

**Imperial County  
Department of Public Works**

**Request for Proposal (RFP)**

**Recommendation and Design Services For Replacement of the Picacho  
Bridge at the Yuma Main Canal  
Bridge No. 58C-0028**

**County Project No. 6811**



Requested by:  
John Gay, P.E  
Director of Public Works

Department of Public Works  
155 South 11<sup>th</sup> Street  
El Centro, CA 92243  
Phone: (442) 265-1818  
Fax: (760) 352-1272

Date: November 10, 2020

Proposals Due December 4, 2020

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# SPECIAL NOTICE

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**Notification of Contractor Registration Requirements (where required)**

Pursuant to the requirements of California Labor Code section 1771.1, all contractors and subcontractors that wish to engage in public work through a public works contract must be registered with the Department of Industrial Relations (DIR).

**Beginning March 1, 2015**, no contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with DIR.

Beginning April 1, 2015, no contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the DIR, pursuant to Labor Code section 1725.5

All contractors, including subcontractors, listed in the proposal must be registered with the DIR at the time proposals are due, and must submit proof of registration with the proposal. Any proposals received listing unregistered contractors and/or subcontractors will be deemed non-responsive.

Application and renewal are completed online with a non-refundable fee of \$300. Read the Public Works Reforms (SB 854) Fact Sheet for requirements. Instructions for completing the form and additional information can be found on the DIR website.

This Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR).

## SOURCES OF INFORMATION

INFORMATION	WEBSITE
Department of Industrial Relations (Public Works)	<a href="http://www.dir.ca.gov/Public-Works/PublicWorks.html">http://www.dir.ca.gov/Public-Works/PublicWorks.html</a>
SB 854 Fact Sheet	<a href="http://www.dir.ca.gov/Public-Works/PublicWorksSB854.html">http://www.dir.ca.gov/Public-Works/PublicWorksSB854.html</a>
Senate Bill 854 Compliance	<a href="http://www.dir.ca.gov/Public-Works/SB854.html">http://www.dir.ca.gov/Public-Works/SB854.html</a>
Public Works Contractor (PWC) Registration	<a href="https://efiling.dir.ca.gov/PWCR/">https://efiling.dir.ca.gov/PWCR/</a>
Classifications and Minimum Labor Rates	<a href="http://www.dir.ca.gov/OPRL/Pwd/">http://www.dir.ca.gov/OPRL/Pwd/</a>

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**PURPOSE AND BACKGROUND**

The Picacho Bridge (bridge #) over the Yuma Main Canal was built in 1925 and modified in 1947. The bridge is located along a along Picacho Rd. (S-24) which is used as a pathway into the Townsite of Winterhaven as well as an important l route the Quechan Tribe, seasonal winter visitors and year round agricultural business. The County of Imperial Department of Public Works (ICDPW) has funding through passage of the 2017 Senate Bill 1 that allows for the replacement of the bridge structure. The bridge is located within the Quechan Tribal territory and spans the canal system owned by the Bureau of Reclamation. The canal is operated and maintained by the Yuma County Water Association. It is anticipated that this project will be done in three phases of work which includes: Preliminary Bridge Strategy Report and CEQA/ NEPA clearance, Final Design and Permitting, Bidding and Construction Related Support

**PROJECT POSTING AND SCHEDULING**

This RFP is being distributed over the internet and is posted at the County of Imperial Department of Public Works website at the following address: <https://www.co.imperial.ca.us/publicwork/index.asp?fileinc=rfq&newsnumber=0> under “Projects out to Bid.” Consultants wishing to propose in response to this RFP must obtain this document from our website. The County will maintain a list of RFP holders based on self identification by interested firms. If you are interested in being added to the RFP holder list, please contact the project manager listed in section CLOSING ITEMS. The County will make every effort to provide individual notification of amendments or addendums to this RFP to known self-identified firms, but it will be the responsibility of each interested firm in checking the “Projects Out To Bid” webpage for any updates as the Web page will be the official media for dissemination of Addenda.

The County will therefore post any addendums to the RFP on the above mentioned website. All consultants shall refer to the website to verify all addendums that have been issued and that they have acknowledged all such addendums and included signed copies of all in their proposal.

**Proposed Schedule of Events**

Issue Request for Proposals	November 10, 2020
Deadline for Written Requests for Clarification	November 20, 2020
Proposals Due	December 4, 2020

Consultant Selection	January 2020
County Awards Contract	January 2020
Notice to Proceed	February 2020

## **SCOPE OF WORK:**

### **Phase 1 - Preliminary Bridge Strategy Report and CEQA/NEPA Clearance**

A thorough evaluation of the Picacho Bridge project site needs to be done, with extensive evaluation for bridge design and road approaches for Phase 1. Consideration for different bridge structure types are expected to be provided for review within a preliminary bridge strategy report that will be used as a basis for cost benefit. It is expected that the general alignment of the roadway will remain the same as well as the traffic capacity of the roadway. However if the structure types dictate significant changes in vertical and horizontal shifts to the roadway then analysis may include new right of way for the project. . Alternatives that ICDPW would like to consider are both concrete and steel type bridge structures. The final alternative will be chosen based upon cost, right of way acquisition, constructability, number of third party permit requirements, speed of delivery and limited impacts to both the environment, canal and traveling public. A single span structure is desired as part of this project to provide better maintenance and flow for the canal waterway.

It is expected that this bridge replacement project will require both a NEPA and CEQA clearance designation since the bridge spans the Yuma Main Canal which is owned by the Bureau of Reclamation (BOR). The consultant shall provide costs up to and including a Mitigated Negative Declaration. In the event a higher level environmental document is determined through the County of Imperial's Planning and Development Department, the County will reopen the contract and may provide necessary increases as determined by ICDPW. It is expected that the Consultant shall also attend the public hearings/ meetings for both the Environmental Evaluation Committee, the Planning Commission and County Board of Supervisors if necessary.

The current bridge is an older structure which will require coordination with the State Historic Preservation determination and recommendation as part of the CEQA/NEPA process. Additionally the site is within the Quechan Tribal area and a cultural/ biological assessment is also expected to be completed as part of the environmental review.

Once the final alternative is chosen and CEQA and NEPA are completed the consultant will then move into the design phase.

### **Phase 2 – Final Design and Permitting Phase**

The scope of work during Phase 2 is to provide professional design engineering services to the County's Public Works Department in accordance with all provisions within this Request for Proposals (RFP).

The scope of work, as given below, does not suggest that any items specifically not mentioned are precluded from the scope of work; nor does it suggest that all items will be required, some of which may depend on the final chosen alternative. Consultant is expected to be proactive in the prosecution of his duties

1. Prepare detailed construction plans and bid documents required for bidding and project implementation. Provide copy of quantity calculations of bid items. Plans shall conform to County

and California Department of Transportation (CDOT) plan preparation criteria and format using current Caltrans Specifications as well as satisfy BOR and Yuma County Water User's Association Bridge Design criteria. Bid items and project special provisions shall conform to County and CDOT standard specifications or special provision and bridge design specifications.

2. Prepare and submit and obtain all necessary permits, including boring permits and third party encroachment permits for all work to be completed Consultant is responsible for all permits needed for Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife, U. S. Army Corps of Engineers and National Pollution Discharge Elimination System (NPDES), BOR, Yuma County Water User's Association (YCWUA), Quechan Tribe and Imperial Irrigation District (for power) and Bard Water District any other permit required to construct the project. Any processing fees required by the permitting agencies will be the responsibility of the ICDPW. . See appendix for information on BOR and YCWUA design and permitting guidelines.
3. If needed, prepare legal descriptions for temporary construction and right of way easements which may be required. Furnish legal descriptions on 8.5" x 11" sheet stamped by a Registered Land surveyor and on disk in Microsoft Word. Also furnish a plat drawing for each land ownership showing existing and proposed right-of-way with bearings on 8.5" x 11" sheets and electronic file in portable document format (PDF).
4. Submit three (3) complete sets (paper) of plans and bid documents to the County. Submit any technical specifications and project special provisions to the County. Submit one (1) complete set of electronic drawings in AutoCAD (Version 2015 or higher) and in Adobe PDF format.
5. As requested by the County, provide services resulting from significant changes in the general scope of the project, or its design, including, but not limited to changes in size, revisions of previously accepted studies, reports, design documents in accordance with County procedures.

All design services shall be in accordance with the Local Assistance Program Guidelines (LAPG), Chapter 6 of the Highway Bridge Replacement and Rehabilitation Program (HBRRP); and Local Assistance Procedures Manual (LAPM). All work and reports, studies and deliverables must meet Caltrans current bridge and road related standards, guidelines and policies. While the design procedures shall follow Caltrans design guidelines, the Caltrans District 11 office and Caltrans HQ will not be involved in the design or permitting process.

The project shall adhere to the current editions of Caltrans Bridge Design Specifications (for bridge work) and American Association of State Highway and Transportation Officials (AASHTO) (for roadwork) and the design guidelines for both BOR and YCWUA.

The bridge replacement plan is to be developed after review of existing records, documents from Caltrans and County of Imperial as well as necessary engineering studies by the consultant. Typical engineering studies to be provided by the Consultant for Phase 1 and Phase 2 will include, but are not limited to the following:

- Structure type selection report (Bridge Strategy Report)
- Stormwater Pollution Prevention Plan (SWPPP) (as applicable)
- Right of way assessment
- Field review reports
- Geotechnical reports
- All engineering calculations as necessary to design/construct bridge
- 
- Environmental studies and permits to clear CEQA/ NEPA (as applicable)
- Hydraulic analysis for new bridge. Hydrology/ Drainage study

- Topographic and boundary surveys

In addition, consultant is to coordinate with the following and other appropriate agencies as necessary:

- Imperial Irrigation District (IID)
- County of Imperial
- Regional Water Quality Control Board (RWQCB)
- California Department of Fish and Wildlife; and
- U. S. Army Corps of Engineers
- United States Bureau of Reclamation
- Quechan Tribe
- Yuma County Water User's Association
- Bard Water District

Bid documents and deliverables shall include, but are not limited to the following:

- Final Geotechnical Report
- Final Design Plans for Bridge and Roadway Approaches
  - Cover sheet with vicinity map/key map and keynotes
  - Horizontal control and vertical control sheets
  - Demolition sheets/existing utilities sheets
  - Relocation of Utilities
  - Civil site bridge and roadway plan and profile sheets
  - Bridge structural sheets
  - Detail sheets
  - Erosion/sedimentation control sheets
  - Traffic control and detour sheets
  - Detail construction schedule
- Specifications
  - Front end general conditions and bid form (based upon County of Imperial bidding template)
  - Special provisions (technical specifications)
  - Construction bid documents

Final Engineering Cost Estimate

### **Phase 3 – Bidding and Construction Support Services**

The Consultant shall also provide bidding support services which includes a prebid meeting with all potential bidders prior to bid and preparation any addendums that are required during the bidding phase of the project.

The consultant shall also be available for the preconstruction meeting with the successful contractor and provide any Request's for Information during construction that are submitted by the Contractor or County's Resident Engineer.

### **PROPOSAL CONTENT AND INFORMATION**

Proposal should be typed, organized and concise yet comprehensive.

#### **A. General Requirements**

- 1) Provide a cover letter
- 2) State the interpretation of the work to be performed. State a positive commitment to perform the scope of services in the required manner and time frame; include a basic summary and understanding of the project. Provide a statement that the offer is valid for at least a ninety (90) day period.
- 3) Provide the name(s) of the primary and/or alternate individuals authorized to respond to this RFP. Include titles, addresses, email if available and phone number. Also provide the name of Project Manager who is a Registered Civil Engineer in the State of California.
- 4) The Consultant is representing itself as a qualified professional in providing Professional Design Services for government municipalities and is to understand that the County is relying on such representation. Therefore, it is acceptable to submit recommendations and comments for consideration on format, process, schedule and additional content of this project. The County will consider comments and recommendations, however is not required to select any of the recommendations or comments.
- 5) Expensive bindings, colored displays, promotional material, etc., are neither necessary nor desired. Emphasis should be concentrated on conformance to the RFP instructions, responsiveness to the RFP requirements, and on completeness and clarity of content.
- 6) If any subcontractors are utilized, the lead Consultant must submit a description of the firm, the portion of work to be done, and cost of each subcontractor. All subcontracts exceeding \$25,000 in cost shall contain all required provisions of the prime contract.

#### **B. Table of Contents**

- 1) Include a table of contents with identification of material by section and page number.

#### **C. Summary of Qualifications and Experience**

- 1) State whether the firm is local, regional, national or international.
- 2) Identify the owner(s) of the firm and legal status (sole proprietor, corporation Etc.)
- 3) Give the location of the office from which work is anticipated to be done, the number of employees of the company and organization chart.
- 4) Identify the qualifications and resumes of all individuals who will be associated with this service. Include professional registrations and affiliations.
- 5) Summarize specific experience and qualification for similar and related projects in similar type areas, both federally funded and locally funded. Describe the services previously performed such

as studies, reports, etc. Indicate if previous work has been performed on tribal land or territories. List at least 3 references with telephone numbers and email contact addresses (if available).

#### **D. Analysis of Effort/Methodology**

- 1) Describe the approach for how the work will be performed to address Scope of Work. The proposal shall indicate any specific software, techniques or methodology to be utilized to keep costs within budget and schedule under control.
- 2) The proposal shall include a project timeline as a flow chart or Gantt chart with specific tasks and activities envisions, including staffing, sequence and timing.
- 3) The proposal shall include methods to support an expedited schedule if requested form the County.

#### **E. Cost and Fees**

- 1) Costs and fees shall be proposed as fix fee lump sum amount for the project.
- 2) Cost should be based on hourly rates of staff, including clerical positions. Such hourly rates should be fully burdened or loaded, including full compensation for all overhead and profit. Billing rates shall include provision for normal office costs, including but not limited to office rental, utilities, insurance, equipment, normal supplies and materials, in-house reproduction services and local travel costs. Daily, Weekly, and Monthly onsite unit rates inclusive of per diem, vehicles, and personal protection equipment. Cost shall be a fixed fee lump sum format separated into appropriate scope of work components.

### **EVALUATION OF PROPOSALS**

*Sample evaluation criteria for proposals are attached for your information as Exhibit A.*

The County will utilize a one-step selection process. Proposals will be reviewed by an evaluation committee. The evaluation committee will determine if qualifications are met. The qualifications will be considered, and recommendations then submitted to the County Board of Supervisors for final selection.

Please take note that the County reserves the right to select any consultant who is determined qualified and may not correlate to a number 1, number 2 or even number 3 ranked consultant. Additionally, the County reserves the right to reject any and all proposals submitted and/or request additional information for clarification.

Consultants are to submit one (1) original, three (3) copies, and one (1) electronic copy in Portable Document Format (PDF) on a USB Thumb Drive of the proposal to the appropriate submission place on the specified date and time. Proposal must be clearly titled:



**Imperial County Department of Public Works Request for Proposal For  
Recommendation and Design Services For Replacement of the Picacho Bridge at the Yuma Main  
Canal Bridge No. 58C-0028  
County Project No. 6811**

Proposals are to be delivered in a sealed envelope, no later than 4:00 P.M. on December 4, 2020 and addressed to the following:

John Gay, P.E  
Director of Public Works  
County of Imperial Department of Public Works  
*Attn: Robert Urena, Civil Engineer Assistant II, EIT*  
155 S. 11<sup>th</sup> Street  
El Centro, CA 92243

**CLOSING ITEMS**

A pre-proposal conference has not been scheduled for this project.

Clarification desired by a respondent relating to definition or interpretation shall be requested in writing with sufficient time to allow for a response and prior to the RFP due date. Oral explanation or instructions shall not be considered binding on behalf of the County.

Any modifications to this solicitation will be issued by the County as a written addendum.

The County will not consider proposals received after the specified date and time. An amendment is considered a new proposal and will not be accepted after the specified date and time.

Any contract resulting from this RFP will be financed with funds available to the County from local County and/or Federal Aid or other grant funds.

This RFP does not commit the County of Imperial to award a contract or pay any costs associated with the preparation of a proposal. The County reserves the right to cancel, in part or in its entirety, this solicitation should this be in the best interest of the County.

Questions concerning this RFP are to be directed to Robert Urena, EIT Civil Engineer Assistant II, with the Imperial County Department of Public Works at (442) 265-1818 or via electronic mail to [roberturena@co.imperial.ca.us](mailto:roberturena@co.imperial.ca.us)



## Exhibit A PROPOSAL EVALUATION FORM

Request for Proposal (RFP) Design Services For Replacement of the Picacho  
Bridge at the Yuma Main Canal

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DATE: \_\_\_\_\_  
RATING POINTS:

EVALUATOR: \_\_\_\_\_

RESPONDENT: \_\_\_\_\_

5 = excellent  
4 = good  
3 = above average  
2 = average  
1 = below average  
0 = unsatisfactory

<u>CRITERIA</u>	<u>WEIGHT FACTOR</u>	<u>X</u>	<u>RATING</u>	<u>=</u>
<u>WEIGHTED RATING</u>				

A. Technical Approach	<b>0.35</b>			
• Responsiveness & understanding of work to be done, (i.e. scope of work)	(0.20)	_____		_____
• Specific experience with similar Bridge design services working with multiple permitting agencies	(0.15)	_____		_____
B. Project Management	<b>0.30</b>			
• Capacity to perform the scope of work and the ability to conclude in a timely manner	(0.20)	_____		_____
• Quality of staff based on recent bridge design experience	(0.10)	_____		_____
C. References	<b>(0.05)</b>			_____
D. Familiarity and/or specific experience with local, state and federal CIP projects on Tribal Lands/ Territories	<b>(0.25)</b>			_____
E. Overall quality of proposal, including qualifications and thoroughness.	<b>(0.05)</b>			_____
			Subtotal Score	_____
F. Previous Experience and Performance working with County of Imperial Department of Public Works				_____
(0 to -5)			<b>Total Score</b>	_____

Note: Positive previous experience and no previous experience will constitute a score of zero (0). Negative experience points will be deducted from the overall score.

**Comments:**

## Appendix

### **Bureau of Reclamation and Yuma Area Office (YAO) General Information and Requirements**

Bureau of Reclamation will require a Right-of-Use (ROU) Authorization to ensure an amended agreement is established for the bridge as well as any other planned improvements and/or modifications within Reclamation's Right-of-Way. In addition, a Temporary Use Permit (TUP) would also be required for any field and exploratory work within Reclamation's Right-of-Way. The ROU and TUP application process would need to be initiated through our local Lands Office. For your information and use, attached are the following:

- Application for Transportation and Utility Systems and Facilities on Federal Lands (SF-299)
- How to Apply Document
- Reclamation's Engineering and O&M Guidelines

### Technical Support Office

- Submit design plans at all stages (30%, 60%, and 90%) for Reclamation's review and comments.
- Please reference Reclamation's Engineering and O&M Guidelines (see Lands comments) in the preparation of planning and design documentation.

### Environmental Compliance Group

- NEPA – A CEC will be prepared for this action.
- Cultural: Consultation with the California SHPO may be necessary. Request that the Imperial County consultant reach out to Andrea Kayser ([akayser@usbr.gov](mailto:akayser@usbr.gov)). As lead federal agency, the Yuma Area Office will need to prepare a letter to the CA SHPO and submit for review and approval.

Replacing the bridge would be a federal undertaking under Section 106 of the National Historic Preservation Act (NHPA). Determinations under Section 106 are made by the lead federal agency in consultation with the SHPO. Imperial County may have information pertaining to the National Register eligibility of the Picacho Bridge. The Yuma Main Canal is part of the Yuma Project and has been determined eligible for the National Register. In any case, significant changes to the roadway ROW involving ground disturbance would likely require SHPO and Quechan (Tribal) consultation through their Historic Preservation Office.

- Water Quality – Coordination with the United States Army Core of Engineering (USACE) for the purposes of requesting a permit for this project is not required. Reclamation does not consider the Yuma Main Canal a waters of the U.S; however, it is recommended that as a best management practice (BMP) that it be treated as such by incorporating measures to:
  - Prevent the discharge of construction debris/waste and/or hazardous materials do not enter the Yuma Main Canal.
  - If discharge of other waters were allowed to enter into the canal, they must be sampled to ensure no containments are being discharged that could impact agricultural fields or cause a fish kill. Please note that any request would need to be evaluated and there is no guarantee that approval for this discharge could be issued.
  - Coordinate with operating Water Districts to ensure no issues.

## **Appendix (Cont.)**

### **Yuma County Water Users' Association**

- Please refer to the attached YCWUA Guidelines for Valley Division, Yuma Reclamation Project, License for Encroachment Rules and Regulations which also includes bridge design guidelines along with general bridge specifications. YCWUA earthwork and concrete guidelines are also attached.
- The canal's designated maximum flow across the existing bridge is 2000 CFS.
- All new bridges will be clear freespan structures with no center piers/pilings allowed. Please refer to section 6.1.6 of the attached YCWUA Guidelines.

# RECLAMATION

*Managing Water in the West*

## Engineering and O&M Guidelines for Crossings

Bureau of Reclamation Water Conveyance Facilities  
(Canals, Pipelines, and Similar Facilities)



U.S. Department of the Interior  
Bureau of Reclamation  
Technical Service Center  
Denver, Colorado

April 2008

## **Mission Statements**

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

# **Engineering and O&M Guidelines for Crossings**

**Bureau of Reclamation Water Conveyance Facilities  
(Canals, Pipelines, and Similar Facilities)**





## Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Official
AOE	authorized operating entity
AWWA	American Water Works Association
CFR	Code of Federal Regulations
CPS	cathodic protection system
DOT	Department of Transportation
HDD	horizontal directional drilling
kV	kilovolt(s)
MERL	Materials Engineering and Research Laboratory
O&M	operations and maintenance
Reclamation	Bureau of Reclamation
ROW	right-of-way
WB-67	67-foot wheelbase



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Appendix A     General Requirements for Installing Bored and Jacked Pipe Undercrossings

Appendix B     Guidelines – Removal of Trees and Other Vegetative Growth from Earth Dams, Dikes, and Conveyance Features (*Appendix B of Review and Operation and Maintenance Program Field Examination Guidelines*)



## 1.0 PURPOSE

These are general guidelines for Bureau of Reclamation (Reclamation) offices to follow when reviewing the engineering and operations and maintenance (O&M) factors in outside entity requests for authorization to cross (encroach upon) Reclamation lands that contain project features such as levees, canals, pipelines, or other water conveyance facilities owned or administered by Reclamation. These guidelines include a general overview of the permitting process administered by Reclamation Lands Groups for allowing a particular use on lands where Reclamation holds a fee or an easement right-of-way interest. These engineering and construction recommendations are minimum guidelines for engineers to use in reviewing and evaluating these portions of the applications.

## 2.0 GENERAL PERMIT INFORMATION

Applicants requesting to cross any Reclamation land, facility, or water body must obtain a written land use authorization from Reclamation. Requirements for obtaining a use authorization to cross Reclamation project land and water surfaces are in the Code of Federal Regulations (CFR) at 43 CFR 429 and Reclamation Manual LND 08-01. The applicant must complete the *Standard Form (SF) 299, "Application for Transportation and Utility Systems and Facilities on Federal Lands,"* or similar forms in use at the local Reclamation office. The form can be obtained by contacting the involved Reclamation office, or it can be accessed electronically at Reclamation's Web site at: <http://www.usbr.gov/pmts/lands>.

Applicants can contact their local Reclamation office to discuss their proposed use before filing an application for a use authorization.

## 3.0 ENGINEERING AND O&M REVIEW CONSIDERATIONS

### 3.1 Introduction

Technical review of the crossing evaluates impacts on any existing Reclamation facility and **does not determine the adequacy of the crossing design for the applicant's intended purpose.**

The use authorization or consent document specifies criteria which, if followed, would not be deemed unreasonable interference. These review guidelines are strictly limited to those criteria which:

## Engineering and O&M Guidelines for Crossings

- Protect Reclamation's facility and/or appurtenant facility from damage
- Ensure unrestricted flow and quality of water in Reclamation's facility
- Do not diminish the ability to perform O&M of Reclamation's facility, including access
- Prevent any burden of liability

These guidelines are provided as recommendations that apply to most Reclamation facilities. Each Reclamation office and/or authorized operating entity (AOE) should apply these guidelines using **sound engineering judgment** that best applies to their facilities and existing conditions. Additional Reclamation guidelines for specific locations (e.g., Central Arizona Project Reach 11 Basin Guidelines) may also apply and may be provided to applicants when necessary. These guidelines are minimums, and local conditions may be more stringent depending on the direct impacts to facilities and lands. AOE's may have additional requirements.

Uses that may be deemed reasonable within Reclamation pipeline easements include greenbelts, asphalt roadways, flexible pavement parking lots, transverse curbs and gutters, and sidewalks. Canals and pipelines may have overhead power and telephone lines (but not their supporting poles), transverse fences with gated openings (no walls), and similar surface and overhead structures.

### 3.2 General

The following individual items should be addressed by the applicant and evaluated by Reclamation and/or AOE as they may affect the Reclamation facility's engineering and O&M aspects. If unusual conditions are proposed for the encroaching structure or unusual field conditions within a Reclamation facility right-of-way (ROW) are encountered, Reclamation reserves the right to impose more stringent criteria than prescribed in these guidelines.

1. Structures that should not be constructed on Reclamation pipeline or canal ROW (whether fee owned or easement) include foundations, buildings, garages, carports, trailers, street light standards, supports for large signs, walls, longitudinal fences (except security/safety fences), power or telephone poles, and similar surface structures.
2. Prior to construction, a joint inspection should be conducted and the condition of existing facilities documented. Reclamation's ROW should be restored to pre-existing conditions following completion of work.

## Engineering and O&M Guidelines for Crossings

3. When applications are requesting public use of trails and maintenance roads adjacent to or crossing Reclamation canals, these facilities should be fenced for safety to separate them from open canal water, except when Reclamation's ROW is used as a greenbelt and the applicant accepts legal hazard responsibility. Trails and maintenance roads should be fenced on an as-needed basis whenever such fencing is warranted for public safety, restricted access, security, etc. If a fence is allowed within Reclamation's ROW, Reclamation should approve the fence materials. Any gates allowed within Reclamation's ROW should be at least 16 feet wide. Reclamation will be provided with full access through any fences or gates.
4. Prior to construction of any structure that encroaches within a Reclamation pipeline or canal ROW, a "pothole excavation" should be made to determine the locations of any existing Reclamation and non-Reclamation facilities and their appurtenant features that may be affected. Potholing is the practice of digging test holes to expose underground utilities to determine the horizontal and vertical location of the utility.

All work within 18 inches of the facility should be done using hand-held tools only. The excavation should be made by or in the presence of Reclamation and/or AOE personnel. The presence of a Reclamation and/or AOE inspector may be required throughout the excavation process, but this presence in no way relieves the applicant or their contractor of responsibility.

The resultant elevation information should be delineated on the profile view and labeled as:

**POTHOLED ELEVATION XX.X**  
Surface Elevation XX.X

The pothole excavation should be filled in, or a safety fence installed, prior to departing the site each day.

5. If Reclamation facilities need to be modified to avoid adverse impacts from the applicant's crossing facility, the applicant should be responsible for the cost of such modifications.

## Engineering and O&M Guidelines for Crossings

6. A temporary permit may be required for visual inspections, ground and aerial surveys,<sup>1</sup> or potholing that requires physical entrance onto a Reclamation facility. **A use authorization or consent document issued by Reclamation and/or AOE should be obtained prior to entering or crossing Reclamation's ROW for any activity.**
7. Applications should include a project description, calculations, specifications, and detailed construction plans showing plan views, profiles and sections, and grading plans of proposed work within or adjacent to Reclamation's ROW. Plans should show an easily recognizable boundary (tied to a known corner) and Reclamation's ROW and Reclamation stationing or mile post designation.

All Reclamation facilities should be shown and labeled (e.g., "Centerline of xx-inch Reclamation Pipeline," "Reclamation Communication and Control Cable," etc.) The type and weight of the construction equipment crossing Reclamation pipelines, roads, and bridges as well as the crossing locations should be included. Additional information, as identified in following individual specific feature sections of these guidelines, should also be included with the application for review.

Any engineering or land survey drawing should contain the appropriate registered engineer's or land surveyor's stamp and signature. A construction schedule outlining the anticipated duration of the construction should be submitted. A minimum of two<sup>2</sup> copies of the application (including calculations, specifications, and plans) should be submitted to Reclamation and/or AOE for review and approval.

8. For crossings of all Reclamation facilities, Reclamation and/or AOE personnel familiar with the facilities (including cathodic protection systems) will obtain and provide copies of existing files showing information about existing buried facilities (center of pipeline, depth of cover, size of pipe, class of pipe, etc.) to the applicant.
9. Existing Reclamation facilities (e.g., canal lining, canal check structure, turnout structure, etc.) and appurtenances (e.g., existing blow-offs, air valves, vents, manholes, and/or cathodic protection test stations) and existing non-Reclamation facilities on Reclamation's ROW (e.g., petroleum pipelines, natural gas pipelines, communications lines, powerlines, water lines, sewer lines, storm drain lines, etc.) **should be protected** in place prior to and during construction.

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<sup>1</sup> Aerial surveys require placing on-the-ground survey control markers.

<sup>2</sup> Revise per local Reclamation office and/or AOE practice.



The applicant and/or their contractor may be liable for all damages to Reclamation facilities and appurtenances as a result of construction and for any other damages or losses suffered by Reclamation or its water contractors, including power, irrigation, municipal and industrial water supply, and communication losses.

10. Trench excavation should comply with the most current Occupational Safety and Health Administration standards or Reclamation Health and Safety Standards, whichever are more stringent. Trench backfill should be placed in 4- to 6-inch lifts if hand compacted or no more than 8-inch lifts if power compacted. Trench backfill within Reclamation's ROW should be compacted to 95 percent relative compaction (ASTM D 698, Standard Proctor) (or 90 percent of ASTM D 1557). Mechanical compaction using heavy equipment (greater than 2,000 pounds) should not be used within 18 inches of the Reclamation pipeline. Flowable fill (or controlled low strength material) should be substituted for compacted pipe embedment under canals and may be used when crossing pipelines.
11. Erosion control measures, including re-vegetation, should be implemented after completing construction.
12. If existing drainage features are to be modified during construction, detailed drawings showing the proposed drainage replacement/restoration should be submitted with the application for review and approval. The applicant is responsible for the care and handling of storm water runoff both during and after construction.
13. The applicant should not divert surface runoff<sup>3</sup> toward Reclamation canal or canal embankments. The 100-year storm<sup>4</sup> surface runoff should use detention basins outside of Reclamation's ROW. Lined drainage channels should be designed to transfer flow from the detention basins to the existing cross drainage facilities that drained the original area. Also refer to "4.4 Storm Water Cross Drainage."
14. Proposed temporary or permanent modifications to the existing cover over Reclamation pipelines should be subject to review and approval by Reclamation and/or AOE. Design parameters for roadway, parking lot, and driveway crossings over the pipe should also be subject to review and approval by Reclamation and/or AOE.

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<sup>3</sup> Subdivision or commercial development on the uphill side of canals that pave large areas and have large roof areas will greatly increase peak storm runoff—most city development requires retention basins. Applicants should provide the same retention basins that are required for similar development projects.

<sup>4</sup> Revise per Reclamation field office for specific canal if a higher storm frequency is required.

## Engineering and O&M Guidelines for Crossings

15. When a Reclamation pipeline system being crossed has pipe with an “A” cover pipe designation (less than 5 feet of earth), the applicant is to analyze the crossing to show “A” pipe load carrying capability exists to meet their carrying requirements or replace the “A” pipe with pipe of sufficient load carrying capability.
16. Reclamation’s ongoing O&M activities should not be disrupted during construction. The primary or secondary operating road should be kept available for Reclamation and/or AOE use at all times.
17. Detectable warning tape may be required over below-ground utilities. Refer to “3.3 Detectable Warning Tape.”
18. The points where the proposed utilities enter and exit Reclamation’s ROW should be plainly and permanently marked by sign posts extending 5 feet above grade. Applicants should provide sign posts directly above their utilities and at all angle points within Reclamation’s ROW. The distance between adjacent sign posts should not exceed 500 feet. Sign posts should contain the name of owner/operator, contents of the pipeline, utility identification, and emergency contact telephone number. Sign posts for angle points that lie within roads or canals should be offset and have a reference noted. The locations of the sign posts should be shown on the plans.
19. Following completion of work, applicants should provide as-built drawings of their facilities on Reclamation’s ROW. Reclamation as-built drawings are to be updated by the appropriate Reclamation office and/or AOE to reflect the crossing. As-built drawings may be maintained by the AOE, but should remain accessible to Reclamation upon request.

### 3.3 Detectable Warning Tape

Detectable warning tape may be required over below-ground utilities situated within Reclamation’s ROW and should be a minimum of 18 inches above the utility and between 18 and 30 inches below the ground surface. Warning tapes should conform to the following specifications:

- a. For potable water lines, the warning tape should be a 3-inch-wide blue detectable tape imprinted with “**CAUTION BURIED POTABLE WATER LINE.**”
- b. For nonpotable water lines, the warning tape should be a 3-inch-wide purple detectable tape imprinted with “**CAUTION BURIED NONPOTABLE WATER LINE.**”

- c. For sewer and storm drain lines, the warning tape should be a 3-inch-wide green detectable tape imprinted with “**CAUTION BURIED (type) LINE.**”
- d. For gas, oil, and steam chemical lines, the warning tape should be a 3-inch-wide yellow detectable tape imprinted with “**CAUTION BURIED (type) LINE.**”
- e. For telecommunications, telephone, and television conduit(s), the warning tape should be a 3-inch-wide orange detectable tape imprinted with “**CAUTION BURIED (type) CONDUIT.**”
- f. For electrical, street lighting, and traffic signal conduit(s), the warning tape should be a 3-inch-wide red detectable tape imprinted with “**CAUTION BURIED (type) CONDUIT.**”

## 4.0 SPECIFIC FEATURE REVIEW GUIDELINES

### 4.1 Bridges

- 1. New bridge crossings (vehicular, pedestrian, and utility) should be perpendicular (between 70 and 90 degrees) to the centerline of the water conveyance facility and at locations approved by Reclamation and/or the AOE. Exceptions to the policy may be considered on an individual basis.
- 2. Public use bridges in urban areas should be spaced no closer together than 1/3 mile (about 4 blocks or 1,700 feet) apart. This is to ensure O&M operations are not overly restricted.
- 3. Bridge crossings should be of free span design. Consideration of any anticipated (known or ongoing) canal subsidence issues, anticipated raising of the canal lining, or anticipated increases in the canal’s high water level should be made. The minimum vertical clearance between the bottom of the superstructure and the top of the canal lining should be 3 feet. For unlined canals, the vertical clearance may be measured to the high water level. If this minimum clearance is reduced by subsidence or by future Reclamation modifications to the canal lining, the minimum clearance should be re-established at the applicant’s expense. The minimum horizontal clearance from the face of the abutment to the top of the canal lining should be 5 feet. For unlined canals, the horizontal clearance may be measured to the high water level.

## Engineering and O&M Guidelines for Crossings

These clearances are suggested to minimize impact on the canal section during construction and future inspections and O&M. Applicants may request to re-construct a canal section if Reclamation's operations are impacted by close construction during periods when the canal is normally unwatered. If so, vertical clearances may be reduced to 1 foot and horizontal clearance to 3 feet.

4. Canal O&M roads should intersect public roads at bridges at right angles for proper visibility. This may require the applicant to acquire additional ROW for use if the existing canal ROW is not sufficient. American Association of State Highway and Transportation Official (AASHTO) criteria for sight distances at the intersection of O&M roads and roadways at new bridges should be met to allow O&M vehicles to cross them safely.
5. Driving piles at concrete-lined canals should not be permitted. Any abutment foundation support piles, at concrete-lined canals, should be drilled and cast-in-place.

At a minimum, the applicant's drilling and piling plan should include:

- Drilling methods and equipment
- Methods for preserving existing foundation material
- Methods and equipment to determine the presence of quick soil conditions or scouring and caving
- The proposed method for casing installation and removal if casings are used
- Methods and equipment for accurately determining the depth of concrete and actual or theoretical volume placed

At a minimum, the applicant's contingency plan should include:

- Means to repair in a certain time
- Minimum flows after event
- Review of geotechnical conditions surrounding the pile locations
- Assessment of how the proposed mitigations will address geotechnical conditions
- Methods for restoring foundation material

## Engineering and O&M Guidelines for Crossings

- A list of material, equipment, and personnel with qualifications to be used during mitigation work
  - A seal from a Professional Engineer on all relevant plans and drawings
6. The submitted plan drawings for the bridge should contain the following information:
    - a. Superstructure, abutments, railings, embankments, and drainage, including details and sections
    - b. Type of materials (concrete, steel, timber, etc.) used for different members
    - c. Details of cast-in-place foundation piles, if any, on both sides of the canal
    - d. The elevation of the bottom of the superstructure and the clearance between the top of the canal lining (or high water level if unlined canal) to the superstructure or bottom of deck slab, whichever is lowest
    - e. Design loadings
    - f. Design standards on which the bridge is based (AASHTO, etc.)
  7. The calculations and specifications for the bridge should be submitted to Reclamation and/or AOE for review.
  8. The right lane turn radius from the new road onto a Reclamation operating road should comply with the provisions of a 67-foot wheelbase<sup>5</sup> (WB-67) truck turning template in the AASHTO manual on Geometric Design of Highway and Streets.
  9. Details of any proposed utilities to be attached to an existing bridge include:
    - a. Anchor bolt locations should not intercept the critical reinforcing steel of the bridge.

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<sup>5</sup> The field office should adjust these provisions according to anticipated needs.

## Engineering and O&M Guidelines for Crossings

- b. Utilities should be placed and anchored under bridge decks and through utility openings, if they are present. The utility should be placed off center in the utility opening, if possible, to allow for future utility additions.
  - c. If an expansion joint is used in the pipeline, the joint should be placed near the bridge deck expansion joint.
  - d. Holes through bridge concrete or abutment and retaining walls for passage of utilities should be allowed by core drilling. The annular space between the utility and core hole surface should be completely filled with an elastomeric sealant to prevent loss of material or water piping from behind the wingwalls and abutments.
  - e. Submit calculations showing the effects of the weights of the proposed utilities on the load carrying capacity of the bridge for Reclamation review.
  - f. Intermediate supports for the utility should withstand the same seismic load considerations as the bridge.
  - g. Load limit signs should be placed adjacent to the bridge, as required under AASHTO criteria.
  - h. Beam guardrails should be installed at bridges and bridge approaches, as required under AASHTO criteria.
10. The applicant will be responsible for changes to Reclamation existing ROW; bridge O&M approach roads; existing fencing, gates, and signs; and the addition of new fencing, O&M gates, cattle guards, signs, etc.

## 4.2 Landscaping

- 1. No landscaping or other changes in ground surfaces within Reclamation pipeline and canal/lateral ROW should be made without advance written permission of Reclamation through the application process. Landscaping changes may (1) limit, prevent, or hamper O&M access; (2) increase the costs of operations and maintenance of the facility; (3) impact facility reliability; or (4) create a public nuisance or liability issue.
- 2. Open space with natural hiking trails and walkways may be permitted if vehicle access to Reclamation pipeline and appurtenant facilities for patrol and maintenance is provided.

3. The following may apply within Reclamation's ROW:
  - a. The easement may be used as a greenbelt upon Reclamation approval.
  - b. Ground cover and shrubs are permitted upon Reclamation approval.
  - c. Trees and vines should not be allowed. See Appendix B of *Review of Operation and Maintenance Program Field Examination Guidelines* (reproduced as appendix B at the end of these guidelines).
4. All temporary or permanent changes in ground surfaces within Reclamation pipeline and canal ROW are considered encroaching structures and are handled as such. Earthfills and cuts on adjacent property should not encroach onto Reclamation pipeline and canal ROW. Excavations of adjacent property (even property not within Reclamation's purview) within the projection of the Reclamation embankment line may impact embankment stability and should be evaluated.
5. Permanent landscaping structures should not be allowed within the exterior limits of a Reclamation linear facility ROW (fee owned or easement).
6. Pressurized lawn and park sprinkler irrigation lines (3-inch maximum size) and isolation valves within Reclamation easements that run parallel to a Reclamation pipeline should be installed at least 15 feet from the edge of the Reclamation pipeline.

Irrigating lawns and flower beds along canal embankments should not overwater the area or threaten the embankment stability.

### 4.3 Roadway Crossing

**Note:** This type of encroachment also includes parking areas and recreational trails.

1. The applicant should submit a grading plan as part of the application.
2. If the roadway crosses a Reclamation pipeline system that has a cover pipe designation of "A," refer to "3.2 General."

## Engineering and O&M Guidelines for Crossings

3. If the applicant intends to modify existing drainage features during construction, detailed drawings showing the proposed drainage replacement/restoration should be submitted with the application for review and approval. (Refer to “3.2 General.”)
4. If the proposed roadway includes a bridge crossing over a Reclamation canal or pipeline, Reclamation and/or AOE should review and approve the vertical clearance and location of the abutments. (Refer to “4.1 Bridges.”)
5. Streets, roads, or parking areas crossing Reclamation pipeline easements are permissible. All streets, roads, and parking surfaces are to be asphalt or other flexible pavement. Depressed curbs or driveways should be provided for Reclamation vehicular access when new roads cross Reclamation pipelines or canals.
6. Roadway ditch drainage should not be allowed to flow into the canal. Drainage should be retained and released in a controlled way to maintain peak discharges that are less than any peak historical runoff rate before these modifications. Applicants should direct drainage to an original sub-basin cross drainage culvert or overchute. (Refer to “3.2 General” and “4.4 Storm Water Cross Drainage.”)
7. If existing roadway embankments are to be widened, the work should be conducted in accordance with the provisions of construction in the applicable State Department of Transportation (DOT) Standard Specifications.

### 4.4 Storm Water Cross Drainage

1. Upslope development impacts historic natural drainage volumes and peak flow rates. Development re-grades and revises drainage sub-basins. Revised ground cover from constructing roads, parking areas, and buildings may result in the need to change the cross drainage features (culverts and/or overchutes) along Reclamation canals.
2. A hydrologic study should accompany all plans that modify the existing drainage across and/or along Reclamation facilities. The study or report should show the proposed flows of the canal and the associated crossings. The drainage study or report should show that the downstream system can accept the flows without creating any flooding to properties adjacent to or downstream of the canal.
3. All drainage crossings, whether existing or proposed, should carry the peak runoff of a 100-year event while preventing any storm water from entering the canal and/or ponding against the canal embankment.



## Engineering and O&M Guidelines for Crossings

4. Urban runoff should not be allowed to enter into, or drain onto, Reclamation's land. All flows generated outside Reclamation's ROW should enter the storm drain system prior to entering Reclamation's ROW. Piped connections are preferred, but concrete-lined channels may be acceptable upon Reclamation's review.
5. The new crossing under a canal should be designed with 3 feet vertical clearance from the top of the cross drainage structure to the bottom of the canal (or liner). The structure should extend completely across Reclamation's ROW.
6. New overcrossings of the canal should have 2 feet of vertical clearance from the top of the liner and 2 feet of horizontal clearance from the support abutments to the outside edge of the canal lining. The O&M road crossing of the cross drainage structure should be structurally capable of withstanding highway-legal vehicle loadings and provide at least 1 foot of cover in the roadway.
7. Pipe crossing barriers should be installed on all pipe overcrossings.
8. All drainage flow should be discharged to a downstream storm drainage system owned, operated, and maintained by a public agency (such as a city or county) or into areas such as channels, roadways, parks, wetland basins, or other non-private lands that can accept the concentrated flows from the drainage crossing.
9. All drainage from upland property should be collected by the applicant's installed system of curbs and inlets within their property and discharged into a non-Reclamation public agency's drainage system.
10. New drainage system designs will not use ponding against the existing canal embankment for temporary detention of storm runoff that will not immediately pass through existing or new crossings.

Proposed permanent detention facilities adjacent to Reclamation's property should include engineered fill beyond the canal ROW to provide, at a minimum, a fill-width maintenance access roadway between the canal property and the basin. The applicant shall submit a geotechnical report verifying that the canal embankments can perform as detention basin embankments. The design should provide for sufficient freeboard to contain the 100-year event within the proposed basin adjacent to Reclamation's property and shall have adequate protection from seepage and erosion.

The ownership and related O&M of the embankments shall be the responsibility of the applicant requesting the crossing.

## Engineering and O&M Guidelines for Crossings

11. When grading operations upstream of existing canal drainage crossings are scheduled to take longer than a normal construction season to complete, temporary basins shall be installed. These temporary basins should be designed to detain the 100-year event, capture silt from the disturbed area, and meter the flows across the existing drain crossings without spilling flows into the canal.
12. Unless Reclamation specifies otherwise, the applicant should remove or plug and abandon existing drainage crossings that are not used by the development unless they are shown to provide an additional measure of safety for the canal by reducing the likelihood of spill into the canal caused by extreme runoff flows. Otherwise, these crossings should remain in place for Reclamation's benefit and will not require ownership transfer to a public agency.

These crossings must discharge into the non-Reclamation public agency's storm drainage systems or into areas such as channels, roadways, parks, wetland basins, or other nonprivate lands that can accept the concentrated flows from the drainage crossing in the case of an extreme runoff event.

Grading in Reclamation property should be preserved or revised to direct extreme runoff flows into these unused drainage crossings without allowing said flows to enter into the canal until the crossings reach their capacity.

### 4.5 Subdivision

Urban developments are reaching Reclamation's lands and ROWs. These are general guidelines for accommodating development in subdivisions (refer to "3.2 General" and "4.4 Storm Water Cross Drainage").

1. Permanent structures should not be permitted within Reclamation fee-owned linear ROWs.
2. Open space with natural hiking trails and vegetation may be allowable.
3. Where subdivision development is adjacent to a canal, fencing should include these characteristics:
  - a. Temporary chain link fences must be installed prior to removing any portion of existing fences.

## Engineering and O&M Guidelines for Crossings

- b. Upon completion of grading for drainage and other work, fencing should be installed along the subdivision's boundary length of the adjacent ROW plus 150 feet beyond the development's property boundary. The fence should be per project standards and at the applicant's expense.
  - c. The new fence should be located 1 foot outside of Reclamation's ROW. The fence location should be shown on the improvement plans.
4. Use of Reclamation pipeline easements as part of residential subdivision lots should not be allowed. Pipeline easements may be included within the subdivision greenbelt or similar use areas.
5. Drawings should include all proposed improvements (i.e., streets, utilities, landscaping, etc.) within, and adjacent to, Reclamation's ROW.
6. Trees or vines should not be allowed within a Reclamation pipeline or canal ROW. See Appendix B of *Review and Operation and Maintenance Program Field Examination Guidelines* (reproduced as appendix B at the end of these guidelines).
7. Streets, roads, or parking areas using Reclamation easements may be permissible. All streets, roads, and parking surfaces should be asphalt or other flexible pavement. Depressed curbs or driveways should be provided for Reclamation vehicular access when new roads cross Reclamation pipelines or canals.
8. Where fencing is proposed within Reclamation easements, a minimum 16-foot-wide gate should be provided for Reclamation access.
9. Pipelines containing sewage, oil, gasoline, natural gas, or hazardous materials should only cross perpendicular (between 70 and 90 degrees) to the Reclamation pipeline or canal and be installed with the necessary safety measures and separation clearance as required in "4.6 Utility Crossing."
10. Electroliers, posts, etc., should be installed at the maximum distance possible from the edge of the pipeline or canal.
11. If crossing a Reclamation pipeline system that has "A" cover pipe designation, refer to recommendations in "3.2 General."

## 4.6 Utility Crossing

*Note:* All pipelines, electrical, and communication lines and conduits are referred to as “utilities” in these guidelines.

### 4.6.1 Casings

The Reclamation Materials Engineering and Research Laboratory’s (MERL) position is to avoid using casing pipes around metallic carrier pipelines (steel, ductile iron, cast iron, reinforced concrete, pretensioned concrete cylinder, etc.) whenever possible. The experience of the corrosion community in general is that these casings often cause corrosion-control problems. Furthermore, dielectric (plastic, fiberglass, etc.) casings, or even dielectrically coated casings, should not be used. They can shield the carrier pipe from receiving cathodic protection current.

Cathodic protection to a buried metallic pipeline is more trouble free and more certain without a casing pipe. MERL recommends relying on effective corrosion control measures on the carrier pipeline rather than relying on a casing pipe (which may shield cathodic protection current) to direct a leak away from Reclamation property.

### 4.6.2 Overhead Line Crossing

1. Overhead wires across Reclamation pipeline and canal ROWs should be at least 32 feet above all ground levels in the Reclamation ROW. For electrical powerlines of 69 kilovolts (kV) or higher voltage, the minimum clearance should be 40 feet plus 0.25 inch per kV of line-to-line voltage above 450 kV. In any case, the minimum clearance is to be that determined to be needed with an ambient temperature of 120 degrees Fahrenheit.
2. Reclamation has the following requirements for overhead crossings:
  - a. Poles or towers should not be allowed within Reclamation’s ROW.
  - b. Overhead electrical and communication lines should cross perpendicular (between 70 and 90 degrees) to the centerline of the Reclamation facility.
  - c. If necessary, fence grounding is to be provided for existing fence lines, especially under power transmission lines.

3. A marker warning sign should be provided that shows the clearance and electrical line voltage. The warning sign should face oncoming traffic and state, “**DANGER, HIGH VOLTAGE OVERHEAD.**”

#### 4.6.3 Utility Crossing Reclamation’s Canal

Utility crossings include open ditch laterals, subsurface and surface drains, levees, and similar facilities.

##### General Requirements:

1. Utilities crossing Reclamation canals should be designed to cross perpendicular (between 70 and 90 degrees).
2. Pier construction in the canal for new utility crossing(s) should not be allowed. New utility crossings should be free span design.
3. Open cut crossings of Reclamation canals and ditches, when allowed, should require replacing linings to re-establish the original construction style and materials (i.e., disturbed concrete lining panels should be removed in their entirety and replaced, membrane lining and earth or concrete protective cover should be re-constructed, gravel and canal under-drainage systems should be re-established to full working order, etc.) Proposals should be submitted for approval with the crossing permit application.
4. For trench excavation and backfill requirements, refer to “3.2 General.”
5. Boring and jacking of a utility through canal embankments or protective levees should not be permitted. Boring and jacking of a utility should be constructed through the embankment foundation materials. Applicants should make special design and construction considerations with bored crossings under canals containing water during construction. Among these should be using proper bentonite slurry to seal the annulus space between the utility conduit and the boring cavity from canal seepage. Refer to appendix A for more details to be considered.

The applicant’s drilling plan should cover:

- a. Drilling methods and equipment
- b. Methods for preserving existing foundation material
- c. Methods and equipment to determine the presence of quick soil conditions or scouring and caving

## Engineering and O&M Guidelines for Crossings

- d. Proposed method for casing installation and removal if casings are used
- e. Methods and equipment for accurately determining the depth of concrete and actual or theoretical volume placed

The applicant's contingency plan should cover:

- a. Means to repair in a certain time
  - b. Minimum flows after event
  - c. Review of geotechnical conditions surrounding the pile locations
  - d. Assessment of how the proposed mitigations will address geotechnical conditions
  - e. Methods for restoring foundation material
  - f. List of material, equipment, and personnel with qualifications to be used during mitigation work
  - g. A seal from a Professional Engineer on all relevant plans and drawings
6. When horizontal directional drilling (HDD) or other trenchless methods are used, canal seepage conditions may be aggravated by the collapse of the canal foundation material into the annular void between the bore and pipe. Penetration through the top stratum of fine-grained materials may concentrate seepage at those locations. Pipe installed with trenchless methods should proceed only after completion of a comprehensive evaluation of the following:
- (a) Comprehensive understanding of the subsurface soil and groundwater conditions to a minimum depth of 20 feet below the lowest pipe elevation
  - (b) Locations of the HDD pipe penetration entry and exit
  - (c) Construction procedure
  - (d) Allowable uplift pressures
  - (e) Onsite quality control and quality assurance monitoring during construction operation

## Engineering and O&M Guidelines for Crossings

- (f) Grouting of the pipe annulus
- (g) Backfilling of any excavated areas
- (h) Repair and reinstatement of the construction staging areas

A geotechnical report should be submitted with the application for review prior to approval of the proposed utility crossing.

Directional drilling under a canal may be considered if a minimum clearance of 25 feet to the bottom of the canal lining is maintained for utilities with less than a 24-inch outside diameter. Larger utility crossings should be considered on an individual basis and may require additional clearance from the bottom of the canal lining.

7. Cut and cover constructed utilities under Reclamation canals should have a minimum cover of 36 inches when within Reclamation's ROWs. Bored construction utilities should have a minimum of 3 diameters cover.
8. Reclamation's ongoing O&M activities should not be disrupted during crossing construction. The primary or secondary operating road should be kept available for Reclamation use at all times.
9. Canal embankments should be re-built or repaired with materials and standards equal to or better than the existing embankments.
10. Drawings should be stamped and signed by a Professional Engineer and contain the following information:
  - a. Canal milepost or station at each proposed crossing, utility size and location, and type of utility or material transported
  - b. Maximum utility operating pressure, type of pipe, joints, wall thickness, maximum test pressure, and description of test procedures
  - c. Type of sleeve/casing (when allowed) including diameter, joints, and wall thickness
  - d. For utilities attached to a bridge or an overchute, details showing the structure name, superstructure, abutments, embankments, protective dikes, method of attachment, spacing of utility supports on the structure, location of other attached utilities, and structural calculations

## Engineering and O&M Guidelines for Crossings

- e. Protective coatings and corrosion control measures
- f. Method of handling pipeline expansion and contraction
- g. Location of nearest shutoff valve on each side of the crossing
- h. Location and details of thrust restraint
- i. Design code(s) used for the utility crossing
- j. Location, including depth, of the buried pipeline communication and control cables
- k. Other existing utility easements in the immediate vicinity

### Hazardous Material Carrier Requirements:

1. Pipelines carrying hazardous material or pollutants (e.g., oils, gasoline, sewage, contaminated waters, and nonpotable waters) should be designed for a reduced risk of failure in the portion within Reclamation's ROW. The design should require either:
  - a. Designing the crossing pipeline with an additional 50 percent working pressure factor
  - or*
  - b. Using secondary containment (casing pipe) for all hazardous material pipelines
2. To minimize the amount of any hazardous material entering the canal, Reclamation may require the installation of a block (gate) valve and or a check valve on each side of the canal between the ROW boundary and the embankment. When selecting the type of the valves, take into the account the flow direction and the terrain.
3. A final hazardous material spill contingency plan and an emergency response plan should be approved by Reclamation prior to start of construction.
4. A monitoring program and/or Supervisory Control and Data Acquisition System alarm may be required depending on the hazardous material transported. This applies to all "overcrossings" and "undercrossings" when the hydraulic grade line is within 60 inches of the canal liner or when local geology would promote this requirement.



**Attaching Utilities to Bridges and Overchutes:**

*Note:* Reclamation does not guarantee the long-term availability of bridges or overchutes as support devices for utility crossings because they may require structural modifications or alterations to accommodate widening, repairs, subsidence offsets, etc., to such an extent that service may be interrupted or stopped. Reclamation may determine the bridge is no longer required and may remove it. In that event, the owner/operator of each utility attached to a bridge or an overchute may be required to re-locate or permanently remove their utility at their own expense.

Specific details for attaching utilities to bridges are:

- a. Utilities should not be placed on the bridge deck.
- b. Anchor bolt locations should not intercept the critical reinforcing steel of the bridge.
- c. Utilities should be placed and anchored under bridge decks between girders and through utility openings, if they are present. The utility should be placed off center in the utility opening, if possible, to allow for future utility additions.
- d. If an expansion joint is used in the pipeline, it should be placed near the bridge deck expansion joint.
- e. Holes through bridge concrete or abutment and retaining walls for passage of utilities may be allowed and should be core drilled. The annular space between the utility and core hole surface should be completely filled with an elastomeric sealant to prevent loss of material or water piping from behind the wingwalls and abutments.
- f. Calculations showing the effects of the weights of the proposed utilities on the load carrying capacity of the bridge should be submitted for Reclamation review.
- g. Intermediate supports for the utility should withstand the seismic conditions of the bridge.

**4.6.4 Utility Crossing Reclamation's Underground Pipelines**

1. The applicant should submit the procedures, excavation plans, schedules, as well as type and weight of the construction equipment to be used for crossing the Reclamation pipeline.

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2. High voltage, direct current powerlines should not be permitted to encroach on the Reclamation pipeline ROW, except in unusual circumstances and with proper cathodic protection considerations.
3. For proposed metallic pipelines, refer to “5.0 Cathodic Protection Requirements.”
4. For utilities crossing above or under the Reclamation pipeline, the vertical clearance between the utility and Reclamation pipeline should be a minimum of 12 inches.
5. The location of the Reclamation pipeline and the communication and control cables throughout the area of the proposed construction should be shown on the plans. Prior to Reclamation and/or AOE issuing a use authorization or consent document, the pipeline and the cable(s) should be located and exposed by potholing. The pothole locations should be shown on the drawings. The pothole elevations should be referenced to Reclamation stationing or milepost. (Refer to “3.2 General.”)
6. Drawings should contain the following information:
  - a. Reclamation milepost or station at each proposed crossing, pipeline size and location, and type of utility or material transported.
  - b. Maximum utility operating pressure, type of pipe and joints, maximum test pressure and description of test procedures, wall thickness, and utility pipe classification.
  - c. Type of sleeve/casing pipe (when allowed) including diameter, joints, and wall thickness.
  - d. Protective coatings and corrosion control measures.
  - e. Location of nearest shutoff valve on each side of the crossing.
  - f. Location and details of thrust restraint.
  - g. Design code(s) used for utility crossing.
  - h. Location, including depth of the Reclamation pipeline and the communication and control cables.
  - i. Other existing utility easements in the immediate vicinity.

7. Detectable warning tape may be required over trenched utilities. (Refer to “3.3 Detectable Warning Tape.”)
8. For trench excavation and backfill requirements, refer to “3.2 General.”
9. Embankments should not be permitted within Reclamation’s ROW where underground pipeline exists.

#### **4.6.5 Utility Crossing Under Reclamation’s Roadways**

1. The applicant should supply typical cross sections that show existing ground surface elevations, utility trench invert elevations, and utility details.
2. For trench excavation and backfill requirements, refer to “3.2 General.”
3. Conduits with diameters up to 24 inches should be bored and jacked underneath pavements. Larger conduits may be considered on an individual basis. Pavement or road surfaces should not be cut unless an acceptable detour, if required, is approved. The cover over the conduit(s) when within Reclamation’s ROWs should be a minimum of 36 inches. (Refer to “3.2 General.”)
4. Unless otherwise approved, the applicant should replace existing Reclamation roads and parking surfaces that are removed or damaged by the applicant’s construction activities in accordance with provisions in the latest edition of the applicable State DOT Standard Specifications.
5. If existing road embankments are to be widened, the work should be conducted in accordance with the provisions of embankment construction in the applicable State DOT Standard Specifications.
6. Detectable warning tape may be required over buried utilities. (Refer to “3.3 Detectable Warning Tape.”)

## **5.0 CATHODIC PROTECTION REQUIREMENTS**

### **5.1 Cathodically Protected Metallic Pipelines**

Unless approved in writing by Reclamation, metallic pipelines or those containing metallic reinforcement (e.g., reinforced concrete) installed within Reclamation’s ROW should have a suitable bonded dielectric coating (see “5.2 Protective Coatings for Corrosion Control”) and be cathodically protected. Impressed current cathodic protection rectifiers and deep-well anode systems should not be

## Engineering and O&M Guidelines for Crossings

permitted within Reclamation facilities without prior approval from MERL's Corrosion Technology Group. All submittals should include details of the cathodic protection system (CPS) and its appurtenances.

1. All existing Reclamation cathodic protection test stations, cables running to these stations, rectifiers, anode beds, and any other appurtenances should be located prior to any grading or excavation. The test stations should be staked and flagged. The test stations, cables running to these stations, any anode beds, etc., should be suitably enclosed or protected during construction to prevent damage. No re-location or modification of the test stations, cables, anode beds, etc., is allowed without prior approval from MERL's Corrosion Technology Group.
2. Generally, the CPS to the proposed pipeline should be the sacrificial anode type unless the proposed installation continues an existing pipeline that uses impressed current type of cathodic protection.
3. A means of monitoring the effectiveness of the CPS on the proposed pipeline should be provided within Reclamation's ROWs. The number of anodes and test stations will differ with each project. Test stations should be located at every anode bed connection and should not be more than 1,000 feet apart. A test station should also be located where any metallic pipeline crosses over or under a metallic Reclamation pipeline, metallic fence, other metallic structure embedded in the ground, or comes within 20 feet of a Reclamation structure on or embedded in the ground. Both the proposed cathodically protected pipeline and the Reclamation pipeline should be monitored regularly using these test stations. Monitoring results should be reported to MERL's Corrosion Technology Group. In addition, the owner of the proposed crossing pipeline should investigate and mitigate any adverse potential shift caused by the proposed pipeline on the Reclamation pipeline. Owners of proposed crossing pipelines should return Reclamation pipelines to their original electrochemical potentials or to more benign potentials. Mitigation measures should be approved by MERL's Corrosion Technology Group. The effectiveness of mitigation measures should be confirmed in the presence of a Reclamation representative following installation.

For those pipelines under DOT regulation, the application and monitoring of the CPS should conform to Title 49 CFR, Part 195, any special provisions of this guideline, and the provisions of NACE International RP 0169, in that order. For other pipelines, any special provisions of this guideline should take precedence, followed by the provisions of NACE RP 0169.

## 5.2 Protective Coatings for Corrosion Control

### 1. *Atmospheric Exposed Pipe*

The coating should be a high build modified aluminum epoxy mastic primer and top coated with a high build aliphatic urethane. The type of coating should be listed in the submitted plans and specifications. Information should include the surface preparation and the thickness of the coating to be applied.

### 2. *Buried Pipe*

The type of coating may vary from project to project due to geology and soil corrosivity and should be considered on an individual basis. The type of coating should be listed in the submitted plans and specifications. Information should include the surface preparation and the thickness of the coating to be applied.



## REFERENCES

- Application for Transportation and Utility Systems and Facilities on Federal Lands, <[http://www.ntia.doc.gov/FROWsite/SF-299\\_2006.pdf](http://www.ntia.doc.gov/FROWsite/SF-299_2006.pdf)>.
- Application for Use of Reclamation Project Land and Water Surfaces, <<http://www.usbr.gov/pmts/lands/>>.
- Bureau of Reclamation Right-of-Use Application, <<http://www.usbr.gov/pmts/lands/FINAL7-2540-5-06ExpDate03312009.pdf>>.
- California Department of Water Resources - Encroachment Permit Guidelines.
- Central Arizona Project, Reach 11 Guidelines.
- GP Region Billings MT – Standard Crossing & Clearance Requirements, Utility Lines and Cables, drawing 40-600-51. The office also uses a Preliminary Project Description Form and a Special Use Permit.
- NACE, International RP 0169, “Standard Recommended Practice – Control of External Corrosion on Underground or Submerged Metallic Piping Systems.”
- PN Region Burley ID – Overhead and underground crossing clearances.
- Policy on Geometric Design of Highway and Streets, American Association of State Highway and Transportation Officials (AASHTO), Fifth Edition, 2004.
- Reclamation, 2005. Preliminary drawing 103-D-1700 that provides general requirements for installation of crossings, June 2005.
- Reclamation Manual, Directive and Standards LND 08-01, Land Use Authorizations, <<http://www.usbr.gov/recman/lnd/lnd08-01.pdf>>.
- Title 29 CFR, Part 195.
- U.S. Army Corps of Engineers – Engineering and Design, Design and Construction of Levees EM 1110-2-1913, 30 Apr 2000, CECW-EG Washington, DC 20314-1000.





## GLOSSARY

***Bored and jacked*** – This terminology is a general way of referring to a family of trenchless methods.

***Bridge, class A*** – Vehicular bridge used by the public. May or may not be owned by the Bureau of Reclamation.

***Consent Document Permit*** – Permit required across fee-owned lands.

***Detention basin*** – An artificial flow control structure used to contain flood water for a limited period of a time, thereby providing protection for areas downstream. Detention basins provide a way to reduce storm peak flows, while retention basins hold water for an extended period of time. These basins are generally a part of a larger engineered flood water management system.

***Electroliers*** – A branching frame, often of ornamental design, used to support electric illuminating lamps.

***Pothole excavation*** – See potholing.

***Potholing*** – The practice of digging test holes to expose underground utilities (e.g., cables) to determine the horizontal and vertical location of these utilities.

***Trenchless methods*** – Procedures for installing pipe without using traditional trench cut and cover methods. These trenchless methods may be referred to as bore and jack, tunneling, horizontal directional drilling, and microtunneling, among others.

***Water conveyance facility*** – Canal, ditch, pipeline, drain, levee, open or closed laterals, and similar facilities and their associated appurtenant features.



Appendix A

## **General Requirements for Installing Bored and Jacked Pipe Undercrossings**



*Bored and Jacked Under the Canal* – This terminology is a general way of referring to a family of trenchless technologies. Similar guidance to the requirements listed below should be followed no matter what method is used for installation.

1. Installing a lone carrier pipe (without casing) is encouraged. Refer to “4.6 Utility Crossing,” and “4.6.1 Casings” for information on cautions of using casings around metallic carrier pipe.
2. Plans must show carrier/casing pipe type, diameter, and thickness. Casing pipes should be steel pipe (American Water Works Association [AWWA] C-200) and have 1/4-inch minimum wall thickness. Applicants should provide the type of carrier pipe and appropriate bell dimensions for said carrier pipe to verify annular clearances.
3. When installing pipe while the canal is unwatered, a minimum of 3 pipe diameters or 60 inches of clearance (whichever is greater) between the top of the pipe and the bottom of the canal must be maintained. However, 72 inches or more clearance is recommended.
4. Provide a minimum of 3 inches of clearance between the carrier and casing pipes at all points (including bells).
5. A bulkhead or effective sealing device should be provided at both ends of each casing pipe to seal the annular space between the two pipes. Vent pipe should be included to allow ventilation and reduce the risk of condensation buildup and flooding.
6. As a result of the installation process, an annular void is usually created around the outside of the casing pipe. Provisions should be made to pressure grout or effectively seal (e.g., bentonite slurry) this void space.
7. Requirements below are provided to establish minimums for determination of the length of pipe to be installed. It is strongly recommended that pipes be installed perpendicular (between 70 and 90 degrees) to the canal alignment. Regardless, the pipe must extend completely through the Bureau of Reclamation’s (Reclamation) right-of-way (ROW). These minimums do not relieve the applicant’s engineer from performing an onsite investigation or other work to determine local conditions that may require additional pipe length.

Jacking pit configuration, location, and length of pipe to be installed should be based on the following parameters:

- a. One operating road shall remain open to vehicular traffic at all times.

- b. The minimum operating road embankment top width to be maintained during construction should be either 14 feet wide, the width of the existing embankment, or as required by Reclamation.
  - c. As a minimum, jacking pit excavations should not be within:
    - (1) A line drawn from the outside edge of the operating road embankment extended downward and away from the canal at a slope of 3/4 horizontal to 1 vertical.
    - (2) A line drawn from the outside edge of the top of the concrete lining extended downward and away from the canal at a slope of 1 horizontal to 1 vertical.
  - d. To contain the slurry during installation, jacking pits should be constructed so that natural ground or a compacted dike is entirely around the pit to an elevation at least 1 foot above the top of the canal lining.
  - e. All excavations should be in compliance with Occupation Safety and Health Administration regulations and Reclamation's Health and Safety Standards.
  - f. If the contractor elects to install shoring in the jacking pits, all shoring designs should be prepared by a Professional Engineer knowledgeable in said type of work. A copy of the shoring designs should be submitted to Reclamation.
8. Jacking pits should be backfilled with native material and mechanically compacted to 95 percent of the maximum dry density per ASTM D-698.
  9. The contractors should be responsible for any damage to the canal section during the construction of a crossing, and the contractor shall repair the damage at their own expense.
  10. If an emergency situation develops during construction, the contractor should immediately notify appropriate contacts with Reclamation. Reclamation must approve further work at that point.
  11. The minimum distance between two jacked pipes should be 10 feet.
  12. Any pressure lines installed within Reclamation's ROW must have adequate thrust restraint at bends and valves. Specified design pressures and thrust restraint calculations shall be provided to Reclamation to confirm the design configuration.

Appendix B

## **Guidelines – Removal of Trees and Other Vegetative Growth from Earth Dams, Dikes, and Conveyance Features**

**Excerpted from: Review of Operation and Maintenance  
Program Field Examination Guidelines**





**GUIDELINES  
REMOVAL OF TREES AND OTHER VEGETATIVE GROWTH  
FROM EARTH DAMS, DIKES, AND CONVEYANCE FEATURES\***

Growth of trees and other significant vegetation on or adjacent to earth dams, dikes, and conveyance features, should be prevented from becoming established for the following reasons:

1. To allow proper surveillance and inspection of the structures and adjacent areas for seepage, cracking, sinkholes, settlement, deflection, and other signs of distress.
2. To allow adequate access for normal and emergency Operation and Maintenance (O&M) activities.
3. To prevent damage to the structures due to root growth, such as shortened seepage paths through embankments; voids in embankments from decayed roots or toppled trees; expansion of cracks or joints of concrete walls, canal lining, or pipes; and plugging of perforated or open-jointed drainage pipes.
4. To discourage animal/rodent activity (by eliminating their food source and habitat), thereby preventing voids within embankments and possible shortened seepage paths.
5. To allow adequate flow-carrying capability of water conveyance channels (e.g., spillway inlet and outlet channels; open canals, laterals, and drains).

The growth of trees and potentially detrimental vegetation should be prevented during its early stages as part of the operating office or entity's normal O&M program. Early control is generally the most cost effective means of avoiding potential adverse effects on these structures from their continued growth. Control efforts may consist of applying herbicides, spraying, cutting, and/or removing the trees or undesirable vegetation.

Suggested clearance zones (areas of control) adjacent to these structures are provided within these guidelines. Concerted efforts should be made to maintain these clearance zones. However, site-specific conditions, such as landscaping, accessibility, erosion susceptibility of material in the area, type of abutment material, original construction clearance zone, right-of-way easement, etc., may influence the necessity or success of these control efforts.

Should trees and/or other significant vegetation become established, proper O&M of earth embankment dams, dikes, and conveyance features, may require their discriminate removal. During the Review of Operation and Maintenance examination for the facility or system, the examiners should use these guidelines, along with their experience and professional judgment, to evaluate the need for removal of such established growth.

If trees and other significant growth are identified by the examination team in locations delineated by these guidelines, a determination should be made regarding their need for removal. If the identified vegetation is deemed to be in location such that its existence is not considered to be detrimental and therefore does not require removal, sufficient justification should be provided during the examination and included within the associated report to support that determination.

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\* Enclosure to memorandum dated April 26, 1989, from Manager, Project Operation Services Staff, to all Regional Directors, Subject: Revised Guidelines — *Removal of Trees and Other Vegetative Growth From Earth Dams, Dikes, and Conveyance Features.*

When, in the opinion of an Review of Operation and Maintenance examination team, such established growth requires removal, specific followup procedures should be addressed as part of the examination. Such procedures may include the need for right-of-way easement determination; the need for an assessment for potential environmental impacts (any impact assessments should be coordinated with designated regional or project office environmental staff); whether removal of the root system is necessary and to what extent; the method of removal and recompaction of material within the void created; and the need for any erosion stabilization measures.

National Environmental Policy Act compliance is required relative to such tree and vegetation removal. Additionally, the application of herbicides should comply with applicable provisions of the Endangered Species Act. The determination of appropriate procedures to be followed in assessing potential environmental impacts and mitigation (including those to wildlife and its habitat) will be the responsibility of each regional and/or project office. This will include the preparation of an appropriate National Environmental Policy Act document and an assessment of the need for mitigation prior to the onset of removal activities. Appropriate National Environmental Policy Act compliance may include a Categorical Exclusion Checklist, an environmental assessment followed by a Finding of No Significant Impact, or an Environmental Impact Statement.

The following guidelines and associated clearance zones should be used for all Reclamation earth dams, dikes, and conveyance features. They are not considered "policy;" rather, they are guides which should be used with reasonable judgment and practicality.

1. Trees and detrimental vegetative growth should be prevented from becoming established on the surface of all earth dam, dike, and conveyance feature embankments. A small amount of shallow-rooted vegetation may be acceptable to aid in erosion protection and slope stabilization. Mowing of grass and other small vegetation is desirable and may be necessary to allow proper surveillance of the surfaces and observation of animal/rodent activity.
2. A clearance zone of 25 feet beyond each contact (groins and toe) of earth dam embankments and dikes should be maintained of all trees and detrimental vegetation. Similarly, a clearance zone of 15 feet should be maintained beyond the outside toe of all fill sections/embankments for open canals and laterals. These clearance zones may need to be extended for seepage areas or other conditions where proper surveillance or access may be warranted.
3. Earth dam, dike, and conveyance feature (open canal and lateral) embankments have large tree growth or stumps from previously cut trees on or near them should be evaluated, usually in conjunction with an Review of Operation and Maintenance examination, for any necessary future action, (i.e., monitor, excavation and backfill, rebuild, etc.). Generally, sizable old root systems of large trees should be grubbed out and the embankment replaced and compacted to prevent the development of piping action or erosion. Likewise, any sizable voids resulting from animal/rodent burrowing activity should be filled and compacted. Seeding may be necessary for protection from surface erosion.
4. Spillway inlet and outlet channels, outlet works discharge channels, and other open conveyance channels (open canals, laterals, and drains) should be free of vegetative growth that could significantly impede water flow or reduce design capacity.
5. A clearance zone of 25 feet adjacent to all concrete structures associated with such facilities should be maintained of all trees and detrimental vegetative growth to prevent damage from root growth, to allow proper surveillance, and to allow adequate O&M access.

6. Associated cut slopes adjacent to open canals and laterals should be kept clear of vegetation which, if toppled and/or uprooted, could affect operations or O&M access.

7. For pipe conveyance systems (such as siphons, aqueducts, discharge lines, perforated or open-jointed drains, etc.), to provide O&M access and to prevent root encroachment, a clearance zone should be maintained 15 feet from each side of the pipeline. However, in some cases, farming of annual crops over pipelines may be permissible.

\* \* \* \* \*

## **How to Apply**

The *Application for Transportation and Utility Systems and Facilities on Federal Lands* (Standard Form 299) can be obtained by accessing the U.S. General Services Administration Forms Library at: [www.gsa.gov/portal/forms/download/117318](http://www.gsa.gov/portal/forms/download/117318)

A \$100 non-refundable application fee must be submitted with the application.

In addition to the \$100 non-refundable application fee, regulations at 43 CFR § 429 require the advance collection of funds in an amount adequate to cover all administrative costs incurred by the Bureau of Reclamation for reviewing, processing and granting use authorizations. The administrative costs include, but are not limited to, costs incurred for project plan review, environmental compliance, contract preparation, determination of annual right-of-use fees, appraisal costs if applicable, and construction and use monitoring. The administrative costs must be recovered by Reclamation prior to the start of processing the application for use authorization. Upon receipt of the application, Reclamation will send a letter agreement acknowledging receipt and requesting funds to process the application.

Along with the completed application and fee, please include the following:

- Engineer-stamped design plans as follows: 7 sets of 11"x17" size, 1 set standard engineering size, and 1 electronic copy.
  - If the proposed project crosses Reclamation facilities, the plans must clearly depict and identify Reclamation's rights-of-way. Copies of Reclamation right-of-way drawings are available upon request.
- A Plan of Development including a description of the project, location map identifying the site(s), and legal description including a metes and bounds describing the total acreage use.
- Any environmental/cultural studies or reports that have been prepared for the proposed project.

To assist with any facility crossing questions, please refer to Reclamation's "Engineering and O&M Guidelines for Crossings - Bureau of Reclamation Water Conveyance Facilities (Canals, Pipelines, and Similar Facilities)."

Typical application review and processing takes approximately 120 days, but may take up to 180 days or more depending on complexity and other variables.

Please address the application and supporting documentation to:

Ms. Cindy Flores  
Water and Lands Contracts Group Manager  
Bureau of Reclamation  
7301 Calle Agua Salada  
Yuma, AZ 85364

**EARTHWORK:**

1. STRIP AND DISPOSE OF ANY REMAINS OF PREVIOUS IMPROVEMENTS DISCOVERED WITHIN THE AREA TO BE GRADED. THIS SHALL INCLUDE REMOVAL OF ALL VEGETATION, DEBRIS, AND OTHER DELETERIOUS MATERIAL. CONCRETE AND/OR ASPHALT RUBBLE LARGER THAN SIX (6) INCHES IN DIAMETER SHOULD BE REMOVED AND WASTED IN ACCORDANCE WITH THE APPLICABLE REGULATIONS.
2. THOROUGHLY AND UNIFORMLY MOISTEN THE SOIL AND MAINTAIN SOIL MOISTURE PRIOR TO PLACEMENT OF ALL CONCRETE.
3. PLACE FILL IN LAYERS NOT TO EXCEED SIX (6) INCHES IN COMPACTED THICKNESS.
4. COMPACTED SOIL SUBGRADE BELOW AC PAVEMENT TO A MINIMUM OF ONE (1) FOOT THICK AND 95% OF A MAXIMUM DENSITY PER ASTM D698.
5. SATURATED MATERIALS (MUCK) SHALL NOT BE USED AS BACKFILL.
6. CONTRACTOR SHALL RE-ESTABLISH THE EXISTING OPERATION AND MAINTENANCE (O & M) AND EMBANKMENTS BEYOND LIMITS OF USBR RIGHTS OF WAY.

REV.	DATE	REVISION DESCRIPTION	BY



DESIGNED BY:  
 DRAWN BY:  
 APPROVED BY:  
 SURVEYED BY:  
 PROJECT NO.:  
 DRAWING:  
 DATE: 12/29/16

**YUMA COUNTY WATER  
 USERS' ASSOCIATION**  
 3800 WEST CO. 15TH STREET  
 SOMERTON, ARIZONA 85350  
 928.627.8824

NOTES



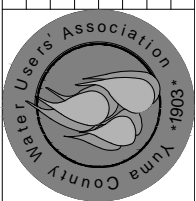
CONCRETE CONSTRUCTION NOTES

1. WATERSTOP AND SEALANT SHALL BE USED AT ALL CONSTRUCTION JOINTS
2. ALL #5 AND LARGER BARS SHALL BE SHOP BENT. NO FIELD BENDS.
3. ALL REINFORCING STEEL SHALL MEET THE REQUIREMENTS OF ASTM A615 AND SHALL BE GRADE 60.
4. CONCRETE MIX DESIGNS ARE TO BE FURNISHED TO YCWUA PRIOR TO CONCRETE PLACEMENT. TRUCK TICKETS AND COMPUTER PRINTOUTS ARE TO BE FURNISHED TO THE YCWUA FOR EACH TRUCK OF CONCRETE DELIVERED TO THE JOBSITE.
5. ALL CONCRETE MIX DESIGNS SHALL CONFORM TO ASTM C-94 EXCEPT AS MODIFIED BY THE FOLLOWING SEPCIFICATIONS :
  - (A) CONCRETE FOR ALL STRUCTURES, SUCH AS TURNOUTS, STANDBOXES, ETC., CONCRETE FILL AT STRUCTURE FOUNDATIONS, CRADLES, COLLARS AND SUPPORTS ACROSS PIPE TRENCHES SHALL BE CLASS "A" CONCRETE, 4000 PSI.
  - (B) MAXIMUM WATER/CEMENT RATIO FOR CLASS "A" CONCRETE SHALL BE 0.45 BY WEIGHT.
  - (C) AIR CONTENT AS DETERMINED BY ASTM C-231 SHALL BE FOUR (4) PERCENT +/- ONE (1) PERCENT.
  - (D) ONE BAG OF FIBERMESH SHALL BE ADDED TO EACH CUBIC YARD OF CONCRETE.
6. CEMENT SHALL CONFORM TO ASTM C-150 TYPE II OR V, WITH A MAXIMUM TRICALCIUM ALUMINATE NOT TO EXCEED FIVE (5) PERCENT, THE MAXIMUM PERCENT ALKALIES SHALL NOT EXCEED SIX (6) PERCENT.
7. CEMENT SHALL BE :
  - (A) TYPE V PORTLAND CEMENT ONLY, OR
  - (B) TYPE II PORTLAND CEMENT PLUS A CLASS N, F, OR C POZZOLAN. THE POZZOLAN CONSTITUENTS SHALL BE BETWEEN FIFTEEN (15) AND TWENTY-FIVE (25) PERCENT BY WEIGHT OF THE PORTLAND POZZOLAN CEMENT. FURTHERMORE THE POZZOLAN USED UNDER THIS OPTION SHALL SIGNIFICANTLY INCREASE THE SULFATE RESISTANCE OF CONCRETE.
8. CHAMFER ALL EXPOSED CORNERS 3/4".
9. FRESH CONCRETE SHALL NOT BE DROPPED MORE THAN 5 FEET. HOPPERS, TREMIES, AND/OR SLICK LINES SHALL BE USED DURING CONCRETE PLACEMENT. WALLS SHALL BE PLACED IN AT LEAST THREE (3) LIFTS, EACH LIFT VIBRATED THROUGH TO THE PREVIOUS LIFT.
10. ALL CONCRETE CRACKS SHALL BE SCORED OR ROUTED 1/4" WIDE AND 1/4" DEEP, BLAST CLEANED AND SEALED WITH AN APPROVED NON SAG, WATER SERVICE, EPOXY OR EPOXY GROUT. EXCESS EPOXY SHALL BE REMOVED FROM EACH SIDE OF THE SCORED CRACK.
11. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY BLAST CLEANED AND CURING COMPOUNDS AND LATENTS REMOVED PRIOR TO SETTING FORMS, BLAST CLEANING SHALL BE PERFORMED WITH A MINIMUM OF TWO (2) PASSES FROM OPPOSITE DIRECTIONS TO PREVENT SHADOWS FROM BEING LEFT. REBAR SHALL BE COMPLETELY CLEANED.
12. AFTER PLACING OF CONCRETE HAS BEEN COMPLETED TO THE CONSTRUCTION JOINTS AND BEFORE PLACING FRESH CONCRETE, THERE SHALL BE A WAIT OF A MINIMUM OF 48 HOURS BETWEEN EACH PHASE OF CONSTRUCTION.
13. FORMS SHALL HAVE CLEANOUT PORTS FOR FINAL WASHING AND CLEANOUT PRIOR TO CONCRETE PLACEMENT.
14. ALL LOOSE WIRE, PAPER, SAWDUST, OR OTHER DETRIMENT SHALL BE REMOVED FROM THE INTERIOR OF THE FORMS PRIOR TO CONCRETE PLACEMENT.

CONCRETE CONSTRUCTION NOTES (CON'T)

15. CONCRETE CLEARANCES ARE EXTREMELY IMPORTANT. ALL TIE WIRE TAILS SHALL BE TURNED IN. ALL STEEL SHALL BE 100% TIED. REINFORCING STEEL IN FLOORS, SLABS AND DECKS SHALL BE SUPPORTED OFF THE GROUND OR FALSE WORK WITH CONCRETE DOBIE BLOCK WITH TIE WIRES OF THE CORRECT DIMENSION TO PROVIDE THE REQUIRED CLEARANCE AND SHALL HAVE THE SAME COMPRESSIVE STRENGTH AS THE SURROUNDING CONCRETE. DOBIE BLOCK SHALL BE TIED TO THE REINFORCING STEEL TO PREVENT DISPLACEMENT. CONCRETE DOBIE BLOCK SHALL NOT BE SPACED GREATER THAN 3' CENTER TO CENTER IN ANY DIRECTION.
16. ALL CONCRETE PLASTER, HEADWALLS, FLOORS, SLABS, DECKS, ETC. SHALL BE CURED WITH WHITE PIGMENTED CURING COMPOUND IMMEDIATELY AFTER FINISHING OR FORM REMOVAL AND IN ADDITION SHALL BE WATER CURED.
17. ALL STRUCTURES AND LINING TRANSITIONS SHALL BE WATERTIGHT UPON COMPLETION.
18. WATERSTOP SHALL BE HELD SECURELY IN PLACE DURING CONCRETE PLACEMENT. WATERSTOP SHALL BE CENTERED IN THE JOINT.
19. WATERSTOP SHALL BE GREEN STREAK #783 OR AN APPROVED EQUAL, 6" WIDE AND 3/8" THICK PVC RIBBED WATERSTOP. ALL JOINING OF WATERSTOP SHALL BE BY FIELD WELDED BUTT JOINTS. SPECIAL SECTIONS SHALL BE PREFABRICATED BY THE WATERSTOP MANUFACTURER AND BUTT WELDED IN THE FIELD. A FIELD WELDING IRON OF THE TYPE AND SIZE RECOMMENDED BY THE WATERSTOP MANUFACTURER SHALL BE USED. THREE (3) TEST WELDS SHALL BE MADE TO DEMONSTRATE ADEQUATE WATER TIGHT FIELD WELDING OF PVC WATERSTOP PRIOR TO FIRST INSTALLATION. WATERSTOP SHALL BE SECURED BY HOG RINGS OR OTHER METHODS. WATERSTOP THAT IS DISPLACED DURING CONCRETE PLACEMENT SHALL BE REMEDIATED. REMEDIATION SHALL INCLUDE BUT IS NOT LIMITED TO SAW CUTTING, CHIPPING, SLOTTING AND EPOXYING IN NEW WATERSTOP FOLLOWED BY ANY NECESSARY PATCHING, OR REMEDIAL CONCRETE REPLACEMENT.
20. ALL FORMED AND UNFORMED WATER BEARING CONCRETE SURFACES SHALL BE MADE SMOOTH. FORMED SURFACES SHALL BE PATCHED, FINES AND ROUGHNESS GROUND SMOOTH, AND THE WATERSIDE SURFACE SACKED. EXPOSED TOP AND BACKSIDE SURFACES SHALL BE SACKED TO SIX (6) INCHES BELOW FINISHED GRADE. CONE HOLES OR OTHER DEPRESSIONS THAT ARE PATCHED AND DO NOT BOND SHALL BE CHIPPED OUT OR BLAST CLEANED AND RE-PATCHED.
21. ALL UNFORMED WATER BEARING CONCRETE SURFACES OF THE STRUCTURES SHALL BE HAND TROWEL FINISHED. PERMANENT CONCRETE LINING SHALL BE FLOAT FINISHED AND SMOOTH TROWEL FINISHED.
22. ANY ROCK POCKETS OR HONEYCOMBING OF THE CONCRETE AT ANY POINT SHALL BE CHIPPED BACK TO SOUND CONCRETE, SLAG BLAST CLEANED AND FRESH CONCRETE BONDED TO THE SUBSTRATE CONCRETE WITH SIKA ARMATEC 110 EPOCEM EPOXY, OR AN APPROVED EQUAL.
23. ALL FORM WORK SHALL BE PROPERLY HELD IN PLACE AND BRACED. NO EARTH FILL SHALL BE USED FOR FORM WORK BRACING OR BACKING. FORM WORK SHALL EXTEND TO THE GROUND AND SHALL BE MORTAR TIGHT AT ALL POINTS.
24. CONCRETE FOR VERTICAL WALLS OF STRUCTURES SHALL BE PLACED SEPARATELY FROM FLOOR AND INCLINED CONCRETE. MANDATORY CONSTRUCTION JOINT AND REBAR SHALL BE BLAST CLEANED PRIOR TO SETTING VERTICAL FORMS.
25. SEALANT BLOCKOUT SHALL BE FIRMLY SECURED TO THE FORM AND SHALL BE TIGHT TO EXISTING CONCRETE SURFACES.
26. WHERE NEW CONCRETE IS PLACED AGAINST EXISTING CONCRETE, SANDBLAST SURFACES TO EXPOSE ROUGH AGGREGATE TO 1/4" AMPLITUDE AND APPLY SIKADUR 32, HY-MOD EPOXY IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

REV.	DATE	REVISION DESCRIPTION	BY



DESIGNED BY:  
 DRAWN BY:  
 APPROVED BY:  
 SURVEYED BY:  
 PROJECT NO.:  
 DRAWING:  
 DATE: 12/29/16

**YUMA COUNTY WATER  
 USERS' ASSOCIATION**  
 3800 WEST CO. 15TH STREET  
 SOMERTON, ARIZONA 85350  
 928.627.8824

NOTES



## **1.0 General License for Encroachment Process – Plan & License Approval**

1. Applicants requesting to encroach upon USBR ROW and easements under the jurisdiction of the Association must first obtain a copy of this document and follow the Plan & License Approval process.
2. The applicant must design plans in accordance with this document and submit them to the Association for an initial review and comment process. The Association will return initial comments back to the applicant within 1 to 2 weeks. The review and comment process will be repeated as many times as necessary until the plans are approved by the Association. The following will apply to this first step:
  - a. We require that plans are submitted at all stages of plans including the initial, preliminary, 30%, 60% and 90% stage of plans.
  - b. Adhere to USBR ROW section, as far as plan design.
  - c. Refer to Section 3.0 for Project ROW and Facility Crossings and Special Use regulations.
  - e. Section 5.0 for Development and Subdivision design.
  - f. Section 6.0 Bridge Design
  - g. Section 7.0 Roadways
  - h. Section 8.0 Electrical
  - i. Section 9.0 Communication
  - j. Section 10.0 Gas
  - k. Section 11.0 Water and Storm Drain
  - l. Section 12.0 Sanitary Sewer
  - m. Section 13.0 Irrigation
  - n. Section 14.0 Water Operations
  - o. If necessary, site meeting(s) or additional meetings shall be coordinated by the applicant.
  - p. The plan approval process time length will ultimately be contingent on the number of times the plans are reviewed by the Association.
3. Once plans are approved by the Association, the Association will provide a letter of plan approval to the applicant.
4. At this point the applicant should provide an official letter (letterhead) to the Association describing the proposed encroachment project. The letter shall also include language requesting for a License for Encroachment.
5. When the Association receives the letter, the Association will initiate the execution of a License for Encroachment. The License for Encroachment process will range anywhere from 60 to 90 days. Large scale projects will eventually take 90 to 180 days (possibly more) prior to the initiation of a License for Encroachment.

## **2.0 Project ROW Surveying and Plan Design**

The following will be adhered to when surveying USBR ROW:

1. USBR canal, lateral and drain ROW maps indicate the minimum width of USBR ROW and approximate location of same. ROW maps will be provided upon request.
2. Present canal and drainage facilities (inclusive of channel, operation and maintenance (O & M) roads and sufficient spoil bank/embankment areas) are within the reserved ROW of the United States (Act August 30, 1890) and should be designated as such.
3. When a canal, lateral or drain facility lies outside of the ROW noted on the USBR ROW maps, please consult with the Association before designating the facilities dimensions. We have authority to maintain the facility at its present location but are willing to work with the developer or landowner when it is in the best interest of all concerned.
4. All plans must show Association facilities, site plan detail and contour information, etc.
5. Plans shall include Section, Township, and Range information.
6. Plans will need to identify person designing or creating the plans, include numbered sheets, date, engineering firm and engineer stamp.
7. Excavation and pot-holing within or across USBR ROW prior to obtaining a License for Encroachment requires the issuance of a Temporary Encroachment Permit (TEP). A TEP will take about one to two weeks to be executed.
8. It shall be the complete responsibility of the applicant to comply with municipality, county, state, federal or country regulations, as far as the engineering design standards and documentation. All of this information shall also be submitted to the Association for review and comment via pdf or hard copy.



### **3.0 Easements and ROW**

Easements and ROW that are under the care for O & M by the Association are vested in the name of the United States Government and therefore ingress, egress and other unauthorized uses is prohibited.

1. Use of Project facilities, easements and ROW by anyone other than the “authorized persons” is prohibited. “Authorized persons” being the USBR, Association and private irrigators when the same are required to enter upon USBR ROW and use facilities in the care and diversion of irrigation water to property under their control.
2. Project maintenance roads will not be used for ingress and egress, garbage/trash pickup, service roads or other related uses even on a temporary basis.

#### **4.0 Project ROW and Facility Crossings and Special Uses**

1. Main Canals and Drains - Crossings will only be permitted on section lines and need to cross at a perpendicular angle. No parallel encroachment is allowed. Variances require Board of Governors approval and will only be granted across culvert or pipelined sections.
2. Main Laterals – There will be no more than one crossing per one-half mile interval and crossings need to be at a perpendicular angle. No parallel encroachment is allowed. NOTE: If an irrigation check structure or other bridge is within one-fourth mile of proposed crossing, the requesting agency or developer at their own expense, will be required to either pipeline the lateral from said existing structures or within subject development plans, design and finance for relocation, reconstruction or deletion of subject existing structures all to the satisfaction of the USBR and the Association. Variances for more than one crossing are contingent on pipelining of the affected main lateral(s) and require Board of Governors approval.
3. Sub-Laterals, Drains and Power Line Easements – No more than one crossing per development and a maximum of two per one-half mile. Crossings need to be at a perpendicular angle and no parallel encroachment is allowed. Where proposed crossings are within one-fourth mile of each other or when subject crossing is within one-fourth mile of an existing irrigation check structure or other bridge or culvert structure the requesting agency or developer, at their own expense, will be required to either pipeline the lateral from said existing structure or, within the subject development plans, design and finance for the relocation, reconstruction or deletion of subject existing structures, all to the satisfaction of the USBR the Association. Variances for more than one crossing are contingent on pipelining of the affected sub-laterals or reconfiguration of power line system and require Board of Governors approval.
4. A License for Encroachment will be denied if the original water right, prior to subdivision or sale of small parcels, had access to a public thoroughfare. It is the responsibility of the purchasers of property to assure that they are not “land locked” by securing access for ingress and egress and public and municipal utilities in advance. This will assure that the operators of the Reclamation Project are not involved in conflicts pertaining to O & M and liability of encroachments and will assure that Project shareholders are not “subsidizing” land use changes through increased O & M activities and costs within USBR ROW.
5. All proposed crossings which are not planned for immediate use i.e. necessary to tie into another proposed development or to provide future access to land locked property will be barricaded off of the USBR ROW and easements. Depending upon the location, barricade construction will be according to City or County specifications. The road will remain closed for use until such time as development of adjacent lands require use of same. Failure to barricade said crossings will result in the repeal of the crossing permit and

denial of access until further arrangements suitable to the USBR and Association are consummated.

6. Approved material for backfill shall be carefully placed in 12" uncompact lifts and compacted to a minimum of 95% Proctor density.
7. All damage to Association's facilities shall be repaired by the Licensee or his contractor to the Association's satisfaction. If emergency repair work is necessary or Licensee fails to complete all work covered by the License in a reasonable time as determined by the Engineer, the remainder of the work will be performed by the Association at the expense of the Licensee.
8. Canal roadway surfaces and ROW shall be restored to the original condition or better and any dirt, debris or materials placed in the canal for any reason shall be completely removed prior to completion of project.
9. Wire barrier, cable, is unauthorized within USBR/YCWUA ROW. See USBR Safety Health Standard, 9.1.10 Traffic Signs and Barricades.

## **6.0 Bridges**

### **6.1 Bridge Design Guidelines**

1. A hydraulic analysis of the canal using existing conditions must be made to determine the maximum capacity of the canal. The maximum canal capacity is the flow at which the canal bank upstream of the subject bridge is over-topped.
2. A second analysis of the canal must be made showing the effects of the bridge modification at maximum capacity. It must be shown that the bridge modification will not raise the water surface in the canal upstream of the bridge.
3. The operating high water elevation will be identified and miscellaneous requirements for the site will be established.
4. Minimum clearances for Association O & M equipment to pass under any portions of new bridges is a minimum of 12 feet wide and 14 feet high.
5. Bridges are to be designed so as not to restrict the bank/embankment full capacity of the canal during periods of storm flows. The minimum freeboard required is 24" at the lowest point on the underside of the bridge.
6. Bridge abutments are to be aligned with the canal so as not to change or interfere with the direction of the water flow. To assure that the desired alignment and grades have been achieved, a full sheet of the bridge plans must be provided showing a plan/profile of the canal for a minimum distance of 400' (200' upstream and 200' downstream of the bridge site) unless special requirements have been established for the site. Profiles are to show the canal bed, operating high water, top of both banks and other elevations that may be pertinent. Plans are to show the alignment of the operating high waterline, the top and bottom of the canal banks, the edges of the canal roads and other topographic features that may affect the design of the bridge. The proposed bridge design is then to be superimposed on the plan/profile. All new bridges will be clear freespan structures. No center piers/pilings allowed.
7. Ripraping will be required to connect bridge under-lined sections into the canal banks except when the bridge is of such width that the lined canal cross-section remains approximately the same under the bridge.
8. Canals under bridges are to be fully lined and the lining is to extend a minimum of 20' beyond the outer sides of the bridge. Bank lining shall be a minimum of 12" above high water and under the bridge shall be tied into the bridge deck or abutments. Upstream and downstream riprap material (3" to 10") may be requested by the Association if conditions dictate its use.

9. If wing walls are not used, the bridge abutment walls or retaining walls must be extended 5' minimum beyond the bridge for safety considerations and to prevent road material from going into the canal. The elevation of these walls is to match the finish grade of the approach aprons and shall extend at a 4% slope to match the finish grade of canal approach road.
10. Concrete driveways are required at each end of the bridge to permit Association O & M equipment to cross without damaging the road surface. They shall be a minimum of 24' wide or match the O & M by 20' long.
11. The approach ramp from the canal road to the bridge approach apron shall be constructed at a maximum +4% slope. The minimum width of the approach ramp is 24' or the width of the existing road, whichever is greater. If an elevation difference between the bridge approach apron and the canal road greater than one foot is proposed, retaining walls on the canal side of the ramp will be required to hold fill in excess of one foot above the existing road. The retaining wall is to be located as close to the top edge of the canal bank as possible, with the top of the concrete at the beginning of the wall matching the approach apron and extending at a gradual slope to match the finish surface of the canal approach road. The top of the retaining wall footing is to be a minimum of one foot below the existing canal road.
12. No obstructions above the bridge deck elevation, such as dados or hand rails, will be permitted to extend beyond the top edge of canal bank.
13. Utility conduits may not extend below the underside of the bridge.
14. On roadways having curbs and gutters fully depressed curbs 30' wide (min.) are required at the entrances to the canal roads and are to be lined up with the concrete aprons so as to permit smooth turning by the Association maintenance equipment from the canal road onto the bridge and vice-versa. If sidewalks are provided, it may be necessary to taper a portion of the sidewalk adjacent to the canal road as well as widening the maintenance road in order to accomplish the smooth turning movement.
15. On divided roadways having a concrete curb median, curb openings 14' wide (min.) are required and are to be aligned with the concrete aprons to allow canal road traffic to go across the public road.
16. When bridge abutment walls are extended and tied directly to the wing walls of a canal structure, appropriate water stops or other similar material must be used to prevent leakage.
17. Surface drainage from bridge will not be allowed to enter the canal by flowing around the ends of the wing walls or retaining walls. Deck drains into the canal from bridge will be allowed only if local conditions permit and only upon Association approval. Otherwise

drainage must be carried beyond the canal road in a manner that will not cause erosion of the banks. The approach ramp must be graded at a 2% maximum slope away from the canal to facilitate drainage. Any storm water collected by the approach roads or the bridge itself will not be distributed upon USBR ROW.

18. Performance of construction activities (excavation, boring, etc.) below the normal operating water surface elevation shall be done only during scheduled water outages.

## **6.2 General Bridge Specifications**

1. Horizontal realignment of canal bank/embankment from existing bank/embankment to tie into the wing wall of the bridge is not to exceed a 4 to 1 taper.
2. The exact alignment and length of retaining walls or wing walls, if required, will be established in the field by the Contractor and approved by the Association inspector prior to setting forms.
3. Hand placed or pneumatically applied concrete lining (minimum 3,000 P.S.I. 28 day strength) placed under the bridge shall be tied to the underside of the bridge or abutment and shall extend a minimum of 20' beyond the disturbed portions of the bank/embankment, or a minimum of 20' beyond end of the bridge whichever is greater, and keyed in a minimum 18" deep and 12" wide cutoff lip into natural material for the full perimeter of the lining (or tied to existing lining).
4. All concrete, plaster or headwalls shall be sprayed with a white pigmented curing compound immediately after finishing or form removal.
5. The approach ramp from the new bridge approach apron to the canal road shall have a maximum slope of +4% graded parallel to the Association facility. The approach ramp or canal road shall be graded with a maximum -2% slope from the canal bank/embankment to the edge of the canal road to facilitate drainage away from the canal. The approach ramp material shall be of reasonable well graded, screened gravel or broken rock with a good distribution of all sizes of material between the 1 inch and the #200 sieve size and shall be thoroughly mixed with a minimum of 20% to a maximum of 40% fines (material that will pass the #200 sieve).