COLORADO
Division of Water Resources
Department of Natural Resources

Application for Livestock Water Tank and Erosion Control Dam
DRS-11 (01/2020)

Received
Jul 31 2023
WATER RESOURCES
STATE ENGINEER
COLO

Application Instructions

For Livestock Water Tank Applications:
This application is required per Section 35-49-106, C.R.S. and must be submitted electronically to the State Engineer's Office Online Form Submission Email account DWRPermitsOnline@state.co.us a minimum of 45 days prior to construction. A filing fee of $15.00 is required for Livestock Water Tanks unless the dam vertical height does not exceed 5 feet and the structure impounds less than 2 acre feet of water. After submitting this form to DWRPermitsOnline@state.co.us, you'll be provided with the payment options.
Livestock Water Tanks are regulated and subject to the authority of the State Engineer consistent with sections 35-49-101 through, 116, C.R.S.

For Erosion Control Dam Applications:
This application is required per Section 37-87-122, C.R.S. and must be submitted electronically to the State Engineer's Office Online Form Submission Email account DWRPermitsOnline@state.co.us a minimum of 45 days prior to construction. A filing fee of $15.00 is required for Erosion Control Dam and after submitting this form to DWRPermitsOnline@state.co.us, you'll be provided with the payment options.
Erosion Control Dams are regulated and subject to the authority of the State Engineer consistent with section 37-87-122, C.R.S.

Additional Information:
Additional information, including beginners guides to Livestock Water Tanks and Erosion Control Dams, is available at www.colorado.gov/water

For Official Use Only

Receipt/Priority Number: 19061 WDID: 0155574
Payment Reference Number: 31559
Date Received: 7/31/23 Date Approved: 11/2/23
Approver's Signature: Corey T. DeAngelis Digitally signed by Corey T. DeAngelis Date: 2023.11.02 11:36:31 -06'00'
Approver's Name: Corey T. DeAngelis

1. Application Type

(●) Livestock Water Tank
Will the structure be used for livestock watering use and no other use? (●) Yes ( ) No

( ) Erosion Control Dam
Will the structure be used to control erosion with no use of the water stored or detained behind the dam? (●) Yes ( ) No

2. Responsible Parties

First Name	Middle Initial	Last Name	Suffix
Jason	E	McGraw	

Name of Company (if applicable): General Shale Brick, Inc.

Phone Number	Email Address
303 435-3279	jason.mcgraw@generalshale.com

Mailing Address	City	State	Zip Code
1845 W. Dartmouth Ave	Denver	CO	80110

3. Contractor Information

First Name: Jason | Middle Initial: E | Last Name: McGraw | Suffix:

Name of Company: General Shale Brick, Inc.

Phone Number: 303 435-3279 | Email Address: jason.mcgraw@generalshale.com

Mailing Address: 1845 W. Dartmouth Ave | City: Denver | State: CO | Zip Code: 80110

4. Name of Dam

Navajo Mine Number 1

5. Dam Location

To determine the location information, please use the Location Spotter at:
https://dwr.state.co.us/Tools/LocationConverter

Water Division: Division 1 (Greeley/South Platte Drainage) | Water District: 01 - South Platte: Greeley to Balzac

PLSS

Q40	Q160	Section		Township		Range		PM	County
SE	NW	31		6	○ N ● S	63	○ E ● W	S	Elbert

GPS Location

- Point taken should be at the crest of the dam above the streamline/outlet
- Datum should be UTM, NAD 83

Zone: Zone 13 | Easting (UTMx): 543912.3 | Northing (UTMy): 4370751.8

6. Tank Dimensions

	Vertical Height (ft)[1]	Length (ft)		Width (ft)		Upstream (Horizontal : 1 Vertical)	Downstream (Horizontal : 1 Vertical)
Dam:	8	190	Crest:	10	Slopes:	3	3

[1] Vertical Height is measured from the elevation of the lowest point of the natural surface of the ground or the invert of the outlet conduit (whichever is lower) where that point occurs along the longitudinal centerline of the dam up to the crest of the emergency spillway of the dam.

7. Reservoir

Stream Name or Water Source: Unnamed

The Water Course must be dry 80% of the time to qualify.

Surface Area (acres)	Capacity (acre-feet)	Drainage Area (acres)[1]
0.3	1.6	6.0

[1] If the drainage area is unknown, leave blank and a spillway size will be assigned

8. Emergency Spillway (See Table 1, Spillway Sizing Guidelines)

Bottom Width (ft)	Side Slopes: (Horizontal : 1 Vertical)	Freeboard (ft)[1]	Location relative to embankment (facing downstream)
15	2	3	(•) Left ( ) Right ( ) No Spillway

[1] Freeboard means the vertical dimension between the crest (or invert) of the emergency spillway and the crest of the dam, the minimum is 3 feet.

9. Outlet Conduit

Material Type

Diameter (inches)

For Livestock Water Tanks

Can all water be drained through a gated or ungated outlet? ( ) Yes (•) No

For Erosion Control Dams

Can water be drained through an ungated outlet leaving no more than 2 acre-feet in storage? ( ) Yes ( ) No

10. Dam Status

( ) Proposed

(•) Existing[1] If existing, when was construction completed? 5-12-2009

[1]These dams may be subject to modification, alteration, repair, or breach consistent with the authority of the State Engineer.

11. Sign and Enter Name of Responsible Individual or Authorized Agent

- Construction must reasonably comply with the attached standard plans and specifications and the claims made in this application. Dam designs completed by a Professional Engineer and submitted with the application may be accepted as an alternative to the standards. If the State Engineer finds that the construction fails to conform with the application and standards, it is the duty of the owner to make changes the State Engineer determines are necessary.
- The making of false statements herein constitutes perjury in the second degree, which is punishable as a class 1 misdemeanor pursuant to C.R.S. 24-4-104 (13)(a). I have read the statements herein, know the contents thereof and state that they are true to my knowledge.

Sign or Enter Name(s) of Responsible Individual(s) or Authorized Agent: Jason McGraw

Date: 7-28-2023

If Signing Enter Name and Title: Jason McGraw Mine Supervisor

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State Engineer Standard Plans and Specifications for Construction of Livestock Water Tank and Erosion Control Dams

- Site Selection
  - Foundation soils should be firm to provide adequate support for the embankment and should have low permeability to allow for water retention. Site selection should consider potential downstream property damage in the event of a dam failure. Construction of dams in boggy areas, areas with non-uniform fractured rock, or sands/gravels is not recommended and an engineer should be hired to evaluate the site conditions. Any part of the reservoir basin excavated below grade cannot expose groundwater.

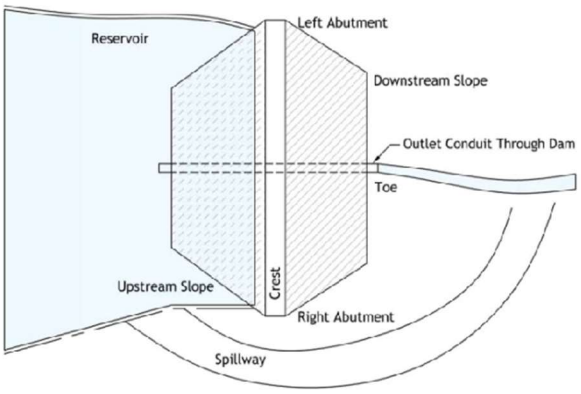
- Embankment Design
  - Backfill material to be used for construction of the cutoff trench and embankment should be a suitable clay material and contain no material larger than 6 inches in diameter.
  - The upstream slope should be constructed with a slope no steeper than 3:1, and the downstream slope should be no steeper than 2:1 (see cross section below). The dam crest should have a minimum width of 10 feet and the surface should be graded with positive drainage toward the reservoir basin.
  - It is recommended that rock rip rap or other suitable material be placed on the upstream slope of the embankment to protect it from wave action. A suitable gravel or geosynthetic material should be placed under the rip rap to prevent fine material from washing out from behind the larger rock.
  - The embankment should be fenced to restrict livestock from accessing the dam since they damage the protective vegetation and increase erosion.

- Embankment Construction
  - The topsoil and all organic material should be removed from the foundation of the proposed dam site. Organic soil should only be reused for placement on the completed embankment to promote the re-growth of vegetation.
  - A cutoff trench should be excavated under the full length of the centerline of the dam with sloping sides (1:1 min.), a minimum bottom width of 3 feet and a depth of 3 feet.
  - The foundation of the dam should be scarified/ripped to a depth of 6-inches to provide proper contact between the native foundation and embankment. This surface should then be moisture treated before placement of fill.
  - Fill material should be placed in layers not exceeding 12 inches in thickness prior to compaction. Suitable backfill material should have enough clay and moisture content to roll a small ball by hand. If this cannot be done, the soil is likely too dry or does not have adequate clay content.
  - Each lift should be thoroughly compacted using a sheeps foot compactor. Care should be taken not to allow the top layers of the soil to dry out between placement of lifts.
  - Fill should be placed in uniform lifts that cover the entire embankment length and width.

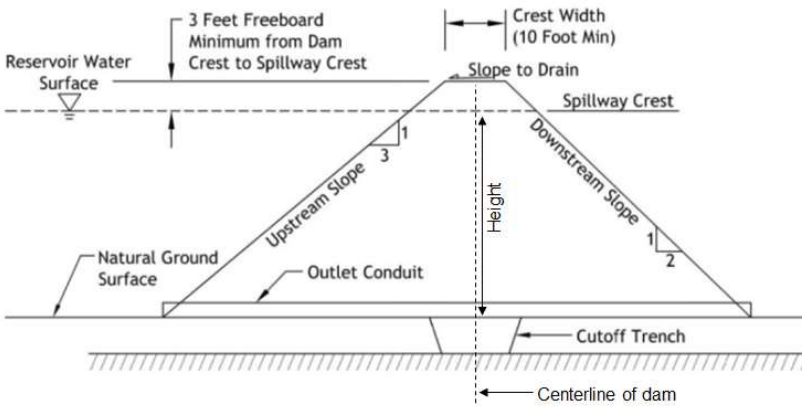
- Outlet
  - A minimum diameter of 12 inches is recommended and should be protected at the upstream end by a trash rack.

- Emergency Spillway
  - The spillway should have sufficient width to provide capacity to route the runoff from the drainage basin above the dam during rainfall/runoff events.
  - A minimum of 3 feet of freeboard is required from the bottom of the emergency spillway to the top of the dam.

- Example Plan View and Cross Section



Plan View



Cross Section

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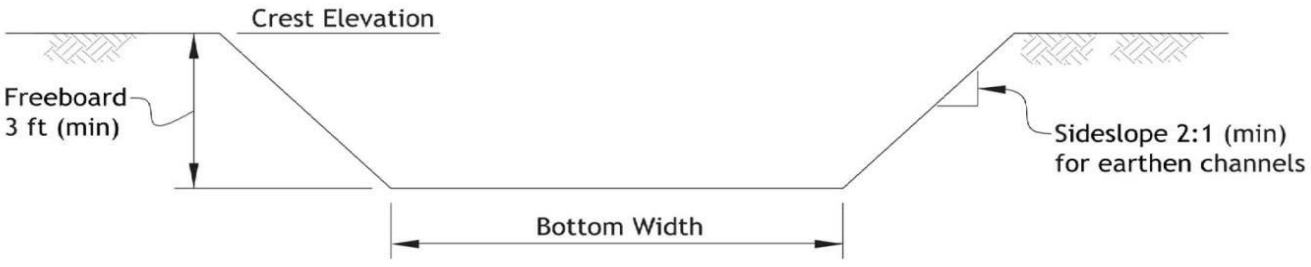
Table 1 Sizing Guidelines for Livestock Water Tanks and Erosion Control Dams

Drainage Area (Acres)[3]	Minimum Recommended Bottom Width[1] (Feet) Low Intensity Rainfall Zone[2]	Minimum Recommended Bottom Width[1] (Feet) High Intensity Rainfall Zone[2]
175	8	8
225	8	10
275	8	12
325	8	15
375	10	17
425	11	19
475	12	21
525	13	24
575	15	26
625	16	28
675	17	30
725	19	33
775	20	35
825	21	37
875	22	39
925	24	42
975	25	44
1025	26	46
1075	28	48
1125	29	51
1175	30	53
1225	31	55
1275	33	57
1325	34	59
1375	35	62
1425	37	64
1475	38	66

[1]Minimum recommended bottom width for drainage areas less than 175 acres is 8 feet
[2]Refer to map of rainfall intensity zones
[3]USGS StreamStats (https://streamstats.usgs.gov/ss) can be used to estimate drainage area if unknown (note: 1 square mile equals 640 acres.



Spillway Section

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Rainfall Intensity Zones for Non-Jurisdictional Dam Spillway Sizing