MINIMUM GUIDELINES
FOR DESIGN AND CONSTRUCTION OF
SMALL EMBANKMENT DAMS*
IN AMADOR COUNTY

ISSUED APRIL, 1985
REVISED AUGUST, 1987
REVISED OCTOBER, 1990

by Amador County
Department of Water Resources

*FOR DAMS NOT UNDER STATE JURISDICTION BUT GREATER THAN 6 FEET IN HEIGHT
RULES AND REGULATIONS
FOR CONSTRUCTION OF
SMALL DAMS
IN
AMADOR COUNTY

TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>PURPOSE AND SCOPE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td></td>
</tr>
<tr>
<td>A. Administrative Procedures</td>
<td>1</td>
</tr>
<tr>
<td>B. Definitions</td>
<td>2</td>
</tr>
<tr>
<td>C. Application</td>
<td>3</td>
</tr>
<tr>
<td>D. Environmental Considerations</td>
<td>3</td>
</tr>
<tr>
<td>11. DAM SIZE AND JURISDICTION</td>
<td></td>
</tr>
<tr>
<td>A. Safety</td>
<td>4</td>
</tr>
<tr>
<td>B. Water Rights</td>
<td>4</td>
</tr>
<tr>
<td>C. Fish and Game</td>
<td>5</td>
</tr>
</tbody>
</table>

APPENDIX A       MINIMUM GUIDELINES

1. Foundations and Construction Materials  1
2. Embankment Design                      i
3. Spillway                                ii
4. Outlets                                iii

APPENDIX B       GUIDE SPECIFICATIONS

(See Chapter VI of "Guidelines for the Design and Construction of Small Embankment Dams" by the State Division of Safety of Dams)
RULES AND REGULATIONS
FOR CONSTRUCTION OF
SMALL DAMS
IN
AMADOR COUNTY

PURPOSE AND SCOPE

The purpose of these rules and regulations is principally to safeguard life, limb, property and public welfare by regulating construction of small dams on private property and to establish standards and procedures so as to minimize hazards to life and limb; protect against erosion; maintain the natural environment; and protect the safety, use and stability of public rights-of-way and drainage ways.

The requirements illustrated apply specifically to small dams in those rural areas where downstream hazards are minimal.

The engineering requirements apply to a hypothetical, specific dam at a specific site. Conditions and materials vary from site to site so it is important to recognize that any specific specification and drawing included herein could not apply without modifications in an actual case.

I. INTRODUCTION

A. Administrative Procedures

Construction of a dam shall not begin until the owner has applied for and obtained from the County Building Department, written approval of his application with written conditions and requested inspection.
All barriers greater than three (3) feet or which require moving a volume of earth fifty (50) cubic yards or more, are subject to a County grading permit (Chapter 70 of the Uniform Building Code).

All barriers will require approval from the State Department of Fish and Game.

All barriers that store water, regardless of size or season, will require a permit from State Division of Water Rights.

Barriers greater than six (6) feet in height, measured vertically from the lowest elevation of the outside limit of the dam to maximum possible water storage elevation, will have conditions placed on the County grading permit. Typical conditions shall be, but not be limited to, a., the dam shall be designed and inspected by a licensed Civil Engineer or qualified Soil Conservation Engineer, which includes plans and specifications, and b., the responsible Engineer shall act as special inspector as per Uniform Building Code, Section 306.12.

B. **Definitions**

In Amador County, "Dam" means any artificial barrier greater than three (3) feet in height, together with appurtenant works, if any, in or across a stream channel, water course, or natural drainage area, which does or may impound or divert water. A road fill without a free flowing culvert at or within three (3) feet of the natural flowing grade constitutes a dam or barrier. A road fill (greater than three (3) feet in height) with a culvert which will not pass the 100 year flood event without overtopping the barrier also constitutes a dam.
C. Application

STEP 1. File an application for a water right with the State Water Resources Control Board, Division of Water Rights, 901 P Street, Sacramento, California 95810.

STEP 2. If barrier is to be State size (see Figure 2) file an application, in duplicate, with the Department of Water Resources, Division of Safety of Dams.

STEP 2. Have State Fish and Game Environmental Services approval by calling Region 2 office (phone 916-355-7030). An on-site inspection may be required and verified by a Fish and Game officer.

STEP 4. After steps 1, 2 and 3 have been completed, apply for a grading permit from the County Building Department. When a permit is issued, it will have certain conditions of approval depending on size of dam.

STEP 5. Check with the Fish and Game and Division of Water Rights as to whether an Environmental Impact Document is required.

STEP 6. Abide by the conditions set forth in the permit.

STEP 7. Submit any required plans and specifications to the County Building Department for their files. For those dams requiring engineered plans and specifications, construction work shall be under the responsible charge of a Registered Civil Engineer.

D. Environmental Considerations

Depending on the location, size and potential impact of the proposed dam, an Environmental Impact Document may be required by State Fish and Game and/or State Division of Water Rights.
II. DAM SIZE AND JURISDICTION

A. Safety

Division 3 of the California Water Code placed the supervision for safety of all dams and reservoirs larger than a minimum size under the jurisdiction of the State Department of Water Resources, Division of Safety of Dams (see Figure 2). These County rules and regulations are intended for small dams which are not under the jurisdiction of the State Division of Safety of Dams. An application for approval of plans and specifications must be filed with State Division of Safety of Dams in duplicate, by the owner or his duly appointed representative for dams which will be 25 feet or more in height, or which will have an impounding capacity of 50 acre-feet or more. Barriers less than twenty-five (25) feet in height or which have a storage capacity less than 15 acre-feet will require County permit (see Figure 2).

B. Water Rights

Application must be filed with State Division of Water Rights by:

Anyone who intends to divert water from surface streams and other surface bodies of water and in subterranean streams flowing through known and definite channels either directly for use on non-riparian land or to storage in a reservoir for later use on either riparian or non-riparian land or for retention in the reservoir.
C. Fish and Game

Owner must obtain clearance from State Department of Fish and Game. County may verify approval with local official.
APPENDIX A
APPENDIX A

1. FOUNDATIONS AND CONSTRUCTION MATERIALS

Soil exploration and testing is necessary to determine depth to adequate foundation, if depth to adequate foundation exceeds twelve (12) feet, drilling will probably be required.

The foundation needs to be analyzed for soil strength AND erosiveness in the area of the embankment, the outlet works and the spillway. This includes mechanical analysis, liquid and plastic limits, soil density test and compaction tests. The foundation materials should have strength properties equal to or greater than that of the embankment. The entire area under the embankment should be stripped of all debris, vegetation, top soil, and loose rock.

2. EMBANKMENT DESIGN

The embankment impervious core must have a thickness at its base equal to at least one-half the height of the dam or a minimum of 14 feet (see Figure 2). The slopes can be 3:1 upstream and 2:1 downstream, if the foundation is strong, otherwise flatter slopes should be considered.

Embarkment soil must be compacted to an average relative compaction of 97 percent (based on ASTM D-698) in low seismic areas. Proper compactions will normally require soil moisture contents near optimum, utilizing 6-inch compacted lifts and requiring at least 12 passes with a tamping roller with a weight of at least 2,400 pounds per lineal foot.
The embankment crest width shall be at least 12-feet with a 3 percent slope toward the reservoir and a 1-foot camber.

For embankments on other than bedrock foundations, there must be a cut-off trench under the central portion of the dam section. The cut-off should have side slopes no steeper than 1:1 for depths up to 12 feet, and no steeper than 1-1/2:1 for greater depths. The bottom width of the trench should be equal to one-half the height of the dam or a minimum of 14-feet with a depth extended to bedrock or to an impervious strata to prevent seepage.

3. **SPILLWAY**

A spillway should be located sufficiently apart from the dam to prevent erosion of the embankment. A non-erosive (such as bedrock) barrier between the dam and the spillway would be adequate. A spillway over the dam embankment is not acceptable. The minimum spillway design flood should have a return period of at least 100 years.

The minimum freeboard should be 3 feet from crest of spillway to crest of dam.

The minimum residual freeboard (spillway design flood stage to dam crest) should be 1.5 feet.

When the spillway is located on soil or deeply weathered rock, the entire length of the spillway should be concrete or gunite lined with an energy dissipator.
4. **OUTLETS**

A low level outlet is required for emptying or lowering the reservoir in case of emergency, for inspection and maintenance and for meeting downstream water rights. The outlet should be located near the base of one of the abutments on native competent material (97 percent of ASTM D-698), preferably bedrock. The conduit should be sized to drain, by gravity, two-thirds the volume of the reservoir and discharge one-half of the reservoir capacity in a period of seven days. In no case shall the minimum pipe diameter be less than 12 inches. Only appropriate types of outlet conduits are allowed - precast reinforced concrete, cast-in-place reinforced concrete or suitable plastic. Precast pipe should have a reinforced concrete bedding and concrete backfill up to the springline of pipe. The bottom of the conduit trench should be at or lower than the bottom of the dam embankment cut-off trench. All outlet conduits should be designed for internal pressure equal to the full reservoir head and for superimposed embankment loads, separately.