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HORSESHOE DRAW FLOOD CONTROL, RESTORATION AND EROSION MITIGATION STUDY AND DESIGN PROJECT

VOLUME 5
REMEDIAL DESIGN ALTERNATIVES
FEASIBILITY STUDY

COCHISE COUNTY, ARIZONA

Prepared for:

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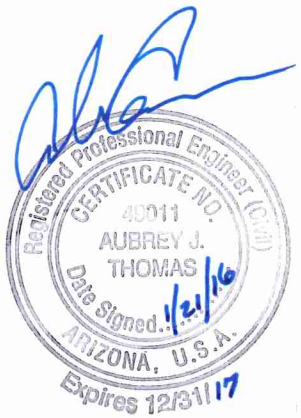

January, 2016
HilgartWilson Project No. 1472

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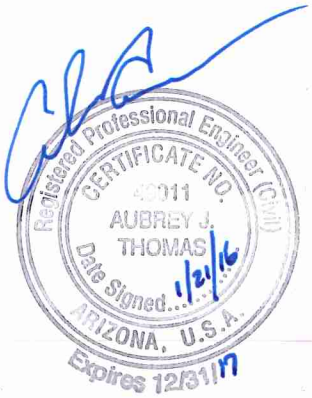

VOLUME 5
REMEDIAL DESIGN ALTERNATIVES FEASIBILITY STUDY

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1. INTRODUCTION

1.1. PROJECT DESRIPTION

This study has been prepared for the Hereford Natural Resource Conservation District (NRCD), who has identified the need for a project which will significantly reduce flooding, erosion and soil loss, as well as road and property damage in and adjacent to the ephemeral Horseshoe Draw (the Project). In order to complete such a project, the Hereford NRCD was awarded a grant from the Arizona Department of Water Resources (ADWR) through the Arizona Water Protection Fund Program. In turn, HILGARTWILSON has been contracted under the Water Protection Fund grant for professional engineering services.

1.2. LOCATION

The study area spans the border between the United States and Mexico roughly 7 miles west of Naco, Arizona/Sonora. The section of the study area located in the US lies within Township 24 South, Range 22 East of the Gila and Salt River Base and Meridian within the Upper San Pedro Basin in Cochise County, Arizona. The watershed of the Project originates in the Sierra San Jose mountains in Mexico and extends to the confluence of Horseshoe Draw and the San Pedro River, located just south of Highway 92. The Project's location is highlighted in Figure 1 (Vicinity Map) of Appendix A.

1.3. PURPOSE

The purpose of this report is to discuss the Project's overall needs and to evaluate potential remedial alternatives that will help mitigate some or all of the project's objectives. Based on the findings of this report, the chosen design alternative will be analyzed and compared to the existing conditions criteria from the previous reports. Volumes 1-4, prepared by HILGARTWILSON and submitted to the NRCD, will serve as a baseline comparison for the future analyses and are summarized in Section 2.

2. EXISTING CONDITIONS REPORTS

Previous reports have been prepared for the NRCD, detailing the hydrologic and hydraulic conditions, as well as estimates for the sediment transport and recharge potential of various storm events for the existing conditions. An overview of each report with pertinent details is discussed in the following sections to provide a background for the chosen Project objectives.

2.1. VOLUME 1 - HYDROLOGIC STUDY

Volume 1, Existing Conditions Hydrologic Study (Volume 1) (HILGARTWILSON 2015a) provides a hydrologic analysis for the Project's existing conditions. The report analyzes the watershed runoff from roughly 17 square miles of undeveloped rangeland stretching from the Sierra San Jose Mountains to the Sand Pedro River and provides a basis of flows used in the subsequent hydraulic analysis. The study also determines the total volume of runoff passing through various concentration points and reaches within the watershed. It was found that an approximate 470 acre-

feet of volume with a peak flow rate of 4,820 cubic feet per second (cfs) pass through the proposed location of the impoundment structure during the peak 100-year storm event. The location of the proposed, conceptual impoundment structure can be seen in Figure 2 (100-Year Floodplain Map) of Appendix A.

2.2. VOLUME 2 - HYDRAULIC REPORT

Hydrologic results from Volume 1 were used in the analysis reported in the *Volume 2, Existing Conditions Hydraulic Report* (Volume 2) (HILGARTWILSON 2015b). The analysis models various storm events and maps the 100-year floodplain inundation limits which are compared to the effective Federal Emergency Management Agency (FEMA) mapping. The study shows the modeled 100-year floodplain to be narrower than the FEMA mapping due to the extensive incising occurring within the wash as a result of the erosive nature of the flows. Figure 2 shows the existing FEMA floodplain compared to the 100-year floodplain determined in Volume 2.

2.3. VOLUME 3 - SEDIMENT TRANSPORT ANALYSIS

Due to the significant erosion observed in the main wash, *Volume 3, Existing Conditions Sediment Transport Analysis* (Volume 3) (HILGARTWILSON 2015c) was prepared to estimate the volume of sediment deposition downstream for various storm events. In order to perform the sediment transport calculations, characterization of local geotechnical conditions was required.

In October 2015, geotechnical analysis for the Project was conducted by Ninyo & Moore, and reported in the *Geotechnical Evaluation, Horseshoe Draw Basin* (Ninyo & Moore 2015). The purpose of the geotechnical evaluation was to assess the subsurface conditions at the project site in order to provide geotechnical recommendations for design and construction of the impoundment structure. The geotechnical evaluation included soil borings, shallow field infiltration tests, and laboratory testing evaluating the soil properties such as; moisture content, dry density, gradation, and Atterberg limits. The report stipulated that local material could be used for the construction of an embankment but exhibited a potential for collapse if inundated with water. Therefore, the material and embankment may require further engineering such as manipulation of the material, addition of geotextile reinforcement, and/or other design solutions for bank stabilization. Pertinent excerpts from the geotechnical evaluation report have been included in Appendix B.

Soil characteristics determined from the geotechnical investigation near the proposed impoundment structure are used in the sediment transport analysis. The results obtained in Volume 3 compared to the future proposed conditions analysis will show that the future impoundment structure reduces the damages and impacts caused by erosion affecting the site downstream.

2.4. VOLUME 4 - RECHARGE POTENTIAL ANALYSIS

It was determined that an additional benefit of the proposed impoundment structure would be the increased groundwater recharge potential based on ADWR's assertion that observed groundwater elevations of the Upper San Pedro Basin aquifer were declining, resulting from a growing population and increased water demand (ADWR 2014). *Volume 4, Existing Conditions Recharge Potential Analysis* (Volume 4)

(HILGARTWILSON 2015d) estimates the volume of infiltration possible in the channel bottom of the main wash of Horseshoe Draw. The total infiltration volumes determined in Volume 4 compared to the future proposed conditions analysis will show that the impoundment structure will effectively slow the rate of discharge to downstream waters by detaining surface water runoff and subsequently, increase groundwater recharge to the local aquifer.

3. PROJECT REMEDIAL OBJECTIVES

Remedial objectives (ROs) are listed below to help mitigate damages, to the maximum extent practicable, for areas affected by flooding and erosion in and near the Project. The ROs are used to help determine the most appropriate design alternative that will meet the projects goals in a feasible and effective way. The ROs determined for the Project are:

- reduce road and property damage near Horseshoe Draw by limiting flooding, erosion, and soil loss on the watershed resulting in sediment flows into the San Pedro River; and
- increase groundwater recharge by slowing the rate of discharge to downstream waters.

4. EVALUATION CRITERIA

For the purposes of this report, the selected alternatives are evaluated and screened according to the criteria listed below and are described in the following sections:

- reduction of flooding;
- reduction of erosion;
- groundwater recharge to aquifer;
- regulatory requirements;
- implementability; and
- cost.

4.1. REDUCTION OF FLOODING

The effectiveness of reduction in flooding of the design alternative is evaluated based on the handling of the watershed runoff. Specifically, it will consider the potential flows resulting from each alternative and the extents of flooding and damage that may occur. The effectiveness of reduction of flooding is rated from low, moderate, or high effectiveness.

4.2. REDUCTION OF EROSION

The effectiveness of reduction in erosion is evaluated based on the reduction in sediment carried downstream and soil loss from the watershed. Similar to the flooding criterion, the effectiveness of reduction of erosion is rated as low, moderate, or high effectiveness.

4.3. GROUNDWATER RECHARGE TO AQUIFER

The estimated volume of recharge to the aquifer is considered for the design alternative. Groundwater recharge is considered to be beneficial based on the declining groundwater elevations within the Upper San Pedro Basin aquifer. This criterion is based on the volume of stormwater runoff that could recharge the aquifer. The greater the potential volume of recharge is, the more desirable the alternative.

4.4. REGULATORY INVOLVEMENT

The required permitting and regulatory oversight for the alternative is considered based on the level of effort for permitting, regulatory review times, initial and periodic inspections, reporting, and permit renewals. Regulatory involvement is rated as low, moderate, and high involvement.

4.5. IMPLEMENTABILITY

Evaluation of the implementability of the alternative will be based on the availability of labor and services, materials, and mobilization effort to site. Implementability is rated as low, moderate, and high; ranging from difficult implementation (low) to easy implementation (high).

4.6. COST

The cost is considered for each alternative based on initial capital costs including design permitting, and construction. Also included in the evaluation criterion is the estimated annual operation and maintenance level of efforts and any other costs that may be incurred throughout the life cycle of the alternative.

5. REMEDIAL DESIGN ALTERNATIVES

This report documents the evaluation of the feasibility of design alternatives which will mitigate damages caused by flooding and erosion to the Project. Consultation with ADWR discussing the applicability and general requirements of various options helped refine the list of potential alternatives evaluated which are listed below.

- Alternative 1 - Do Nothing
- Alternative 2 - Jurisdictional Dam
- Alternative 3 - Jurisdictionally Exempt Structure(s)
- Alternative 4 - Combination Embankment and Basin(s)

5.1. ALTERNATIVE 1: DO NOTHING

The Do Nothing alternative is based on no action being taken to mitigate damage caused by flooding and erosion, used as a baseline for comparison which requires no human intervention.

5.2. ALTERNATIVE 2: JURISDICTIONAL DAM (STRUCTURE)

The installation of a jurisdictional dam involves the design and construction of a large impoundment structure. The ADWR defines a jurisdictional dam as; an artificial barrier for the impounding or diversion of water, either 25-feet or more in height

and/or having a storage capacity of more than 50 acre-feet. The volume generated from the 100-year peak flow at the location of the proposed impoundment structure would require 470 acre-feet of storage, subjecting the structure to regulatory oversite governed by; *Arizona Revised Statutes (A.R.S.) Title 45 – Waters, Chapter 6., Article 1. Supervision of Dams, Reservoirs, and Projects* as well as *Arizona Administrative Code (A.A.C.) Title 12. Natural Resources, Chapter 15. Department of Water Resources, Article 12. Dam Safety Procedures*. Although, the construction of new dams is prohibited according to *A.R.S Title 45 – Waters, Chapter 15., Article 4. Dams Within Gila River Maintenance Area*, the statute does not apply to flood control structures. For this Project, according to the A.R.S. and the A.A.C., the dam would be classified as "small" and have a "low" hazard classification. Applicable Arizona statutes and code have been included as Appendix C for reference. Since the construction of the dam will be located in the wash, a Clean Water Act (CWA) Section 404 permit issued by the United States Army Corps of Engineers (USACE) as well as a CWA Section 401 permit issued by the Arizona Department of Environmental Quality (ADEQ) will be required. The structure will need to release all the detained storage within a 24-hour period to avoid becoming an ADWR water rights Issue requiring an application to appropriate public water. A conceptual location and layout of a jurisdictional dam can be seen on Figure 3 (Conceptual Jurisdictional Dam Exhibit) of Appendix A.

5.3. ALTERNATIVE 3: JURISDICTIONALLY EXEMPT STRUCTURE(S)

The installation of an exempt (non-jurisdictional) impoundment structure(s) involves the design and construction of a smaller embankment(s) that does not meet ADWR's definition of a jurisdictional dam. An exempt structure is classified as having an embankment less than 6 feet in height downstream from the crest to the toe of the embankment (no storage restriction) or a storage capacity of less than 15 acre-feet (no height restriction) or a combination of a maximum embankment height of 25-feet and a maximum storage capacity of 50 acre-feet. The impoundment structure(s) would not detain all of the watersheds runoff of larger storms, but could potentially reduce flows and sediment transported downstream. The structure(s) would be exempt from regulation under the A.R.S. and A.A.C. (Appendix C) and would not require permitting or oversite once built. However, the structure(s) would require the submittal of a maintenance plan to ADWR. Just like Alternative 2, all detained stromwater would need to be released within a 24-hour period to avoid ADWR water rights issues. However, the structure would require CWA permits issued by the USACE and the ADEQ. Figure 4 (Conceptual Exempt Embankment Exhibit) of Appendix A details the conceptual layout of the exempt structure.

5.4. ALTERNATIVE 4: COMBINATION EMBANKMENT AND BASIN(S)

Similar to Alternative 3, a smaller, exempt structure (Figure 4) would be constructed, combined with the excavation of an in-line or appurtenant detention basin. The top of the structure would be either less 6 feet in height on the downstream side from the crest to the toe of the embankment (no storage restriction) or have a storage capacity of less than 15 acre-feet (no height restriction) or a combination of a maximum embankment height of 25-feet and a maximum storage capacity of 50 acre-feet. The excavated basin below the ground surface elevation on the downstream side of the toe of the embankment would not have a maximum storage capacity. Storage detained above the ground surface on the downstream side of the toe of the embankment would be limited to 50 acre-feet. As with Alternatives 2 and

3, all detained water, above and below the ground surface, would need to be released within 24-hours in order to avoid surface water rights issues. A series of embankments and basins may be needed in order to effectively reduce flows downstream while not being subjected to Jurisdictional Dam regulations. The same regulatory permits would be required from the USACE and the ADEQ mentioned in Alternatives 2 and 3.

6. COMPARATIVE ANALYSIS

The comparison of the four remedial alternatives to the evaluation criteria is detailed in Table 1 on the following page.

Table 1: Remedial Alternatives Evaluation				
Evaluation Criteria	**Alternative 1 - Do Nothing**	**Alternative 2 - Jurisdictional Structure**	**Alternative 3 - Jurisdictionally Exempt Structure(s)**	**Alternative 4 - Combination Embankment and Basin**
Reduction in Flooding	**Low** - This alternative will not meet project ROs.	**High** - A jurisdictional dam will meet the Project's ROs, greatly reducing downstream impacts.	**Low** - The structure may have little impact on amount of damage incurred downstream from storm events due to the small storage capacity of the jurisdictionally exempt dam.	**Low to Moderate** - The combination of an embankment and basin has the potential to reduce negative downstream impacts, helping meet Project ROs for smaller storm events but may have limited effectiveness during larger storm events.
Reduction in Erosion	**Low** - Same as above	**High** - Same as above	**Low** - Same as above	**Low to Moderate** - Same as above
Groundwater Recharge to Aquifer	**Low** - Same as above	**High** - A jurisdictional dam will meet the Project's ROs detaining most, if not all, of the watersheds runoff, greatly increasing groundwater infiltration at the location of the dam.	**Low** - The structure may have little impact during larger storm events due to the small storage capacity and amount of flow bypassing the structure. This option may have little influence in helping achieve the Project ROs.	**Low to Moderate** - The combination of an embankment and basin will help meet the Project's ROs detaining a significant portion of the watersheds runoff, increasing groundwater infiltration at the location and downstream of the embankment and basin.
Regulatory Requirements	**Low** - Since no action is being taken, there will be no regulatory involvement.	**High** - A jurisdictional dam requires a great deal of permitting and approval prior to construction. Application completeness and substantive review times are significant as well. Rigorous inspections and oversite are required with regular reporting after the construction of the dam has been completed. USACE 404 and ADEQ 401 permits would also be required.	**Low to Moderate** - The design and construction of the structure(s) will require the submittal of a maintenance plan but would not be subject to permitting, annual inspections, or other regulations as it will be considered a jurisdictionally exempt structure. However, USACE 404 and ADEQ 401 permits would be required.	**Low to Moderate** - The combination of an embankment and basin(s) will not require review or approval by regulators as it will be considered a jurisdictionally exempt structure. A maintenance plan would need to be submitted to ADWR and periodic maintenance may be required to ensure the structure functions properly but would not involve regulatory inspections. However, USACE 404 and ADEQ 401 permits would be required.

Table 1: Remedial Alternatives Evaluation				
Evaluation Criteria	**Alternative 1 - Do Nothing**	**Alternative 2 - Jurisdictional Structure**	**Alternative 3 - Jurisdictionally Exempt Structure(s)**	**Alternative 4 - Combination Embankment and Basin**
Implementability	**High** - Since no action is being taken, there will be nothing to implement.	**Low** - The level effort to design the dam will require a great amount of coordination and time. After the design of the dam is finalized and has been approved for construction, mobilization of equipment to the site and man hours involved will be considerable, due to the remote location and magnitude of the Project. Local material may be used for construction but additional materials not found locally may be required in order to build the structure.	**Moderate to High** - The level effort to design the structure(s) would be much less compared to the jurisdictional dam. The design, equipment, and man hours required would be greatly reduced as well. The remote location will still be a factor but local materials on site could be readily utilized with less dependence on outside sources.	**Moderate** - The effort to design the embankment and basin would be less than the jurisdictional dam. The design of the alternative along with the equipment, and man hours required will fall somewhere between the jurisdictional dam and the exempt structure(s). The remote location will still be a factor but materials excavated from the basin can be used to construct the embankment.
Cost	**Low** – Flooding and erosion will continue to occur resulting in continued maintenance of the affected areas of the wash.	**High -** Due to the scale of the project and the scope of work, the cost of design, permitting, construction, and annual operation and maintenance will be extremely high.	**Low to Moderate** - The cost of design, permitting, and construction will be fractional compared to the jurisdictional dam and would not require annual operation and maintenance. However, with minimal storage and embankment height, the structure(s) would be susceptible to overtopping and failure, possibly requiring maintenance and repairs after larger storm events.	**Moderate to High** – Depending on the size and quantity of embankments and basins, the capital cost of construction will be comparable to the jurisdictional dam due to excavation, but would not be subject to rigorous reporting, permitting, and expensive operation and maintenance costs.

7. PROPOSED REMEDY

HILGARTWILSON recommends Alternative 4, the construction an embankment and in-line or appurtenant basin(s) based on dialogue with the ADWR and the design alternatives evaluation of this report with further justification discussed below.

It has been determined in this study that Alternative 1 is not desirable as it does not help meet the Project ROs and would continue to affect the residents, town, and county requiring continued maintenance and associated costs. Conversely, while Alternative 2 does meet all of the Project ROs, the regulatory involvement, implementability, and extremely high costs make this an unrealistic option. Alternative 3 is a viable option based on lower levels of efforts for design, permitting, considerably lower capital costs, and minimal operation and maintenance. However, this option would provide little help to mitigate damages to roads and properties from flooding and erosion during storm events based on the limited storage capacity. Alternative 4 can help meet the Project ROs for smaller storm events but may incur continuing erosion and property damage during larger, more exceptional, events. There would be limited regulatory requirements pertaining to the design and construction of the embankment and detention basin(s). A reasonable level of effort for design and implementation would be required resulting in slightly higher capital costs.

8. REFERENCES

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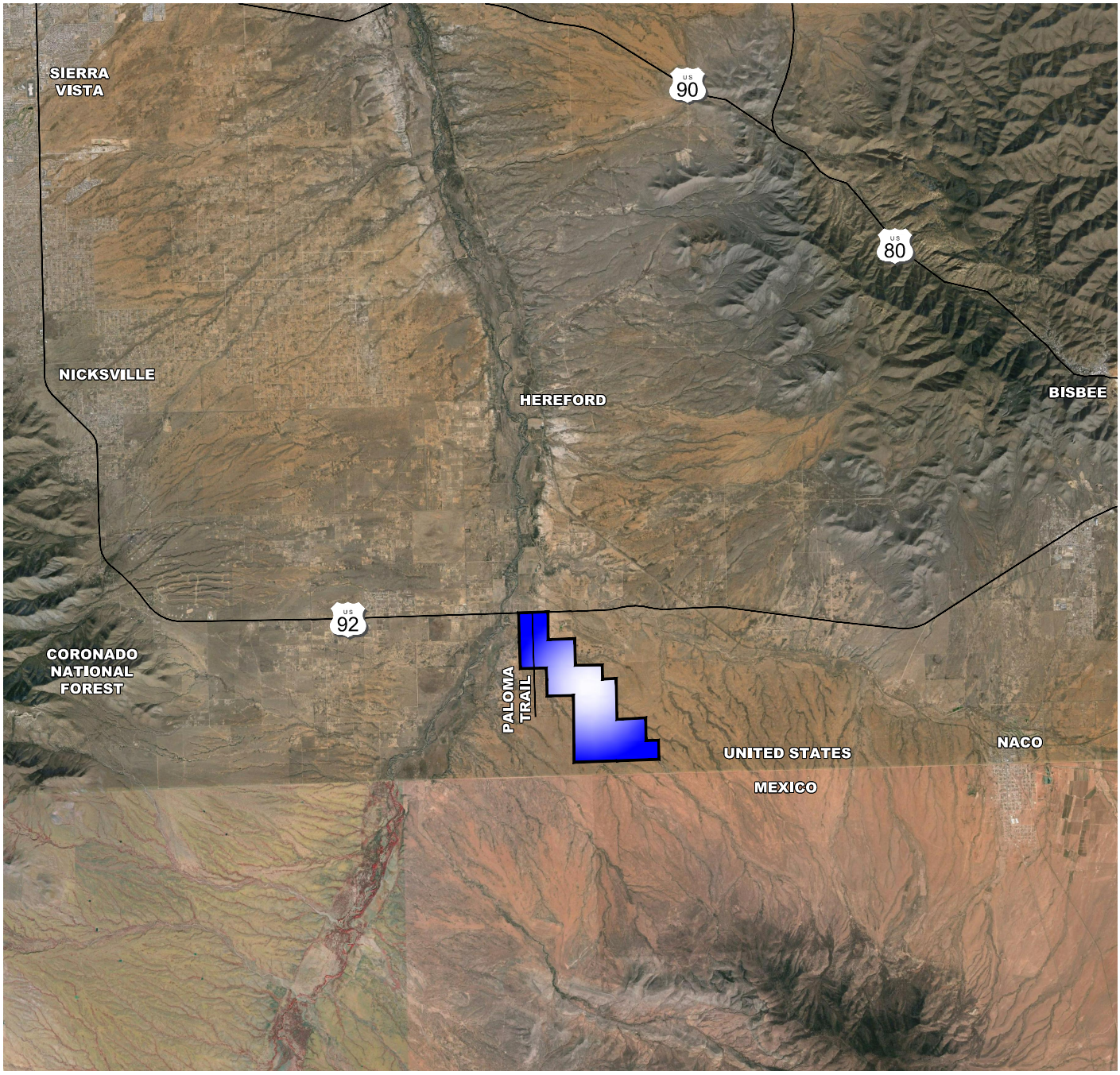
APPENDIX A
FIGURES



LEGEND

PROJECT LOCATION

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HORSESHOE DRAW

COCHISE COUNTY, ARIZONA

FIG 1: VICINITY MAP

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U:\1400\1472\REPORTS\DRAINAGE\Exhibits\1472 FIG 1 – Vicinity Map 15-1002.dwg 12/2/2015 7:43 AM

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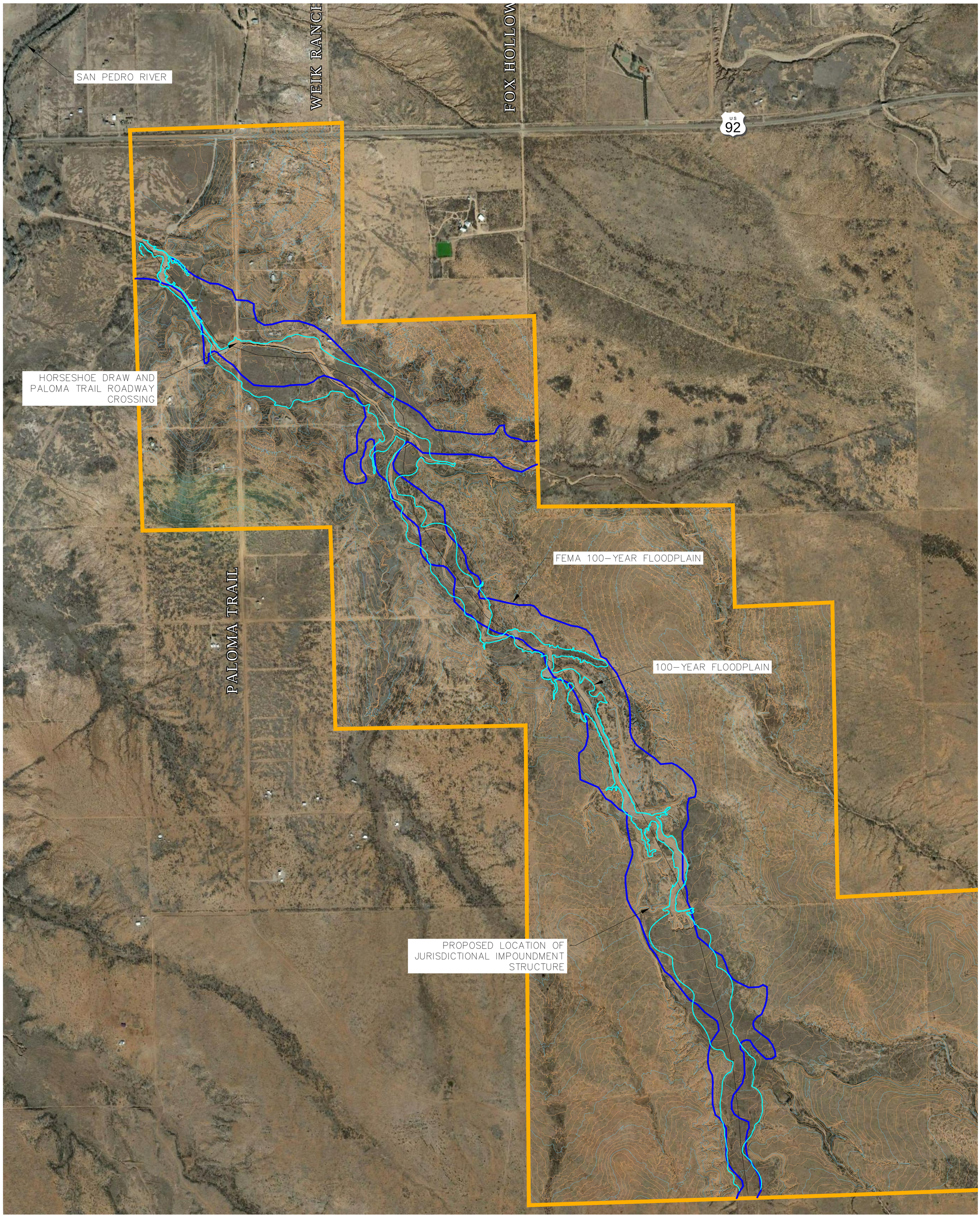

LEGEND

- PROJECT BOUNDARY
- FEMA FLOODPLAIN
- 100-YEAR FLOODPLAIN

N

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SCALE FEET

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DESIGNED:	HW
APPROVED:	AT

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HORSESHOE DRAW

COCHISE COUNTY, ARIZONA

FIG 2. 100-YEAR FLOODPLAIN MAP

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U:\1400\1472\REPORTS\DRAINAGE\Exhibits\1472 FIG 2 - 100-year Floodplain.dwg 12/23/2015 12:48 PM

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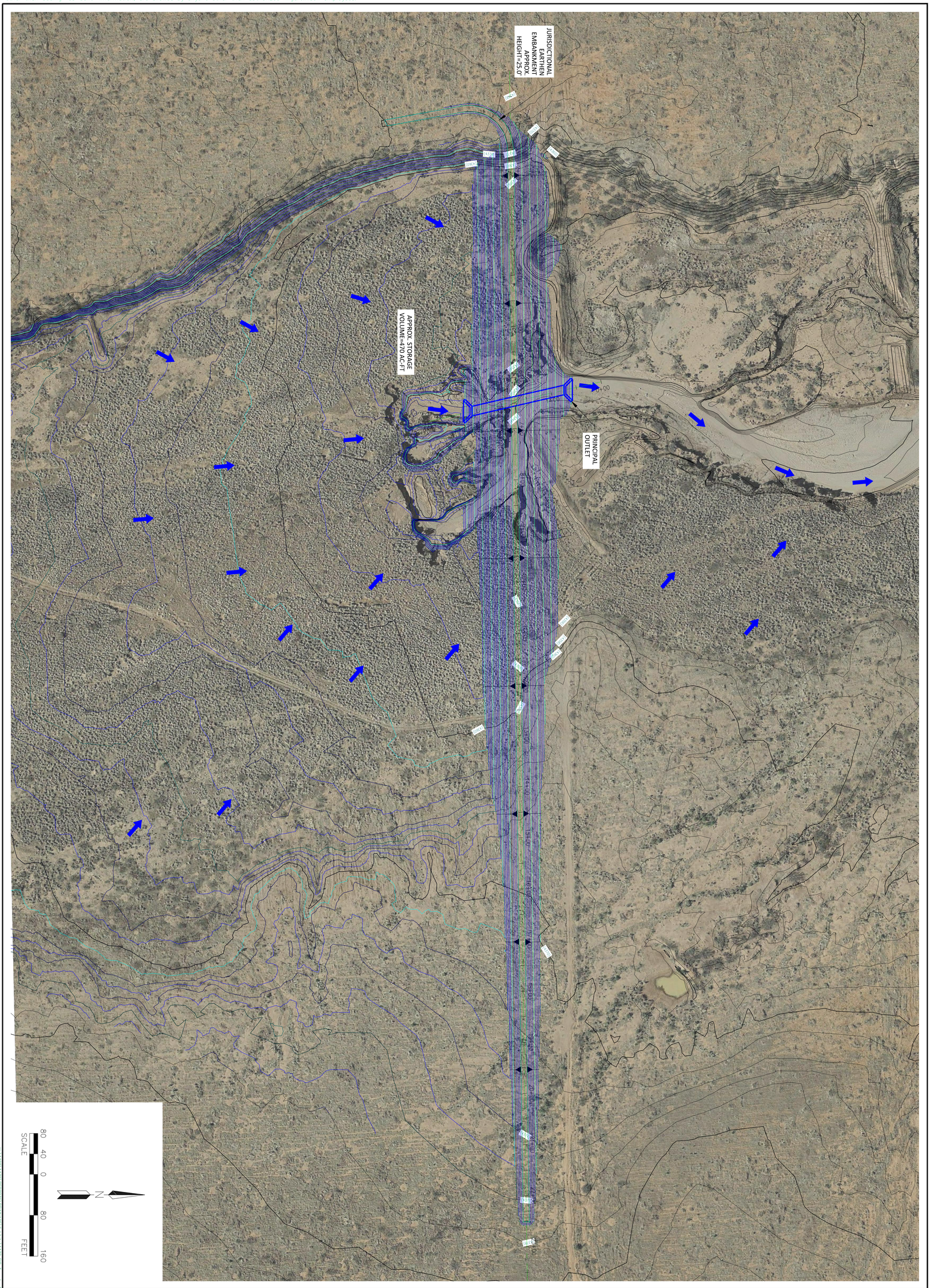

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COCHISE COUNTY, ARIZONA

FIG 3: Conceptual Jurisdictional Dam Exhibit

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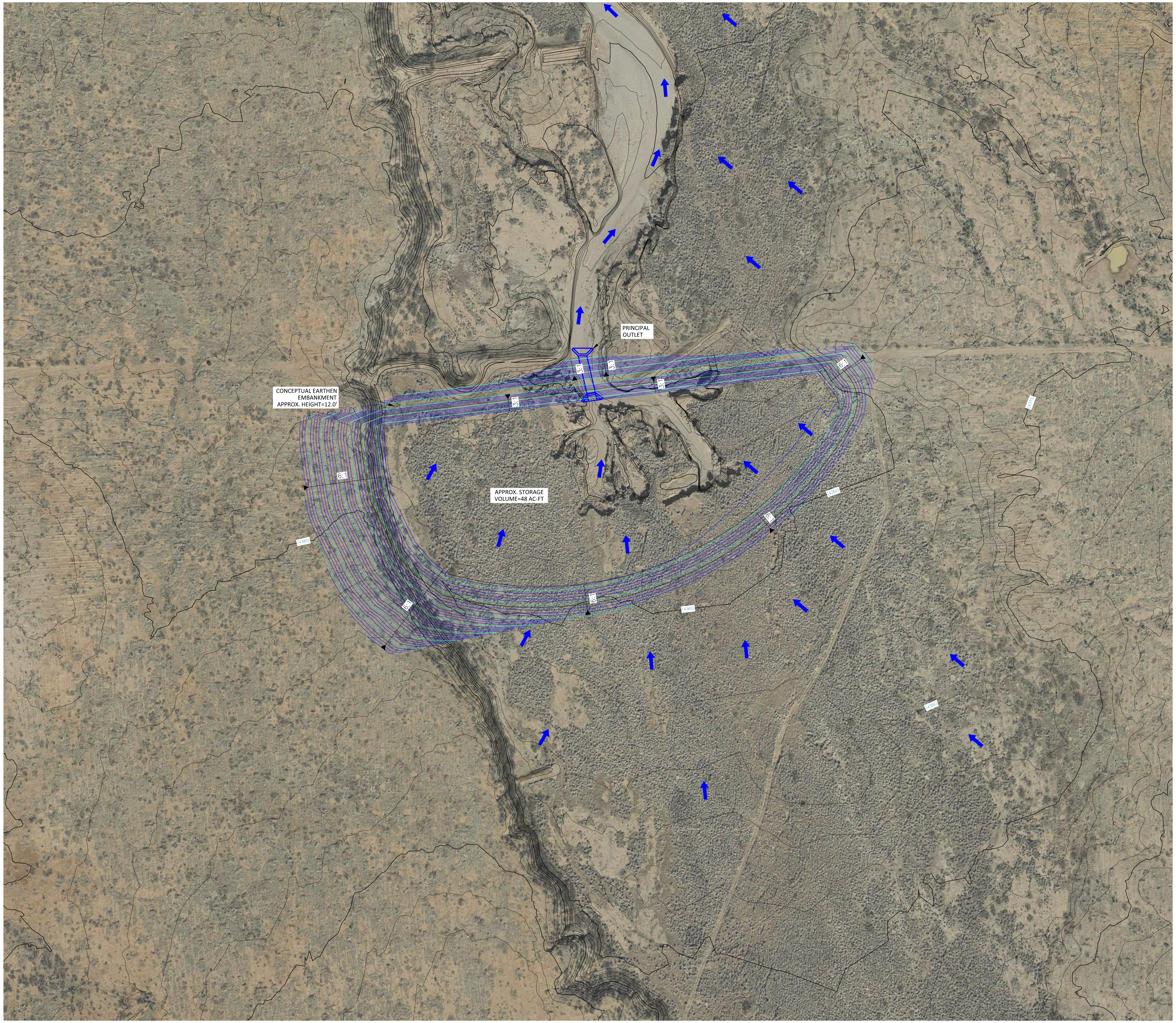

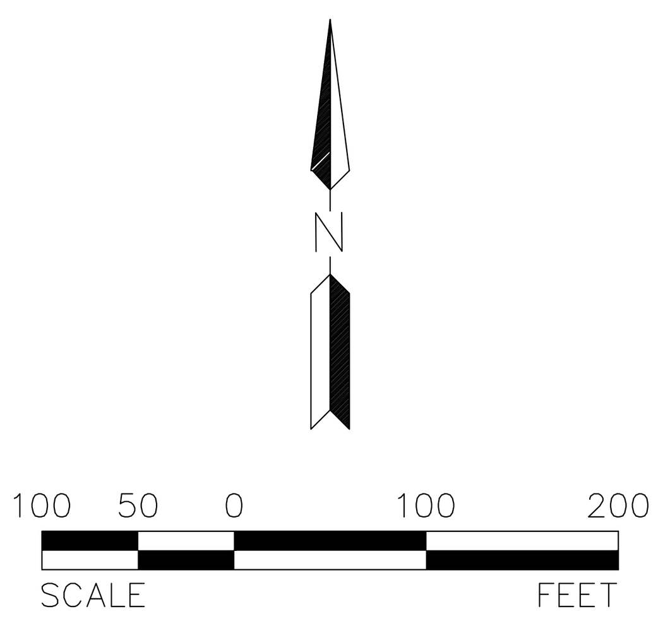

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FIG 4: Conceptual Exempt Embankment Exhibit

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APPENDIX B
GEOTECHNICAL EVALUATION EXCERPTS

GEOTECHNICAL EVALUATION
HORSESHOE DRAW BASIN
COCHISE COUNTY, ARIZONA

PREPARED FOR:
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Phoenix, Arizona 85016

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
1991 East Ajo Way, Suite 145
Tucson, Arizona 85713

October 30, 2015
Project No. 604915001

Active areas of ground surface subsidence have not been documented near the study area. Based upon our field reconnaissance and review of the referenced material, there are no known earth-fissures underlying or near the subject area. Therefore, ground subsidence and earth fissures are not expected to be a constraint to the project.

7.2. Faulting and Seismicity

The site lies within the Mexico Basin and Range zone, which is a relatively stable tectonic region located in southwestern Arizona, southeastern California, southern Nevada, and northern Mexico (Euge et al., 1992). This zone is characterized by sparse seismicity and few Quaternary faults. Based on our field observations, review of pertinent geologic data, and analysis of aerial photographs, faults are not located on or adjacent to the property.

The closest fault to the site is the Huachuca fault, located approximately 6 miles north-west of the site (Pearthree, 1996). The Huachuca fault is recognized by a low fault scarp trending north to northwest from near the US-Mexico Border to Arizona SR 90. Detailed surficial geologic mapping and morphologic fault scarp analysis indicate that the youngest fault rupture occurred 100,000 to 200,000 years ago. It is possible that faulting occurred in the early Quaternary as well. The slip-rate category of this fault is less than 0.2 millimeters per year (Pearthree, 1996). Seismic parameters recommended for the design of the proposed improvements are presented in Section 9.2.

8. CONCLUSIONS

Based on the results of our subsurface evaluation, laboratory testing, and data analysis, it is our opinion that the proposed construction is feasible from a geotechnical standpoint, provided that the recommendations of this report are incorporated into the design and construction of the proposed project, as appropriate. Geotechnical considerations include the following:

- In general, the near surface soils encountered at the project site are considered to be excavatable with conventional earth moving or excavation equipment in good working condition. However, gravel, cobbles, and possible boulders were encountered in our borings at variable depths and will result in slower excavation rates. The contractor should plan for such conditions.

- Based on the results of the field and laboratory evaluations, it is our opinion that the proposed embankments can be founded on native soil deposits, subject to the subgrade overexcavation.

- We anticipate that many of the site soils will be suitable for re-use as engineered fill. Imported and onsite soils that exhibit a relatively low plasticity and a very low to low expansive potential can generally be used for engineered fill. However, some isolated soils may not be suitable for reuse for the dam embankment construction without processing.

- We estimate an earthwork (shrinkage) factor of 15 to 25 percent for the native soils on this project. This estimate is based on the results of the in-situ dry density testing and an assumed maximum density.

- No known or reported geologic hazards are reported underlying, or immediately adjacent to, the site.

- Groundwater was not observed in our borings. Based on ADWR well data, the regional groundwater table has been historically measured at a depth on the order of 100 feet bgs. In general, groundwater is not expected to be a constraint to the design and construction of this project.

- Corrosivity test results indicate that the tested subgrade soils at the site may be corrosive to ferrous metals, and the sulfate content of the sampled tested presents a negligible sulfate exposure to concrete.

9. RECOMMENDATIONS

The following sections present our geotechnical recommendations for the proposed construction. If the proposed construction is changed from that discussed in this report, Ninyo & Moore should be contacted for additional recommendations.

9.1. Earthwork

The following sections provide our earthwork recommendations. In general, the earthwork specifications contained in the Maricopa Association of Governments (MAG), *Uniform Standard Specifications and Details for Public Works Construction,* or relevant grading ordinances having jurisdiction (e.g., City of Sierra Vista Development Code), and the project construction specifications should apply, except as noted in this report.

9.1.1. Site Preparation

Prior to performing grading operations, the site should be cleared of existing vegetation, surface obstructions, rubble and debris, and other deleterious materials. Existing utilities within the project limits, if encountered, should be re-routed or protected from damage by construction activities. Obstructions that extend below finished grade, if any, should be removed and the resulting voids filled with engineered fill. Materials generated from the clearing operations should be removed from the project site and either disposed of at a legal dumpsite or reused, if appropriate.

9.1.2. Excavations

Our evaluation of the excavation characteristics of the on-site materials is based on the results of the exploratory borings, our site observations, and our experience with similar materials. In our opinion, excavation of the alluvium soils can generally be achieved with heavy-duty earthmoving and excavation equipment. However, gravel, cobbles, and possible boulders were observed in our borings, which will be more difficult to excavate and will result in slower excavation rates. The contractor should be prepared for such conditions.

The proposed excavations are not anticipated to encounter significant groundwater (the possible exception of surface run-off or perched zones). However, relatively soft and/or loose materials may be encountered within or near the existing draw. Therefore, excavation bottom stabilization measures should be anticipated for this site during construction.

For temporary excavations in alluvium, the contractor should provide safely sloped excavations or an adequately constructed and braced shoring system, in compliance with Occupational Safety and Health Administration (OSHA) regulations, for employees working in an excavation that may expose them to the danger of moving ground. For planning purposes and according to OSHA soil classifications, a "Type C" soil should be considered for excavation in alluvial and/or fill soil for this project. In

general, temporary slopes above the water table and excavations in competent "Type C" soil should be inclined no steeper than 1.5H:1V. These details apply to temporary open-trench excavations up to 20 feet deep. Trenches over 20 feet deep or in areas where seepage is encountered should be designed by the contractor's engineer based on project-specific geotechnical analyses.

Upon making the excavations, soil classification and excavation performance should be evaluated in the field by Ninyo & Moore in accordance with the OSHA regulations. Details for open-cut slopes and shoring based on soil type and groundwater conditions are provided in the latest amended OSHA regulations.

Temporary excavations that encounter groundwater seepage or surface runoff may need shoring or may be stabilized by placing sandbags or gravel along the base of the seepage zone. Excavations encountering groundwater seepage should be evaluated on a case-by-case basis. Flatter slopes or bracing should be used if sloughing or raveling is observed. If material is stored or equipment is operated near an excavation, stronger shoring should be used to resist the extra pressure due to superimposed loads.

9.1.3. Engineered Fill Placement, and Compaction

Soils generated from on-site excavation activities that exhibit a relatively low Plasticity Index ([PI] of less than 15, as evaluated by American Society for Testing and Materials [ASTM] D 4318) are generally suitable for re-use as engineered fill. Our Atterberg Limits tests indicated that the PI of the tested soils ranged from 7 to 15. Based on these results, many of the on-site soils will be suitable for re-use as engineered fill. Additional field sampling and laboratory testing should be conducted during construction by the contractor to better evaluate the suitability of on-site soils for re-use as engineered fill.

Engineered fill should be placed in lifts not exceeding 8 inches in loose thickness and compacted by appropriate mechanical methods to a relative compaction of 95 percent as evaluated by ASTM D 698 at a moisture content slightly above the laboratory optimum.

Suitable fill should not include organic material, construction debris, or other non-soil fill materials. Rock particles and clay lumps should not be larger than 6 inches in dimension. Unsuitable material should be disposed of off-site or in non-structural areas.

Imported fill, if utilized, should consist of granular material with a very low or low Expansion Index, and a PI of less than 18. Import material in contact with ferrous metals should preferably have low corrosion potential (minimum resistivity of 2,000 ohm-cm or more, chloride content less than 25 parts per million [ppm]). Import material in contact with concrete should preferably have a soluble sulfate content of less than 0.1 percent. In addition, imported fill should meet relevant requirements for the embankment construction, as detailed in Section 9.1.4. Ninyo & Moore should evaluate such materials and details of their placement prior to importation.

9.1.4. New Embankment

Based on the laboratory test results the near surface soils, and soils found near the foundation elevation of the new fill embankment exhibited a significant potential for collapse upon inundation with water. In addition, some of the subsurface soils demonstrated significant variation of relative densities within the anticipated foundation zone. Additionally, because this site could potentially contain buried channels creating lenses of highly permeable soils, the recommendations provided below are designed to reduce potential total and differential movements under proposed embankments and channels, and reduce hydraulic piping potential under engineered embankments.

We recommend that the new fill embankment be founded 5 feet below adjacent grade as measured from the center of the embankment, as measured from the existing ground surface. New embankment construction guidelines are presented on Figure 3.

Following the overexcavation as described above, and prior to the placement of new fill, the resulting exposed surface should be carefully evaluated by Ninyo & Moore. Based on this evaluation, additional remediation may be needed. This could include scarification of the exposed surface. This additional remediation, if needed, should be

addressed by Ninyo & Moore during the earthwork operations. An earthwork (shrinkage) factor of about 15 to 25 percent for the on-site soils is estimated.

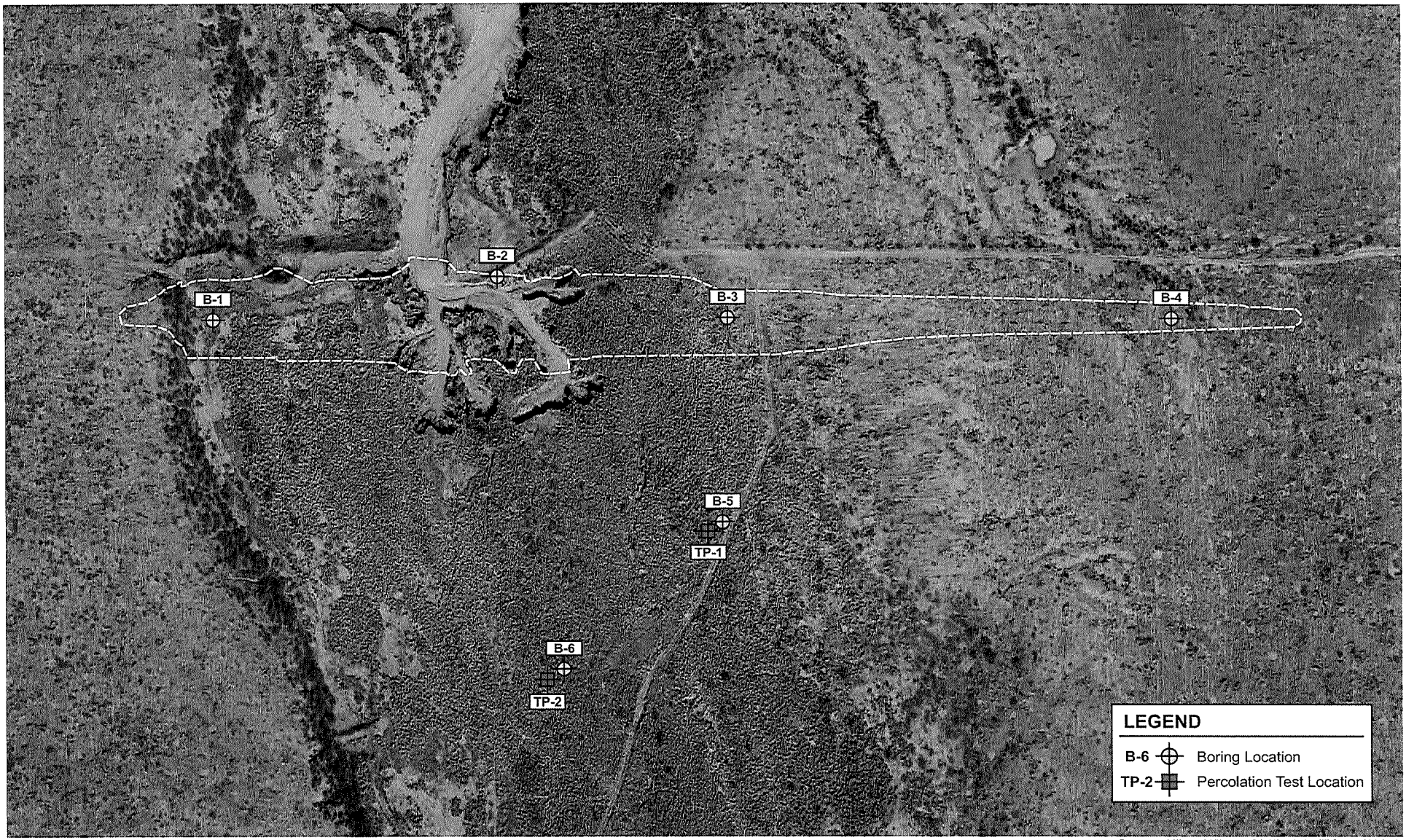
We recommend that the new embankment fill material gradation and plasticity meet the requirements presented below. Based on the results of our laboratory testing, some of the in-site soils may not meet these requirements. Blending with other soils obtained from the on-site excavations may result in acceptable material properties. Additional field sampling and laboratory testing should be conducted during construction to evaluate the suitability of on-site soils for the embankment construction.

Table 1 – New Embankment Fill

Sieve	Percent Passing
3 inch	100
No. 4	60-100
No. 8	55-100
No. 40	40-95
No. 200	20-60
PI	3-18

The new embankment fill should be placed in lifts the thickness of which will depend on the compaction equipment used, and should be re-compacted to 95 percent or more relative compaction, as evaluated by ASTM D 698 at a moisture content generally slightly above the optimum moisture.

Settlements of the new embankment fills as recommended above should be anticipated and can generally be estimated to be on the order of 1 to 1-½ percent of the fill height. Due to the generally unsaturated nature of the on-site soils majority of settlement is anticipated to occur during construction. No appreciable long-term settlements are anticipated.



Source: HilgartWilson, 2015, NAVTEQ, 01/03/15.

N

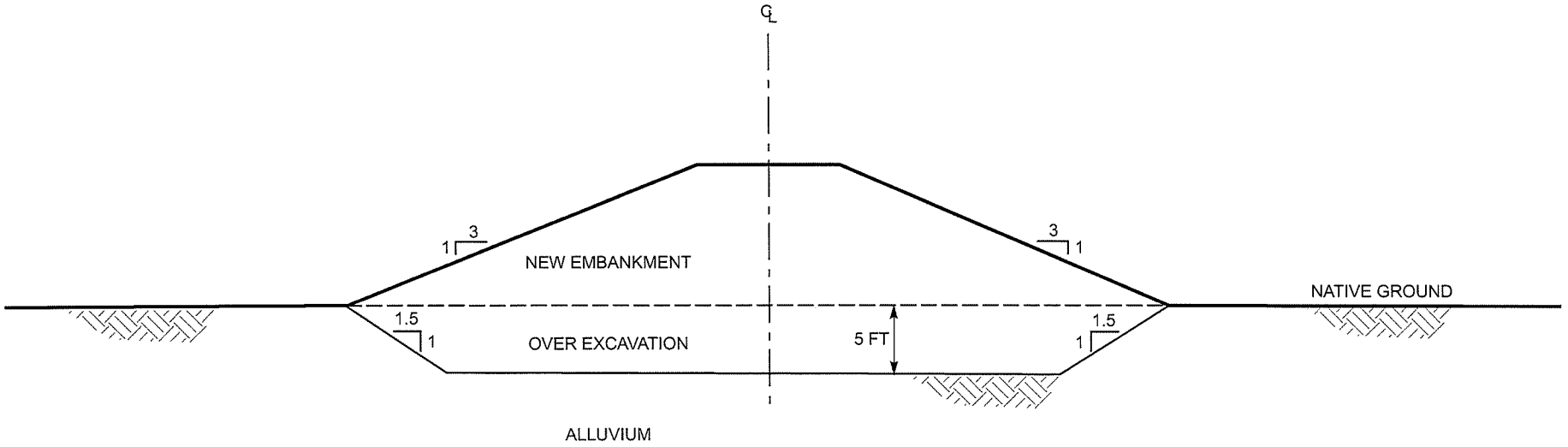
0 250

Approximate Scale:
1 inch = 250 feet

Note: Dimensions, directions, and locations are approximate.

file no: 4915blm1015

Ninyo & Moore	EXPLORATION LOCATIONS	FIGURE
PROJECT NO: 604915001 / DATE: 10/15	HORSESHOE DRAW BASIN COCHISE COUNTY, ARIZONA	2



NOT TO SCALE

Note: Dimensions, directions, and locations are approximate.

Ninyo & Moore		NEW EMBANKMENT CONSTRUCTION GUIDELINES	FIGURE
PROJECT NO: 604915001	DATE: 10/15	HORSESHOE DRAW BASIN COCHISE COUNTY, ARIZONA	3

file no: 4915sec1015

APPENDIX C

APPLICABLE ARIZONA REGUALTORY STATUTES AND CODE

46. "Unsafe" means that safety deficiencies in a dam or spillway could result in failure of the dam with subsequent loss of human life or significant property damage.

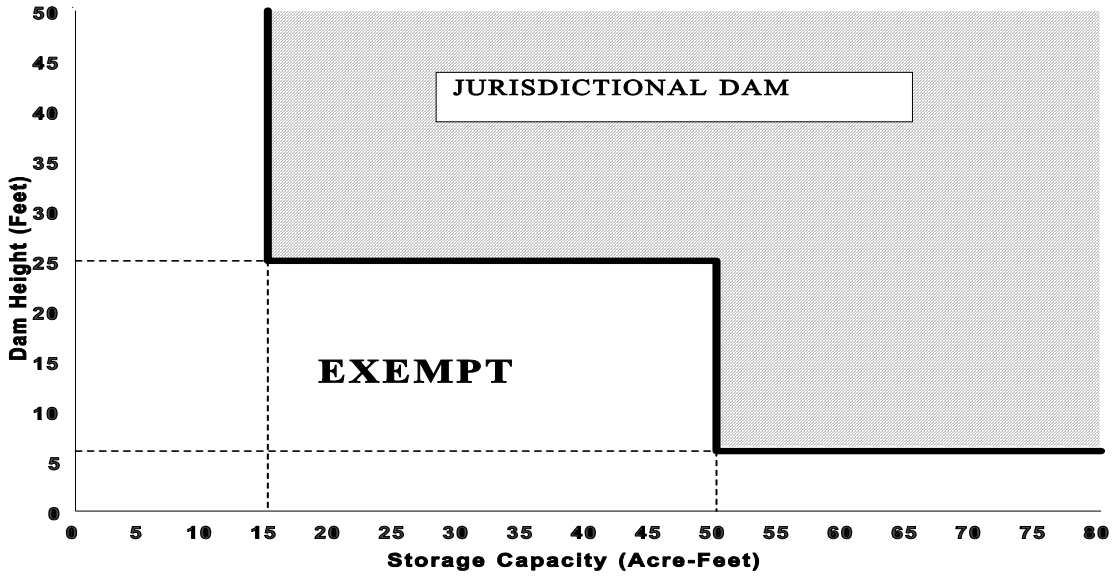
Historical Note
Adopted effective November 2, 1978 (Supp. 78-6). Former Section R12-15-02 renumbered without change as Section R12-15-1202 effective October 8, 1982 (Supp. 82-5). Section repealed; new Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2). Amended to correct typographical error under A.A.C. R1-1-109 (Supp. 01-2).

R12-15-1203. Exempt Structures
The following structures are exempt from regulation by the Department:

1. Any artificial barrier identified as exempt on Table 1 and defined as follows:
   a. Less than 6 feet in height, regardless of storage capacity.
   b. Between 6 and 25 feet in height with a storage capacity of less than 50 acre-feet.
   c. Greater than 25 feet in height with 15 acre-feet or less of storage capacity.
2. A dam owned by the federal government. A dam designed by the federal government for any non-federal entity or person that will subsequently be owned or operated by a person or entity defined as an owner in A.R.S. § 45-1201 is subject to jurisdiction, beginning with design and construction of the dam.
3. A dam owned or operated by an agency or instrumentality of the federal government, if a dam safety program at least as stringent as this Article is applicable to and enforced against the agency or instrumentality.
4. A transportation structure such as a highway, road, or railroad fill that exists solely for transportation purposes. A transportation structure designed, constructed, or modified with the intention of impounding water on an intermittent or permanent basis and meeting the definition of dam in A.R.S. § 45-1201 is subject to jurisdiction.
5. A levee constructed adjacent to or along a watercourse, primarily to control floodwater.
6. A self-supporting concrete or steel water storage tank.
7. An impoundment for the purpose of storing liquid-borne material.
8. A release-contained barrier as defined by A.R.S. § 45-1201(5).

Historical Note
Adopted effective November 2, 1978 (Supp. 78-6). Former Section R12-15-03 renumbered without change as Section R12-15-1203 effective October 8, 1982 (Supp. 82-5). Section repealed; new Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

Table 1. Exempt Structures



Historical Note
New Table adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1204. Provision for Guidelines
The Department may develop and adopt substantive policy statements that serve as dam safety guidelines to aid a dam owner or engineer in complying with this Article. The Department recommends that dam owners and engineers consult design guidelines published by agencies of the federal government, including the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, and the Federal Energy Regulatory Commission, for the design of concrete, roller compacted concrete, stone masonry, timber, inflatable rubber, and mechanically-stabilized earth dams. The Director may require that other criteria be used or revise any of the specific criteria for the purpose of dam safety. An owner shall obtain advance approval by the Director of design criteria.

Historical Note
Adopted effective November 2, 1978 (Supp. 78-6). Former Section R12-15-04 renumbered without change as Section R12-15-1204 effective October 8, 1982 (Supp. 82-5). Section repealed; new Section adopted by final

rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1205. General Responsibilities

A. Each owner is responsible for the safe design, operation, and maintenance of a dam. The owner shall operate, maintain, and regularly inspect a dam so that it does not constitute a danger to human life or property. The owner of a high or significant hazard potential dam shall provide timely warning to the Department and all other persons listed in the emergency action plan of problems at the dam. The owner shall develop and maintain effective emergency action plans and coordinate those plans with local officials as prescribed in R12-15-1221.

B. The owner shall conduct frequent observation of the dam, as prescribed in the emergency action plan and as follows:

1. The owner shall increase the frequency of observation when the reservoir is full, during heavy rains or flooding, and following an earthquake.
2. The owner shall report to the Director any condition that threatens the safety of the dam as prescribed in R12-15-1224(A). The owner shall make the report as soon as possible, but not later than 12 hours after discovery of the conditions.
3. If dam failure appears imminent, the owner shall notify the county sheriff or other emergency official immediately.
4. The owner is responsible for the safety of the dam and shall take action to lower the reservoir if it appears that the dam has weakened or is in danger of failing.

C. The owner of a dam shall install, maintain, and monitor instrumentation to evaluate the performance of the dam. The Director shall require site-specific instrumentation that the Director deems necessary for monitoring the safety of the dam when failure may endanger human life and property. Conditions that may require monitoring include land subsidence, earth fissures, embankment cracking, phreatic surface, seepage, and embankment movements.

D. The owner shall perform timely maintenance and ordinary repair of a dam. The owner shall implement an annual plan to inspect the dam and accomplish the maintenance and ordinary repairs necessary to protect human life and property.

E. If a change of ownership of a dam occurs, the new owner shall notify the Department within 15 days after the date of the transaction and provide the mailing address and telephone number where the new owner can be contacted. Within 90 days after the date of the transaction, the new owner shall provide the name and telephone number of the individual or individuals who are responsible for operating and maintaining the dam.

Historical Note

Adopted effective November 2, 1978 (Supp. 78-6). Former Section R12-15-05 renumbered without change as Section R12-15-1205 effective October 8, 1982 (Supp. 82-5). Section repealed; new Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1206. Classification of Dams

A. Size Classification. Dams are classified by size as small, intermediate, or large. Size is determined with reference to Table 2. An owner or engineer shall determine size by storage capacity or height, whichever results in the larger size.

B. Hazard Potential Classification

1. The Department shall base hazard potential classification on an evaluation of the probable present and future incremental adverse consequences that would result from the release of water or stored contents due to failure or improper operation of the dam or appurtenances, regardless of the condition of the dam. The evaluation shall include land use zoning and development projected for the affected area over the 10 year period following classification of the dam. The Department considers all of the following factors in hazard potential classification: probable loss of human life, economic and lifeline losses, and intangible losses identified and evaluated by a public resource management or protection agency.
   a. The Department bases the probable incremental loss of human life determination primarily on the number of permanent structures for human habitation that would be impacted in the event of failure or improper operation of a dam. The Department considers loss of human life unlikely if:
      i. Persons are only temporarily in the potential inundation area;
      ii. There are no residences or overnight campsites; and
      iii. The owner has control of access to the potential inundation area and provides an emergency action plan with a process for warning in the event of a dam failure or improper operation of a dam.
   b. The Department bases the probable economic, lifeline, and intangible loss determinations on the property losses, interruptions of services, and intangible losses that would be likely to result from failure or improper operation of a dam.
2. The 4 hazard potential classification levels are very low, low, significant, and high, listed in order of increasing probable adverse incremental consequences, as prescribed in Table 3. The Director shall classify intangible losses by considering the common or unique nature of features or habitats and temporary or permanent nature of changes.
   a. Very Low Hazard Potential. Failure or improper operation of a dam would be unlikely to result in loss of human life and would produce no lifeline losses and very low economic and intangible losses. Losses would be limited to the 100 year floodplain or property owned or controlled by the dam owner under long-term lease. The Department considers loss of life unlikely because there are no residences or overnight camp sites.
   b. Low Hazard Potential. Failure or improper operation of a dam would be unlikely to result in loss of human life, but would produce low economic and intangible losses, and result in no disruption of lifeline services that require more than cosmetic repair. Property losses would be limited to rural or agricultural property, including equipment, and isolated buildings.
   c. Significant Hazard Potential. Failure or improper operation of a dam would be unlikely to result in loss of human life but may cause significant or high economic loss, intangible damage requiring major mitigation, and disruption or impact on lifeline facilities. Property losses would occur in a predominantly rural or agricultural area with a transient population but significant infrastructure.
   d. High Hazard Potential. Failure or improper operation of a dam would be likely to cause loss of human life because of residential, commercial, or industrial development. Intangible losses may be major and potentially impossible to mitigate, critical lifeline

services may be significantly disrupted, and property losses may be extensive.

3. An applicant shall demonstrate the hazard potential classification of a dam before filing an application to construct. The Department shall review the applicant's demonstration early in the design process at pre-application meetings prescribed in R12-15-1207(D).
4. The Department shall review the hazard potential classification of each dam during each subsequent dam safety inspection and revise the classification in accordance with current conditions.

Historical Note
Adopted effective November 2, 1978 (Supp. 78-6). Former Section R12-15-06 renumbered without change as Section R12-15-1206 effective October 8, 1982 (Supp. 82-5). Section repealed; new Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

Exhibit A. Repealed

Historical Note
Exhibit repealed by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000; a Historical Note for Exhibit A did not exist before this date (Supp. 00-2).

Table 2. Size Classification

Category	Storage Capacity (acre-feet)	Height (feet)
Small	50 to 1,000	25 to 40
Intermediate	greater than 1,000 and not exceeding 50,000	higher than 40 and not exceeding 100
Large	greater than 50,000	higher than 100

Historical Note
New Table adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

Table 3. Downstream Hazard Potential Classification

Hazard Potential Classification	Probable Loss of Human Life	Probable Economic, Lifeline, and Intangible Losses
Very Low	None expected	Economic and lifeline losses limited to owner's property or 100-year floodplain. Very low intangible losses identified.
Low	None expected	Low
Significant	None expected	Low to high
High	Probable - One or more expected	Low to high (not necessary for this classification)

Historical Note
New Table adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1207. Application Process

A. An applicant shall obtain written approval from the Director before constructing, reconstructing, repairing, enlarging, removing, altering, or breaching a dam. Application requirements differ according to the hazard potential of the dam.

1. To construct, reconstruct, repair, enlarge, or alter a high or significant hazard potential dam, the applicant shall comply with R12-15-1208.
2. To breach or remove a high or significant hazard potential dam, the applicant shall comply with R12-15-1209.
3. To construct, reconstruct, repair, enlarge, alter, breach, or remove a low hazard potential dam, the applicant shall comply with R12-15-1210.
4. To construct, reconstruct, repair, enlarge, alter, breach, or remove a very low hazard potential dam, the applicant shall comply with R12-15-1211.

B. An application shall not be filed with the Director under the following circumstances:

1. The dam is exempt under R12-15-1203;
2. A dam owner starts repairs to an existing dam that are necessary to safeguard human life or property and the Director is notified without delay;
3. The owner performs general maintenance or ordinary repairs as prescribed in R12-15-1217(A) or (B); or
4. Breach, removal, or reduction of a very low hazard dam as prescribed in R12-15-1211(C).

C. An applicant is not required to comply with a requirement in this Article if the Director finds that, considering the site characteristics and the proposed design, the requirement is unduly burdensome or expensive and is not necessary to protect human life or property. The Director shall consider the size, hazard potential classification, physical site conditions, and applicability of a requirement to a proposed dam. The Director shall state in writing the reason or reasons the applicant is not required to comply with a requirement.

D. An applicant shall schedule pre-application conferences with the Department to discuss the requirements of this Article and to resolve issues essential to the design of a dam while the design is in preliminary stages. The Director shall view the dam site during the pre-application process. The following are examples of issues for pre-application conferences: the hazard potential classification, the approximate inflow design flood, the basic design concepts, and any requirements that may be found by the Director to be unduly burdensome or expensive and not necessary to protect human life or safety. In addition, the applicant may submit preliminary design calculations to the Department for review and comment. The Department shall comment as soon as practicable, depending on the size of the submittal and the current workload.

E. The Department shall review applications as follows:

1. Applications will be received by appointment. During this meeting the Department shall make a brief review of the application to determine that the application contains each of the items required by R12-15-1208, R12-15-1209, R12-15-1210, or R12-15-1211.
2. Following receipt of an application submitted under R12-15-1208, R12-15-1209, R12-15-1210, or R12-15-1211, the Director shall complete an administrative review as prescribed in R12-15-401(1) and notify the applicant in writing whether the application is administratively complete. If the application is not administratively complete, the notification shall include a list of additional information that is required to complete the application.
3. After finding the application submitted under R12-15-1208, R12-15-1209, R12-15-1210, or R12-15-1211 administratively complete, the Director shall complete a substantive review as prescribed in R12-15-401(3) and notify the applicant in writing of the Director's approval or disapproval. If during this review period, the Director

determines that there are defects in the application that would impact human life and property, a written notice of the defects shall be sent to the applicant.

4. An applicant may request in writing that the Director expedite the review of an application by employing an expert consultant on a contract basis under A.R.S. § 45-104(D). The Director shall establish on-call contracts with expert consultants to facilitate the process of expediting review. The Director may retain a consultant to review all or a portion of the application as necessary to expedite the process in response to an owner's request or to comply with time-frame rules. Before conducting the review, the consultant shall provide the Director and the applicant with a proposed time schedule and cost estimate. If the applicant agrees to the consultant's proposal for an expedited review of an application and the Director employs the consultant, the applicant shall pay to the Department the cost of the consultant's services in addition to the application fees. The Director retains the authority to review and approve, disapprove, or modify the findings and recommendations of the consultant.
5. The Director shall not approve an application in less than 10 days from the date of receipt.
6. If the Director disapproves the application, the Director shall provide the applicant with a statement of the Director's objections.
7. If the Director approves an application, the applicant shall submit in triplicate revised drawings and specifications that incorporate any required changes.
   a. The Director shall return to the applicant 1 set of final construction drawings and specifications with the Department's approval stamp to be retained onsite during construction;
   b. The Director shall retain for permanent state record 1 set of final construction drawings and specifications with the Department's approval stamp; and
   c. The Director shall retain for use by the Department during construction the 3rd set of final construction drawings and specifications with the Department's approval stamp.
8. The Director shall impose conditions and limitations that the Director deems necessary to safeguard human life and property. Examples of the conditions of approval include but are not limited to:
   a. The applicant shall not cover the foundation or abutment with the material of the dam until the Department has been given notice and a reasonable time to inspect and approve them.
   b. The applicant shall start construction within 1 year from the date of approval.
   c. The applicant shall maintain a safe storage level for an existing dam being reconstructed, repaired, enlarged, altered, or breached.

F. An approval to construct a new dam or repair, enlarge, alter, breach, or remove an existing dam is valid for 1 year.

1. If construction does not begin within 1 year, the approval is void.
2. Upon written request and good cause shown by the owner, the time for commencing construction may be extended. An applicant shall not start construction before the Director reviews the application for changes and grants approval.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1208. Application to Construct, Reconstruct, Repair, Enlarge, or Alter a High or Significant Hazard Potential Dam

A. An application package to construct, reconstruct, repair, enlarge, or alter a high or significant hazard potential dam shall include the following prepared by or under the supervision of an engineer as defined in R12-15-1202(11):

1. A completed application filed in duplicate on forms provided by the Director.
2. A design information summary or checklist of items prepared in duplicate on forms provided by the Director.
3. An initial application fee based on the total estimated project cost and computed in accordance with A.R.S. § 45-1204 and R12-15-104(A)(7).
4. A detailed estimate of project costs. Project costs are all costs associated with construction of the dam and appurtenant works including preliminary investigations and surveys, engineering design, supervision of construction, and any other engineering costs.
5. Two complete sets of construction drawings as prescribed in R12-15-1215(1).
6. Two complete sets of construction specifications as prescribed in R12-15-1215(2).
7. An engineering design report that includes information needed to evaluate all aspects of the design of the dam and appurtenances, including references with page numbers to support any assumptions used in the design, as prescribed in R12-15-1215(3). The engineering design report shall recommend a safe storage level for existing dams being reconstructed, repaired, enlarged, or altered.
8. A construction quality assurance plan describing all aspects of construction supervision.
9. A description of the use for the impounded or diverted water, proof of a right to appropriate, and a permit to store water as prescribed in A.R.S. §§ 45-152 and 45-161.
10. A long-term budget plan and evidence of financing, prepared using customary accounting principles, that demonstrate that the applicant has the financial capability to construct, operate, and maintain the dam in a safe manner. If the applicant does not have evidence that can be verified by an independent audit of the financial capability to construct, operate, and maintain the dam in a safe manner, the Director may require a performance bond for the entire cost of the proposed construction work.

B. The following may be submitted with the application or during construction.

1. An emergency action plan as prescribed in R12-15-1221.
2. An operation and maintenance plan to accomplish the annual maintenance.
3. An instrumentation plan regarding instruments that evaluate the performance of the dam.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2). Amended by exempt rulemaking at 16 A.A.R. 1205, effective June 15, 2010 (Supp. 10-2). Amended by exempt rulemaking at 16 A.A.R. 1950, effective September 10, 2010 (Supp. 10-3). Amended by final rulemaking at 17 A.A.R. 659, effective June 4, 2011 (Supp. 11-2).

R12-15-1209. Application to Breach or Remove a High or Significant Hazard Potential Dam

A. An applicant shall excavate the dam down to the level of the natural ground at the maximum section. Upon approval of the Director, additional breaches may be made. This provision shall not be construed to require more than total removal of the

dam regardless of the flood magnitude. The breach or breaches shall be of sufficient width to pass the greater of:
1. The 100 year flood at a depth of less than 5 feet, or
2. The 100 year flood at a normal flood depth of not more than 2 feet at a distance of 2,000 feet downstream of the dam.

B. The sides of each breach shall be excavated to a slope ratio that is stable and not steeper than 1 horizontal to 1 vertical.

C. Each breach shall be designed to prevent silt that has previously been deposited on the reservoir bottom and the excavated material from the breach from washing downstream.

D. Before breaching the dam, the reservoir shall be emptied in a controlled manner that will not endanger lives or damage downstream property. The applicant shall obtain approval from the Director for the method of breaching or removal.

E. An application package to breach or remove a high or significant hazard potential dam shall include the following prepared by or under the supervision of an engineer as defined in R12-15-1202(11).
1. The construction drawing or drawings for the breach or removal of a dam, including the location, dimensions, and lowest elevation of each breach.
2. A long-term budget plan and evidence of financing, prepared using customary accounting principles, that demonstrate that the applicant has the financial capability to breach or remove the dam in a safe manner. If the applicant does not have evidence that can be verified by an independent audit of the financial capability to breach or remove the dam in a safe manner, the Director may require a performance bond for the entire cost of the proposed construction work.
3. A construction quality assurance plan describing all aspects of construction supervision.

F. Reduction of a high or significant downstream hazard potential dam to nonjurisdictional size may be approved by letter under the following circumstances:
1. The owner shall submit a completed application form and construction drawings for the reduction and the appropriate specifications, prepared by or under the supervision of an engineer as defined in R12-15-1202(11).
2. The construction drawings and specifications shall contain sufficient detail to enable a contractor to bid on and complete the project.
3. The plans shall comply with all requirements of this Section except that the breach is not required to be to natural ground.
4. Upon completion of an alteration to nonjurisdictional size, the engineer shall file as constructed drawings and specifications with the Department.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1210. Application to Construct, Reconstruct, Repair, Enlarge, Alter, Breach, or Remove a Low Hazard Potential Dam

A. An application package to construct, reconstruct, repair, enlarge, or alter a low hazard potential dam shall include the following prepared by or under the supervision of an engineer as defined in R12-15-1202(11):
1. A completed application filed in duplicate on forms provided by the Director.
2. An initial application fee based on the total estimated project cost, computed in accordance with A.R.S. § 45-1204 and R12-15-104(A)(7).
3. A detailed estimate of project costs. Project costs are all costs associated with construction of the dam and appurtenant works, including preliminary investigations and surveys, engineering design, supervision of construction, and any other engineering costs.
4. The seal and signature of the responsible engineer in accordance with A.A.C. R4-30-304.
5. A statement by the responsible engineer that classifies the dam as low hazard in accordance with R12-15-1206(B). The responsible engineer shall submit a map of the area that would be inundated by failure or improper operation of the dam. The responsible engineer shall demonstrate that failure or improper operation of the dam would be unlikely to result in:
   a. Loss of human life. The demonstration may be based on an emergency action plan for persons who may be in the area of inundation;
   b. Significant incremental adverse consequences; or
   c. Significant intangible losses, as defined in R12-15-1202(21) and identified and evaluated by a public natural resource management or protection agency.
6. Two complete sets of construction drawings as prescribed by R12-15-1215(1).
7. Two complete sets of construction specifications as prescribed by R12-15-1215(2).
8. An engineering design report that includes information needed to evaluate all aspects of the design of the dam and appurtenances, including references with page numbers to support any assumptions used in the design, as prescribed in R12-15-1215(3).
9. A description of the use for the impounded or diverted water, proof of a right to appropriate, and a permit to store water as prescribed in A.R.S. §§ 45-152 and 45-161.
10. A construction quality assurance plan clearly describing all aspects of construction supervision.
11. A long-term budget plan and evidence of financing, prepared using customary accounting principles, that demonstrate that the applicant has the financial capability to construct, operate, and maintain the dam in a safe manner. If the applicant does not have evidence that can be verified by an independent audit of the financial capability to construct, operate, and maintain the dam in a safe manner, the Director may require a performance bond for the entire cost of the proposed construction work.

B. An application package for the breach or removal of a low hazard potential dam shall include the following:
1. A completed application filed in duplicate on forms provided by the Director that contains the following information:
   a. The name and address of the owner of the dam or the agent of the owner.
   b. A description of the proposed removal.
   c. The proposed time for beginning and completing the removal.
2. An initial application fee based on the total estimated project cost and computed in accordance with A.R.S. § 45-1204 and R12-15-104(A)(7).
3. A statement by the responsible engineer demonstrating both of the following:
   a. That the dam will be excavated to the level of natural ground at the maximum section; and
   b. That the breach or breaches will be of sufficient width to pass the greater of:
      i. The 100 year flood at a depth of less than 5 feet, or

ii. The 100 year flood at a normal flood depth of not more than 2 feet at a distance of 2,000 feet downstream of the dam,
iii. Subsection (B)(3)(b) shall not be construed to require more than a total removal of the dam regardless of flood magnitude.
c. That the sides of the breach will be excavated to a slope ratio that is stable and not steeper than 1 horizontal to 1 vertical.
4. A detailed estimate of project costs. Project costs are all costs associated with the removal of the dam and appurtenant works, including preliminary investigations and surveys, engineering design, supervision of removal, and any other engineering costs.

C. An applicant intending to reduce a low hazard potential dam to nonjurisdictional size shall submit a written notice to the Director at least no less than 60 days before the date that construction begins.

D. Within 45 days after receipt of a complete application package as prescribed by subsection (A) or (B), the Director shall either:
1. Determine that the dam falls within the low hazard potential classification, or
2. Issue a written notice that the dam does not fall within the low hazard potential classification.

E. The Director's determination that the proposed dam does not fall within the low hazard classification is an appealable agency action and subject to administrative and judicial review under A.R.S. Title 41, Chapter 6, Article 10.

F. Upon completion of construction, the owner shall notify the Department in writing. The owner shall not use the dam or reservoir before issuance of a license unless the Director issues written approval.

G. Within 90 days after completing construction, reconstruction, repair, enlargement, or alteration of a low hazard potential dam, the owner shall file the following:
1. An affidavit showing the actual cost of construction, reconstruction, repair, enlargement, or alteration of the dam. The owner shall submit a detailed accounting of the costs, including all engineering costs.
2. An additional fee or refund request computed in accordance with A.R.S. § 45-1209 and R12-15-104(A)(7), based on the actual cost of construction, reconstruction, repair, enlargement, or alteration.
3. A brief completion report summarizing the salient features of the project, including a description of the causes for any changes or deviations from the approved application package prepared by the engineer who supervised the construction, in accordance with A.R.S. Title 32, Chapter 1. The engineer shall indicate:
a. That the dam has been designed and constructed in compliance with basic principles of dam construction currently being practiced in the industry;
b. That the dam as constructed has structural integrity and flood routing capacity consistent with its hazard potential classification; and
c. That the as constructed drawings and the report accurately represent the construction of the dam.
4. As constructed drawings prepared and sealed by the engineer who supervised the construction. The owner and the engineer shall maintain a record of the drawings.

H. Upon receiving the Director's written approval, the owner may operate the dam and appurtenant works. Within 30 days after receipt of the information in subsection (G), the Director shall issue to the owner either a license or a notice that the dam and appurtenant works shall not be operated because the dam and appurtenant works do not qualify as low hazard or were not built according to the submitted design. The license shall include conditions of operation, including:
1. The safe storage level of the reservoir,
2. A requirement that the dam be operated and maintained so that it does not constitute a danger to human life and property,
3. A requirement that the conditions resulting in the low hazard classification be maintained throughout the life of the dam, and
4. A requirement that the owner demonstrate in writing the low hazard classification in the manner prescribed by subsection (A)(5) every five years.

I. Within 90 days after completing removal of a low hazard potential dam, the owner shall file the following. The Director shall remove the dam from jurisdiction upon approval of the submittal.
1. An affidavit showing the actual cost of removal of the dam. The owner shall submit a detailed accounting of the costs, including all engineering costs.
2. An additional fee or refund request computed in accordance with A.R.S. § 45-1204 and R12-15-104(A)(7), based on the actual cost of removal.
3. A brief completion report, including a description of the causes for any changes or deviations from the approved application package prepared by the engineer who supervised the construction, in accordance with A.R.S. Title 32, Chapter 1. The engineer shall certify that the as removed drawings and the report accurately represent the actual removal of the dam.
4. As-removed drawings prepared and sealed by the engineer who supervised the removal. The owner and the engineer shall maintain a record of the drawings.

J. An owner shall immediately commence repairs necessary to safeguard human life and property and prevent failure and improper operation of a low hazard potential dam. The owner shall notify the Department as soon as reasonably possible and in all cases within 10 days of commencing the required repairs.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2). Amended by final rulemaking at 13 A.A.R. 3022, effective October 6, 2007 (Supp. 07-3). Amended by exempt rulemaking at 16 A.A.R. 1205, effective June 15, 2010 (Supp. 10-2). Amended by exempt rulemaking at 16 A.A.R. 1950, effective September 10, 2010 (Supp. 10-3). Amended by final rulemaking at 17 A.A.R. 659, effective June 4, 2011 (Supp. 11-2).

R12-15-1211. Application to Construct, Reconstruct, Repair, Enlarge, Alter, Breach, or Remove a Very Low Hazard Potential Dam

A. An application package to construct, reconstruct, repair, enlarge, or alter a very low hazard potential dam shall include the following prepared by an engineer or a person under the supervision of an engineer as defined in R12-15-1202(11):
1. A completed application filed in duplicate on forms provided by the Director that contains the following information:
a. The name and address of the owner of the dam or the agent of the owner.
b. The location, type, size, and height of the proposed dam and appurtenant works.
c. The storage capacity of the reservoir associated with the proposed dam.

d. The proposed time for beginning and completing construction.
e. A description of the use for the impounded or diverted water and proof of a right to impound that water.

2. The means, plans, and specifications by which the stream or body of water is to be dammed, by-passed, or controlled during construction.
3. Maps, drawings, and specifications of the proposed dam.
4. An initial application fee based on the total estimated project cost and computed in accordance with A.R.S. § 45-1204 and R12-15-104(A)(7).
5. A detailed estimate of project costs. Project costs are all costs associated with construction of the dam and appurtenant works, including preliminary investigations and surveys, engineering design, supervision of construction, and any other engineering costs.
6. A statement by the responsible engineer that classifies the dam as very low hazard in accordance with R12-15-1206(B). The responsible engineer shall submit a map of the area that would be inundated by failure or improper operation of the dam. The responsible engineer shall demonstrate that failure or improper operation would be unlikely to result in:
   a. Loss of human life. The demonstration may be based on an emergency action plan for persons who may be in the area of inundation;
   b. Significant incremental adverse consequences; or
   c. Significant intangible losses, as defined in R12-15-1202(21) and identified and evaluated by a public natural resource management protection agency, because the dam has a size classification of either small or intermediate under R12-15-1206(A) and any release would be limited to the 100 year floodplain or property owned or controlled by the dam owner under long-term lease.
7. The seal and signature of the responsible engineer in accordance with A.R.S. Title 32, Chapter 1.
8. The drawings required by subsection (A)(3) shall include a plan view and maximum section of the dam; the outlet works; and the spillway plan, profile, and cross section.
9. The specifications required by subsection (A)(3) shall include the construction materials, testing criteria, and installation techniques.

B. The Director may make other requirements for drawings and specifications for the proposed repair or alteration of a very low hazard potential dam. In determining other requirements, the Director shall consider the size and extent of the repair or alteration, the portions of the dam that will be repaired or altered, and whether the requirements elicit a description of the proposed construction work that is adequate to allow the Director to evaluate the repair or alteration.

C. An owner intending to breach, remove, or reduce a very low hazard potential dam to nonjurisdictional size shall submit written notice to the Director at least 60 days before the date that construction begins.

D. After receipt of a complete application package as prescribed by subsection (A), the Director shall either:
1. Determine that the dam falls within the very low hazard classification and approve the application in writing; or
2. Issue a written notice that the dam does not fall within the very low hazard classification.

E. The Director's determination that the proposed dam does not fall within the very low hazard classification is an appealable agency action and subject to administrative and judicial review under A.R.S. Title 41, Chapter 6, Article 10.

F. Upon completion of construction, the owner shall notify the Department in writing. The owner shall not use the dam and reservoir before receipt of a license unless the Director issues written approval.

G. Within 90 days after completion of the construction, reconstruction, repair, enlargement, or alteration of a very low hazard potential dam, the owner shall file the following:
1. An affidavit showing the actual cost of construction, reconstruction, repair, enlargement, or alteration of the dam. The owner shall submit a detailed accounting of the costs, including all engineering costs.
2. An additional fee or refund request computed in accordance with A.R.S. § 45-1209 and R12-15-104(A)(7), based on the actual cost of construction, reconstruction, repair, enlargement, or alteration.
3. A brief completion report summarizing the salient features of the project, including a description of the causes for any changes or deviations from the approved application package prepared by the engineer who supervised the construction in accordance with A.R.S. Title 32, Chapter 1. The report shall include:
   a. That the dam has been designed and constructed in compliance with basic principles of dam construction currently being practiced in the industry;
   b. That the dam as constructed has structural integrity and flood routing capacity consistent with its hazard potential classification; and
   c. That the as constructed drawings and the report accurately represent the construction of the dam.
4. As constructed drawings prepared by the engineer who supervised the construction. The owner and the engineer shall maintain a record of the drawings.

H. Within 30 days after receipt of the information in subsection (G), the Director shall issue to the owner either a license or a notice that the dam and appurtenant works shall not be operated because the dam and appurtenant works do not qualify as very low hazard or were not built according to the submitted design. Upon receiving the Director's written approval, the owner may operate the dam and appurtenant works. The license shall include conditions of operation, including:
1. The safe storage level of the reservoir,
2. A requirement that the conditions resulting in the very low hazard classification be maintained throughout the life of the dam, and
3. A requirement that the owner demonstrate in writing the very low hazard classification in the manner prescribed by subsection (A)(6) every five years.

I. An owner shall immediately commence repairs necessary to safeguard human life and property and prevent failure or improper operation of a very low hazard potential dam. The owner shall notify the Department as soon as reasonably possible and in all cases within 10 days of commencing the required repairs.

J. The Department may periodically inspect construction to confirm that it is proceeding according to the approved design and that proper construction quality assurance is being exercised by the owner's engineer. The owner, or the owner's engineer under the direction of the owner, shall remedy any unsatisfactory condition using the contractor.

K. The owner shall provide the Department access to the dam site for purposes of inspecting all phases of construction, including the foundation, embankment and concrete placement, inspection and test records, and mechanical installations.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2). Amended by

exempt rulemaking at 16 A.A.R. 1205, effective June 15, 2010 (Supp. 10-2). Amended by exempt rulemaking at 16 A.A.R. 1950, effective September 10, 2010 (Supp. 10-3). Amended by final rulemaking at 17 A.A.R. 659, effective June 4, 2011 (Supp. 11-2).

R12-15-1212. Construction of a High, Significant, or Low Hazard Potential Dam

A. Before commencement of construction activities, the owner shall invite to a pre-construction conference all involved regulatory agencies, the prime contractor, and all subcontractors. At this meeting the Department shall identify, to the extent possible, the key construction stages at which an inspection will be made. At least 48 hours before each key construction stage identified for inspection, the owner or the owner's engineer shall provide notice to the Department.

B. The owner and the owner's engineer shall oversee construction of a new dam or reconstruction, repair, enlargement, alteration, breach, or removal of an existing dam. Failure to perform the work in accordance with the construction drawings and specifications approved by the Director renders the approval revocable. The owner's engineer shall exercise professional judgment independent of the contractor.

C. A professional engineer with proficiency in engineering and knowledge of dam technology shall supervise or direct the supervision of construction in accordance with the construction quality assurance plan.

D. The owner's engineer shall submit summary reports of construction activities and test results according to a schedule approved by the Department.

E. The owner shall immediately report to the Department any condition encountered during construction that requires a deviation from the approved plans and specifications.

F. The owner shall promptly submit a written request for approval of any necessary change and sufficient information to justify the proposed change. The owner shall not commence construction without the written approval of the Director unless the change is a minor change. A minor change is a change that complies with the requirements of this Article and provides equal or better safety performance.

G. Upon completion of construction, the owner shall notify the Department in writing. The Department shall make a final inspection. The owner shall correct any deficiencies noted during the inspection.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1213. Completion Documents for a Significant or High Hazard Potential Dam

Within 90 days after completion of the construction or removal work for a significant or high hazard potential dam and final inspection by the Department, the owner shall file the following:

1. An affidavit showing the actual cost of the construction. The owner shall submit a detailed accounting of the costs, including all engineering costs.
2. An additional fee or refund request based on the actual cost of the construction, computed in accordance with A.R.S. § 45-1209 and R12-15-104(A)(7).
3. One set of full sized as constructed drawings prepared and sealed by the engineer who supervised the construction. If changes were made during construction, the owner shall file supplemental drawings showing the dam and appurtenances as actually constructed.
4. Construction records, including grouting, materials testing, and locations and baseline readings for permanent bench marks and instrumentation, initial surveys, and readings.
5. Photographs of construction from exposure of the foundation to completion of construction.
6. A brief completion report summarizing the salient features of the project, including a description of the causes for any changes or deviations from the approved drawings and specifications that were made during the construction phase.
7. A schedule for filling the reservoir, specifying fill rates, water level elevations to be held for observation, and a schedule for inspecting and monitoring the dam. The owner shall monitor the dam monthly during the first filling.
8. An operating manual for the dam and its appurtenant structures. The operating manual shall include a process for safety inspections prescribed in R12-15-1219. The operating manual shall include schedules for surveillance activities and baseline information for any installed instrumentation as follows:
   a. The frequency of monitoring,
   b. The data recording format,
   c. A graphical presentation of data, and
   d. The person who will perform the work.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2). Amended by exempt rulemaking at 16 A.A.R. 1205, effective June 15, 2010 (Supp. 10-2). Amended by exempt rulemaking at 16 A.A.R. 1950, effective September 10, 2010 (Supp. 10-3). Amended by final rulemaking at 17 A.A.R. 659, effective June 4, 2011 (Supp. 11-2).

R12-15-1214. Licensing

A. Upon review and approval of the documents filed under R12-15-1213 and finding that the construction at the dam has been completed in accordance with the approved plans and specifications and finding that the dam is safe, the Director shall issue a license. The license shall specify the safe storage level for the reservoir and shall specify conditions for the safe operation of the dam. The dam and reservoir shall not be used before issuance of a license unless the Director issues written approval. Procedures for issuance of a license for low and very low hazard potential dams are prescribed in R12-15-1210(H) and R12-15-1211(H), respectively.

B. A new license shall be issued in the following instances:

1. Upon change of ownership of a dam.
2. Upon change of the safe storage level.
3. Upon expiration of time to appeal a notice issued under R12-15-1223(B).
4. Upon expiration of time to appeal an order issued by the Director under R12-15-1223(D).
5. Upon expiration of time to appeal an order of a court.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1215. Construction Drawings, Construction Specifications, and Engineering Design Report for a High, Significant, or Low Hazard Potential Dam

The owner and engineer are responsible for complete and adequate design of a dam and for including in the application all aspects of the design pertaining to the safety of the dam.

1. Construction Drawing Requirements. The construction drawings required by R12-15-1208(5), R12-15-

1209(E)(1), and R12-15-1210(A)(6) shall include the following:

a. The seal and signature of the responsible engineer in accordance with A.A.C. R4-30-304.
b. One or more topographic maps of the dam, spillway, outlet works, and reservoir on a scale large enough to accurately locate the dam and appurtenances, indicate cut and fill lines, and show the property lines and ownership status of the land. Contour intervals shall be compatible with the height and size of the dam and its appurtenances and shall show design and construction details.
c. A reservoir area and capacity curve that reflect area in acres and capacity in acre-feet in relation to depth of water and elevation in the reservoir. The construction drawings shall show the spillway invert and top of dam elevations. The construction drawings shall also show the reservoir volume and space functional allocations. The construction drawings may include alternate scales as required for the owner's use.
d. Spillway and outlet works rating curves and tables at a scale or scales that allow determination of discharge rate in cubic feet per second at both low and high flows as measured by depth of water passing over the spillway control section.
e. A location map showing the dam footprint and all exploration drill holes, test pits, trenches, adits, borrow areas, and bench marks with elevations, reference points, and permanent ties. This map shall use the same vertical and horizontal control as the topographic map.
f. Geologic information including 1 or more geologic maps, profile along the centerline, and other pertinent cross sections of the dam site, spillway or spillways, and appurtenant structures, aggregate and material sources, and reservoir area at 1 or more scales compatible with the site and geologic complexity, showing logs of exploration drill holes, test pits, trenches, and adits.
g. One or more plans of the dam to delineate design and construction details.
h. Foundation profile along the dam centerline at a true scale where the vertical scale is equal to the horizontal scale, showing the existing ground and proposed finished grade at cut and fill elevations, including anticipated geologic formations. The foundation profile shall include any proposed grout and drain holes.
i. Profile and a sufficient number of cross sections of the dam to delineate design and construction details. The drawings shall illustrate and show dimensions of camber, details of the top, core zone, interior filters and drains, and other zone details. The profile of the dam may be drawn to different horizontal and vertical scales if required for detail. A maximum section of the dam shall be drawn to a true scale, where the vertical scale is equal to the horizontal scale. The outlet conduit may be shown on the maximum section if this is typical of the proposed construction.
j. One or more dam foundation plans showing excavation grades and cut slopes with any proposed foundation preparation, grout and drain holes, and foundation dewatering requirements.
k. Plan, profile, and details of the outlet works, including the intake structure, the gate system, conduit, trashrack, conduit filter diaphragm, conduit concrete encasement, and the downstream outlet structure. The drawings shall include all connection and structural design details.
l. Plan, profile, control section, and cross sections of the spillway, including details of any foundation preparation, grouting, or concrete work that is planned. A complex control structure, a concrete chute, or an energy dissipating device for a terminal structure shall include both hydraulic and structural design details.
m. Hydrologic data, drainage area and flood routing, and diversion criteria.

2. Construction Specification Requirements. The construction specifications required by R12-15-1208(6) and R12-15-1210(A)(7) shall include the following:
   a. The seal and signature of the responsible engineer in accordance with A.A.C. R4-30-304.
   b. The statement that the construction drawings and specifications shall not be materially changed without the prior written approval of the Director.
   c. A detailed description of the work to be performed and a statement of the requirements for the various types of materials and installation techniques that will enter into the permanent construction.
   d. The statement that construction shall not be considered complete until the Director has approved the construction in writing.
   e. The statement that the owner's engineer shall control the quality of construction.
   f. The following construction information:
      i. All earth and rock material descriptions, placement criteria, and construction requirements for all elements of the dam and related structures.
      ii. All concrete, grout, and shotcrete material and mix descriptions, placement and consolidation criteria, temperature controls, and construction requirements for all elements of the dam and related structures.
      iii. Material criteria and material testing, cleaning, and treatment. If foundation or curtain grouting is required, the specifications shall describe the type of grout, grouting method, special equipment necessary, recording during grouting, and foundation monitoring to avoid disturbance from grouting.
      iv. All materials testing that will be performed by the contractor for pre-qualification of materials, including special performance testing, such as water pressure tests in conduits. The Director shall accept materials that are pre-tested successfully and constructed in-place in accordance with specifications.
      v. A plan for control or diversion of surface water during construction. The design engineer may determine frequency of storm runoff to be controlled during construction, commensurate with the risk of economic loss during construction.
      vi. Criteria for blast monitoring and acceptable blast vibration levels, including particle velocities for the dam and other critical appurtenances. Monitoring equipment and monitoring locations shall be specified.
      vii. Instrumentation material descriptions, placement criteria, and construction requirements and a statement that instrumentation shall be

installed by experienced speciality subcontractors.

3. Engineering Design Report Requirements. The engineering design report required by R12-15-1208(7) and R12-15-1210(A)(8) shall include the following:
   a. The seal and signature of the responsible engineer in accordance with A.A.C. R4-30-304.
   b. The classification under R12-15-1206 of the proposed dam, or for the proposed enlargement of an existing dam or reservoir.
   c. Hydrologic considerations, including calculations and a summary table of data used in determining the required emergency spillway capacity and freeboard, and design of any diversion or detention structures. The design report shall include input and output listings on both hard copy and computer diskette.
   d. Hydraulic characteristics, engineering data, and calculations used in determining the capacities of the outlet works and emergency spillway. The design report shall include input and output listings on both hard copy and computer diskette.
   e. Geotechnical investigation and testing of the dam site and reservoir basin. Results and analysis of subsurface investigations, including logs of test borings and geologic cross sections.
   f. Guidelines and criteria for blasting to be used by the contractor in preparing the blasting plan.
   g. Details of the plan for control or diversion of surface water during construction.
   h. Details of the dewatering plan for subsurface water during construction.
   i. Testing results of earth and rock materials, including the location of test pits and the logs of these pits.
   j. Discussion and design of the foundation blanket grouting, grout curtain, and grout cap based on foundation stability and seepage considerations.
   k. Calculations and basic assumptions on loads and limiting stresses for reinforced concrete design. The design report shall include input and output listings on both hard copy and computer diskette.
   l. A discussion and stability analysis of the dam including appropriate seismic loading, safety factors, and embankment zone strength characteristics. Analyses shall include both short-term and long-term loading on upstream and downstream slopes. The design report shall include input and output listings on both hard copy and computer diskette.
   m. A discussion of seismicity of the project area and activity of faults in the vicinity. The design report shall use both deterministic and statistical methods and identify the appropriate seismic coefficient for use in analyses.
   n. Discussion and design of the cutoff trench based on seepage and other considerations.
   o. Permeability characteristics of foundation and dam embankment materials, including calculations for seepage quantities through the dam, the foundation, and anticipated in the internal drain system. The design report shall include input and output listings on both hard copy and computer diskette. The design report shall include copies of any flow nets used.
   p. Discussion and design of internal drainage based on seepage quantity calculations. The design report shall include instrumentation necessary to monitor the drainage system and filter design calculations for protection against piping of foundation and embankment.
   q. Erosion protection against waves and rainfall runoff for both the upstream and downstream slopes, as appropriate.
   r. Discussion and design of foundation treatment to compensate for geological weakness in the dam foundation and abutment areas and in the spillway foundation area.
   s. Post-construction vertical and horizontal movement systems.
   t. Discussion of foundation conditions including the potential for subsidence, fissures, dispersive soils, collapsible soils, and sink holes.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1216. Design of a High, Significant, or Low Hazard Potential Dam

A. General Requirements.
   1. Emergency Spillway Requirements. An applicant shall:
      a. Construct each spillway in a manner that avoids flooding in excess of the flooding that would have occurred in the same location under the same conditions before construction. The owner of a dam shall demonstrate that a spillway discharge would not result in incremental adverse consequences. In determining whether a spillway discharge of a dam would result in incremental adverse consequences, the Director shall evaluate whether the owner has taken any or all of the following actions: issuing public notice to downstream property owners, complying with flood insurance requirements, adopting emergency action plans, conducting mock flood drills, acquiring flow easements or other acquisitions of real property, or other actions appropriate to safeguard the dam site and flood channel.
      b. Include a control structure to avoid head cutting and lowering of the spillway crest for spillways excavated in soils or soft rock. In the alternative, the design may provide evidence acceptable to the Director that erosion during the inflow design flood will not result in a sudden release of the reservoir.
      c. Provide each spillway and channel with a minimum width of 10 feet and suitable armor to prevent erosion during the discharge resulting from the inflow design flood.
      d. Ensure that downstream spillway channel flows do not encroach on the dam unless suitable erosion protection is constructed.
      e. Ensure that each spillway, in combination with outlets, is able to safely pass the peak discharge flow rate, as calculated on the basis of the inflow design flood.
      f. Not construct bridges or fences across a spillway unless the construction is approved in writing by the Director. The Director's approval may include conditions regarding the design and operation of the spillway and fencing, based on safety concerns.
      g. Not use a pipe or culvert as an emergency spillway unless the Director approves the use following review of the dam design and site characteristics.
   2. Inflow Design Flood Requirements

a. Unless directed otherwise in writing by the Director, the inflow design flood requirements for determining the spillway minimum capacity are stated in Table 4.
b. As an alternative to the requirements prescribed in Table 4, the Director may accept an inflow design flood determined by an incremental damage assessment study, based on the relative safety of the alternatives.
c. The Director may accept site-specific probable maximum precipitation studies in determination of the inflow design flood.
d. An applicant shall ensure that the total freeboard is the largest of the following:
i. The sum of the inflow design flood maximum water depth above the spillway crest plus wave run up.
ii. The sum of the inflow design flood maximum water depth above the spillway crest plus 3 feet.
iii. A minimum of 5 feet.

3. Outlet Works Requirements. An applicant shall ensure that a dam has a low level outlet works that:
a. Is capable of draining the reservoir to the sediment pool level. A low level outlet works for a high or significant hazard potential dam shall be a minimum of 36 inches in diameter. A low level outlet works for a low hazard potential dam shall be a minimum of 18 inches in diameter.
b. For a high or significant hazard potential dam, has the capacity to evacuate 90% of the storage capacity of the reservoir within 30 days, excluding reservoir inflows.
c. Has a filter diaphragm or other current practice measures to reduce the potential for piping along the conduit.
d. Has accessible outlet controls when the spillway is in use.
e. Has an emergency manual override system or can be operated manually.
f. Is constructed of materials appropriate for loading condition, seismic forces, thermal expansion, cavitation, corrosion, and potential abrasion. The applicant shall not use corrugated metal pipes or other thin-walled pipes except as a form for a cast-in-place concrete conduit. The applicant shall construct outlet conduits of cast-in-place reinforced concrete. The applicant shall design each outlet to maintain water tightness. The applicant shall construct each outlet to prevent the occurrence of piping adjacent to the outlet.
g. Has an operating or guard gate on the upstream end of any gated outlet.
h. Has an outlet conduit near the base of 1 of the abutments on native bedrock or other competent material. The applicant shall support the entire length of the conduit on foundation materials of uniform density and consistency to prevent adverse differential settlement.
i. Has an upstream valve or gate capable of controlling the discharge through all ranges of flow on any gated outlet conduit.
j. Has a trashrack designed for a minimum of 25% of the reservoir head to which it would be subjected if completely clogged at the upstream end of the outlet.
k. Has an air vent pipe just downstream of the control gate. The applicant shall include a blow-off valve at or near the downstream toe of the dam for an outlet conduit that is connected directly to a distribution system.
l. Has an outlet conduit designed for internal pressure equal to the full reservoir head and for superimposed embankment loads, acting separately.

4. Dam Site And Reservoir Area Requirements
a. An applicant shall demonstrate that reservoir storage during the inflow design flood will not result in incremental adverse consequences and that the design will not result in the inundation or wave damage of properties within the reservoir, except marina-type structures, during the inflow design flood. In determining whether a discharge will result in incremental adverse consequences, the Director shall evaluate whether the owner has taken any or all of the following actions: issuing public notice to upstream affected property owners, complying with flood insurance requirements, adopting emergency action plans, conducting mock flood drills, acquiring flood easements or other acquisitions of real property, or other actions appropriate to safeguard the dam site and reservoir. Permanent habitations are not allowed within the reservoir below the spillway elevation.
b. The applicant shall clear the reservoir storage area of logs and debris.
c. The applicant shall place borrow areas a safe distance from the upstream toe and the downstream toe of the dam to prevent a piping failure of the dam.
d. The applicant shall keep the top of the dam and appurtenant structures accessible by equipment and vehicles for emergency operations and maintenance.

5. Geotechnical Requirements
a. The applicant shall provide an evaluation of the static stability of the foundation, dam, and slopes of the reservoir rim and demonstrate that sufficient material is available to construct the dam as designed.
b. The applicant shall not construct a dam on active faults, collapsible soils, dispersive soils, sink holes, or fissures, unless the applicant demonstrates that the dam can safely withstand the anticipated offset or other unsafe effects on the dam.

6. Seismic Requirements
a. The applicant shall submit a review of the seismic or earthquake history of the area around the dam within a radius of 100 miles to establish the relationship of the site to known faults and epicenters. The review shall include any known earthquakes and the epicenter locations and magnitudes of the earthquakes.
b. The applicant shall identify the location of active or potentially active faults that have experienced Holocene or Late Pleistocene displacement within a radius of 100 miles of the site.
c. For a high or significant hazard potential dam, the applicant shall design the dam to withstand the maximum credible earthquake.
d. For a low hazard potential dam, the applicant shall use probabilistic or deterministic methods to determine the design earthquake. The magnitude of the design earthquake shall vary with the size of the dam, site condition, and specific location.

B. Embankment Dam Requirements.

1. Geotechnical Requirements. Table 5 states minimum factors of safety for embankment stability under various loading conditions. For an embankment dam an applicant shall provide a written analysis of minimum factors of safety for stability.
   a. The analysis of minimum factors of safety shall include the effects of anisotropy on the phreatic surface position by using a ratio of horizontal permeability to vertical permeability of at least 10. The Director may require ratios of up to 100 if the material types and construction techniques will cause excessive stratification.
   b. The applicant shall use tests modeling the conditions being analyzed to determine the strengths used in the stability analysis. The stability analysis shall include total and effective stress strengths appropriate for the different material zones and conditions analyzed. The stability analysis shall use undrained strengths or strength parameters for all saturated materials.
   c. The applicant shall perform an analysis of the upstream slope stability for a partial pool with steady seepage considering the reservoir level that provides the lowest factor of safety.
   d. A stability analysis is not required for low hazard potential dams if the owner or the owner's engineer demonstrates that conservative slopes and competent materials are included in the design.
2. Seismic Requirements
   a. The applicant shall determine the seismic characteristics of the site as prescribed in subsection (A)(6).
   b. The applicant shall determine the liquefaction susceptibility of the embankment, foundation, and abutments. The applicant shall use standard penetration testing, cone penetration testing, shear wave velocity measurements, or a combination of these methods to make this determination. The applicant shall compute the minimum factor of safety against liquefaction at specific points and make a determination of whether the overall site is subject to liquefaction.
   c. The applicant shall determine the safety of the dam under seismic loading using a pseudo static stability analysis, computing the minimum factor of safety if the embankment, foundation or abutment is not subject to liquefaction and has a maximum peak acceleration of 0.2g or less, or a maximum peak acceleration of 0.35g or less, and consists of clay on a clay or bedrock foundation. The applicant shall use in the pseudo static stability analysis a pseudo static coefficient that is at least 60% of the maximum peak bedrock acceleration at the site.
   d. The applicant shall compute a minimum factor of safety against overtopping due to deformation and settlement in each of the following cases. The minimum factor of safety against overtopping can be no less than 2.5, determined by dividing the total pre-earthquake freeboard by the estimated vertical settlement in feet. The applicant shall determine the total vertical settlement by adding the settlement values of the upstream and downstream slopes.
      i. The minimum factor of safety in a pseudo static analysis is less than 1.0;
      ii. An embankment, foundation, or abutment is not subject to liquefaction, has a maximum peak acceleration of more than 0.2g or a maximum peak acceleration of more than 0.35g and consists of clay on a clay or bedrock foundation; or
      iii. The embankment, foundation or abutment is subject to liquefaction.
   e. The applicant shall perform a liquefaction analysis to establish approximate boundaries of liquefiable zones and physical characteristics of the soil following liquefaction for an embankment, foundation, or abutment subject to liquefaction. The applicant shall perform an analysis of the potential for flow liquefaction.
   f. Other, more sophisticated analytical procedures may be required by the Director for sites with high seismicity or low strength embankment or foundation soils.
3. Miscellaneous Design Requirements
   a. The design of any significant or high hazard potential dam shall provide seepage collection and prevent internal erosion or piping due to embankment cracking or other causes.
   b. The Director shall review the filter and permeability design for a chimney drain, drain blanket, toe drain, or outlet conduit filter diaphragms on the basis of unique site characteristics.
      i. The minimum thickness of an internal drain is 3 feet.
      ii. The minimum width of a chimney drain is 6 feet.
      iii. The applicant shall filter match an internal drain to its adjacent material.
      iv. The applicant shall design internal drains with sufficient capacity for the expected drainage without the use of drainpipes using only natural granular materials.
   c. The use of a geosynthetic is not permitted in a design if it serves as the sole defense against dam failure. The use of geotextiles and geonets as a filter or drain material or a geomembrane liner is permitted only in a location that is easily accessible for repair or if its excavation cannot create an unsafe condition at the dam. A geosynthetic liner is allowed under special conditions and in specific situations if it is subject to monitoring and redundant safety controls. The Director may impose conditions, including monitoring appropriate to the hazard classification, inspection, and necessary repairs, each performed every 5 years.
   d. The applicant shall use armoring on any upstream slope of an embankment dam that impounds water for more than 30 days at a time. If the applicant uses rock riprap, it shall be well-graded, durable, sized to withstand wave action, and placed on a well-graded pervious sand and gravel bedding or geotextile with filtering capacity appropriate for the site.
   e. The applicant shall protect the downstream slopes and groins of an embankment dam from erosion.
   f. The minimum width of the top of an embankment dam is equal to the structural height of the dam divided by 5 plus an additional 5 feet. The required minimum width for any embankment dam is 12 feet. The maximum width for any embankment dam is 25 feet.

Historical Note

New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

Table 4. Inflow Design Flood

Dam Hazard Class	Dam Size Classification	IDF Magnitude
Very Low	All Sizes	100-year
Low	All Sizes	0.25 PMF
Significant	Small Intermediate Large	0.25 PMF 0.5 PMF 0.5 PMF
High*	All Sizes	*

* For a high hazard potential dam, the applicant shall design the dam to withstand an inflow design flood that varies from .5 PMF to the full PMF, with size increasing based on persons at risk and potential for downstream damage. The applicant shall consider foreseeable future conditions.

Historical Note
New Table adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

Table 5. Minimum Factors of Safety for Stability[1]

Embankment Loading Condition	Minimum Factor of Safety
End of construction case – upstream and downstream slopes	1.3
End of construction case for embankments greater than 50 feet in height on weak foundations	1.4
Steady state seepage - upstream (critical partial pool) and downstream slope (full pool)	1.5
Instantaneous drawdown - upstream slope	1.2

[1] Not applicable to an embankment on a clay shale foundation.

Historical Note
New Table adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1217. Maintenance and Repair; Emergency Actions

A. An owner shall perform general maintenance and ordinary repairs that do not impair the safety of the dam. General maintenance and ordinary repair activities listed under this subsection do not require prior approval of the Director. These repair activities include:
1. Removing brush or tall weeds.
2. Cutting trees and removing slash from the embankment or spillway. Small stumps may be removed provided no excavation into the embankment occurs.
3. Exterminating rodents by trapping or other methods. Rodent damage may be repaired provided it does not involve excavation that extends more than 2 feet into the embankment and replacement materials are compacted as they are placed.
4. Repairing erosion gullies less than 2 feet deep on the embankment or in the spillway.
5. Grading the surface on the top of the dam embankment or spillway to eliminate potholes and provide proper drainage, provided the freeboard is not reduced.
6. Placing additional riprap and bedding on the upstream slope, or in the spillway in areas that have sustained minor damage and restoring the original riprap protection where the damage has not yet resulted in erosion and weakening of the dam.
7. Painting, caulking, or lubricating metal structures.
8. Patching or caulking spalled or cracked concrete to prevent deterioration.
9. Removing debris, rock, or earth from outlet conduits or spillway channels and basins.
10. Patching to prevent deterioration within outlet works.
11. Replacing worn or damaged parts on outlet valves or controls to restore them to original condition or its equivalent.
12. Repairing or replacing fences intended to keep traffic or livestock off the dam or spillway.

B. General maintenance and ordinary repair that may impair or adversely effect safety, such as excavation into or near the toe of the dam, construction of new appurtenant structures for the dam, and repair of damage that has already significantly weakened the dam shall be performed in accordance with this Article. The Director may approve maintenance performed according to a standard detail or method of repair on file with the Department upon submittal of a letter. The Director shall determine whether general maintenance and ordinary repair activities not listed in subsection (A) will impair safety.

C. Emergency actions not impairing the safety of the dam may be taken before guidance can be provided by an engineer and do not require prior approval of the Director. Emergency actions do not excuse an owner's responsibility to promptly undertake a permanent solution. Emergency actions include:
1. Stockpiling materials such as riprap, earth fill, sand, sandbags, and plastic sheeting.
2. Lowering the reservoir level by making releases through the outlet or a gated spillway, by pumping, or by siphoning.
3. Armoring eroded areas by placing sandbags, riprap, plastic sheeting, or other available material.
4. Plugging leakage entrances on the upstream slope.
5. Increasing freeboard by placing sandbags or temporary earth fill on the dam.
6. Diverting flood waters to prevent them from entering the reservoir basin.
7. Constructing training berms to control flood waters.
8. Placing sandbag ring dikes or reverse filter materials around boils at the downstream toe to provide back pressure.
9. Removing obstructions from outlet or spillway flow areas.

D. Emergency actions impairing the safety of the dam require prior approval of the Director. An owner shall not lower the water level by excavating the spillway or embankment unless failure is imminent.

E. For all high and significant hazard potential dams, the emergency action plan shall be implemented with any emergency actions taken at the dam.

F. The owner shall notify the Director immediately of any emergency condition that exists and any emergency action taken.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1218. Safe Storage Level

The Director has the authority to determine the safe storage level for the reservoir behind each dam, including the storage level of an existing dam while it is being repaired, enlarged, altered, breached, or removed. The elevation of the safe storage level is stated on the license. The owner shall not store water in excess of the level determined by the Director to be safe. The owner shall not place flashboards or other devices in the emergency spillway without approval of an alteration of the dam in accordance with this Article.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1219. Safety Inspections; Fees

A. Except as provided in subsection (E), the Director shall conduct a dam safety inspection annually or more frequently for each high hazard potential dam, triennially for each significant hazard potential dam, and once every five years for each low and very low hazard potential dam. An owner of a dam shall pay the inspection fee required by R12-15-105 for each inspection of the dam pursuant to this subsection.

B. An engineer is considered qualified to provide information to the Director regarding the safe storage level of a reservoir if the engineer:
1. Meets the criteria in R12-15-1202(11),
2. Has three years of experience in the field of dam safety, and
3. Has actual experience in conducting dam safety inspections.

C. A dam safety inspection includes:
1. Review of previous inspections, reports, and drawings;
2. Inspection of the dam, spillways, outlet facilities, seepage control, and measurement systems;
3. Inspection of any permanent monument or monitoring installations;
4. Assessment of all parts of the dam that are related to the dam's safety; and
5. A recommendation regarding the safe storage level of the reservoir.

D. The engineer shall submit a safety inspection report that describes the findings and lists actions that will improve the safety of the dam. The report shall include the engineer's recommendation of the safe storage level. The engineer shall use a report form approved by the Director.

E. Inspections by the Owner
1. An owner may provide to the Director, at the owner's expense, a safety inspection report that complies with the requirements of subsections (B), (C), and (D) in place of an inspection by the Department. The owner's engineer shall notify the Director and submit a written summary of the engineer's qualifications at least 14 days before the scheduled safety inspection.
2. The Director may refuse to accept an inspection that does not conform to this Article.
3. A safety inspection report submitted pursuant to this subsection shall include the fee required by R12-15-105(D).

F. Inspections by the Department
1. The Director may enter at reasonable times upon private or public property and the owner shall permit such entry, where a dam is located, including a dam under construction, reconstruction, repair, enlargement, alteration, breach, or removal, for any of the following purposes:
   a. To enforce the conditions of approval of the construction drawings and specifications related to an application for construction, reconstruction, repair, enlargement, alteration, breach, or removal.
   b. To inspect a dam that is subject to this Article.
   c. To investigate or assemble data to aid review and study of the design and construction of dams, reservoirs, and appurtenances or make watershed investigations to facilitate decisions on public safety to fulfill the duties of A.R.S. § 45-1214.
   d. To ascertain compliance with this Article and A.R.S. Title 45, Chapter 6.
2. Upon receipt of a complaint that a dam is endangering people or property:
   a. The Director shall inspect the dam unless there is substantial cause to believe the complaint is without merit.
   b. If the complainant files a complaint in writing and deposits with the Director sufficient funds to cover the costs of the inspection, the Director shall make an inspection.
   c. The Director shall provide a written report of the inspection to the complainant and the dam owner.
   d. If an unsafe condition is found, the Director shall cause it to be corrected and return the deposit to the complainant. If the complaint was without merit the deposit shall be paid into the general fund.
3. The Director may employ qualified on-call consultants to conduct inspections.
4. Inspections under subsection (A) shall comply with the requirements of A.R.S. § 41-1009.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2). Amended by exempt rulemaking at 16 A.A.R. 1205, effective June 15, 2010 (Supp. 10-2). Amended by exempt rulemaking at 16 A.A.R. 1950, effective September 10, 2010 (Supp. 10-3). Amended by final rulemaking at 17 A.A.R. 659, effective June 4, 2011 (Supp. 11-2).

R12-15-1220. Existing Dams

A. The requirements of this Article apply to existing dams, except as provided in subsections (B) and (C).

B. If the Director has determined that an existing dam is in a safe condition, the owner is not required to comply with R12-15-1216 unless the Director determines that it is cost effective to upgrade the dam to comply with the requirements of R12-15-1216 at the time a major alteration or major repair is planned. In determining whether it is cost effective to upgrade a dam, the Director shall consider:
1. The hazard potential classification of the dam;
2. Whether the cost of the upgrade would exceed 25% of the total cost of the major alteration or major repair; and
3. Whether there is a more cost effective alternative that would provide an equivalent increase in safety.

C. If the Director has determined that a dam is in an unsafe condition, the owner shall comply with the requirements in R12-15-1216. The owner is not required to comply with a requirement in this Article if the Director finds that, considering the site characteristics and the proposed design, the requirement is unduly burdensome or expensive and is not necessary to protect human life or property. The Director shall consider the size, hazard potential classification, physical site conditions, and applicability of a requirement to the dam. The Director shall state in writing the reason or reasons the owner is not required to comply with a requirement.

D. The owner shall ensure that installation of utilities beneath or through an existing dam is accomplished by open cuts or jacking and boring methods.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1221. Emergency Action Plans

A. Each owner of a high or significant hazard potential dam shall prepare, maintain, and exercise a written emergency action plan for immediate defensive action to prevent failure of the dam and minimize any threat to downstream development. The emergency action plan shall contain a:

1. Notification chart showing the priority for notification in an emergency situation. The owner shall notify local emergency response agencies, affected downstream populations, county emergency management agencies, and affected flood control districts;
2. Description of the demand reservoir and scope of the emergency action plan;
3. Delineation of potentially unsafe conditions, evaluation procedures, and triggering events that require the initiation of partial or full emergency notification procedures, based on the urgency of the situation;
4. Delineation of areas of responsibility of the owner and other parties. The emergency action plan shall clearly identify individuals responsible for notifications and declaring an emergency;
5. Specific notification procedure for each emergency situation anticipated;
6. Description of emergency supplies and resources, equipment access to the site, and alternative means of communication. The emergency action plan shall also identify specific preparedness activities required, such as annual full or partial mock exercises and updates of the emergency action plan; and
7. Map showing the area that would be subject to flooding due to spillway flows and dam failures.

B. The owner shall use the Director's model emergency action plan, which is available at no cost, or an equivalent model, for guidance in preparing the emergency action plan.

C. The owner shall submit a copy of the proposed emergency action plan for review by the Arizona Division of Emergency Management and all local emergency coordinators involved in the plan. The owner shall incorporate appropriate recommendations generated by the reviews and submit the revised emergency action plan to the Department.

D. The owner shall review and update the emergency action plan annually or more frequently to incorporate changes such as new personnel, changing roles of emergency agencies, emergency response resources, conditions of the dam, and information learned from mock exercises. The owner shall send updated portions of the plan to persons and agencies holding copies of the plan within 15 days after preparation of an update.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1222. Right of Review

A. An applicant or owner aggrieved by a decision of the Director regarding the determination of hazard classification, jurisdictional status, or the Director's application of this Article may seek review of an appealable agency action under A.R.S. Title 41, Chapter 6, Article 10.

B. An applicant or owner aggrieved by a decision of the Director that requires the exercise of professional engineering judgment or discretion or the assessment of risk to human life or property, such as the adequacy of an applicant's project documentation, dam design, safe storage level, requirements for existing dams, or maintenance, may seek review by a board of review under A.R.S. §§ 45-1210 and 45-1211.

C. The following actions are not subject to review:
1. Emergency measures taken under A.R.S. §§ 45-1212 or 45-1221.
2. Agency decisions made under A.R.S. §§ 41-1009(E) or (F).
3. Agency actions made exempt from review by law.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1223. Enforcement Authority

A. The Department may exercise its discretion to take action necessary to prevent danger to human life or property. The Director may take any legal action that is proper and necessary for the enforcement of this Chapter.

B. If the Director has cause to believe that a dam is unsafe or a person is violating or has violated a provision of this Article or A.R.S. Title 45, Chapter 6, Article 1, the Director may issue a notice directing the owner to remedy the safety deficiency or correct the violation. The owner may appeal a notice issued under this subsection as an appealable agency action in accordance with A.R.S. Title 41, Chapter 6, Article 10. If the owner does not appeal within 30 days after the date on the notice, the notice becomes final and may be incorporated as a condition of any license based on the duration of the requirement.

C. If the Director has cause to believe that a dam is unsafe or a person is violating or has violated a provision of this Article or A.R.S. Title 45, Chapter 6, Article 1, the Director may proceed under A.R.S. § 45-1221 to initiate a contested case under A.R.S. Title 41, Chapter 6, Article 10 by requesting an administrative hearing.

D. Following a written decision by an administrative law judge, the Director shall issue a decision and order accepting, rejecting, or modifying the administrative law judge's decision. Upon expiration of time to appeal, the decision and order becomes final and may be incorporated as a condition of any license based on the duration of the requirement.

E. If the Director has cause to believe that a dam is unsafe or a person is violating or has violated a provision of this Article or A.R.S. Title 45, Chapter 6, Article 1 the Director may commence an action in a court of appropriate jurisdiction if:
1. The violation is an emergency requiring appropriate steps to be taken without delay; or
2. The Director has cause to believe that use of the administrative procedure would be ineffective or that delay would ensue and a deterioration in the safety of the dam would occur.

F. If the Director commences an action it shall be brought in a court of appropriate jurisdiction in which:
1. The cause or some part of the cause arose; or
2. The owner or person complained of has his or her place of business; or
3. The owner or person complained of resides.

G. A person determined to be in violation of this Article; A.R.S. Title 45, Chapter 6; a license; or order may be assessed a civil penalty not exceeding $1,000 per day of violation. The Director may offer evidence relating to the amount of the penalty in accordance with A.R.S. § 45-1222.

H. A violation of A.R.S. Title 45, Chapter 6, Article 1 regarding Supervision of Dams, Reservoirs, and Projects is a class 2 misdemeanor, in accordance with A.R.S. § 45-1216.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1224. Emergency Procedures

A. The owner of a dam shall immediately notify the Department and responsible authorities in adjacent and downstream communities, including emergency management authorities, of a condition that may threaten the safety of the dam. The owner shall take necessary actions to protect human life and property, including action required under an emergency action plan or order issued under this Article.

1. A condition that may threaten the safety of a dam includes:
   a. Sliding of upstream or downstream slopes or abutments contiguous to the dam;
   b. Sudden subsidence of the top of the dam;
   c. Longitudinal or transverse cracking of the top of the dam;
   d. Unusual release of water from the downstream slope or face of the dam;
   e. Other unusual conditions at the downstream slope of the dam;
   f. Significant landslides in the reservoir area;
   g. Increasing volume of seepage;
   h. Cloudy seepage or recent deposits of soil at seepage exit points;
   i. Sudden cracking or displacement of concrete in a concrete or masonry dam spillway or outlet works;
   j. Loss of freeboard or dam cross section due to storm wave erosion;
   k. Flood waters overtopping an embankment dam; or
   l. Spillway backcutting that threatens evacuation of the reservoir.
2. In case of an emergency, the owner shall telephone the Arizona Department of Public Safety's emergency numbers at (800) 411-2336 or (602) 223-2000.

B. The Director shall issue an emergency approval to repair, alter, or remove an existing dam if the Director finds that immediate remedial action is necessary to alleviate an imminent threat to human life or property.
1. The emergency approval shall be provided in writing on a form developed for this purpose.
2. The emergency approval may contain conditions the Director determines are appropriate to protect human life or property.
3. The emergency approval is effective immediately for 30 days after notice is issued unless extended in writing by the Director. The Director shall also send notice to the county flood control district of the county in which the dam is located, all municipalities within 5 miles downstream of the dam, and any additional persons identified in the emergency action plan.
4. The Director may institute legal or administrative proceedings that the Director deems appropriate for violations of the emergency approval or conditions of the emergency approval.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1225. Emergency Repairs

A. The Director shall use monies from the dam repair fund, established under A.R.S. § 45-1212.01 to employ any remedial measure necessary to protect human life and property resulting from a condition that threatens the safety of a dam if the dam owner is unable or unwilling to take action and there is not sufficient time to issue and enforce an order.

B. The deputy director may authorize an expenditure not to exceed $10,000 from the dam repair fund for remedial measures under A.R.S. § 45-1212. The expenditure of any additional funds shall be approved by the Director.

C. The Director shall hold a lien against all property of the owner in accordance with A.R.S. § 45-1212.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

R12-15-1226. Non-Emergency Repairs; Loans and Grants

A. If the Director determines that a dam represents a threat to human life and property but is not in an emergency condition, the Director may use the dam repair fund, established under A.R.S. § 45-1212.01, as prescribed in this Article to defray the costs of repair.

B. Monies from the dam repair fund may be used for loans and grants to owners as provided in A.R.S. §§ 45-1218 and 45-1219.

C. To qualify for a loan or grant from the dam repair fund, a dam shall be classified as unsafe by the Director.

D. The Director may authorize grant funds for all or part of the cost of engineering studies or construction needed to mitigate the threat to human life and property created by a dam.
1. The Director and the grantee shall execute a financial assistance agreement that includes terms of financial assistance, the work progress, and payment schedule.
2. The Director shall disburse grant funds in accordance with the financial assistance agreement.
3. The Director shall establish a priority ranking for grants based on factors including the potential for failure of a dam, the number of lives at risk, and the capability of the owner to pay a portion of the costs.

E. The Director may loan funds for engineering studies or for all or part of construction as prescribed in A.R.S. § 45-1218.
1. The Director and the dam owner shall execute a loan repayment agreement. The loan repayment agreement shall be delivered to and held by the Department.
2. The Director shall establish a priority ranking for loans based on factors including the potential for failure of a dam, the number of human lives at risk, and the capability of the owner to pay a portion of the costs.

Historical Note
New Section adopted by final rulemaking at 6 A.A.R. 2558, effective June 12, 2000 (Supp. 00-2).

ARTICLE 13. WELL SPACING REQUIREMENTS; REPLACEMENT WELLS IN APPROXIMATELY THE SAME LOCATION

R12-15-1301. Definitions

In addition to the definitions in A.R.S. §§ 45-101, 45-402, and 45-591, the following words and phrases in this Article shall have the following meanings, unless the context otherwise requires:
1. "Abandoned well" means a well for which a well abandonment completion report has been filed pursuant to R12-15-816(E) or for which a notification of abandonment has been filed pursuant to R12-15-816(K).
2. "Additional drawdown" means a lowering in the water levels surrounding a well that is the result of the operation of the well and that is not attributable to existing regional rates of decline or existing impacts from other wells.
3. "Applicant" means any of the following:
   a. A person who has filed an application for a permit to construct a new well or a replacement well in a new location under A.R.S. § 45-599;
   b. A person who has filed an application for a recovery well permit under A.R.S. § 45-834.01 for a new well as defined in A.R.S. § 45-591 or, except as provided in A.R.S. § 45-834.01(B)(2) or (3), an existing well as defined in A.R.S. § 45-591;
   c. A person who has filed an application for approval to use a well to withdraw groundwater for transportation to an active management area under A.R.S. § 45-559; or
   d. A person, other than a city, town, private water company, or irrigation district, who has filed an applica-

ARIZONA DEPARTMENT OF WATER RESOURCES

OFFICE OF DAM SAFETY AND FLOOD MITIGATION

ARIZONA REVISED STATUTES

TITLE 45-WATERS, CHAPTER 6., ARTICLE 1.

SUPERVISION OF DAMS, RESERVOIRS AND PROJECTS

ARIZONA REVISED STATUTES
TITLE 45 - WATERS

CHAPTER 6. - DAMS AND RESERVOIRS
ARTICLE 1. - SUPERVISION OF DAMS, RESERVOIRS AND PROJECTS

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ARTICLE 1. - SUPERVISION OF DAMS, RESERVOIRS AND PROJECTS

Section 45-1201. Definitions

In this article, unless the context otherwise requires:

1. "Dam" means any artificial barrier, including appurtenant works for the impounding or diversion of water twenty-five feet or more in height or the storage capacity of which will be more than fifty-acre feet, but does not include:

(a) Any barrier that is or will be less than six feet in height, regardless of storage capacity.
(b) Any barrier that has or will have a storage capacity of fifteen acre feet or less, regardless of height.
(c) Any barrier for the purpose of controlling liquid borne material.
(d) Any barrier that is a release contained barrier.
(e) Any barrier that is owned, controlled, operated, maintained or managed by the United States Government or its agents or instrumentalities if a safety program that is as least as stringent as the state safety program applies and is enforced against the agent or instrumentality.

2. "Height" means the vertical distance from the lowest elevation of the outside limit of the barrier at its intersection with the natural ground surface to the spillway crest elevation.

3. "Owner" includes any person or entity that owns, controls, operates, maintains, manages or proposes to construct or modify a dam.
4. "Person" means any person, firm, association, organization, partnership, business trust, corporation, company or district.

5. "Release-contained barrier" means any artificial barrier and appurtenant works that comply with both of the following:
(a) Has a storage capacity that in the event of failure would be contained within property that the release contained barrier owner owns, controls, operates, maintains, or manages.
(b) The property on which the release would be contained is not open to the public.

6. "Storage capacity" means the maximum volume of water that can be impounded by the reservoir when there is no discharge of water.

Formerly Section 45-701. Amended by Laws 1971, Ch. 49, Sec. 13, eff. April 13, 1971; Laws 1973, Ch. 79, Sec. 1; Laws 1977, Ch. 34, Sec. 1; Laws 1980, 4th S.S., Ch. 1, Sec. 87, eff. June 12, 1980. Renumbered as Sec. 45-1201 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987. Amended by Laws 1999, Ch.187, Sec. 11.

Section 45-1202. Jurisdiction of director of water resources; records; rules and regulations

A. All dams are under the jurisdiction of the director of Water Resources. Dams of the state, or any political subdivisions thereof, or dams of public utilities, and all dams within the state are included within the jurisdiction conferred by this section. It is unlawful to construct, reconstruct, repair, operate, maintain, enlarge, remove or alter any dam except upon approval of the director.

B. The records pertaining to dam supervision are public documents.

C. The director shall adopt and revise rules and issue general orders to effectuate this article.

D. To qualify for an exemption for a release contained barrier, the owner of an existing or proposed release contained barrier shall submit to the director a notice of exemption. The director shall accept or reject the notice of exemption within thirty days after receipt of both of the following:

1. A statement signed by the owner that:

(a). The storage capacity of the release contained barrier would be contained within property that the release-contained barrier owner owns, operates, controls, maintains, or manages and that is not open to the public.

(b) The release-contained barrier owner will maintain the downstream containment structures or sites with sufficient containment throughout the useful life of the release-contained barrier.

2. A topographic site plan that shows:

(a) The property lines and ownership status of the land.

(b) Any areas of the property that are open to the public.

(c) The locations and storage capacities of the release-contained barrier and the downstream containment structures or sites.

E. The director may conduct site inspections to verify the release-contained barrier exemption.

Formerly Sec. 45-702. Amended by Laws 1970, Ch. 204, Sec. 193; Laws 1971, Ch. 49, Sec. 14, eff. April 13, 1971; Laws 1980, 4th S.S., Ch. 1, Sec. 88, eff. June 12, 1980. Renumbered as Sec. 45-1202 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987. Amended by Laws, 1999, Ch. 187, Sec.12.

Section 45-1203. Approval by director of proposed dam or enlargements of existing dams; application for construction or enlargement

A. Construction of a dam or enlargement of an existing dam shall not be commenced until a written approval of plans and specifications has been obtained from the director.

B. A separate application for each dam shall be filed with the director upon forms provided by him, reciting the name and address of the owner or his agent, the location, type, size and height of the proposed dam and appurtenant works, the storage capacity of the reservoir, and such other information as the director requests. The application shall also set forth the area of the drainage basin, rainfall and stream flow records, flood flow records and estimates and other similar information required by the director. The director may require information concerning subsoil and foundation conditions and may require that the site be drilled or otherwise prospected.

C. When the physical conditions and the size of the dam do not require the information provided in subsection B, such information may be waived by the director.

D. The means, plans and specifications by which the stream or body of water is to be dammed, by-passed or controlled during construction shall be stated in the application, or such means, plans and specifications shall be submitted to the director for approval prior to beginning construction. The director shall have the same authority over the construction and maintenance of such means of damming, bypassing or controlling the stream or body of water during construction of the dam as he has over similar work on the dam itself.

E. The application shall further state the proposed time of beginning and completing construction, the estimated cost of construction, the use to which the impounded or diverted water is to be put, and shall be

accompanied by maps, plans and specifications and state such details and dimensions as the director may require. The maps, plans and specifications shall be a part of the application.

F. Prior to the approval of plans and specifications, the director may require a surety company bond in an amount sufficient to secure the costs to the state in assuring the safety of any dam left partially constructed. The bond may be required only when the director questions the financial ability of the owner or contractor, or otherwise deems the bond advisable.

Formerly Sec. 45-703. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 89, eff. June 12, 1980. Renumbered as Sec. 45-1203 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1204. Estimated cost of dam; application fees

A. The estimated cost of the dam or alterations thereof shall include the cost of all labor and materials entering into the construction of the dam and appurtenant works. The cost of the preliminary investigation and surveys, the construction plant and all other items properly included in the cost of the dam shall be chargeable to the cost of the dam.

B. The director shall establish by rule and the department shall collect a reasonable filing fee which shall be based on the estimated cost of the dam but in no event shall the fee exceed two percent of the estimated cost. The applicant shall pay the filing fee at the time of filing the application. The fee shall be required of all applicants including the state and its departments, institutions or agencies.

C. An application shall not be considered nor shall construction be permitted until the filing fee has been paid.

Formerly Sec.45-704. Renumbered as 45-1204 by Laws 1987,Ch. 2, Sec. 4,eff. Feb 27, 1987. Amended by Laws 1987,Ch. 287Sec.1, Laws 1999, Ch.187, Sec. 13.

Section 45-1205. Charges against irrigation projects; disposition of proceeds

A. Upon all projects for which approval is required by the state certification board, or which involve examination, supervision and inspection by the director, whether in connection with the construction of a dam or otherwise, the following shall be paid:

1. For irrigation projects of any kind involving twenty-five thousand acres or less, an annual tax levy of ten cents per acre shall be levied and collected.

2. For such irrigation projects in excess of twenty-five thousand acres, an annual levy of five cents per acre shall be levied and collected.

B. The levy shall be made only in the years required for construction of the project, and shall be made and collected in the same manner as provided for the levy and collection of taxes made for other expenses of the particular district. Such collections shall be transmitted to the state treasurer and credited to the state general fund.

Formerly Sec. 45-705. Amended by Laws 1971, Ch. 49, Sec. 15, eff. April 13, 1971; Laws 1980, 4th S.S., Ch. 1, Sec. 90, eff. June 12, 1980. Renumbered as Sec. 45-1205 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987. Amended by Laws 1987, Ch. 287, Sec. 2.

Section 45-1206. Approval of repair, alteration or removal of dam

A. Before commencing the repair, alteration or removal of a dam, application shall be made for written approval by the director, except as otherwise provided by this article. The application shall state the name and address of the applicant, shall adequately detail the changes it proposes to effect and shall be accompanied by maps, plans and specifications setting forth such details and dimensions as the director requires. The director may waive any such requirements. The application shall give such other information concerning the dam and reservoir required by the director, such information concerning the safety of any change he may require, and shall state the proposed time of commencement and completion of the work. The application shall otherwise conform to the requirements of Section 45-1203.

B. When repairs are necessary to safeguard life and property, they may be started immediately, but the director shall be notified forthwith of the proposed repairs and of work under way, and they shall be made to conform to his orders.

Formerly Sec. 45-706. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 91, eff. June 12, 1980. Renumbered as 45-1206 and amended by Laws 1987, Ch. 2, Sec. 4, 29, eff. Feb. 27, 1987.

Section 45-1207. Approval or disapproval of applications; commencing construction

A. Upon receipt of an application, the director shall approve, disapprove or approve subject to conditions necessary to insure safety.

B. A defective application shall not be rejected, but notice of the defects shall be sent to the applicant by registered mail. If the applicant fails to file a perfected application within thirty days, the original shall be canceled unless further time is allowed.

C. No application shall be approved in less than ten days from its receipt, nor shall an application be retained more than sixty days after it is filed unless the director finds that additional information is necessary. An applicant may request that the director expedite the review of the application through the employment of an expert consultant on a contract basis pursuant to section 45-104, subsection D to assist the director in reviewing the application. If an applicant requests an expedited review of the application pursuant to this subsection and the director employs a consultant, the applicant shall pay to the department the cost of the consultant's services in addition to any other fees that the applicant is required to pay under this chapter.

D. If the director disapproves an application, one copy shall be returned with a statement of his objections. If an application is approved, the approval shall be attached to the application and a copy returned by registered mail. Approval shall be granted under terms, conditions and limitations, which the director deems necessary to safeguard life and property.

E. Construction shall be commenced within one year after the date of approval of the application or such approval is void. The director upon written application and good cause shown may extend the time for commencing construction. Notice by registered mail shall be given to the director at least ten days before construction is commenced.

Formerly Sec. 45-707. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 92, eff. June 12, 1980. Renumbered as Sec. 45-1207 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987; Laws 1996, Ch 103, § 18, eff. April 9, 1996.

Section 45-1208. Inspection and investigations during construction; modifications; notice

A. During the construction, enlargement, repair, alteration or removal of a dam the director shall make such inspections, investigations or examinations as he deems necessary to enforce the provisions of his approval and the plans and specifications as approved. If thereafter as the work progresses the director believes amendments, modifications or changes are necessary to insure safety, he shall revise the approval.

B. If, during construction, reconstruction, repair, alteration or enlargement of any dam, the director finds the work is not being done in accordance with the provisions of the approval and the approved plans and specifications, he shall give written notice by registered mail or personal service to the person who received the approval and to the person in charge of construction at the dam. The notice shall state the particulars in which compliance has not been made, and shall order immediate compliance with the terms of the approval, and the approved plans and specifications. The director may order that no further construction work be undertaken until such compliance has been effected and approved by the director. A failure to comply with the approval and the approved plans and specifications shall render the approval revocable unless compliance is made after notice as provided by this section.

Formerly Sec. 45-708. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 93, eff. June 12, 1980. Renumbered as Sec. 45-1208 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1209. Notice of completion; license of final approval; removal of dam

A. Immediately upon completion or enlargement of a dam, notice of completion shall be given to the director. As soon as possible thereafter supplementary drawings or descriptive matter showing or describing the dam as actually constructed shall be filed with the director which shall include:

1.A record of all grout holes and grouting.

2.A record of permanent location points and bench marks.

3.A record of tests of concrete or other material used in the construction of the dam.

4.A record of other items of permanent value bearing on safety and permanence of construction.

B. When an existing dam is enlarged, the supplementary drawings and descriptive matter need apply only to the new work.

C. The owner of a completed dam shall file an affidavit of the total cost of the dam comprised of items set forth in Section 45-1204, and furnish such evidence in support thereof as the director requires. No license of final approval shall issue until the affidavit is filed. The completed dam shall be inspected by the director, and upon finding that the work has been done as required and that the dam is safe, the director shall issue a license of final approval forthwith, subject to such terms as the director deems necessary for the protection of life and property. In the event the total cost exceeds the estimated cost, the fee shall be recomputed in accordance with rules adopted pursuant to Section 45-1204, subsection B. The owner shall pay the difference between the fee already paid and the recomputed fee.

D. Pending issuance of the license, the dam shall not be used except on written consent of the director, subject to conditions he may impose.

E. When a dam is removed the owner shall file with the director evidence showing that a sufficient

portion has been removed to permit the free passage of flood waters. Before final approval of the removal of the dam the director shall inspect the work to ascertain its safety.

Formerly Sec. 45-709. Amended by Laws 1973, Ch. 79, Sec. 2; Laws 1980, 4th S.S., Ch. 1, Sec. 94, eff. June 12, 1980. Renumbered as Sec. 45-1209 and amended by Laws 1987, Ch. 2, Sec. 4, 30, eff. Feb. 27, 1987. Amended by Laws 1992, Ch. 3, Sec. 14, eff. March 24, 1992.

Section 45-1210. Petition for review

Except as otherwise provided in this article, a petition for review by the board of review of any approval, disapproval or order of the director concerning plans, specifications, construction or maintenance pertaining to any dam may be filed by the owner or applicant, or by three land owners whose property would be endangered by the failure of the dam.

Formerly Sec. 45-710. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 95, eff. June 12, 1980. Renumbered as Sec. 45-1210 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1211. Time for filing petition; board of review

A. The petition for review shall be in writing and shall be filed with the director within ten days after issuance of the approval, disapproval or order of which complaint is made. Upon receipt of the petition, the director shall prepare a list of ten qualified experts. Within ten days the petitioner shall select three individuals from the list who shall then serve as the board of review. The board shall serve at the expense of the petitioners. Within thirty days from its designation, or within such further time as the director allows, the board shall report to the director and he shall forthwith affirm, change or modify the report, and his action shall be final and not subject to further review. No board of review shall be appointed to consider any action taken by the director relative to emergency regulation and control of a dam under Section 45-1212 or action taken by the director under Section 45-1221.

B. Pending examination, change or modification by the director, his approval, disapproval or order issued shall remain operative. Operations shall be suspended if an applicant or owner files a petition for a board of review unless the director orders work to proceed because of emergency conditions.

Formerly Sec. 45-711. Amended by Laws 1973, Ch. 79, Sec. 3; Laws 1980, 4th S.S., Ch. 1, Sec. 96, eff. June 12, 1980. Renumbered as Sec. 45-1211 and amended by Laws 1987, Ch. 2, Sec. 4, 31, eff. Feb. 27, 1987. Amended by Laws 1987, Ch. 287, Sec. 3.

Section 45-1212. Supervision over maintenance and operation; remedial measures; lien

A. Supervision over the maintenance and operation of dams to safeguard life and property is vested exclusively in the director. The director shall make complete inspections, require reports from owners or operators and issue rules, and orders necessary to secure maintenance and operation of dams which will safeguard life and property.

B. If the director determines that the dam under consideration is dangerous to the safety of life and property, and that there is not sufficient time to issue and enforce an order relative to its maintenance or operation, or if the director believes that imminent floods threaten the safety of the dam under consideration, the director shall immediately employ remedial measures necessary to protect life and property. The director may spend monies from the dam repair fund established by Section 45-1212.01 in employing remedial measures.

C. In applying remedial measures the director may lower the water level of a reservoir by releasing water impounded, may completely empty the reservoir, may destroy the dam or reservoir, or such portions as appear necessary, or may construct, reconstruct, repair or enlarge the dam and may exercise any other control of the dam, reservoir and appurtenances essential to safeguard life and property. The director shall remain in full charge and control of the dam, reservoir and appurtenances until they have been rendered safe or the emergency has terminated.

D. The costs and expenses of the control, regulation and abatement provided by this section, including costs of construction work done to render the dam, reservoir, or appurtenances safe, shall constitute a lien against all property of the owner, and the lien shall be prior and superior to all other mortgages, liens or encumbrances of record. The lien shall have the force and effect of a mechanic's and materialman's lien and may be foreclosed at any time within two years.

E. The lien referred to in subsection D may be perfected and foreclosed in advance of construction or repair or after completion of the repairs. If in advance, the lien shall be perfected by the filing of an affidavit of the director setting forth the estimate of the costs of construction or repair with the county recorder in the county in which the dam is located in the same manner as prescribed for mechanics' liens in Title 33, Chapter 7, Article 6 and may be foreclosed in the same manner as a mechanic's and materialman's lien. When the affidavit is filed, the amount set forth in the affidavit shall be a lien in such amount against all property of the owner. If the actual cost of construction or repair exceeds the estimated cost, the director may amend the affidavit setting forth the additional estimated cost. If the estimated cost exceeds the actual costs of construction or repair at completion, the director shall file an amended affidavit at completion. If a lien is perfected in advance and the construction or repair is not commenced within two years from the date of perfection, the lien shall be void. The director shall file a satisfaction of lien upon payment of the costs of construction or repair by the owner.

F. Monies collected in full or partial satisfaction of a lien created pursuant to subsection D of this section shall be deposited in the dam repair fund established by Section 45-1212.01.

Formerly Sec. 45-712. Amended by Laws 1973, Ch. 79, Sec. 4; Laws 1979, Ch. 217, Sec. 4; Laws 1980, 4th S.S., Ch. 1, Sec. 97, eff. June 12, 1980. Renumbered as Sec. 45-1212 by Laws 1987, Ch. 2, Sec. 4, eff. Feb 27, 1987. Amended by Laws 1987, Ch. 287, Sec 4; Laws 1998, Ch242, Sec. 37, eff. July 1, 1999

Section 45-1212.01. Dam repair fund

A. The dam repair fund is established consisting of monies appropriated by the legislature, and monies collected by the director in full or partial satisfaction of a lien created by section 45-1212, subsection D and monies collected pursuant to section 45-1220.

B. Monies in the fund shall be used to employ remedial measures necessary to protect life and property in accordance with section 45-1212.

C. The director shall annually report to the legislature on the status of the fund and the purposes for which monies were expended during the preceding calendar year. The report shall be submitted pursuant to Section 41-1178 no later than fifteen days after the commencement of each regular session.

D. The director shall administer the fund. On notice from the director, the state treasurer shall invest and divest monies in the fund as provided by Section 35-313, and monies earned from investment shall be credited to the fund. Monies in the dam repair fund are exempt from Section 35-190 relating to lapsing of

appropriations.

Added by Laws 1987, Ch. 287, Sec. 5. Amended by Laws 1992, Ch. 3, Sec. 15, eff. March 24, 1992; Laws 1998, Ch. 242, Sec. 38, eff. July 1, 1999.

Section 45-1213. Inspection upon complaint

Upon receipt of a written complaint that the person or property of the complainant is endangered by any dam, the director shall inspect such dam unless his records disclose that the complaint is without merit. If the complainant insists upon an inspection and deposits with the director an amount sufficient to cover costs of inspection, the inspection shall be made. If an unsafe condition is found, the director shall cause it to be corrected, and the deposit shall be returned. If the complaint was without merit the deposit shall be paid into the general fund.

Formerly Sec. 45-713. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 98, eff. June 12, 1980. Renumbered as Sec. 45-1213 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1214. Investigations for review of design and construction

The director shall make investigations and assemble data for a proper review and study of the design and construction of dams, reservoirs and appurtenances, and shall make watershed investigations to facilitate decisions on public safety. The director or his representatives may enter upon private property for such purposes.

Formerly Sec. 45-714. Amended by Laws 1980, 4th S.S., Ch. 1, Sec. 99, eff. June 12, 1980. Renumbered as Sec. 45-1214 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1215. Liabilities of state and owners of dam in action for damages

A. No action shall be brought or maintained against the state, or any of its departments, agencies or officials thereof, or any of their employees or agents, for damages sustained through the partial or total failure of any dam or its maintenance by reason of control and regulation thereof by any of them pursuant to duties imposed upon them under the provisions of this chapter.

B. Nothing in this article shall relieve any owner or operator of a dam from the legal duties, obligations and liabilities arising from such ownership or operation.

Formerly Sec. 45-715. Amended by Laws 1971, Ch. 49, Sec. 16, eff. April 13, 1971. Renumbered as Sec. 45-1215 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1216. Violations; classification

A. It is unlawful for an owner, director, officer, agent, employee, contractor or his agents to construct, reconstruct, repair, enlarge, alter or remove a dam without an approval as provided in this chapter, or contrary to an approval issued. It is unlawful for the agents or employees of the director to permit such work to be done without immediately notifying the director.

B. A person who violates this article, except as otherwise provided, is guilty of a class 2 misdemeanor,

and each day such violation continues constitutes a separate offense.

Formerly Sec. 45-716. Amended by Laws 1973, Ch. 79, Sec. 5; Laws 1978, Ch. 201, Sec. 834, eff. Oct. 1, 1978; Laws 1980, 4th S.S., Ch. 1, Sec. 100, eff. June 12, 1980. Renumbered as Sec. 45-1216 by Laws 1987, Ch. 2, Sec. 4, eff. Feb 27, 1987.

Section 45-1217. Action and procedures to restrain violations

A. The director may take any legal action proper and necessary for the enforcement of this chapter.

B. An action or proceeding under this section may be commenced whenever any owner or any person acting as a director, officer, agent or employee of any owner, or any contractor or agent or employee of such contractor is:

1.Failing or omitting or about to fail or omit to do anything required of him by this chapter or by any approval, order, rule, regulation or requirement of the director under the authority of this chapter; or

2.Doing or permitting anything or about to do or permit anything to be done in violation of or contrary to this chapter or any approval, order, rule, regulation or requirement of the director under this chapter; or

3.In the opinion of the director, in any manner in violation of this chapter.

C. Any action or proceeding under this section shall be commenced in a court of appropriate jurisdiction in which:

1.The cause or some part thereof arose; or

2.The owner or person complained of has his principal place of business; or

3.The person complained of resides.

Added Sec. 45-717 by Laws 1973, Ch. 79, Sec. 6. Amended By Laws 1980, 4th S.S., Ch. 1, Sec 101, eff. June 12, 1980. Renumbered as Sec. 45-1217 by Laws 1987, Ch. 2, Sec. 4, eff. Feb. 27, 1987.

Section 45-1218. Dam repair loans

A. The director may grant loans from the dam repair fund to dam owners to defray the costs of repairing dams which the director determines to be dangerous to the safety of life and property but which are not in an emergency condition. Loans shall be granted on such terms and conditions as may be imposed by the director.

B. The loans granted by the director shall be for a term of not more than twenty years.

C. The loans shall bear interest at the following rates:

1.If the loan is for a term of not more than five years, the rate is three percent per year.

2.If the loan is for a term of more than five years but not more than ten years, the rate is five percent per year.

3.If the loan is for a term of more than ten years, the rate is six percent per year.

D. Each loan shall be evidenced by a contract between the dam owner and the director, acting on behalf of this state. The contract shall provide for the loan by this state of a stated amount to defray some or all of the costs of repairing the dam. The contract shall provide for equal annual payments of principal and interest for the term of the loan.

E. The attorney general may commence whatever actions are necessary to enforce the contract and achieve repayment of loans provided by the director pursuant to this section.

Added by Laws 1987, Ch. 287, Sec. 6;Amended by Laws 1998, Ch. 242, Sec. 39, eff. July 1, 1999.

Section 45-1219. Dam repair grants

The director may provide grants from the dam repair fund to dam owners to defray the costs of repairing dams which the director determines to be dangerous to the safety of life and property but which are not in an emergency condition. Grants shall be provided on such terms and conditions as may be imposed by the director and may be in addition to loans granted under Section 45-1218.

Added by Laws 1987, Ch. 287, Sec. 6; Amended by Laws 1998, Ch. 242, sec. 40, eff. July 1, 1999.

Section 45-1220. Deposit of monies: dam repair fund

A. Monies appropriated by the legislature for the non emergency dam repair fund, safety inspection fees collected pursuant to section 45-113, filing fees collected pursuant to section 45-1204 and payments of principal and interest collected by the director pursuant to section 45-1218 shall be deposited in the dam repair fund established by section 45-1202.01

B. Monies in the dam repair fund deposited pursuant to subsection A of this section shall be used for loans and grants as provided in Sections 45-1218 and 45-1219. Upon approval of the joint legislature budget committee, such monies may be transferred to pay necessary costs of remedial measures as provided in Section 45-1212.

Added by Laws 1987, Ch. 287, Sec. 6. Amended by Laws 1989, Ch. 213, Sec. 2, eff. May 22, 1989; Laws 1998, Ch242, Sec. 41, eff. July 1999.

Section 45-1221. Cease and desist order; temporary cease and desist order; hearing; injunctive relief

A. Except as provided by subsection B of this section, if the director has reason to believe that a person is violating or has violated a provision of this article for a license, rule or order issued or adopted pursuant to this article, the director may give the person written notice that the person may appear and show cause at an administrative hearing not less than thirty days from the date of service of the notice why the person should not be ordered to cease and desist from the violation. The notice shall inform the person of the date, time and place of the hearing and the consequences of failure to appear.

B. If the director finds that a person is constructing, reconstructing, enlarging, altering, removing or using a dam without having first obtained the necessary approval of the director, the director may issue a temporary order for the person to cease and desist the construction, reconstruction, enlargement, repair, alteration, removal or use pending final action by the director pursuant to subsection C of this section. The order shall include written notice to the person of the date and time when and place where the person may appear at an administrative hearing to show cause why the temporary order should be vacated. The hearing shall be held within fifteen days of the date of the order unless the person consents to a longer period.

C. The decision and order of the director may take such form as the director determines to be reasonable and appropriate and may include a determination of violation, a cease and desist order, the recommendation of a civil penalty and an order directing that positive steps be taken to abate or ameliorate any harm or damage arising from the violation. The person affected may seek judicial review of the final decision of the director as provided in section 45-114, subsection B in the superior court in the county in which the violation is alleged to have occurred.

D. If the person continues the violation after the director has issued a final decision and order pursuant to subsection C of this section or a temporary order pursuant to subsection B of this section, the director may apply for a temporary restraining order or preliminary or permanent injunction from the superior court according to the Arizona rules of civil procedure. A decision to seek injunctive relief does not preclude other forms of relief or enforcement against the violator.

E. Section 45-114, subsections A and B govern administrative proceedings, rehearing or review and judicial review of final decisions of the director under this section.

Added by Laws 1987, Ch. 287, Sec. 6; Amended by Laws 1998, Ch57, 109 (Inserted sec.E and made other nonsubstansive changes)

Section 45-1222. Violation; civil penalties

A. A person who is determined pursuant to Section 45-1221 to be in violation of this article or a license, rule or order issued or adopted pursuant to this article may be assessed a civil penalty in an amount not exceeding one thousand dollars per day of violation.

B. The director shall bring an action to recover penalties under this section in the superior court in the county in which the violation occurred.

C. In determining the amount of the penalty, the court shall consider the degree of harm to the public, whether the violation was knowing or willful, the past conduct of the defendant, whether the defendant should have been on notice of violation, whether the defendant has taken steps to cease, remove or mitigate the violation and any other relevant information.

D. All penalties collected pursuant to this section shall be deposited in the state general fund.

Added by Laws 1987, Ch. 287, Sec. 6.

Section 45-1223. Stay of director's decision; precedence of actions for judicial review.

A. A decision of the director shall not be stayed pending an action for judicial review, except that the

judge to whom the action for judicial appeal has been assigned may stay the decision of the director with or without bond on a showing of good cause. In determining if good cause exists under the circumstances, the court may consider whether:

1.The public interest will be adversely affected by a stay.

2.The stay will harm others.

3.There is a high probability that the appellant will succeed on the merits.

4.The appellant will suffer irreparable harm before a decision on the merits can be rendered.

B. For the benefit of the people of this state, actions for judicial review under this article have precedence, in every court, over all other civil proceedings.

C. The final decision of the superior court is appealable in the same manner as in civil actions generally and shall be governed by the rules of appellate procedure.

Added by Laws 1987, Ch. 287, Sec. 6 Amended by Laws 1998, Ch 57, Sec. 110.