RESOURCES INVENTORY

(Use Irrigation Inventory Worksheet, Ch 15, pg. 15-9)

1. Measure acres to be serviced by conveyance system.
2. Determine crops to be grown, cropping systems to be used.
3. Gather information on soils. Obtain survey by soil scientist, if needed.
   - Dig holes if necessary, to locate restrictive layers or a high water table.
   - Evaluate intake rates.
4. Gather site details and topography information.
   - Slopes, relief, system layout and obstructions to management of system.
5. Gather quantitative information about existing or potential erosion problems.
   - Estimate amount of erosion using field measurements or currently available procedures.
6. Determine the potential crops to be grown, planting and harvest dates, rotations, cropping systems used, tillage methods, residue management, and chemical usage.
7. Determine crop water use characteristics, and irrigator’s method of assessment.
8. Water quantity and quality Components:
   - Water source, reliability, availability, water rights, regulations, restrictions, or flow variations
   - Seasonal water quantity and quality problems (salts, moss, debris, etc.)
   - Water measurement procedures used at delivery point to farm, and/or to each field. Does irrigator know how much water is used in terms of real units (gpm, cfs, miners inch, etc.)?
9. Obtain all information needed about the existing deliver system (from operator, ditch company or district, NRCS case files, etc.):
   - Type of delivery system
   - Delivery system details: dimension of system components
   - Delivery system policies, restrictions
   - Capacity of system components (may need to measure flow rates)
   - Ditch material and lining characteristics for estimating conveyance losses.

References:
- NPPM 600.2
- NEH-Part 652
RESOURCE INVENTORY (continued)

10. Existing and proposed application system:
   - Type of system (furrow, graded border, side roll, pivot, hand move)
   - Estimated or measured system application efficiency
   - Exact location, elevation of all turnouts
   - Design pressure requirements at each turnout.

11. Inlet structure or connection details:
   - Dimensions, elevations of existing inlet if to be used in new installation
   - Problems associated with existing inlet
   - User desires concerning new inlet, connection.

12. Existing and proposed screening devices
   - Details of existing screening devices
   - Problems presently encountered with debris, sediment
   - User desires concerning screening devices.

13. Pump characteristics (if a pump is used):
   - Pump type (centrifugal, turbine, submersible)
   - Pump model, ratings (get pump curve if possible)
   - Condition of existing pump (by test or observation)
   - Adequacy of existing plumbing and connections
   - Details of suction pipe, pump columns, number of impellers, etc.
   - Availability and cost of bringing in electric power
   - User desires concerning pump.

14. Management problems with existing or proposed application system:
   - Type of system (furrow, graded border, hand move, side roll, pivot, etc.)
   - Details of system that affect efficiency.
   - Type of sprinkler nozzles, pressures, and are there wind impacts on the systems performance?
   - Furrow and border widths, length of run, degree of land leveling, etc.
   - Is there tail-water reuse?

15. Irrigation management:
   - Present method used to determine when and how much to irrigate?
   - Labor availability? Skill? Basic knowledge?
   - Present problems in managing water.
Irrigation Water Conveyance System

RESOURCES INVENTORY (continued)

16. Site considerations:
   • Determine location and details of any utilities in the construction area.
   • Is the site within a floodplain?
   • Will wetlands be modified, disturbed or affected by installing project?

17. How is the decision made on when and how much to irrigate for the present method?

18. Labor availability; how much, times of day, and skill level.

19. Is irrigator/land user willing to consider improving water management?

20. Are there high cost items, such as power, labor, system maintenance needs or water availability that motivate the irrigator/land user to improve irrigation efficiency?

21. Based on restrictions imposed, can changes be made?
   (Imposed by system limitations, water supply limitations or restrictions, economics, labor considerations, agricultural operations, or field layout.)

INTERPRETING, ANALYZING, AND EVALUATING

1. Are soils appropriate for the intended irrigation system?

2. If the site is within a flood plain, what effect will a flood have on the system and on the area?

DEVELOPING AND EVALUATING ALTERNATIVES

1. Determine Available Water Capacity (AWC), Management Allowed Depletion (MAD) and intake characteristics of soil.

2. Analyze seasonal efficiency and how changes in system and management could be improved (use FIRI computer program).

3. Determine peak consumptive use for crops to be grown:
   (Irrigation Water Requirement - IWR Software or NEH, Part 623, Chapter 2)
   • Peak daily, set period, monthly and/or seasonal consumptive use
   • Rooting depth at various times during season.

4. Determine minimum flow requirements during period of peak consumptive use (may use Irrigation Planning Worksheet).

5. Determine flow requirements required to complete irrigation during time period desired by irrigator.

References
- NPPM 600.2
- NEM 503.3
- FEMA flood map
- Field Investigation
- NEH-Part 652
- FIRI documentation
- NEH-Part 652 MT Supp to EFH/Ch. 53/MT-ENG-2A
DEVELOPING AND EVALUATING ALTERNATIVES (continued)

6. Based on the irrigation system design or existing system, prepare information on alternative methods of:
   - Determining when and how much to irrigate
   - System operation considerations
   - Knowing how much is being put on
   - Monitoring soil moisture or crop use
   - System improvements which would lead to better water management.

7. Select inlet, turnout, water control structure/fitting types, locations and preliminary sizes and elevations.

8. Perform preliminary hydraulics to set size and grades (may use any approved computer programs to aid with calculations).

IMPLEMENTING DECISIONS

Approval Authority

Determine job approval authority for pipelines, canals, water control structures, pumps and ask for appropriate assistance.

Collect Final Data for Design

1. Additional detailed engineering surveys which were not obtained during initial planning:
   - Topographic survey of structure sites (grid, cross section, stadia or EDM)
   - Profile along pipeline or ditch alignment
   - Cross section data where required
   - Water surface elevations.

2. Geologic investigation. Borings as required at structure sites and at questionable locations on-line.

System Design

1. Detailed hydraulic design which was not done previously.
   - Pipeline hydraulics (may use approved computer programs to aid in calculations.)
   - Ditch hydraulics, size, shape, water surface (May use approved computer programs to aid in design.)
   - Structure hydraulics, sizing, control elevations

2. Structure design (inlet, turnouts, valves, crossings).

3. Critical area seeding design.
**IMPLEMENTING DECISIONS (continued)**

**System Design (continued)**

4. Quantity calculations (if needed for cost share, bidding or other reasons):
   - Schedule of pipe sizes, type, rating
   - Schedule of ditch lining quantities
   - Concrete, timber, seeding quantities
   - Earthwork quantities.

**Drawings**

Minimum drawings shall include:
- Location map or enough description on plan view map to adequately locate job
- Plan view map showing location and layout of all pipelines, ditches, structures, turnouts, etc.
- Profiles along each pipeline or ditch
- Typical cross sections at critical locations
- Table or drawing notes showing elevations, descriptions, dimensions and size of all structures, valves, special fitting and appurtenances.

**Compliance Checking**

1. Pipelines:
   - Take elevations at critical points if needed
   - Record markings from pipe
   - Pressure or operation checking.
2. Ditches and lining:
   - Concrete quality checks during construction
   - Take grade elevations at minimum 100 foot intervals.
3. Structures:
   - Measure and record dimensions and key elevations on all structures
   - Record notes on the type and quality of materials and workmanship.
4. Vegetative measures:
   - Check that critical area seeding has been completed properly.
5. As-built drawings prepared.

× This activity or documentation is usually required on each job.