

## DWR Rules and Regulations Checklist for Dams

**Disclaimer:**

This checklist is not intended to be submitted to DWR. It is provided for your convenience in ensuring your plans are complete and meet DWR requirements. In some cases the Rules and Regs provide for alternatives not shown on the checklist. You should carefully peruse the *Dams Rules and Regulations K.S.A. 82a-301 to 305a (K.A.R. 5-40-1 thru 5-42-5)* to understand the regulatory requirements.

K.A.R	Description	√	Remarks
<b>5-40-2</b>	<b>Plans</b>		
	index		
(a)	Plan View - dam & dam site		
(a)	Plan View - abutments		
(a)	Plan View - downstream		
(a)	Plan View - upstream		
1	axis w/ stations & top width		
2	toes of both slopes		
3	centerline and limits of each open channel spillway		
4	primary spillway and stilling basin		
5	berms		
6	slope protection		
7	borings, test holes, and/or test pits		
8	intakes, outlets, valves, valve wells		
9	description & elevation of each BM		
10	description & details of all foundation drains		
11	limits of each borrow area		
12	location & topography of auxiliary spillway outlet		
(b)	Complete map of drainage area		
1	lat/lon or feet from SE corner		
2	outline of dam and reservoir		
3	watershed boundary		
4	section lines (identify sections)		
5	size of drainage area		
(c)	Topo map scale appropriate		
	Elevation of each contour		
1	location of dam		
2	topography		
A	contours ( ____ ft Interval)		
B	lowest uncontrolled spillway inlet contour		

C	design storm contour		
D	top of dam contour		
E	construction egress/ingress routes		
F	names and addresses of:		
i	dam site land owners		
ii	ingress, egress owners		
iii	landowners to top of dam		
iv	all borrow areas		
G	property lines of multiple owners		
H	all identifying features		
I	easement boundary lines		
J	limits of each borrow area		
(d)	Cross section of the valley		
1	design elevation		
1	overflow elevation		
2	location & elevation of auxiliary or service spillway		
3	original ground surface		
4	cutoff trench (with elevations)		
5	test holes w/material encountered		
(e)	Cross section of the dam		
1	elevation of shoulders & centerline		
1	top width		
2	top elevation of berm		
2	elevation of berm outside shoulder		
2	top width berm		
3	slopes		
4	elevation, location & type of slope protection		
5	embankment zones		
6	settlement allowances		
7	cutoff trench		
8	downstream toe elevation		
(f)	Open channel spillway		
1	plan view showing location, stations & control section		
2	cross section showing side slopes, dimensions & original ground		
3	profile		
3	downstream to flowline of streambed		
3	stationing		
3	stations and elevations of breaks		
3	bottom grade		
3	slope protection elevation		
3	geologic logs		
4	curve data		

(g)	Primary spillway		
1	profile along centerline		
1	location & dimension of seepage control features		
1	existing ground elevations		
1	proposed grade of spillway		
2	plan of the stilling basin, supports & other features		
2	profile of the stilling basin, supports & other features		
2	x-section of the stilling basin, supports & other features		
3	geologic logs near primary spillway		
4	bedding material		
5	table of (concrete) pipe grades		
6	conduit joint details		
(h)	Capacity storage table		
(i)	Discharge table(s)		
(j) 1	Drain details (3 views)		
2	permanent erosion control (3 views)		
3	details of stilling basins, outlets, etc. (3 views)		
(k) 1	drain gradation table		
2	riprap gradation table		
<b>5-40-2a Benchmarks</b>			
(a)	2+ permanent benchmarks		
1	secure location		
2	each end along centerline if practical		
2	undisturbed soil		
(b)	high impact dams		
1 A	hole diameter > 12 inches		
B	hole depth > 42 inches		
2	bar size 3/8" x 36"		
3	metal survey marker cap		
4	witness post or signs or objects		
(c)	Low impact dams		
1	Bar size 1/2" x 36"		
2	protected location		
3	witness post or signs or objects		
<b>5-40-2b Design reports</b>			
(a)	Design report documents every major element & condition including:		
1	slope protection - embankment		
1	slope protection - auxiliary		
2	hazard class documented		

3	geotech report (include test results)		
4	embankment design documentation		
5	hydrological documentation		
6	general plan conformity (WJD's)		
7	foundation design		
7	cutoff trench design		
8	drain design		
9	pipe bedding design (loading)		
10	stilling basin design		
11	flood routing documentation		
12	diaphragm design		
13	other relevant information?		
(b)	high impact dams		
1	auxiliary or service spillway analysis		
2	slope stability analysis		
3	embankment settlement analysis		
<b>5-40-3 Specifications</b>			
(a)	Sufficiently detailed		
1	excavation procedure		
2	placement and compaction of fill		
3	dewatering		
4	concrete and rebar		
5	all conduits (pipes)		
6	permanent erosion control		
7	drains & seepage control		
8	seeding and fencing		
	index		
<b>5-40-20 Hazard Class</b>			
			Class -
<b>5-40-21 Class Size of Dam</b>			
			Size -
<b>5-40-22 Design Requirements for Construct</b>			
<b>5-40-23 Detention Storage</b>			
			Detention Storm -
<b>5-40-24 Dam Breach Analysis</b>			
<b>5-40-40 Geotechnical (all dams)</b>			
(a)	sufficient investigation		
(b)	designed by licensed and competent professional		
(c)	description & method of investigation included in design report		
(d)	uniform soil classification used		
(e)	geology incorporated into design		
(f)	1/2 height of dam + 5 ft or to bedrock		
(g)	static H <sub>2</sub> O level recorded		
(h)	number of holes sufficient (auxiliary)		

(i)	number of holes sufficient (borrow)		
<b>5-40-41</b>	<b>Geotechnical (Low impact dam)</b>		
(a)	average 1 hole / 200 ft ( 3 minimum)		
<b>5-40-42</b>	<b>Geotechnical (high impact dam)</b>		
(a) 1	average 1 hole / 100 ft ( 3 minimum)		
2 A	near base of drop inlet		
B	near outlet support		
(b)	undisturbed sample tested		
(c) 1	atterburg limits		
2	settlement characteristics		
3	procter curves		
4	gradation tests of foundation material		
5	other		
<b>5-40-43 Cutoff trench</b>			
(a) 1	side slopes < 1:1		
2	bottom width > 10 feet		
3	depth justified in design report		
4	most impervious backfill material		
5	homogenous backfill material		
6	each lift < 9 inches		
7	acceptable moisture		
<b>5-40-44 Embankment</b>			
(a)	minimum top width based on height		
(b)	sloped top		
(c)	each lift < 9 inches		
(d)	specifications for compaction (low-impact)		
1	sheepsfoot		
2	rubber-tired		
3	other method		
(e)	specifications for compaction (hi-impact)		
1	allowable soil moisture met		
2	compaction standards		
3	provisions for testing soil		
4	assurance that compactions met		
(f)	Hand compaction		
1	max lift 1/3 diameter of pipe but < 4 inches		
2	minimum distance around conduit		
<b>5-40-45 Settlement</b>			
(a)	for hi-impact dams settlement based on soil mechanics report ( included within design report)		

(b)	for lo-impact dams settlement allowance > 5%		
<b>5-40-46</b>	<b>Side slopes</b>		
(a)	stable and easily maintained		
(b)	slope stability analysis for hi-impact		
(c)	factor of safety		
(d)	wind erosion protection		
(e)	side slope steepness		
<b>5-40-50</b>	<b>Pipes</b>		
(a) 1	withstand external loading		
2	resist flotation		
3	water tight joints & seams		
4	sufficient slope		
5	hi-impact dam alignment & slope		
6	extended sufficient distance		
7	adequate support of discharge end		
8	excavate detention storage in 14 days		
(c)	depth of fill over pipe		
(d)	protective coating for metal pipe?		
(f) 1	maximum fill over any PVC		
2	High plastic soil?		
3	exposed pipe protected from sunlight		
(g) 1	pipe life > 25 years		
2	pipe manufacturer specs included in specifications and documented in the design report		
3	pipe manufacturer specs for bedding supporting and installing pipe included in specifications and documented in the design report		
4	Design report includes pipe life estimate,		
4	Design report includes life of dam estimate		
4	Design report includes plan to replace pipe if needed		
5	design report shows pipe(s) meet sound engineering practice		
<b>5-40-51</b>	<b>Acceptable trash rack</b>		
(b)	acceptable design		
<b>5-40-52</b>	<b>Stilling basin design</b>		
(a) 1	constructed stilling basin		
2	other energy dissipation device		
(b)	designed to reduce erosion of basin and outlet channel		
(c)	invert >12" above tailwater		

<b>5-40-53</b>	<b>Drawdown Pipe</b>		
(a)	valve		
(a)	accessible		
(a)	protected from freezing		
(c)	pipe > 4 inches & drain 90% of permanent pool in < 14 days		
<b>5-40-54</b>	<b>Seepage Control</b>		
(a)	drainage diaphragm or cutoff collars		
(b) 1	largest face perpendicular to conduit		
2	correctly sized for specific pipe		
3	width parallel to conduit >3 feet		
4	located correctly		
4	fill over top > 2 feet		
5	positive drainage of diaphragm		
5	outlet > 0.5' above stilling basin outlet		
(c)	cutoff collars		
1	same material as conduit		
2	watertight attachment		
3	increase seepage path by 15%		
4	properly spaced		
5	located in saturated zone		
6	project > 2 feet from outside of pipe		
7	located > 2 feet from joint(s)		
(d)	location justified in design report		
<b>5-40-55</b>	<b>Auxiliary Spillway</b>		
(a)	Wing dike		
(b)	armor		
(c)	side slopes		
(d)	supercritical velocity		
(d)	level section >30 feet		
(e)	depth > 3 feet		
(f)	smooth entrance channel		
(g)	minimally erosive outlet		
<b>5-40-56</b>	<b>exit velocity</b>		
(a)	Maximum velocity		
<b>5-40-70</b>	<b>Construction Notification</b>		
<b>5-40-71</b>	<b>Construction Inspection</b>		
<b>5-40-73</b>	<b>Emergency Action Plan</b>		
<b>5-40-77</b>	<b>Easements</b>		