

**INTERNATIONAL BOUNDARY AND WATER COMMISSION  
UNITED STATES AND MEXICO  
UNITED STATES SECTION**

**CRITERIA FOR CONSTRUCTION ACTIVITIES  
WITHIN THE LIMITS OF USIBWC FLOODWAYS**



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**CRITERIA FOR CONSTRUCTION ACTIVITIES WITHIN THE LIMITS  
OF USIBWC FLOODWAYS**

**I PURPOSE**

The purpose of this document is to present criteria and guidelines for the review, approval and inspection of construction activities within the limits of United States Section, International Boundary and Water Commission (USIBWC) flood protection works which are currently maintained and operated by the USIBWC.

**II APPLICABILITY**

This document applies to all USIBWC Divisions and Project field offices having responsibility for reviewing and inspecting the construction of facilities within the limits of existing USIBWC floodways.

**III GENERAL**

The USIBWC retains right of approval on all improvements which are to pass over, under, or through the walls, levees, improved channel or floodways of the following USIBWC Flood Control Projects:

- Upper Rio Grande Flood Control Project
  - Rio Grande Canalization Project
  - Rio Grande Rectification Project
- Presidio Valley Flood Control Project
- Lower Rio Grande Flood Control Project
- Colorado River Project
- Tijuana River Flood Control Project

In addition, approval must be received from the USIBWC prior to commencement of construction of any facility which passes over, under, or within the floodplain of the international reaches of the Rio Grande and Colorado Rivers.

#### **IV GENERAL CRITERIA**

A License or Permit is required from the USIBWC for any proposed activities crossing or encroaching upon the floodplains of USIBWC Flood Control Projects and Right-of-Way. The License/Permit is issued by the General Services Division which coordinates the review and approval process with the Operation and Maintenance, Design, and Environmental Management Divisions and the appropriate Project field office. If required, a review from our legal office is conducted.

To obtain a License/Permit from the USIBWC, the Sponsor or Owner (hereafter referred to as Sponsor) of the proposed project shall comply with the National Environmental Policy Act (P.L. 91-190, as amended), the Endangered Species Act (P.L. 93-205, as amended), the National Historic Preservation Act (P.L. 89-665, as amended), the Clean Water Act (Federal Water Pollution Control Act)(P.L. 92-500, P.L. 93-243, and P.L. 95-217; 33 U.S.CSec1251, et seq.), the Clean Air Act (42 U.S.C.A. 7401 et seq.) and the USIBWC implementing procedures published in the Federal Register.

In addition to other requirements set forth in this document, the Sponsor must submit to the USIBWC all necessary permits, environmental studies and documents as required by the above U.S. agencies assuring adherence to all environmental laws and regulations for work within a floodway.

The USIBWC requires coordination with several agencies in the approval of proposed works along the international boundary with Mexico, including but not limited to the United States Fish and Wildlife Service, United States Environmental Protection Agency, United States Army Corps of Engineers, and the appropriate State Historical Commissions. The USIBWC will also coordinate with the Mexican Section of the IBWC when required or is appropriate.

Construction shall not start until final plans and specifications have been approved in writing by the USIBWC In addition, final construction plans shall be stamped and signed by a Registered Professional Engineer prior to USIBWC approval.

#### **V. PIPELINES CROSSING EXISTING LEVEES**

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

Levee integrity is to be maintained with any pipeline crossing. Each pipeline crossing should be evaluated for its potential damage which would negatively impact the integrity of the flood protection system and could eventually lead to catastrophic failure. Serious damage to levees can be caused by inadequately designed or constructed pipelines, utility conduits, or culverts (all hereafter referred to as "pipes") beneath or within levees. During high water, seepage tends to concentrate along the outer surface of pipes resulting in piping of fill or foundation material. Seepage may also occur because of leakage from the pipe through joints In the case of pipes crossing over levees, leakage can cause erosion in the slopes. In addition, loss of fill or foundation material into the pipe can occur if joints are open. Some of the principal inadequacies that are to be avoided or corrected are as follows:

- Pipes having inadequate strength to withstand loads of overlying fill or stresses applied by traffic.
- Pipe joints unable to accommodate movements resulting from foundation or fill settlement.
- Unsuitable backfill materials or inadequately compacted backfill.

Major factors to be considered in deciding if an existing pipe can remain in place under a new levee or must be rerouted over the levee, or if a new pipe should be laid through, under or over the levee are as follows:

- The height of the levee.
- The duration and frequency of high water stages against the levee.
- The susceptibility to piping and settlement of levee and foundation soils.
- The type of pipeline (low or high pressure line, or gravity drainage line).
- The structural adequacy of existing pipe and pipe joints, and the adequacy of the backfill compaction.
- The feasibility of providing closure in event of ruptured pressure lines, or in the event of failure of flap valves in gravity lines during high water.
- The ease and frequency of required maintenance.
- The cost of acceptable alternative systems.
- Possible consequences of piping or failure of the pipe.
- Previous experience with the owner in constructing and maintaining pipelines.

The methods of pipe installation should be understood by the designer to anticipate problems with: over excavating around the pipe, type of backfill materials, compaction of the pipe backfill, piezometric head acting on the pipe for the design flood, grouting of the pipe annulus, and high pressures from directional drilling that could result in hydro-fracturing the surrounding materials. In areas where backfill compaction is difficult to achieve, flowable low strength concrete-fill has been used to encapsulate pipe in narrow trenches. .

B. Small Diameter Pipelines Crossing Through Levees

1. General

- a. Small diameter pipes (2"-S" dia.) shall be placed a minimum of two feet below the levee-road surface and side slopes. See Attachment I, for details.
- b. Small diameter pipes must be properly designed and constructed to prevent (a) flotation if submerged, (b) scouring or erosion of the embankment slopes from leakage or currents, and (c) damage from debris carried by currents, etc.
- c. Valve or junction boxes shall not be permitted within the levees. All valves located within 15 feet either side of the toe of the levee shall be housed in a concrete box enclosure with a manhole type cover and shall have a minimum cover of one foot (1').
- d. Sewer manholes within the floodway is strictly prohibited. All sewer manholes shall be placed on the land side of levees.

- e. Pipeline installations shall not parallel the levees on either the channel or land side of the levees (this will avoid utility corridors). Pipelines are allowed only to cross perpendicular to channels, rivers or USIBWC right-of-way m:d levees.
- f. Leakage from or infiltration into any Pipe crossing over, through, or beneath a levee must be prevented. Therefore, the pipe joints as well as the pipe itself must be watertight. All pressure pipes should be pressure tested at the maximum anticipated pressure before they are covered and put into use.
- g. During the design, the potential for electrochemical or chemical reactions between the substratum materials or groundwater and construction materials should be determined. If it is determined that there will be a reaction, then protective measures to be taken may include the use of cathodic protection, coating of the pipe, or use of a corrosion-resistant pipe material.
- h. All pipes on the crown and riverside of the levee should have sufficient cover to withstand heavy equipment traffic during maintenance activities or debris during high water. Where mounding of soil is required, the slope should be gentle to allow mowing equipment or other maintenance equipment to operate safely on the slopes and to allow traffic to move safely on the levee crown.

2. Pressure Pipelines

Pressure pipelines (2"-8" dia.) shall be placed a minimum of two feet below the levee road surface and side slopes. See Attachment I, for details. Before consideration is given to allowing a pressure pipe to extend through or beneath the levee, the pipe owner - Should provide an engineering study to support the request for such installation. It is imperative that pressure pipes be fitted with rapid closure valves or devices to prevent escaping gas or fluid from damaging the levee.

C. Pipelines Crossing Through Levees

1. General

Pipes constructed through a levee are very susceptible to seepage along the pipe surface and piping of the levee embankment material can occur. **Directional drilling through levees is strictly prohibited.** Provisions for maintaining flood protection will be made and become an enforceable criterion with all pipe crossings. As an example, the Sponsor will be required to maintain a 24 hour emergency service equipment and personnel during construction work in order to backfill and compact all excavated trenches and to reconstruct the levee to its original condition in case of a flood situation.

The installation of pipes (10" diameter and larger) through levees shall be performed using the open cut method. See Section V.G.2 and Attachment No. II, for installation requirements.

2. Gravity Pipelines

Generally, the only pipelines allowed to penetrate the foundation or embankments of the levee are gravity drainage lines. The number of gravity drainage structures should be kept to an absolute minimum.

- a. Gravity flow pipes and conduits shall be designed with a positive cut-off structure (gatewell) located on the riverside of the levee crown to prevent water from the riverside to flow through the pipeline to the landside. The cut-off structure shall be extended to the levee crown elevation. This structure must be accessible no matter what flood condition may exist. The closure device must be operational by manpower. See Sections V.G.2.i,j,k for equipment requirements.
- b. All gravity storm drains discharging into a river or channel shall contain means of Positive closure such as an automatic flap gate or sluice gate at the discharge end of the line and energy dissipaters, as required. The Sponsor, as per license agreement, shall be responsible for inspection and maintenance to ensure proper operation of the gates and energy dissipaters.
- c. The Sponsor shall provide scour protection at the outfall consisting of riprap or a stilling basin depending upon the issuing jet velocity. Pipelines discharging into a river or channel, may be required to be aligned 45 degrees toward the flow of water, this will prevent possible erosion to the opposite bank of the river or channel.

D. Pipelines Crossing Under Levees

1. General

Pipes crossing beneath levees shall be constructed with open excavation methods and in accordance with the requirements stated in Section V.G.2.

2. Nearsurface Directional Drilling

Directional crossings include pipelines that carry natural gas, oil, petrochemicals, water, sewerage, and other products. Ducts are also installed to carry electric and fiber optic cables. Directional crossings have the least environmental impact to any alternate method. The technology also offers maximum depth of cover under the obstacle thereby, affording maximum protection and minimizing maintenance costs. In addition, river traffic and flow are not interrupted, as most of the work is confined to either bank.

If directional drilling methods are used, seepage conditions may be aggravated by the collapse of levee foundation materials into the void left by the drilling and washing of the pipe runs. Penetration through the top stratum of fine grained materials may concentrate seepage at those locations. Pipes constructed with directional drilling methods should proceed only after a comprehensive evaluation of the following: comprehensive understanding of the subsurface soil and groundwater conditions to a minimum depth of 20 feet below the lowest pipe elevation, locations of the pipe penetration entry and exit,

drilling procedure, allowable uplift pressures, onsite quality control and quality assurance monitoring during drilling operation, grouting of the pipe annulus, backfilling of any excavated areas, and repair of the construction-staging areas. For installation requirements, see Section V.G.3.

3. Boring and Jacking of Sleeves for Gravity Pipeline

Installation of pipes in existing levees by tunneling or jacking is strictly prohibited.

4. Electrical, Telephone, Telegraph and T.V. Cables

All cables shall be placed a minimum of two feet below the levee road surface and side slopes. See Attachment I, for details.

E. Antiseepage Devices

Antiseepage devices have been employed in the past to prevent piping or erosion along the outside wall of the pipe. The term "antiseepage devices" usually referred to metal diaphragms (seepage tins) or concrete collars that extended from the pipe into the backfill material. The diaphragms and collars were often referred to as "seepage rings." However, many piping failures have occurred in the past where seepage rings were used. Assessment of these failures indicated that the presence of seepage rings often results in **poorly compacted backfill at its contact with the structure.**

Where pipes or conduits are to be constructed through new or existing levees to depths greater than the design freeboard allowance, then concrete collars shall be provided for the purpose of increasing seepage resistance. See Attachment III for details. The number of collars required based on the pipe diameter, length, soil conditions and hydraulic head shall be determined by the Sponsor and calculations of such determinations shall be submitted to the USIBWC for review and approval.

F. Closure Devices

1. All pipes allowed to penetrate the embankment or foundation of a levee must be provided with devices to assure positive closure. Gravity lines should be provided with flap-type or slide-type service gates on the water side of the levee. Automatic flap-type gates are usually used where the water is likely to rise to the "Gate Closing Stage" rather suddenly and where the water stage is likely to fluctuate within a few feet above and below the "Gate Closing Stage" for prolonged periods of time during flood season. For an emergency gate to be effective it must be located so that its controls are accessible during flood stage.

2. Slide-type gates are usually preferred as service gates where the rate of rise of the water during major floods is slow enough (minimum of 12-hr flood prediction time) to give ample time for safe operation. The principal advantages of the slide gate in comparison with automatic flap gates are greater reliability of operation and the ease with which emergency closure can be made in event obstructions prevent closure of the gate. Usually an emergency closure can be made by filling a pipe manhole with sandbags. The obvious disadvantage of slide-type gates is that personnel must be on hand for their operation. Also their initial cost is generally greater than that for a flap-type gate.

3. A slide type gate with a flap type gate Attachment is often used and affords the

advantages of automatic flap gate operation with the added safety of the slide-type gate.

- 4 Pressure pipes should be fitted with valves at various stations that can be closed rapidly to prevent gas or fluid from escaping within or beneath a levee should the pipe rupture within these areas.

G. Installation Requirements

1. General

- a. The installation of pipes or other structures within the levee or foundation probably requires the greatest care and the closest supervision and inspection of any aspect of levee construction. Most failures of levee systems have initiated at the soil structure interface and therefore every effort must be made to ensure that these areas are not susceptible to piping. Of overriding importance is good compaction of backfill material along the structure. Pipes and seepage collars should be installed in the dry and a dewatering system should be used where necessary.
- b. The Sponsor shall practice approved construction methods to minimize erosion at the construction site. Construction equipment, supplies, forms, etc., shall not be stored in the floodway during the construction. Any item that might float during a flood shall not be stored in the floodway. The sponsor must obtain approval from the Commission, before placing any excess material excavated from the structure, and the material excavated from the drain ditch on USIBWC right-of-way.
- c. The Sponsor shall furnish all necessary environmental studies and documents as required by U.S. environmental laws and regulations. The Sponsor shall furnish plans and specifications for the proposed work to the USIBWC, sufficiently in advance of construction to allow adequate time for review and approval. USIBWC personnel will discuss proposals at the concept level prior to preparation of plans to avoid major revisions. Concept proposals may be submitted for review. Proposals should include the proposed construction starting date and the construction schedule prior to initiation of work.
- d. See Section VII, for additional requirements during the installation of pipelines through USIBWC floodways.

2. Pipelines Crossing Through or Beneath Levees

- a. The preferred method of installing pipes within the embankment or foundation of a levee is by the open cut method. The trench should be excavated to a depth of 2 feet below the bottom of the pipe and at least 4 feet wider than the outside diameter of the pipe. Pipe collars shall be constructed in undisturbed or compacted soil where required. See Attachment II for details.

Work requiring the open cut method shall be scheduled during the following non-flood seasons:

Upper Rio Grande Flood Control Project: October 16<sup>th</sup> thru May 31<sup>st</sup>

Presidio Flood Control Project: October 16<sup>th</sup> thru May 31<sup>st</sup>

Lower Rio Grande Flood Control Project: November 1<sup>st</sup> thru May 31<sup>st</sup>

Tijuana Flood Control Project: April 1<sup>st</sup> thru October 31<sup>st</sup>

When installing pipelines through new levees, the levee embankment should be brought to grade about 2 feet above the proposed crown of the pipe. This allows the soil to be preconsolidated before excavating the trench and installing the pipe.

- b. The excavation through the levee and berm area (35 feet from the levee toe) for the length of the structure shall meet OSHA criteria and have a side slope of one vertical foot to one horizontal foot (1:1) minimum or flatter and shall be excavated to maintain the 1:1 slope from the top of the levee or berm area to the bottom of the cut as shown on Attachment II. During the excavation for the structure, if unsuitable material is encountered, the Sponsor shall keep it separate from suitable material and shall not use it for backfill. Unsuitable materials shall be any soil classified in accordance with ASTM 02487 as organic (OL, OH, or PT), elastic silts (MH), fat clays (CH), clean sands (SW, SP, SW-SM, SW-SC, SP-SM, or SP-SC), or clean gravels (GW, GP, GW-GM, GW-GC, GP-GM, or GP-GC). Where imported material is required for backfill, it shall consist of natural soil which is not judged unsuitable according to the above criteria. All fill material shall be free from roots, trash, organic matter, and other objectionable material. The Sponsor shall submit to the USIBWC for approval, soil classification test results for any borrow source proposed for use.
- c. For small diameter pressure pipelines (2" to 8" diameter), the pipeline shall be installed by the open cut method with a minimum of two feet below the levee road surface and side slopes. See Attachment I, for details.
- d. After the trench has been excavated, it should be backfilled and compacted to the pipe invert elevation. The backfill should be brought up and compacted evenly on both sides of the pipe to avoid unequal side loads that could fail or move the pipe. Special care must be taken in the vicinity of any protrusions such as joint collars to ensure proper compaction. Trench backfill through the levee and berm area (35 feet from levee toe), including any bedding material for the pipe, shall consist of suitable material placed in horizontal lifts not exceeding six (6) inches in compacted thickness. Suitable material shall be imported material as defined in the above Paragraph V.G.2.b, or material excavated from the levee or foundation which is not judged unsuitable according to Paragraph V.G.2.b. Backfill material used shall have a uniform moisture content within plus or minus 3% optimum. Each layer of material shall be bonded to the next and shall be compacted to not less than 95% of maximum density, as determined by ASTM Designation: D 698, Method A. Backfill outside the levee and berm area, shall approximate that of the surrounding natural ground.

The Sponsor shall repair any settlement in the trench which may occur within one (1) year of completion of the work. Tests to verify moisture content, compaction or soil classification, as may be determined to be necessary by the USIBWC, shall be performed by an independent testing laboratory at the expense of the Sponsor. A USIBWC representative shall designate the times and locations of the tests.

All pipes shall be installed in the dry, and a dewatering system shall be used where necessary.

- e The Sponsor shall restore the surfaces of the levee crown, slopes, and ramps, along with all gravel surfacing disturbed by the excavation with a minimum thickness of six (6) inches of compacted surfacing material. The surfacing shall be compacted to not less than 90% of maximum density, as determined by ASTM Designation: D 698, Method A. Should settlement of the repaired roadway occur within one year following completion of work, Licensee shall rework and relay the road surface, bringing it up to its original grade and structural stability.

Gravel surfacing material shall be uniformly graded and shall conform to the following specifications:

Lower Rio Grande Flood Control Project Only:

Surfacing material shall be composed of caliche (argillaceous limestone, calcareous or calcareous clay particles, with or without stone, conglomerate gravel, sand or granular materials.)

<u>Retained on Square Sieves</u>	<u>Percent Retained</u>
2" (50 mm)	0
½" (12.5 mm)	20-60
No.4 (4.75 mm)	40-75
No. 40 (0.425 mm)	75-85

Max Liquid Limit 40

Max Plasticity Index 12

All other USIBWC Projects:

Surfacing material shall be crushed stone produced from oversized quarried aggregate, sized by crushing and produced from a naturally occurring single source. Crushed gravel or uncrushed gravel shall not be acceptable for this type of material. No blending of sources and/or additive materials will be allowed.

<u>Retained on Square Sieves</u>	<u>Percent Retained</u>
1-3/4" (45 mm)	0
1" (25.4 mm)	0-10
No.4 (4.75 mm)	35-75
No. 40 (0.425 mm)	65-90

Max Liquid Limit 35

Max Plasticity Index, 12

- f. The Sponsor shall install and maintain suitable markers or signs indicating the location of the pipeline where it crosses the levee, pilot channel or river and where the pipeline changes direction within the Project right-of-way where practicable. The markers or signs should be a minimum height of five feet (5') above the ground. No markers are to be installed on the levee slopes or fifteen (15) feet from the toe of the levee.
- g. All pipes on the river side of the levee shall have a minimum of 3 ft of soil cover for protection from heavy equipment.
- h. Leakage from or infiltration into any pipe crossing through or beneath a levee must be prevented. Therefore, the pipe joints as well as the pipe itself must be watertight. For pipes located within or beneath the embankment, the expected settlement and outward movement of the soil mass must be considered. **Corrugated metal pipes will not be allowed to cross USIBWC levees.**
- i. The Sponsor shall be required to install a gateway operation platform at least three (3') feet from the levee crownline. The Sponsor shall be required to install and maintain a galvanized, or equivalent, grid grating over the gateway opening.
- j. HYDRO 50-10 WATER CONTROL GATE or equal shall be used. All anchor bolts in the gateway and the gate stem shall be stainless steel.
- k. Steps shall be installed in accordance with OSHA requirements in the gateway on twelve-inch (12") centers for access.

3. Installing Pipelines by Nearsurface Directional Drilling

a. Pipe Location

For installation under both levees and the river or pilot channel: The proposed pipeline entry or exit location, when located landside of a levee, shall be set back sufficiently from the landside levee toe to ensure that: (a) the pipeline reaches its horizontal level (maximum depth), and/or (b) the pipeline contacts the substratum sands or some other significant horizon but is no less than 300 feet landside from the levee centerline.

For installation under river or pilot channel only: The proposed pipeline entry or exit location, when located on the riverside of the levee, shall be located at least 35 feet from the levee toe.

The Sponsor shall determine the minimum cover under the bed of the river channel and submit plans for review and approval.

b. Drilling Requirements

The Sponsor shall furnish information addressing the following concerns and give specific dimensions, distances, pressures, weights, and all other pertinent data.

The pilot hole cutter head shall not be advanced beyond/ahead of the wash pipe more than a distance such that return flow is lost. Also, the wash pipe ID shall be sufficiently greater than the OD (cutting diameter) of the pilot cutter head such that return flow is enhanced. The applicant shall directly address the methodology which he plans to employ in his efforts to keep the return of flow up the drill hole during his entire operation. These requirements are to assure that blockage of the annular space between the wash pipe and drill pipe and associated pressure build up do not occur.

Drilling fluid (mud) shall be of sufficient viscosity, be of sufficient weight and contain sufficient noncolloidal lubricating admixtures to: (a) assure complete suspension and removal of sands and other "solids" cuttings/materials; and (b) provide adequate lubrication to minimize bridging by cohesive materials.

The fly cutter used in the prereamer run shall have an OD (cutting diameter) sufficiently greater than the OD of the production pipe to assure that the hole diameter remains adequate to minimize hang ups of the production run and thereby, associated stresses on surrounding soils.

The prereamer boring diameter shall be of sufficient size to ensure that the production pipe can be advanced without delay and undue stress to the surrounding soils. The prereamer boring operation shall be a continuous operation for the downslope and up slope cutting sections to prevent undue stress on the surrounding soils during re start operations.

The depth of the pipe under the levee shall be at a level to maintain a minimum factor of safety of 3.0 against uplift from the pressurized drilling fluid during the drilling operation. A positive means of maintaining an open vent to the surface will be required whether through bored holes or downhole means while installing the drill pipe.

Automatic shut off capability in the production pipeline shall be provided to immediately cutoff flow through the pipeline should leakage occur.

Excessive drilling fluid pressures can hydraulically fracture the levee foundation and levee embankment and shall be avoided. Should evidence of sinkholes, depressions, unexpected settlements, drilling fluid or grout manifest themselves on the ground surface or levee during the pipe installation, hydraulic fracturing of the levee foundation should be suspected and repairs to the levee shall be accomplished immediately. The Sponsor is liable for replacing/repairing the damaged levee to the USIBWC's satisfaction. The levee repair includes: degrade the levee embankment, open an inspection trench, excavate the damaged levee foundation, backfill under controlled conditions, and reconstruct the levee by placing and compacting with satisfactory levee construction materials and methods (See Section V.G.2). As example of the damage to levees which occurred on similar projects, the levee was hydraulically fractured and drilling fluid exited on the crown and/or toe of the levee. Repair may include total replacement of the levee and installation of a grout curtain to the depth of the pipe.

4. Reseeding of Levee and Berm Areas

Upon completion of any construction with USIBWC right-of-way, the work site area shall be left in a clean and neat appearing condition with all debris and excess material removed from the site. That portion of the levee and berm area disturbed in the process of constructing a structure shall be re-seeded with "bermuda-type NK-37" or other native sod grasses such as Buffalo Grass. Seeds may be broadcast along with a good commercial grade fertilizer 16-20-0 or 16-8-8. The Sponsor shall water as frequently as necessary for a period of twenty-one (21) days to ensure a germination rate of not less than eighty percent (80%).

5. Headwalls Chutes, Gate Valves, Flap (Automatic) Gates, etc.

The Sponsor shall provide a headwall, chutes, gate valve, flap (automatic) gates, energy dissipaters, and other types of outfall structures in such a manner to prevent obstruction of flow or creation of scouring conditions in the floodway. In addition, the Sponsor shall provide scour protection at the outfall such as riprap. The Sponsor shall design the riprap based upon the issuing jet velocity. Pipelines discharging into a river or pilot channel, shall be required to be aligned 45 degrees toward the flow of water, this will prevent possible erosion to the opposite bank of the river or channel.

**VI PIPELINES CROSSING RIVERS, PILOT CHANNELS OR DRAINAGE DITCHES**

A. Pipelines Crossing Under Rivers

Restrictions must be placed on all construction activities involving temporary water diversions or constrictions placed in the river channel. No constrictions or diversions will be allowed during the flood seasons listed below:

Upper Rio Grande Flood Control Project:	June 1 <sup>st</sup> thru October 15 <sup>th</sup>
Presidio Flood Control Project:	June 1 <sup>st</sup> thru October 15 <sup>th</sup>
Lower Rio Grande Flood Control Project:	June 1 <sup>st</sup> thru October 31 <sup>st</sup>
Tijuana River Flood Control Project:	November 1 <sup>st</sup> thru March 31 <sup>st</sup>

Note: flood conditions may exist before or after the flood season that would require restrictions

During the non-flood seasons (listed in Section V.G.2.a), river constriction or diversion shall not exceed more than 50% of the river channel width at any one time. Any temporary embankments or similar constructions to divert water from a portion of the river channel must be limited to an elevation of one foot lower than the over bank floodway surface. As much work as possible should be performed during the "non-irrigation" season that usually extends from mid-October to mid- January.

The Sponsor shall determine the minimum cover under the bed of the river channel and submit plans for review and approval. The pipeline shall be constructed in a straight alignment for a minimum distance of 15 feet beyond the landside of the levee toe.

The Sponsor will assure that no borrowed material will be left in the floodplain.

The Sponsor will replace to its predisturbed condition rip-rap material along the levee or river bank.

See Section V.G for installation requirements.

**B. Pipelines Crossing Under Pilot Channels or Drainage Ditches**

The pipeline shall be installed with a minimum cover of five feet (5') under the channel side slopes and bed of the pilot channel or drainage ditch. However, the Sponsor shall submit to the USIBWC scour calculations to justify depth See Attachment IV for details.

**C. Pipelines Crossing Over Rivers and Pilot Channels**

Where the pipeline crosses over a river, the pipeline shall be placed on piers (the piers must not obstruct flood flows of the river). See Section VIII for additional requirements that apply to the construction of pipelines crossing over rivers.

The Sponsor shall submit final plans and hydraulic computations to indicate the effects the proposed project would produce on flows and floodway capacity.

Pipes crossing over the Rio Grande and Colorado Rivers shall require a Department of Transportation permit (US Coast Guard). Clearances and requirements shall be directed by the US Coast Guard.

**VII CONSTRUCTION REQUIREMENTS FOR LICENSES**

**A General**

A License or Permit is required from the USIBWC for any proposed activities crossing or encroaching upon the floodplains of USIBWC Flood Control Projects and Right-of-Way. Each License/Permit shall contain different construction requirements, depending on the type and method of construction Therefore, the following requirements shall apply to most USIBWC Licenses:

- The Licensee shall maintain a 24 hour flood emergency service equipment and personnel during construction work on USIBWC right-of-way. The Licensee will be required to take immediate action upon notification by USIBWC to backfilling and compacting all excavated trenches and to reconstruct the levee to its original condition to prevent any flooding. The Licensee will also be required to remove all excess material from the floodplain and levees. The Licensee shall furnish to the USIBWC, the names and telephone numbers of two persons responsible for this emergency service Any damages and cost associated with such, to person(s) or property resulting from the Licensee's failure to conduct the necessary emergency measures, will be the Licensee's responsibility. The following requirements shall be included in all USIBWC Licenses for construction within USIBWC Right-of-Way.
- Upon completion of the construction work, the site of the work shall be restored to a clean and neat appearing condition Restore the areas disturbed by the project to pre-project conditions. All debris and excess materials shall be removed from the site to the satisfaction Of the USIBWC.

- The Licensee shall provide a full-time construction inspector for the duration of the work. The construction inspector shall be responsible for overall construction requirements and must be on-site during all compacted embankment work
- Licensee shall notify the USIBWC at least one week prior to the start of work authorized by each License.

- Protection of Existing Improvements

During construction of work within USIBWC Right-of-Way, care shall be exercised to prevent damage to existing United States facilities. Any facilities damaged as a result of the construction shall be repaired or replaced at the Licensee's expense to the satisfaction of the USIBWC. United States facilities include but are not limited to levee roads and slopes and ramps.

- Safety to the Public

The Licensee shall provide, erect, and maintain all necessary barricades, suitable and sufficient flasher lights, flagmen, danger signals, and signs; and shall take all necessary precautions for the protection of the work and the safety of the public. Roads closed to traffic shall be Protected by effective barricades on which shall be placed acceptable warning and detour signs. All barricades and obstructions shall be illuminated at night by lights kept burning from sunset until sunrise

- Landscape Preservation

The Licensee shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for permanent work, for approved construction roads and for excavation operations, all trees, native shrubbery, and vegetation shall be preserved and shall be protected from damage which may be caused by the Licensee's construction operations and equipment. Movement of crews and equipment within the right-of-way and over routes used for access to the work shall be performed in a manner to prevent damage to United States' facilities.

- Prevention of Water Pollution

The Licensee shall comply with applicable Federal and State laws, orders, and regulations concerning the control and abatement of water pollution.

The Licensee's construction activities shall be performed by methods that will prevent entrance, or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into the river/channel, flowing or dry watercourses, and underground water sources. Such pollutants and wastes include, but are not restricted to refuse, garbage, cement, concrete, sewage effluent, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution. Sanitary wastes shall be disposed of in accordance with State and local laws and ordinances.

Dewatering work for structure foundations or earthwork operations near streams or watercourses shall be conducted in a manner to prevent excessive muddy water and eroded materials from entering the river or watercourses by construction of intercepting ditches, bypass channels, barriers, settling ponds, or by other approved means. Mechanized equipment shall not be unnecessarily operated in flowing water.

- Abatement of Air Pollution

The Licensee shall comply with applicable Federal, State, interstate, and local laws and regulations concerning the prevention and control of air pollution.

In conduct of construction activities and operation of equipment, the Licensee shall utilize such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants. Equipment and vehicles that show excessive emissions shall not be operated until corrective repairs or adjustments are made.

The Licensee's methods of storing and handling cement shall include means of controlling atmospheric discharges of dust.

During the performance of the work required by these specifications or any operations appurtenant thereto, whether on right-of-way provided by the United States or elsewhere, the Licensee shall furnish all of the labor, equipment, materials, and means required, and shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust which has originated from his operations from damaging crops, lands, and dwellings, or causing a nuisance to persons. The Licensee will be held liable for any damage resulting from dust originating from his operations under these specifications on United States right-of-way or elsewhere.

- Temporary Erosion Control

Erosion and sedimentation control devices shall be constructed or installed as needed based upon site conditions during construction activities. These preventive measures are required to minimize the potential for soil erosion or sedimentation of streams and rivers and to restore the construction site.

Erosion control techniques maybe vegetative or physical. The vegetative techniques includes reseeding with native grasses as stated in Section V.G.4. The physical structure techniques include sediment barriers such as hay bale berms or silt fences.

## **VIII BRIDGE CROSSING OF FLOODWAYS AND RIVERS**

### **A. General**

The Sponsor shall submit final plans and hydraulic computations to indicate the effects the proposed project would impact on flows and floodway capacity. The plans shall include cross and transverse section drawings covering the floodplain bound by levees or high ground in both the

United States and Mexico and reasonable distances up and downstream of the proposed structure. The drawings should have sufficient detail on existing vegetation, roads and structures along with proposed improvements in to overbanks such as paved roads and ramps.

B. International Bridges

1. General

Pursuant to the International Bridge Act of 1972 (P.L.92A34, 86 States731, approved September 26, 1972) and Executive Order 11423, the U.S. bridge sponsor must acquire a Presidential Permit through the Department of State authorizing the construction, operation and maintenance of the international bridge.

After issuance of Presidential Permit, the bridge Sponsor must apply to the Department of Transportation (U.S. Coast Guard) for issuance of a bridge permit to construct a bridge crossing over a navigable waterway. The USIBWC and MXIBWC must approve the bridge conceptual plans prior to U.S. Coast Guard action on the application.

Approval of any proposed structure to be constructed within an international river floodplain will be required from the USIBWC to assure compliance with provisions of Article IV, B of the 1970 Boundary Treaty. At the present time, the U.S. and Mexican Sections have informal agreements to use criterion or design flood flow data requiring two meters of freeboard between the lowest bridge chord and the design water surface elevation to help facilitate approval of bridge structure and to minimize effects which would be in contravention to Article IV, B of the 1970 Boundary Treaty.

The bridge designers or owners will seek design coordination and assistance from the U.S. and Mexican Sections, USIBWC by forwarding their request through the appropriate sponsoring authority in each country.

2. Items to Review

- a. The bridge structure must be designed to pass the project design or criterion flood (although there is no official flow policy, the two sections use informal agreements) at the bridge site without causing an obstruction to normal or flood flows. No significant increase in water surface elevation is allowed, and the proposed structure may not deflect the normal or flood flow to one bank or the other.
- b. A minimum clearance of 6.6 feet (two meters) must be provided between the bottom of the lowest bridge chord (usually at abutments) and the design water surface for the project design or criterion flood at the bridge site. This freeboard provides extra capacity for passage of debris, wave buildup and uncertainties in the hydraulic analysis (i.e. variable conditions of an alluvial river).
- c. For bridges crossing over levees, a minimum vertical clearance of 14.5 feet (4.42 meters) shall be provided above the levee crown to allow for the safe passage of heavy equipment.

- d. Pier bents are to be aligned with the direction of the river flow to prevent the least obstructive area to the flood flows and floating debris. Piers will be sufficiently founded to preclude scour failure.
- e. Provisions must be incorporated into the bridge design for installation of an international boundary monument(s) over the centerline of the normal flow channel. The Commission will provide the exact location for the monument(s) In addition, demarcation of the international boundary shall be provided on the road surface. The criteria for demarcation shall be provided by the USIBWC.
- f. Generally, earth fills or approach roadway embankments within the floodplain should be kept to a minimum and not allowed to increase the water surface elevations upstream of the proposed bridge.
- g. For parallel bridge crossings, new bents and piers will be placed adjacent to each other and in alignment with the river flows with the understanding that the number of bents and piers can be decreased in favor of longer spans. In other words, the number of bents and piers in a new bridge are to be decreased to the extent that is practical; however, the new bridge piers are to conform to location of existing bents of parallel bridge.
- h. Approval must be received from the IBWC prior to commencement of bridge construction or any structure within the floodplain of the international reaches of the Rio Grande and Colorado River.
- i. The integrity of the levee systems must he maintained during (and after)-bridge construction. Provisions should be made to assure that construction does not impede the ability of the project to convey the project design or criterion flood.
- j. The Sponsor(s) shall submit hydraulic studies to assure compliance with items above. This includes a scour analysis using Federal and Highway standards.

C. Bridges within Texas and New Mexico (Rio Grande Canalization Project)

1. General and Construction Requirements

- a. Restrictions must be placed on all construction activities involving temporary water diversions or constrictions placed in the river channel No constrictions or diversions will be allowed within the river channel during the flood season As a general rule, flooding should be anticipated during June, July, August, and September. Additionally, there may be some risk of flooding in May and October for some years that must be evaluated on a case by case basis with due consideration of river conditions in that year. During non-risk months, river constrictions or diversions shall not exceed 50% of the river channel width at any time Any temporary embankments or similar constructions to divert water from a portion of the river channel must be limited to an elevation of one foot lower than the overbank floodway surface. Additionally, as much construction work as possible should be performed during the "non-irrigation" season that usually extends from mid-October to mid-January.

- b. Contractor's program of work shall be such as to have the minimum impact on river flows. The program should be submitted to the USIBWC for review and approval before initiating work.
- c. River flow diversions for construction of any one pier or placement of beams should be restricted to a period not to exceed 45 days.
- d. The river channel, river banks, floodplains, and levees must be restored to their original condition promptly in the event of unexpected high river flows and prior to the next flood season which ever occurs first.
- e. For bridges crossing over levees, a minimum vertical clearance of 14.5 feet (4.42 meters) must be provided above the levee crown to allow for the safe passage of heavy equipment.
- f. The bridge's Sponsor will be responsible for coordinating construction activities with the USIBWC Project Manager.
- g. The Sponsor will be required to submit a schedule of construction to the local USIBWC Field Office Project Manager for approval.
- h. The Sponsor will be responsible for obtaining other permits as may be required (i.e. 404 permits, etc.) for the subject work and for complying with restrictions of the same.

2. Items to Review

- a. Old bridge piers must be removed to an elevation two feet below the invert of the channel and to 12 inches below ground level in the floodplain, as a minimum.
- b. The Sponsor must submit scour calculation analysis to assure the depth of the bridge foundation is adequate. This information is requested to assure the sponsor has taken scour into account in the design.
- c. The bottom chord of the bridge will be no lower than the elevation at centerline of the levee(s) in the vicinity of the proposed bridge site.
- d. For replacement of an existing bridge, the proposed bridge length will be no shorter than that of the existing bridge. Additionally, the USIBWC may require longer bridges than the existing bridges if hydraulic analysis show this is necessary.
- e. The bridge structure will be designed to pass the project design flood at the bridge site without causing an obstruction to normal or flood flows, without significantly increasing the flood stage, and without deflecting the normal or flood flow to one bank or the other.

- f. Piers and bents are to be aligned with river flow in order to present the least obstruction area to the path of flood waters and floating debris Piers must be sufficiently founded to preclude scour failure.
- g. For parallel bridge crossings, piers and bents will be placed adjacent to each other and in alignment with the river flow, however, piers and bents shall be spaced to the maximum distance as practical (ie. the new bridge can have fewer bents and piers than the nearby existing bridge).
- h. Approval must be received from the USIBWC prior to commencement of construction of any structure within the .floodplain.
- i. The integrity of the levee system must be maintained Provisions should be made to assure that construction does not impede the ability of the project to convey the project design flood.
- j. Stockpiling of materials within the floodway is not permitted.
- k. The Sponsor must submit hydraulic studies to assure compliance with items above.

## **IX NATURAL GAS DRILLING WITHIN THE RIO GRANDE FLOODPLAIN**

The following requirements shall be enforced for all vertical drilling within the Rio Grande floodplain:

- All drilling and completion operations shall be performed in accordance with the rules and regulations of the Texas Railroad Commission (TRC) and the Bureau of Land Management (BLM). A permit shall be required from the TRC and a lease from the BLM.
- Prior to completion, the casing and wellhead shall be pressure tested to maximum allowable operating pressure to insure complete control in case of future leaks/equipment failure.
- No separators or tanks of any type shall be permitted in the floodplain Such facilities shall be located on the landside of the levees or outside of the 100-yr floodplain when the well is completed and in service. All facilities constructed within the floodplain shall project over the natural ground no more than three feet (3').
- The Sponsor shall install and maintain suitable markers or signs indicating the location of the well site within the USIBWC right-of-way. The markers or signs shall be a minimum height of five (5') feet above the ground No markers are to be installed on the levee slopes or fifteen (15) feet from the toe of the levee.
- The USIBWC shall notify Mexico of the proposed operations in accordance with Section XVII.

- If the drill site is located within USIBWC Right-of-Way, a permit to perform the work and maintenance of the site will be required.

## **X FENCES**

Fences within the floodplain of a river or floodway channel are not recommended where avoidable. During high flood stages, floating debris may pile up on a fence line and consequently raise flood stages. However, the installation of chain link fences may be allowed if they are designed to collapse during high flood stages or if they can be removed within a twenty-four hour period. In addition, four strand barbed wire fencing is authorized with posts no larger than four (4") inches in diameter, spaced no closer than twelve (12) feet apart and the wire shall be attached to the downstream side of the posts. The sponsor shall submit plans and design calculations to assure compliance with the above criteria.

No fencing shall be placed on the levee slopes or roadway that is running parallel to the levee itself. All fencing placed parallel to the levee shall be a minimum distance of fifteen (15) feet from the toe of the levee. No fencing shall be placed inside or across a pilot channel.

## **XI GATES**

Gates on the levee roads will be allowed once reviewed and approved by the USIBWC. They are not to interfere with the construction operation, and/or maintenance of the USIBWC flood control project work. All gates shall have a minimum clear opening of sixteen (16) feet and will be such that they can easily be opened or closed by one individual. Suitable markers and reflectors shall be placed on the gate so as to be readily visible at night. All gates shall be located a sufficient distance back from any off-ramp or roadway to permit a vehicle to park on level ground while opening and closing the gate. The exact location and type of gate shall be reviewed and approved by the USIBWC prior to installation.

## **XII RAMPS**

Ramps on the riverside of the levee will be allowed when a new bridge is constructed across a river or channel. These ramps are used for the purpose of crossing under the bridge. Ramps for other purposes shall be avoided and will be approved only if they are essential. The actual location of the ramps shall be reviewed and approved by the USIBWC prior to any construction.

All ramps shall have a minimum width of 20 feet (20'). Some widening of the crown of the levee at its juncture with the ramp may be required to provide adequate turning radius. The grade of the ramp should be no steeper than 12 percent. Side slopes on the ramp should not be less than IV on 3H to allow mowing equipment to operate. The fill material shall meet the requirements of Section V.G.2.b and compacted in accordance with Section V.G.2.d. The ramp shall be surfaced in accordance with Section V.G.2.e. See Attachment V, for details.

### **XIII ELECTRICAL AND TELEPHONE CRITERIA FOR OVERHEAD WIRE CROSSING**

The overhead transmission line shall be constructed and maintained in such a manner as to provide a minimum vertical clearance (at the temperature of 60 degrees Fahrenheit) of not less than 28 feet above the levee crown and at least 12 feet (3.7 meters) above the floodway design high water surface level in the area of the floodway channel.

No structure (poles or guy wires) shall be located closer than 35 feet from the toes of any levee. No structure (poles or otherwise) shall be located closer than 15 feet from the top of any channel bank.

Guy wires may be anchored within the USIBWC right-of-way in such a manner that they do not interfere with the operation and/or maintenance of the channel levees, or related structures. A witness post, not less than five feet (5') above the ground, shall be installed by each anchor or the cable shall be wrapped up to a point at least five feet (5') above the ground with a bright colored material to make it obviously visible.

It shall be the Sponsor's responsibility to maintain the areas clear of brush within a ten foot (10') radius of each pole, under the guy wires and around the anchors, on both sides of the levee and within the USIBWC right-of-way limits.

### **XIV LOW DAMS OR DIVERSIONS OF FLOWS**

The Sponsor shall submit plans, hydraulic and structural computations and specifications for low dams or other obstructions for review and comments prior to the construction of any type dam structure in a floodway area. These plans will be reviewed to determine if adverse hydraulic or structural effects would occur within the floodway as a result of the proposed construction. Prior to an extensive engineering study for any type of water barrier in a floodway, the concept plan, proposed location, and purpose shall be reviewed by the USIBWC and MXIBWC (international projects).

Further, the Sponsor(s) are responsible for obtaining the proper water rights permits from the Texas National Resource Conservation Commission, Water Master before providing diversions structure plans to the USIBWC. Additional permits mentioned in Section IV must also be obtained.

Should such diversions be permissible, the Sponsor of the facilities shall install at his expense, the measuring devices that the USIBWC considers necessary to carry out treaty-required water measurements and water accounting.

### **XV CONSTRUCTION OF RECREATION FACILITIES**

The Sponsor shall submit plans to USIBWC for review and approval on any proposed recreation type facilities to be constructed in an existing or approved floodway area. Each plan including hydraulic computations will be reviewed for individual and cumulative effects to determine if the proposed construction would produce adverse effects on an existing or approved floodway area.

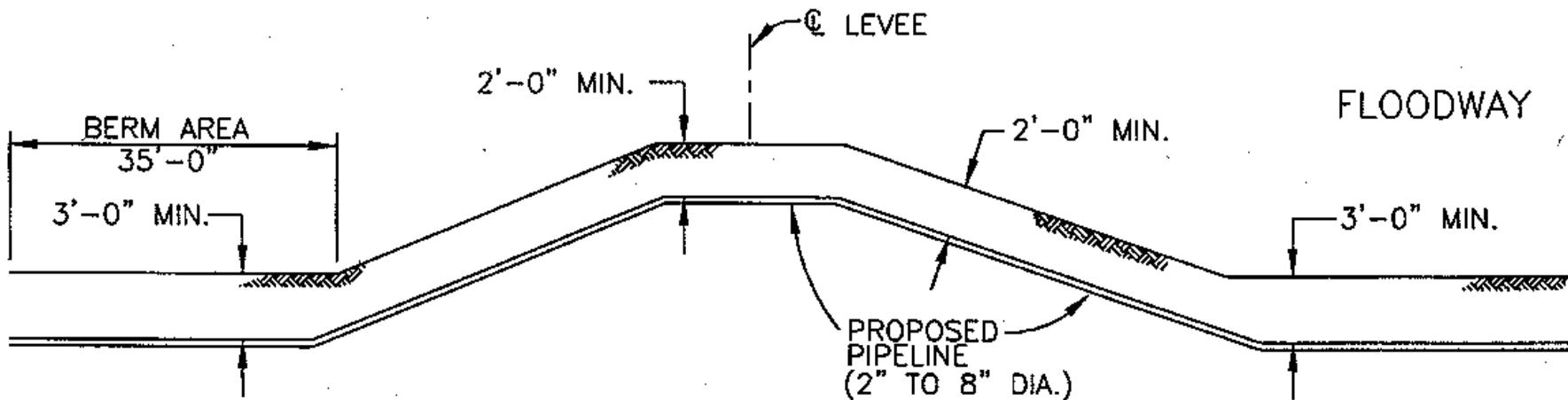
## **XVI PLANTING OF TREES**

Planting of trees in existing floodways is not encouraged and shall be permitted only where levee freeboard is available to permit an increase in water surface elevation. Only trees with deep-type root systems may be planted in selected areas of existing or approved floodways. The planting shall be a minimum of 50 feet from the toe of the levee or the top of the channel bank unless otherwise directed by the IBWC. Trees shall be planted at an average spacing of 100 feet, center to center. Appropriate protection against rodents or beavers shall be provided and each tree location shall be identified to prevent damage while mowing operations are conducted. Trees shall be pruned by the Sponsor to allow mowing with tractor type mowers. No bush or vine plants will be permitted.

The Sponsor shall submit a coordinated planting plan with hydraulic computations for review and approval

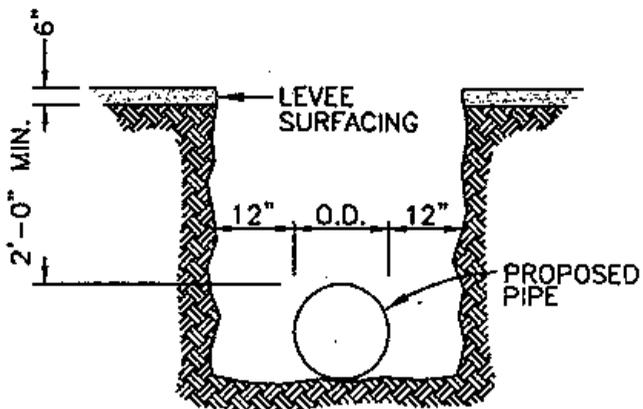
## **XVII COORDINATION WITH MEXICO**

The USIBWC is required by the 1970 Boundary Treaty (23 UST 371) between the United States and Mexico, to join the Mexican Section of the IBWC in approving any activities within the channel of the Rio Grande and Colorado River or their design flood floodplains to assure that their construction will not cause deflection or obstruction of the normal or flood flows of these international boundary rivers. Further, the IBWC under provisions of the 1944 Water Treaty (59 Stat 1219) between the United States and Mexico, must be assured that the construction will not result in an international water quality problem and that the activities will not interfere with the operation of WC Flood Control Projects. Statutory authority of the USIBWC for carrying out actions in the United States is provided in 22 U.S.C. 277 a-d.



TYPICAL PIPELINE LEVEE CROSSING DETAIL

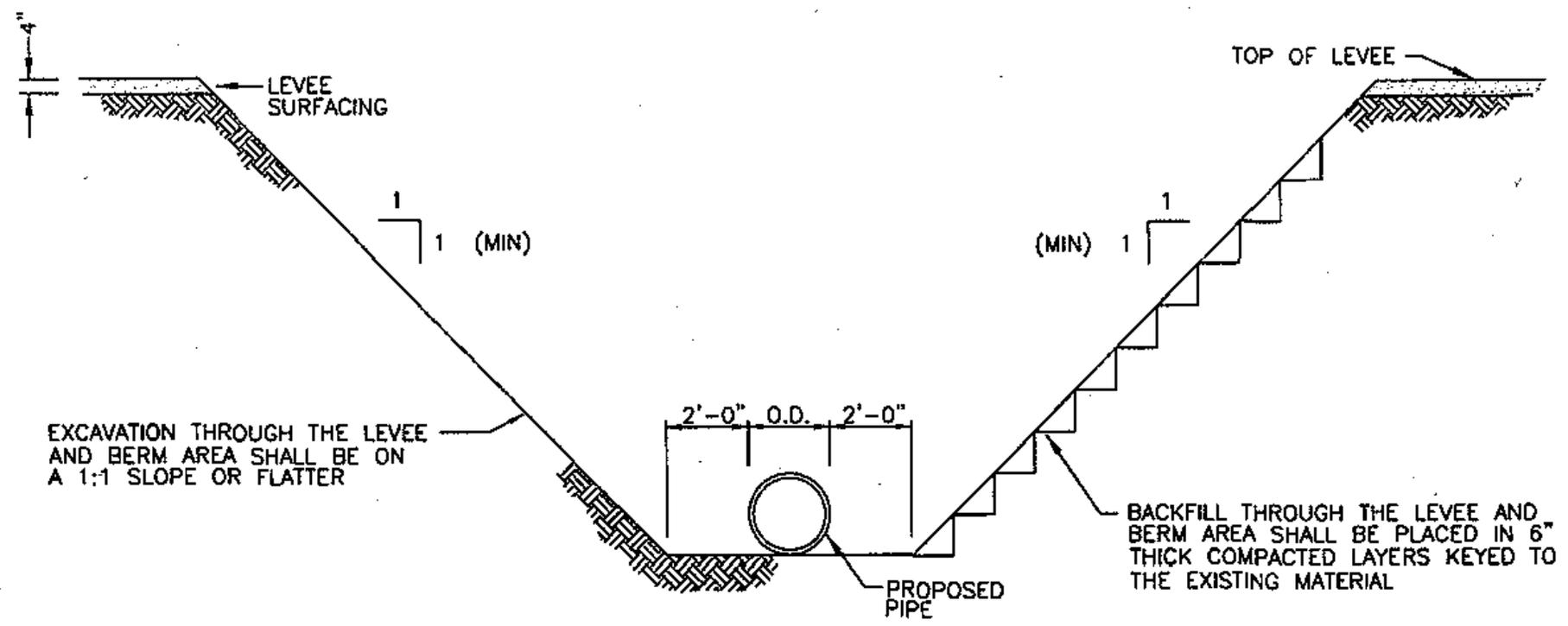
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TYPICAL EXCAVATION SECTION

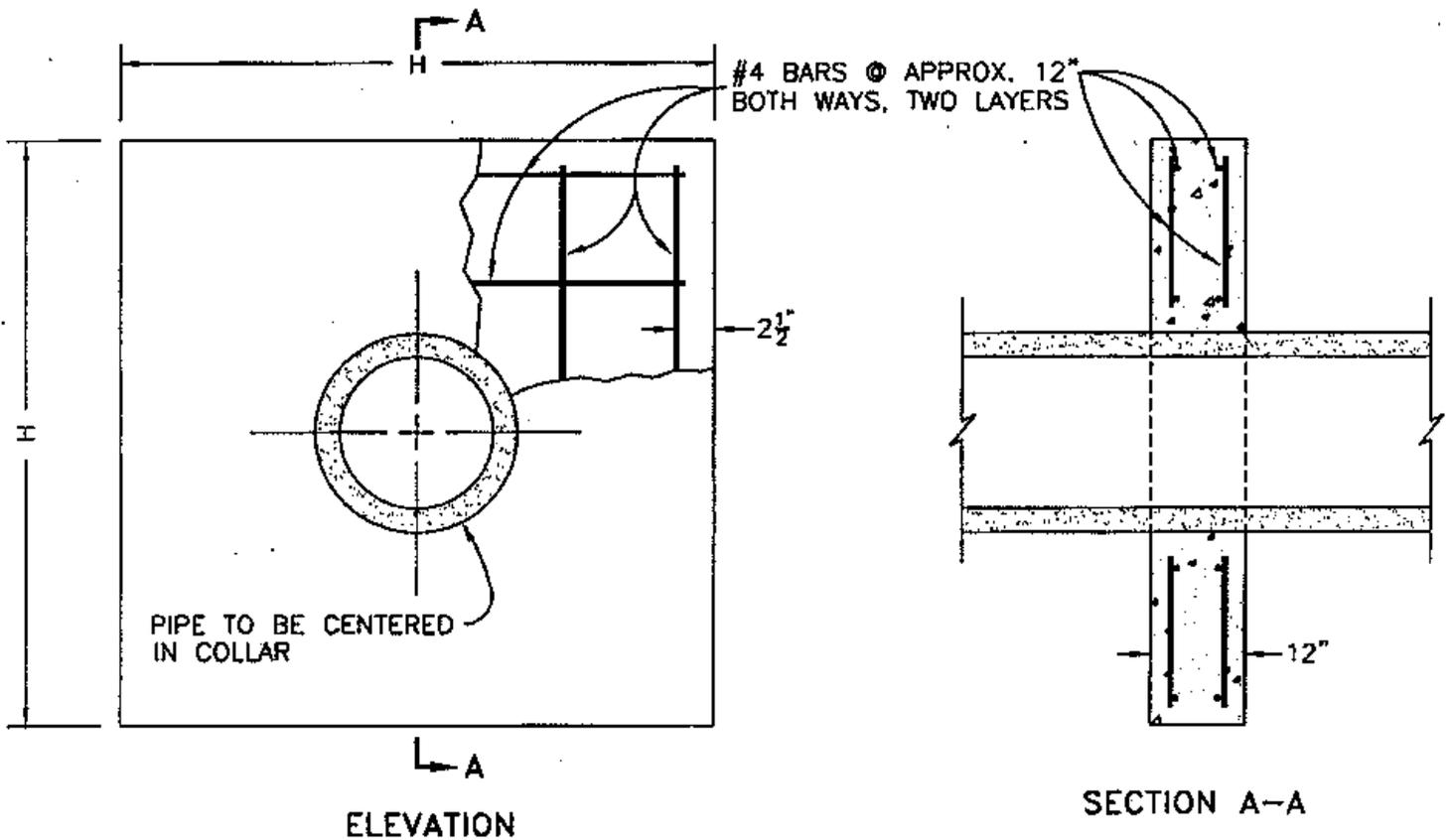
N.T.S.

REV.	DESCRIPTION	RECOM'D. BY	DATE
INTERNATIONAL BOUNDARY AND WATER COMMISSION UNITED STATES AND MEXICO UNITED STATES SECTION  PIPELINES CROSSING LEVEES 2" TO 8" DIAMETER PIPES DETAILS			
DRAWN C.B.		RECOMMENDED	
CHECKED R.P.		APPROVED C.M.	
1 OF 1	EL PASO, TEXAS	JANUARY 1999	24953



**TYPICAL EXCAVATION SECTION**  
N.T.S.

REV.	DESCRIPTION	RECOM'D. BY	DATE
<b>INTERNATIONAL BOUNDARY AND WATER COMMISSION</b> <b>UNITED STATES AND MEXICO</b> <b>UNITED STATES SECTION</b>			
<b>EXCAVATION THROUGH LEVEES</b> <b>OPEN CUT METHOD</b> <b>(10" DIAMETER PIPES &amp; LARGER)</b>			
DRAWN	C.B.	RECOMMENDED	
CHECKED	R.P.	APPROVED	C.M.
1 OF 1	EL PASO, TEXAS	JULY 1998	25083



**PIPE COLLAR FOR PRECAST CONCRETE PIPE**

N.T.S.

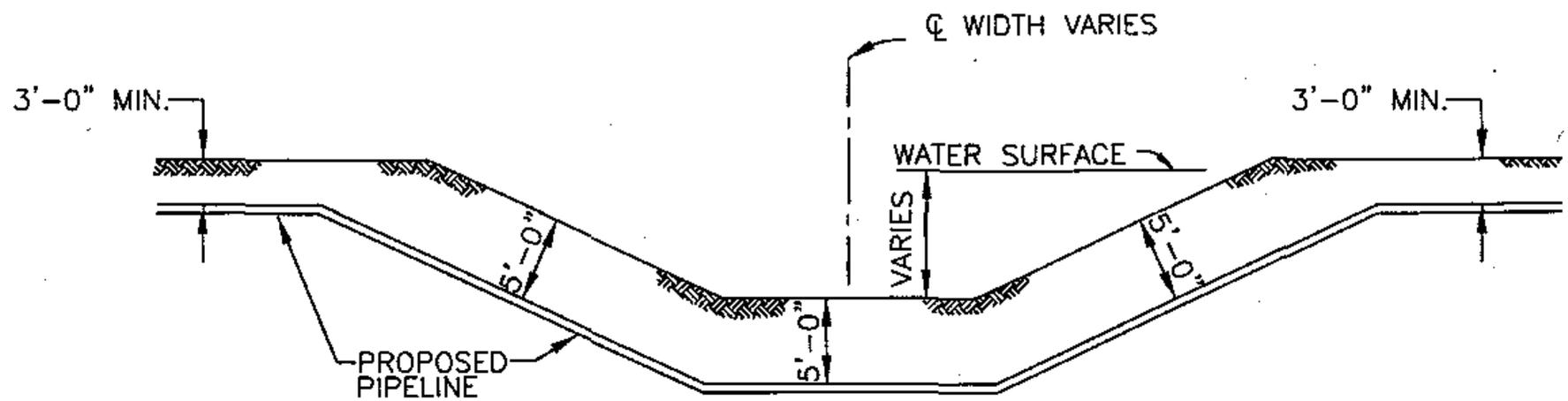
**DIMENSIONS**

PIPE DIA.	H
10"	4'-0"
12"	4'-3"
15"	4'-6"
18"	5'-0"
21"	5'-3"
24"	5'-6"
27"	6'-3"
30"	7'-0"
36"	8'-6"
42"	9'-3"
48"	10'-0"
54"	11'-6"
60"	12'-0"
72"	14'-0"

**NOTES:**

1. CONCRETE CUT-OFF COLLAR(S) SHALL BE INSTALLED ON THE LEVEE CENTERLINE. THE COLLAR SHALL HAVE A MINIMUM THICKNESS OF TWELVE (12") INCHES.
2. THE NUMBER OF COLLARS SHALL BE DETERMINED BY SPONSOR AND SUPPORTED BY CALCULATIONS.
3. FORMS FOR CUT-OFF COLLAR SHALL REMAIN IN PLACE FOR FOUR (4) DAYS.
4. COMPACTION AROUND CUT-OFF COLLAR SHALL BE PERFORMED USING MANUAL EQUIPMENT TO AVOID DAMAGING THE COLLAR.
5. CONCRETE STRENGTH SHALL NOT BE LESS THAN 3,000 psi.

REV.	DESCRIPTION	RECOMM'D. BY	DATE
<b>INTERNATIONAL BOUNDARY AND WATER COMMISSION</b> UNITED STATES AND MEXICO UNITED STATES SECTION			
<b>PIPE COLLAR</b> <b>DETAILS</b>			
DRAWN	C.B.	RECOMMENDED	
CHECKED	R.P.	APPROVED	C.W.
EL PASO, TEXAS			DECEMBER 1995
			24954



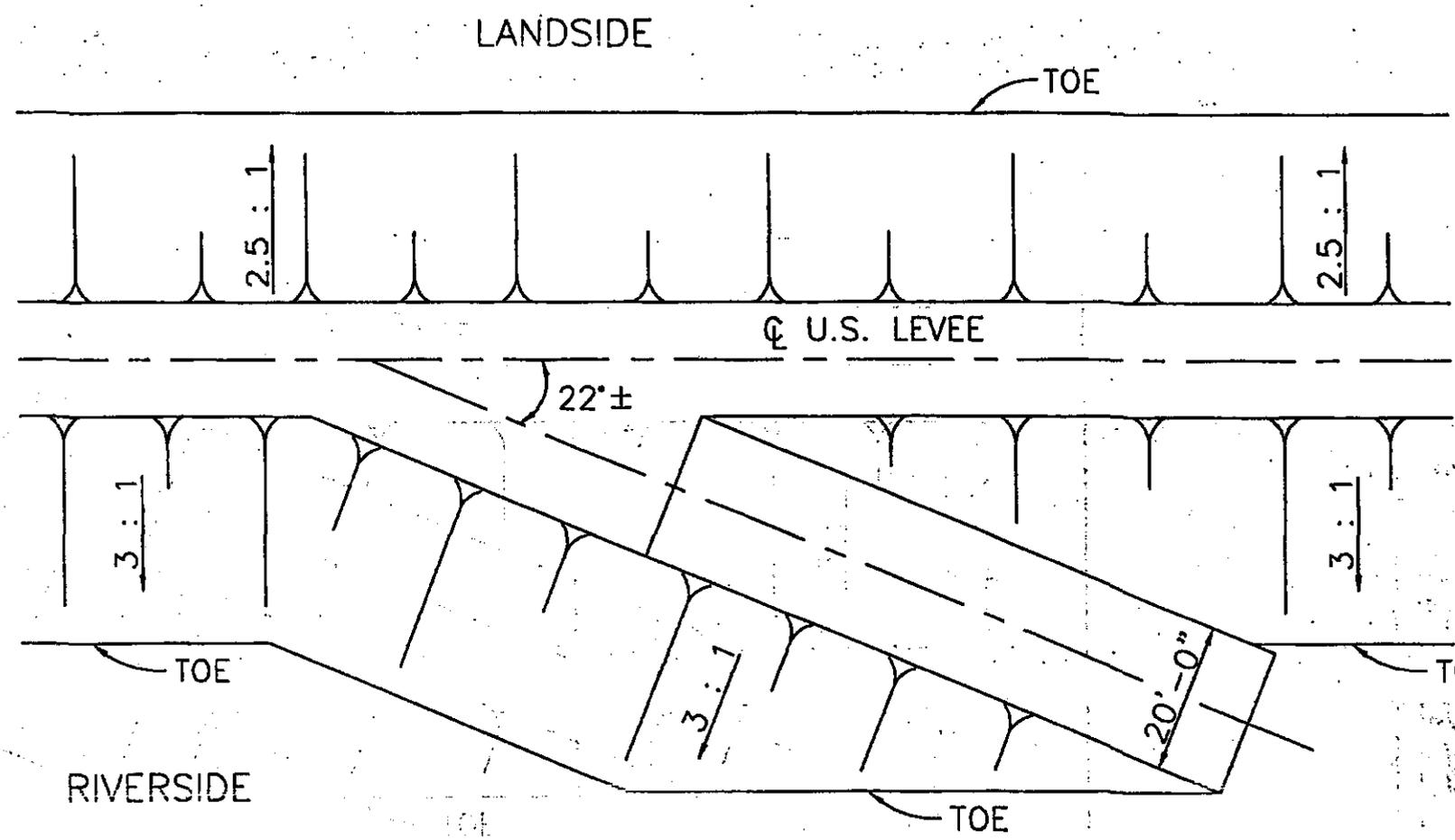
TYPICAL PIPELINE CROSSING DETAIL

N.T.S.

NOTES:

1. THE SPONSOR SHALL SUBMIT SCOUR CALCULATIONS TO JUSTIFY DEPTH.

REV.	DESCRIPTION	RECOM'D. BY	DATE
INTERNATIONAL BOUNDARY AND WATER COMMISSION UNITED STATES AND MEXICO UNITED STATES SECTION			
PILOT CHANNEL & DRAINAGE DITCH PIPELINE CROSSING DETAILS			
DRAWN	C.B.	RECOMMENDED	
CHECKED	R.P.	APPROVED	C.M.
1 OF 1	EL PASO, TEXAS	JULY 1998	25016



LEVEE RAMP  
N.T.S.

REV.	DESCRIPTION	RECOMM'D. BY	DATE
INTERNATIONAL BOUNDARY AND WATER COMMISSION UNITED STATES AND MEXICO UNITED STATES SECTION			
LEVEE RAMP DETAILS			
DRAWN	C.B.	RECOMMENDED	
CHECKED	R.P.	APPROVED	C.M.
1 OF 1	EL PASO, TEXAS	JULY 1998	25084