Integrated Planning - Engineering

NRCS Engineers
Planning Information needed

- **Biological goals** (NRCS Easement Team Lead, Ducks Unlimited, FWS, NGPC)
  - Wetland Complex / Type / Historical Function
    - Restoring Vegetation
    - Tree & brush removal
  - Inundation depths, hydroperiods, saturated vs inundated areas
    - Restoring Hydrology
Planning Information needed

- Soils investigation (Soil Scientist)
  - Sedimentation depths / Depth to Bt
  - Depth to sand
  - Depth to ground water
  - Wetland delineation
Planning Information needed

- Engineering Evaluation
  - GIS
    - Aerials & LiDAR + Soils
  - Hydrologic data
    - Water budgets (spreadsheets, SPAW, EFH-2, WETS Tables)
  - Hydraulic analysis
    - USGS stream gauge data, HEC-RAS, Mannings Eqn
Preliminary Design Phase

- Engineering Evaluation
  - Layer stack
Hydrologic Data - SPAW

Precipitation

Wetland Water Budget
- Inflow, Ac.-Ft.
- Outflow, Ac.-Ft.
- Change in Storage

Depth 12”, Watershed:Wetland ratio 0:1

Depth (in)

Volumes, Ac.-Ft.
Vanhousen
10-Year Flood (13,233 cfs)
Vanhousen
15-Year Flood (15,200 cfs)
Hydraulic Data – Wet Meadows, Ditch Plugs
Hydraulic Data – Wet Meadows, Ditch Plugs

https://sandhillstaskforce.org/project/awesome-project-1/
Hydraulic Data – Wet Meadows, Ditch Plugs

https://sandhillstaskforce.org/project/awesome-project-1/
Preliminary Design Phase

- Evaluating Alternatives (Feasibility)
  - Impacts to neighbors
    - Flooding (overland) or Lateral Effects (groundwater)
    - 3rd Party Conversion (compensatory storage on pit fills)
  - Stakeholder Objectives vs Program vs Cost $ for full restoration
  - Permitting
  - Constructability
Preliminary Design Phase

- Engineering Deliverables
  - Preliminary plans and cost estimate
Preliminary Design Phase

- Engineering Deliverables
  - Preliminary plans and cost estimate
Final Design Phase

- Construction Plans & Specs
  - What you want (Plan)
  - When you want it (Sequence)
  - How you want it (Specs)
  - How much of it (Quantities)
Final Design Phase

- Final Deliverables
  - Construction Plans
  - Construction Specifications
  - Bid Packet

BID SCHEDULE
EXAMPLE WETLAND RESTORATION

<table>
<thead>
<tr>
<th>BID ITEM</th>
<th>SPEC NO.</th>
<th>QUANTITY</th>
<th>UNITS</th>
<th>UNIT PRICE</th>
<th>TOTAL COST</th>
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<tr>
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<td>1</td>
<td>AC</td>
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<td>CY</td>
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<td>CY</td>
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<tr>
<td>Excavation, Striping Ditch Fill</td>
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<td>1,800</td>
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<td>CY</td>
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<td>CY</td>
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<td>3.4</td>
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</table>

LUMP SUM Total Bid = $1

* Project will be bid as lump sum and shall be based off of these planned quantities.
** Project construction must be completed by October 30, 2021.
*** Earthfill cubic yards are figured with 25% compaction. Borrow sources are shown as excavation on plan map. Excavation is subsidiary to earthfill where "mixed" in bid schedule above.

EARTHWORK ACTIVITIES NOTED ON PLANS AS "DITCH FILL" MUST BE COMPLETED BY OCTOBER 31, 2021.
Bid Acceptance

- Contracting
  - Low bid higher than the allocated funding / prelim cost estimate
    - Unit cost of component(s) higher than ACEP cost docket?
  - Low bid higher than the easement acquisition cost (Rejection)