### General Information
- Dam Number
- Dam Name
- Owner Name
  - Agent
  - Telephone Number
  - Email Address
  - Mailing Address
- Designer
- Dam Location (UTM)

### Structural Information
- Dam Type
- Water Use
- Crest Elevation
- Structural Height
- Hydraulic Height
- Crest Width
- Crest Length
- Reservoir Area at Spillway Crest
- Reservoir Capacity at Spillway Crest
- Reservoir Capacity at Dam Crest
- Drainage Basin Area

### Spillway Information
- Principal Spillway Type
- Emergency Spillway Type
- Spillway Crest Length
- Spillway Discharge Capacity
- Breach Flows

### Outlet Information
- Outlet Diameter
- Outlet Length
- Outlet Material
- Outlet Control Location
- Outlet Control Type
- Maximum Outlet Capacity

### Emergency Information
- First Downstream Town
- Distance
I. DESIGN REPORT - R655-10-6B.E

A. Hydrology and Hydraulics – R655-11-4,7,8

   Revision Date ______________ Reviewer’s Initials ______

   ______ Drainage & Reservoir Basin Hydrology
   ______ Drainage basin area
   ______ Reservoir area & capacity curves
   ______ Drainage basin land use & soil type descriptions
   ______ Loss method
       ______ SCS Curve Number
       ______ Initial and Constant
   ______ Runoff (transform) method
   ______ Baseflow method
   ______ SEF Identified
   ______ SEF compared to 100yr event on saturated soil with required allowances for freeboard
   ______ IDF Identified

<table>
<thead>
<tr>
<th>Storm Events</th>
<th>Precipitation Depth, in</th>
<th>Curve Number or Infiltration Rates</th>
<th>Percent Impervious</th>
<th>Lag time, min</th>
<th>Peak inflow to reservoir, cfs</th>
<th>Maximum water surface at dam while routing peak inflow, ft</th>
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<td>USU – 72hr</td>
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<td>100yr – 24hr or 100yr – 6hr</td>
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   ______ Freeboard Analysis
       ______ Minimum 3 feet
       ______ Wave height, runup, & reservoir setup considered
   ______ Spillway Design (principal & auxiliary spillways)
       ______ Spillway rating curve(s)
       ______ Spillway(s) routes the IDF?
       ______ No damage to principal spillway while routing the IDF
       ______ Channel hydraulics addressed
       ______ Adequate erosion protection and/or energy dissipation
       ______ Underdrain System Considered
       ______ Log Boom
   ______ Fuse Plug Design
       ______ Trigger elevation
       ______ Breach time
   ______ Dam Breach Analysis and Downstream Routing
       ______ Trigger elevation
       ______ Breach time
       ______ Breach width
       ______ Peak breach flow
       ______ Inundation area identified
       ______ Hazard rating assessed
   ______ Incremental Damage Assessment
       ______ Threshold flow
       ______ % SEF routed
   ______ Outlet Design
       ______ Outlet Rating Curve
       ______ Pipe size & type (24” minimum diameter)
       ______ Capable of evacuating 90% of the storage capacity in 30 days
       ______ Channel hydraulics addressed
       ______ Adequate energy dissipation
B. **Geologic and Seismic Study – R655-11-5A.**

Revision Date ________________ Reviewer’s Initials ______

- Regional geology
- Site specific geology
  - Bedrock description
  - Alluvial description
  - Geologic cross-sections at maximum section and along the dam axis
- Faults and faulting history
- Seismicity - Deterministic and probabilistic
- Design Earthquake parameters identified. (i.e. Magnitude, PGA, etc.)
- Landslide potential of reservoir perimeter
- Other geologic hazards

C. **Geotechnical Report - R655-11.5,6,9.**

Revision Date ________________ Reviewer’s Initials ______

- Borings / test pit logs
  - Exploration locations map
  - Total depth (depth > height of dam or 10’ into bedrock, with a min. depth of 25’ to 30’)
  - Stratigraphy with elevations of different formations
- Depth to groundwater
- Availability of materials / borrow material analysis
- Liquefaction or other seismic strength loss potential in embankment and foundation/abutment
- Dispersive potential in borrow and foundation soils
- Collapse/Swell potential in the foundation soil
- Foundation design (seepage cutoff, soil & rock treatment, grouting, etc.)
- Abutment design (seepage cutoff, soil & rock treatment, grouting, etc.)
- Cutoff trench/grout curtain - specific design details
- Embankment design (geometrics, zones, cutoff trench, etc.)
- Defensive design measures (differential settlement at steep abutment slopes, crack stopper, etc.)
- Soil/Rock zone properties (including strength parameters)
- Seepage analysis (with permeability anisotropy ratio ≥ 9)
- Slope stability analyses
  - End of construction F.S. > 1.3
  - Steady-state F.S. > 1.5
  - Instantaneous drawdown F.S. > 1.2
  - Pseudo-static analysis F.S. > 1.0 for no liquefaction & pga <0.2g or <0.35g if clay.
  - Post-Earthquake F.S. > 1.2
    - Liquefaction/strength loss & excess pore pressure
  - Deformation analysis F.S.>2.0 (no liquefaction) or F.S ≥3.0 (liquefaction)
  - Strength loss and excess pore pressure generation considered?
  - Upstream & downstream movement considered in total crest settlement?
- Internal drainage design
  - Chimney, blanket, & toe drain
  - Outlet conduit filter & drain collar/diaphragm
  - Filter analysis for adjacent zones, foundation, and pipe slots
- Erosion protection on both upstream and downstream slopes

D. **Structural/Others**

Revision Date ________________ Reviewer’s Initials ______

- Reinforced concrete design for appurtenant hydraulic structures (ACI 350)
  - Spillway
  - Outlet works
  - Others
- Structural Calculations with loading conditions utilized
II. DESIGN DRAWINGS/PLANS R655-10-6B.B,C
Revision Date ________________ Reviewer’s Initials ________
R655-11-6,7,8,9,10

A. General Plan
   ___ Cover Sheet with Index
   ___ Signature Block for owner’s acceptance
   ___ All drawings stamped and signed by responsible engineer(s)
   ___ Reference to Water Rights assigned to the water storage
   ___ Reservoir stage versus area/storage capacity curve
   ___ Rating curves for the outlet(s) and spillway(s)
   ___ Vicinity / location map
   ___ Topography of site
   ___ Bar scale and north arrow
   ___ Plan view of dam and reservoir area (including showing locations of appurtenant structures)
   ___ Abutment turn-around for dams over 500-feet long and with a dead-end crest
   ___ Outlet controls accessible during a spilling event
   ___ Location of instrumentations (i.e. monuments (200’spacing), piezometers, drain outfall, staff gauge)
   ___ Setback dist. for fences and woody vegetation from embankment and appurtenances – 25 feet

B. Details and Sections
   ___ Cross-section of embankment at maximum section
      ______ Elevations of dam crest
      ______ Elevations of maximum water level in reservoir (spillway crest)
      ______ Freeboard – consider hydrologic routing and/or vertical seismic deformation
      ______ Original ground surface
      ______ Limits of foundation excavation
      ______ Geologic information / cross-section
      ______ Longitudinal Cutoff trench with sideslopes ≥1H:1V
      ______ Crest width (0.2*H+5 feet, 12-feet minimum)
      ______ Crest slope (2-percent minimum towards the reservoir)
      ______ Crest surface (protected with a wearing surface of granular material)
      ______ Embankment geometrics including upstream/downstream slope and internal zones
      ______ Define material properties in drawings
      ______ Top of clay core and chimney drain up to or above the 100-year flood elevation
      ______ Chimney drain width
         ______ Minimum 3-feet wide per zone for vertical drain, possibly wider for inclined drain
         ______ Filter chimney width at least twice the predicted horizontal deformation
      ______ Drainage blanket minimum thickness
      ______ Internal drainage system (i.e., collection pipes > 6 inches)
      ______ Erosion protection of upstream and downstream slopes
   ___ Profile along dam axis (longitudinal profile)
      ______ Elevation of dam crest and centerline stationing
      ______ Camber and anticipated settlement
      ______ Cutoff trench
      ______ Limits of foundation excavation
      ______ Abutment slopes
      ______ Geologic information / profile
      ______ Location of outlet(s) and spillway(s)
   ___ Spillway plan view, profile, and details
      ______ Elevation, grades, and centerline stationing
      ______ Geologic information / profile
      ______ Cutoff walls
      ______ Energy dissipation structure
      ______ Structural details for reinforcement steel
      ______ Waterstops at construction joints
   ___ Fuse plug plan view, cross-sections, and details, if applicable
      ______ Elevation and grades
      ______ Cutoff walls
      ______ Structural details for reinforcement steel
      ______ Waterstops at concrete construction joints
____Outlet works plan view, profile, cross-section, and details
   ____Control details
   ____Valve stem seals details
   ____Intake structure (with trash rack)
   ____Guard gate system
   ____Air vent pipe (appropriately sized, goose neck, rodent/basket screen)
   ____Air vent manifold (perforated holes have equivalent surface area as air vent pipe)
   ____Conduit size (minimum 24-inch diameter)
   ____Concrete cradle or encasement
   _____Battered sides 1H:<10V typical (unless concrete poured against excavation, if approved)
   _____Soil side-slopes ≥2H:1V (unless concrete poured against excavation)
   _____Restraint plan during cradle/encasement installation
   ____Seepage collar/diaphragm around conduit (2-stage with min. 6-inch cover around drain pipe)
   ____Seepage collar drain pipe located off to one side of encasement (not below it)
   ____Outlet elevations and grades at both the intake structure and stilling basin
   ____Stilling basin / energy dissipation structure
   ____Inspection access port (for outlet conduit connected to a distribution line)
   _____Emergency bypass line (for outlet conduit connected to a distribution line)

____Internal drainage system
   ____Sand filter and gravel drain material (2-stage)
   ____Pipe diameter (≥6-inch) – to allow for camera inspection
   ____Radius bends (≤22.5-degrees) between straight sections – to allow camera inspection
   ____Access ports – to allow for camera inspection
   ____Slot width requirement
   ____Measuring devices (i.e., V-notch boxes, bucket access, etc.)
   ____Rodent screen
   ____Piezometers/Instrumentation - type and location – R655-11-10
   ____Relief Wells - type and location

Comments
III. SPECIFICATIONS R655-10-6B.D

Site preparation (stripping and grubbing)

Foundation preparation
- Treatment requirements for soil foundation
- Cleaning and treatment of bedrock foundation (provide drawing)
- Grouting
- Cutoffs
- Shaping
- Abutment contacts
- Dental concrete / slush grout
- Blasting approved?

Earthwork
- Moisture conditioning at borrow and/or stockpile area only
- Compaction requirements for soil and rock zone
- Moisture content requirements
- Initial lift placement (first 2-feet) placed against concrete structures or bedrock
  - Maximum particle size (less than 2-inches)
  - Clay core material placed pneumatically and rolled wet of OMC
- Lift thickness (heavy compactors and hand operated compactors)
- Placement and compaction pattern of embankment material
  - Dump and spread parallel to dam axis
  - Uniformly and horizontally (abutment to abutment, upstream to downstream with drainage)
  - Filter and drainage material above adjacent embankment zones or trench method
  - Limited traffic and chimney drain cross-over points on filter and drainage material
  - Segregation, heterogeneous pockets, and rock nesting not allowed
- Temporary construction slopes (when & where approved by engineer) no steeper than 4H:1V
- Embankment compaction issues (i.e., shearing or slicken sides, rutting, heaving, cracking, etc.)
- Treatment of lift surface (i.e., scarification)
- Embankment fill (zones) gradation requirements
- Filter and drain gradation requirements – after placement and compaction
- Filter and drain thickness & width requirements
- Riprap gradation and durability (i.e. abrasion, sulfate soundness, freeze-thaw) requirements
- Handling of deleterious material (i.e., organics, frozen soil, debris, etc.)
- Frost protection for different zones (i.e., filter zones, clay core, shells, etc.)
  - Seed mix design does not include any woody vegetation

Concrete and reinforcement
- Concrete mix, admixtures, slump, air entrainment, w/c ratio, and strength requirements
- Testing requirements
- Use of chlorides not allowed
- Free fall limits (to prevent possible aggregate separation/segregation)
- Form requirements
- Preparation
  - Concrete mix, placement, and curing requirements, including hot/cold weather conditions
- Aggregate specifications
- Finishing requirements
  - Strength or age requirement before form removal / backfilling / structural loading
  - Steel reinforcement requirements
  - Protective cover thickness (i.e., 2" & 3" for concrete placed against wooden form or soil respectively)
  - Waterstops and joint preparation (i.e., sand blasting)
  - Stinging and consolidation of concrete requirements
  - Repair requirements for damaged or improperly placed concrete (i.e., honey combing, exposed steel reinforcement, etc.)

Pipe materials and installation
- Outlet conduit
  - Bedding requirements (i.e., concrete cradle or encasement)
  - Hydrostatic pressure test
- Drain pipe
  - Pipe diameter (≥6-inch) – to allow for camera inspection
  - Minimum radius bends (≥22.5-degrees) – to allow for camera inspection
  - Access ports – to allow for camera inspection
___ Slot width requirement
___ Internal camera inspection after installation (preferably after 3 to 5 ft of cover)
___ Drain pipe to be flushed cleaned or repaired if camera inspection shows any signs of debris or damage
___ Gates and mechanical systems – operation
___ Piezometer installation method – hollow-stem auger in embankment area
___ Dewatering during construction plan (i.e., construction in the dry, W.T. 3-feet below subgrade, prevent removal of fines)

Comments

V. OTHER

___ Water Rights Number and Regional Engineer review
___ Reservoir operation during construction
___ Survey control
___ Diversion and care of stream during construction plan
___ Site reclamation
___ Plan for monitoring dam performance during construction
___ Stream alteration permit
___ Initial Filling Plan (IFP) submittal (prior to final inspection)
___ Emergency Action Plan (EAP) submittal (prior to final inspection)
___ Standard Operating Plan (SOP) submittal (prior to final inspection)
___ Other permits (reminder to owner/engineer of possible other permits)

Reviewers Initials________