such as:
 - Care of works
 - Guaranty
- Specific requirements (or approved equal)
 - Definitions
 - Payment evaluation
 - Materials (concrete, compaction, reinforcement)
 - Structures
 - Pipelines (trenching, pipe placement, joints)
 - Equipment (pumps, filters, valves, sprinklers, driplines, etc.)
 - Electrical
 - Startup, adjustment, and performance tests
 - Acceptance tests

8) Drawings

- (**note:** in the event of a conflict, the drawings are used as the final authority.)

- Administer bidding process, including analysis and recommendation for bid award. Award given to lowest responsive bid by a responsible contractor.
 - (**note:** original bid must be precisely as per specifications and drawings. Award judged on this basis. Alternatives invited but must be negotiated after the award.)
- Represent owner in contract administration, system installation test operation and acceptance.

G. Sample “short form” contract

- Cover letter of announcement
- General instructions
- Form of tender
- Bill of quantities
- Definitions
- Specifications – Part I and Part II