



**LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS**

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

**GUIDELINES
FOR
CONNECTION PERMITS**

LAND DEVELOPMENT DIVISION

REVISED JUNE 2018

I. GENERAL NOTES:

- A. Before submitting for a permit, make sure the system you are connecting to is maintained by the Los Angeles County Flood Control District (LACFCD).
- B. Additional comments or requirements may be applicable and not covered in these guidelines based on your proposal.
- C. Re-stamped and signed copies of the Department's "As-built" or final construction plans that have been altered for additional drainage connections are not acceptable for LACFCD permit purposes.
- D. Plans that are required to be reviewed by other divisions of the Department of Public Works and/or the U.S. Army Corps of Engineers will be coordinated by this Section, unless otherwise established by the Engineer processing your connection permit application. Please do not contact other divisions directly.
- E. For projects within a City of jurisdiction, the City is responsible for the review and approval of the hydrology study, onsite drainage and water quality improvements related to Low Impact Development (LID) requirements.
- F. For projects within the Unincorporated County area, review and approval of the corresponding hydrology study, onsite drainage and water quality improvements for LID requirements must be obtained through a separate review process from either our Building and Safety Division or Land Development Division – Drainage Section.

II. PERMIT APPLICATION REQUIREMENTS:

To process a request for a permit to connect to a Los Angeles County Flood Control District (LACFCD) facility, the following shall be submitted:

- A. An electronic "Flood Construction" Permit Application at <https://epicla.lacounty.gov> at least four (4) weeks prior to your desired start-up construction date, assuming we receive a complete and accurate permit application and supporting documentation package. You must be a registered User to submit a permit application. If you need additional assistance, you may contact Land Development Division – Permits Section (Flood) Public Counter at (626) 458-4921.
- B. Plan checking and inspection fees. To be assessed by the assigned permit Engineer after the initial completeness check upon permit application submittal.
- C. Construction/Engineering plans (pdf).
- D. As-built plans with the sketch of the correct location for the proposed connection (pdf).
- E. WSPG Input and Output files (pdf).
- F. Allowable discharge flow rate (Q_{ALLOW}) and hydraulic Grade Line (HGL) – (pdf).
- G. Contractor's license information and insurance documents including the endorsement that names the County as additional insured (pdf).
- H. For non-storm water discharges, upload a copy of the NPDES permit from the California Regional Water Quality Control Board (pdf).

III. ENGINEERING PLANS SHALL SHOW THE FOLLOWING INFORMATION:

- A. A vicinity map. Show the "North" arrow, scale(s) used, and elevations on the profile view(s).
- B. Plan sheets should be wet stamped and signed by a professional Civil/Structural Engineer licensed to practice in California.
- C. On both the plan and profile views, show the exterior and interior outlines of the existing LACFCD storm drain and/or channel in dashed lines and label the storm drain with the complete LACFCD or the Army Corps of Engineers name. E.g., "Existing LACFCD 48" RCP, Project No. ____, Line ____". Also, include the Right of Ways in dashed lines and label.
- D. On the plan and profile views, show the centerline of the existing LACFCD facility in "centerline-style" dashed lines. On the plan view, include stationing tick marks and label the stations along the centerline of the existing LACFCD facility. Also, indicate the LACFCD Stations at all points of work that affect LACFCD facilities. **NOTE: Midline connections to connector pipes are not allowed.**
- E. Show and label the property boundary and LACFCD right-of-way lines (fee and easement).
- F. Plans stamped "preliminary" or "not for construction" etc. are not acceptable for permit issuance.
- G. Show plan (See Attached – Sample Connection Plan), profile, details, and dimensions for all proposed connections.
- H. Label the station of the proposed line at the connection (centerline intersection). Show the D-load for reinforced concrete pipe (RCP). For smaller connections (D<12") use HDPE 35 R minimum or polyvinyl chloride pipe (PVC) of Schedule-80 minimum strength. Asphalt concrete pipe (ACP) and corrugated metal pipe (CMP) are not acceptable as connections to LACFCD facilities.
- I. Label across the profile view who will be maintaining the proposed connection: LACFCD or Owner.
- J. Call out the applicable Standard Plans for Public Works Construction (SPPWC, latest edition) Standard Plan(s) (specify applicable variables, A, B, C, etc.) or the US Army Corps Standard Drawings and Junction Structure for all proposed connections. If not per Standard, show details and cross sections of the proposed connection (allow additional time for review).
- K. Show a profile view with the following items:
 - 1. Show the connection to the nearest drainage structure (i.e. grate inlet, catch basin, etc.) related to the proposal.
 - 2. Label " $Q_{\text{allowable}} = \text{___ cfs}$ " across the top of the profile view.
 - 3. Velocity "v" in fps at the point of connection.
 - 4. Label the maintenance responsibility across the top of the profile view .
 - 5. Show the HGL along the proposed connecting system.
 - 6. Slope along the proposed connection pipe.
 - 7. Show the elevation at the top of the grate or inlet.
 - 8. Label the pipe size, length, material and strength across the bottom of the profile view.
 - 9. Label the dimensions of the LACFCD facility at the point of the proposed connection.
 - 10. Show invert elevation of the mainline/channel and of the proposed pipe at the point of connection. If the survey invert elevation of the LACFCD facility at the proposed point of

connection is inconsistent with the “as-built” plans. Provide both the as-built and survey invert elevations.

- L. Show a profile of the proposed line with the following items if it is to be maintained by LACFCD:
1. Slope along the grade line (minimum 1.0% for connector pipes)
 2. Size of pipe (minimum 18" for connector pipe and a minimum 24" for laterals and mainlines)
 3. Use reinforced concrete pipe (RCP) and show the D-load

NOTE: Remember to research utilities, verify utility location, and design accordingly (pothole if necessary). Show all utilities affecting your design on the plan and profile view.

- M. Common types of connections and their requirements:

1. **DIRECT CONNECTION TO MAINLINE:**

- a. Show the invert elevation of the mainline and of the proposed line at the point of connection. Also, show the elevation of the top of grate inlet on-site.
- b. Show the slope along the proposed connector pipe.
- c. Connection shall be done radially.
- d. Show the existing hydraulic grade line (HGL) of the mainline.
- e. Include the “Concrete Removal Notes” (See Exhibit A).

2. **CONNECTION TO BACK OR SIDE OF CATCH BASIN:**

- a. The point of discharge shall not be on the steps of the catch basin.
- b. Only one connection for a catch basin is allowed.
- c. The entrance angle of the connection should be at 90 degrees.
- d. The invert elevation of the connection at the catch basin should exactly 6 inches above the floor of the catch basin.
- e. Connections larger than 12-inches are not allowed.
- f. Label the invert elevation of the catch basin, of the proposed line at the point of connection, and of the top of curb at the catch basin.
- g. Label the elevation of the invert and the elevation of the top of the grate inlet on-site.
- h. Include the “Concrete Removal Notes”, (See Exhibit A).

3. **DIRECT CONNECTION TO A CHANNEL**

- a. If the channel was constructed by the U.S. Army Corps of Engineers, the type of connection shall be per a Corps of Engineers Standard Junction Structure drawings with construction details (See Exhibit C).

- b. Show the profile of the proposed connection including the elevations at the top of channel, at the invert of the channel, and at the invert of the proposed line.
- c. A flap gate will be required, but not limited to, when the elevation of the top of the proposed inlet is below the water surface elevation of the channel to avoid back flow along the proposed connection. Use automatic flap gate inlet per LACDPW Std. Plan 3061-2.
- d. The Angle of Entry of the proposed connection shall meet Corps criteria.
- e. The invert of the connection to the channel shall be a minimum of 1-foot above the invert of the channel.
- f. The soffit of the connection should be at a minimum 4-feet below the design water surface elevation in the channel as established by the approved hydrology study unless otherwise approved by the District Engineer.
- g. Include the "Concrete Removal Notes", (See Exhibit A).

4. CATCH BASIN RELOCATION REQUIREMENTS

- a. Minimum 1% slope for proposed connector pipe.
- b. Call out the size, length and D-load of the proposed connector pipe.
- c. The horizontal alignment of connector pipes shall contain no angle points or bends.
- d. Abandonment of the connector pipes is not allowed. Call out the removal of the catch basin and connector pipe.
- e. If a different size (W or V-depth) or type of catch basin or a different local depression is used, submit calculations to show the capacity of the proposed catch basin will meet the original design requirements. If an identical catch basin and local depression are used, **hydrology and hydraulic calculations are not required**. Show reference to all appropriate SPPWC Std. Plans (i.e., curb opening C.B. per SPPWC 300-2 and local depression at C.B. per SPPWC 313-2).
- f. Indicate the type of local depression and "H" value on the plans for proposed catch basins. Be sure to dimension according to the latest edition of SPPWC Standard Plan 313. "H" should be 2 inches.
- g. For catch basins located at corners of intersections, submit a plan that shows the elevations of the top of curb and flow lines at Beginning of Curb (BC) and End of Curb (EC) and mid-point of curb return, and 5' beyond on both sides.

NOTE: If an existing catch basin is located at a low point (i.e. sump condition) and proposed relocation of catch basin is to be upstream of the low point, ponding of nuisance water will **not** be allowed at the low point where the existing catch basin is removed.

IV. HYDROLOGY AND HYDRAULIC DATA

An allowable discharge flow rate (Q_{Allow}) and hydraulic grade line data (HGL) for the affected system shall be obtained from the LACDPW Design Division by emailing designinfo@dpw.lacounty.gov.

V. HYDROLOGY AND HYDRAULIC CALCULATIONS:

- A. Onsite drainage and water quality reports and proposed improvements shall be reviewed and approved by the local jurisdiction. For projects within the Unincorporated County, an approved hydrology and LID report is required. Approval of the hydrology and LID reports will be processed by either LACDPW Building and Safety Division (Drainage Section) or Land Development Division (Drainage Section). Separate fees and additional review time will be required by the appropriate reviewing Division.
- B. Size the proposed connection based on the allowable discharge flow rate (Q_{Allow}). Submit a WSPG hydraulic analysis, including the input and output data, based on the mainline hydraulic control elevation to demonstrate the limited allowable discharge flow rate. To limit the discharge, size the connection to ensure the HGL at the lowest proposed inlet is less than 1' below the finished surface.

VI. NON-STORM WATER DISCHARGES

For non-storm water discharges, submit a copy of the NPDES permit from the California Regional Water Quality Control Board, which can be contacted at (213) 576-6600 or 320 West 4th Street, Suite 200; Los Angeles, CA 90013.

EXHIBIT "A"

CONCRETE REMOVAL NOTES

WHERE REINFORCEMENT IS REQUIRED TO EXTEND THROUGH THE NEW JOINT, CONCRETE SHALL BE REMOVED IN THE FOLLOWING SEQUENCE.

1. A SAWCUT SHALL BE MADE ONE AND ONE-HALF INCHES DEEP AT THE REMOVAL LIMITS. CARE SHALL BE EXERCISED IN SAWING AT THE REMOVAL LIMITS SO AS NOT TO CUT THE REINFORCING STEEL IN THE REMAINING SLAB. THE EXISTING REINFORCING STEEL SHALL BE RETAINED AND EXTENDED INTO THE NEW CONSTRUCTION AS INDICATED ON THE PLANS.
2. USING HANDHELD EQUIPMENT, THE CONCRETE SHALL BE CAREFULLY REMOVED FOR THE FULL DEPTH OF THE WALL OR SLAB AND FOR A MINIMUM DISTANCE FROM THE SAWCUT EQUAL TO THE LONGEST EXTENSION OF THE EXISTING BARS TO BE EXTENDED INTO THE NEW CONSTRUCTION. THIS EXTENSION SHALL BE 30 BAR DIAMETERS, UNLESS OTHERWISE SHOWN.
3. EXISTING REINFORCEMENT SHALL BE CUT TO THE REQUIRED BAR EXTENSION.
4. THE REMAINING CONCRETE MAY BE REMOVED BY ANY SUITABLE METHOD UPON APPROVAL OF THE ENGINEER, WHO SHALL BE THE SOLE JUDGE OF THE USE OF ANY CONCRETE REMOVAL EQUIPMENT. EXPLOSIVES, WRECKING BALL, OR OTHER SIMILAR DEVICES, WHICH ARE LIKELY TO DAMAGE THE CONCRETE TO BE LEFT IN PLACE, SHALL NOT BE USED.

EXHIBIT C

ACOE - STANDARD JUNCTION STRUCTURES

1. Purpose: This memorandum supplements criteria found in EM 1110-2-1601, *Hydraulic Design of Flood Control Channels* and establishes policy for the hydraulic design and criteria for side drain inlets into flood control channels within the Los Angeles District. The following design guidance was developed using hydraulic model test data that the Los Angeles District performed in the early 1960's.

2. Discussion:

a. All side drain connections (i.e., pipes, culverts, etc) must be designed with a certain angle of entry to minimize the flow disturbances within a channel that are caused by a sudden increase in side inflow. For supercritical flow conditions (high velocity), the maximum permissible angles of entry are listed below:

<u>Pipe Size</u>	<u>Angle of Entry</u>
Up to 24"	90°
24"-33"	60°
36"-57"	45°
60" and over	30°

For subcritical flow conditions (low-velocity), the maximum permissible angles of entry are listed below:

<u>Pipe Size</u>	<u>Angle of Entry</u>
Up to 36"	90°
36"-57"	45°
60" and over	30°

b. In addition, a minimum of 4 feet of submergence from the top of the pipe to design water surface should be used in the side drain inlet design to help minimize surface flow disturbances caused by both a sudden increase in channel discharge and a notch in the channel side wall. The invert of the inlet should be a minimum 6 inches above the channel invert. See Attachment 1. If the 4 feet of submergence is not possible due to a shallow channel depth in relation to the size of the side drain, parapet walls along the channel may be considered to achieve this criteria. The parapet walls should extend downstream from the side drain inlet a distance of 4 times the base width of the channel. Another design option is to split the flow and have two smaller side drain inlets that meet the 4 feet of submergence. See Attachment 2.

c. As a general guideline, the side drain discharge should be less than 3% of the channel design discharge. This percentage minimizes the flow disturbance that the side drain introduces into the channel. Side drain discharge in excess of 3% of the channel discharge should be conveyed with a confluence structure. However, in a stable subcritical channel, side drain flows as high as 10% of the main channel may be designed as a side drain inlet, if factors such as freeboard, channel configuration, and channel lining are addressed in the design and approved by the Los Angeles

District. The criteria in designing a confluence structure is found in EM 1110-2-1601, *Hydraulic Design of Flood Control Channels*.

d. For supercritical, high velocity flood control channels, the location of side drain inlets are critical in the maintaining channel flow stability. Inlets should be located preferably within a straight reach of a channel. If possible inlets should not be located upstream of piers, or transitions. They should not be located immediately downstream of confluence structures, or transitions. The above mentioned locations may cause unforeseen hydraulic complications and/or disruptions to the water surface, causing the water surface to abruptly rise above a stable water surface (i.e., encroaches into the freeboard of the channel). Inlets should be located approximately two channel widths from non-prismatic sections.

3. Flap gates: The design engineer must check the hydraulic grade line (HGL) of both the flood control channel and the lateral to ensure that no interior flooding may occur. If the HGL of the flood control channel is higher than the side drain HGL design, flap gates must be used on the side drain structure to prevent potential interior flooding.

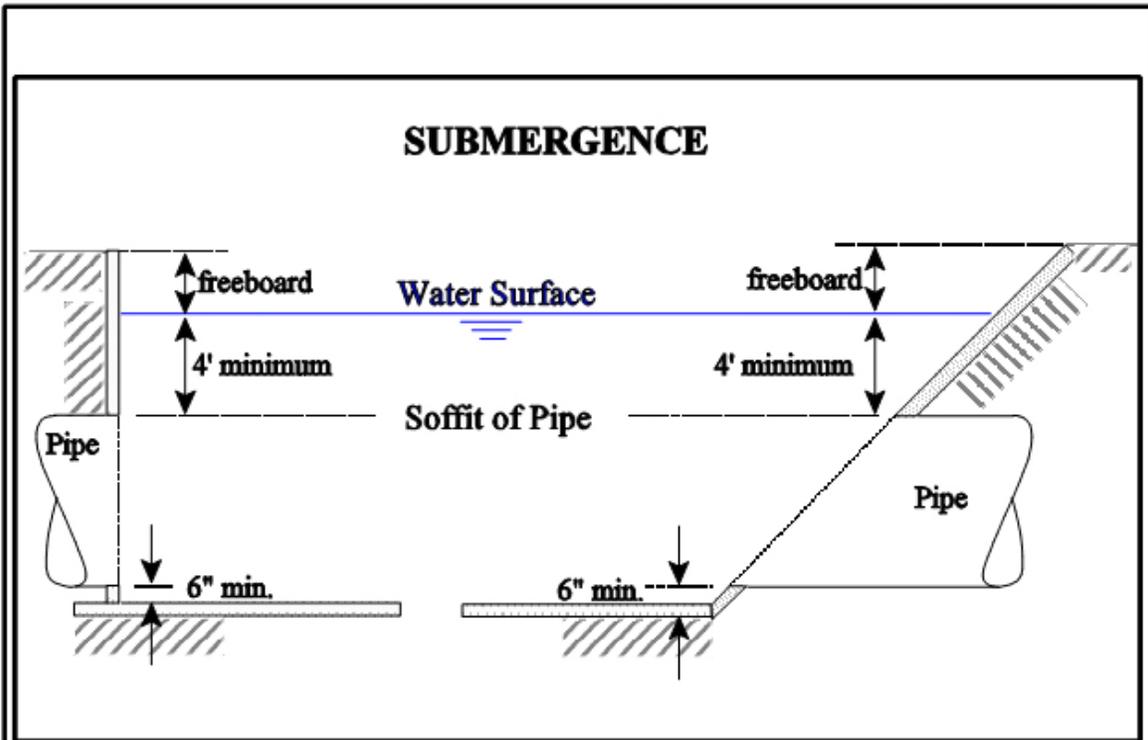
4. Junction Structures: This policy memorandum does not address the structural aspects of junction structures. However, the appropriate junction structure must be used when connecting to any Corps flood control channel. Junction structure details can be found in the Corps' Permit Manual which is maintained by Design Branch within Engineering Division. For trapezoidal channels, the side drain junction structure must include a cantilevered head wall. See Attachment 3.

5. Deviation: Any deviation from this criteria shall require approval by the Hydrology and Hydraulics Section of the Los Angeles District.

JOSEPH B. EVELYN, P.E.
Chief, Hydrology & Hydraulics Branch

MEMORANDUM FOR RECORD

SUBJECT: H&H Policy Memorandum Number 1
 Side Drain Connections into Flood Control Channels



SUPERCritical FLOW

(high velocity)

Pipe Size	Angle of Entry
up to 24"	90°
24"-33"	60°
36"-57"	45°
60" and over	30°

SUBCRITICAL FLOW

(low velocity)

Pipe Size	Angle of Entry
up to 36"	90°
36"-57"	45°
60" and over	30°

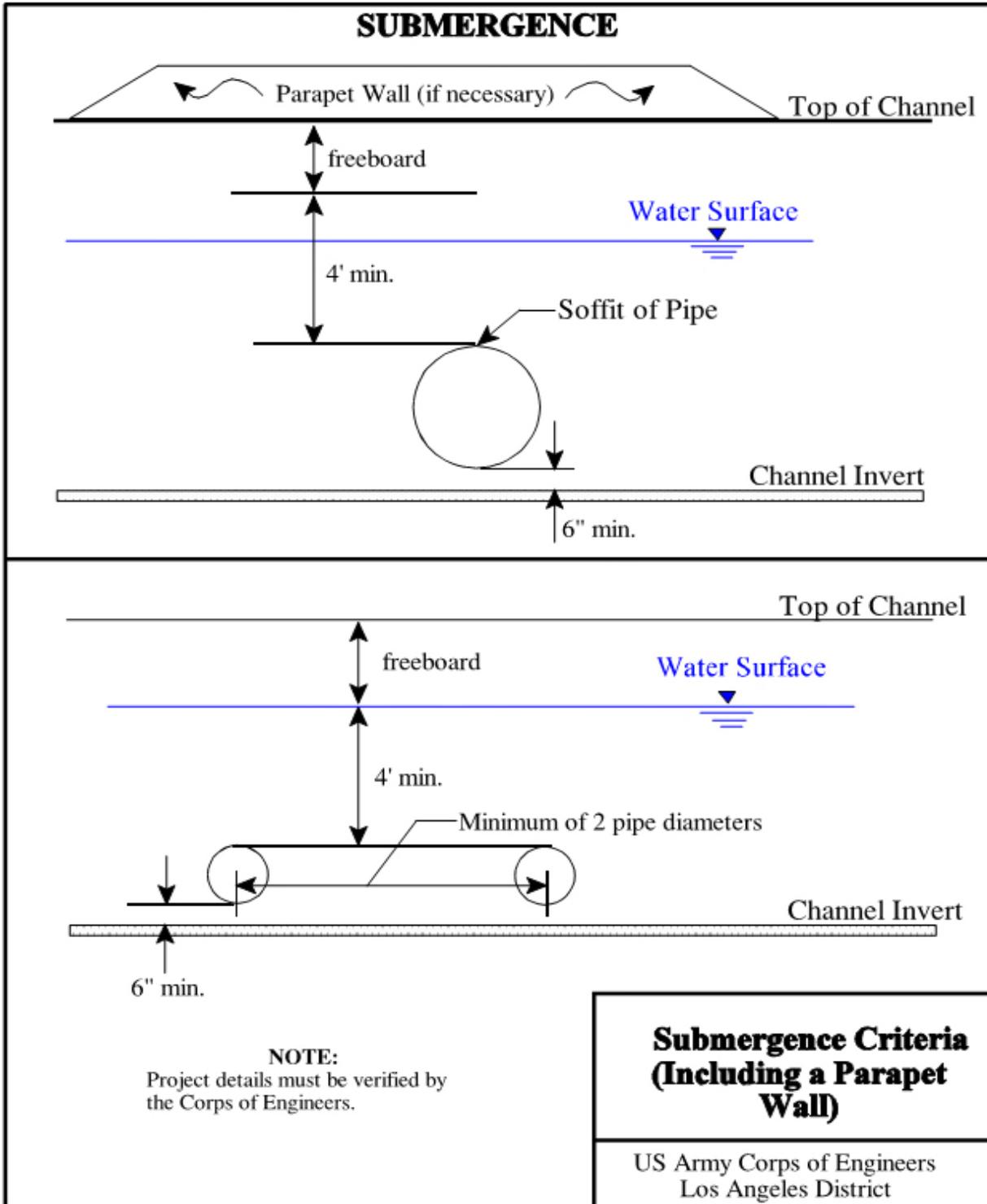
NOTE:
 Project details must be verified by
 the Corps of Engineers.

**Standards for Angle of
 Entry of Storm Drains**

US Army Corps of Engineers
 Los Angeles District

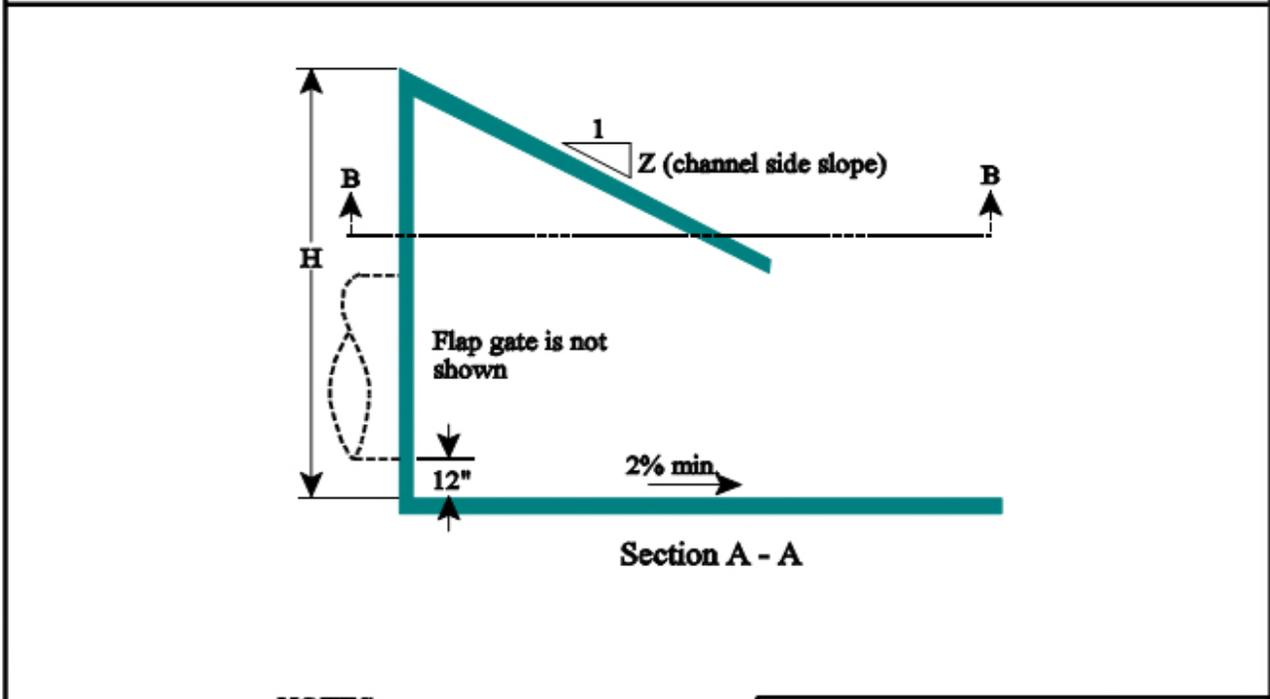
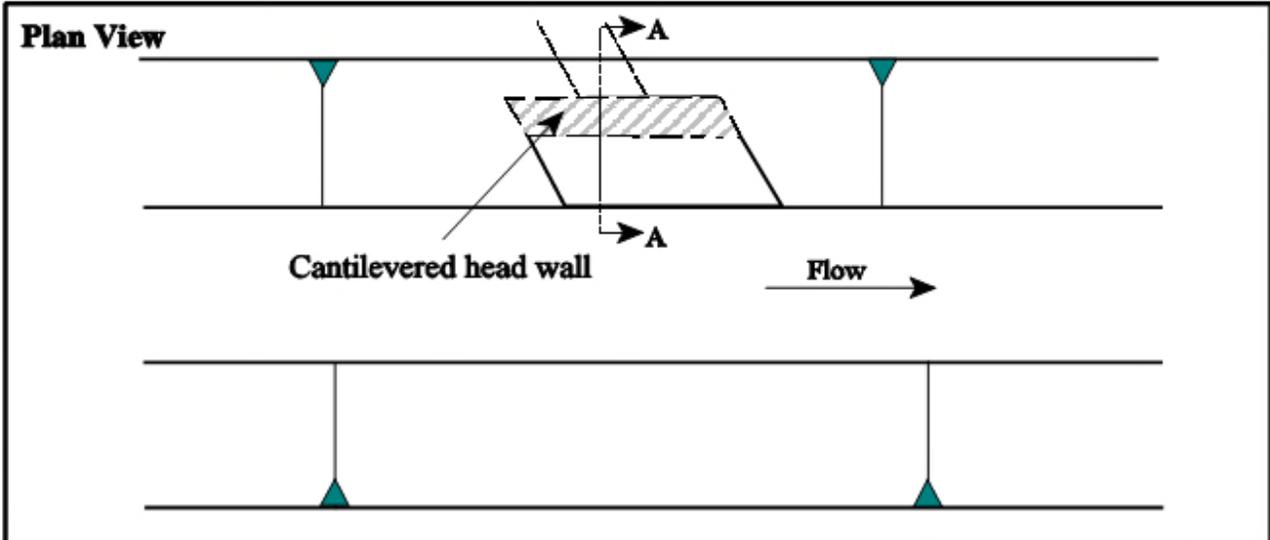
MEMORANDUM FOR RECORD

SUBJECT: H&H Policy Memorandum Number 1
Side Drain Connections into Flood Control Channels



MEMORANDUM FOR RECORD

SUBJECT: H&H Policy Memorandum Number 1
Side Drain Connections into Flood Control Channels



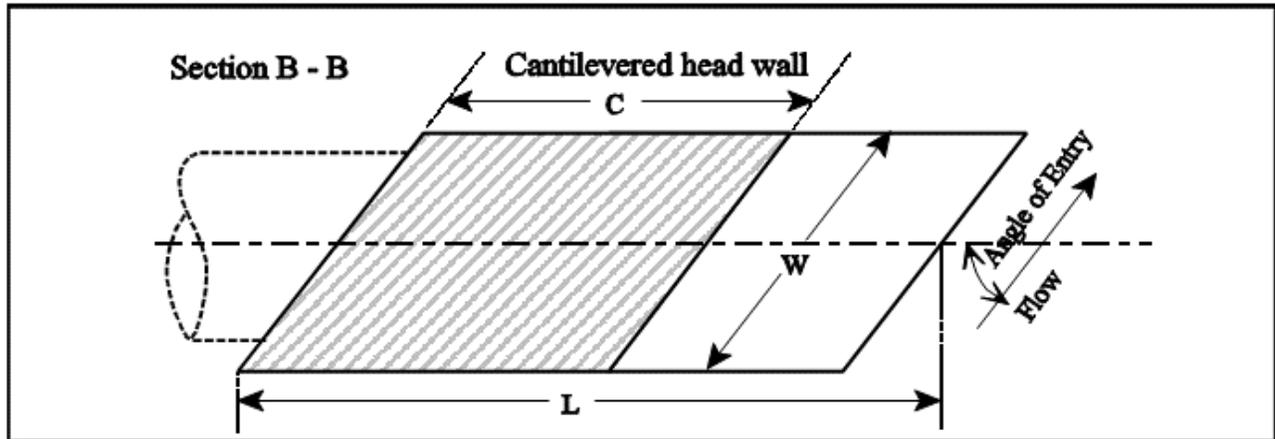
- NOTES:**
1. See sheet 2 for Section B-B and dimensions.
 2. See Permit Manual for structural dimensions.
 3. Project details must be verified by the Corps of Engineers.

Side Drain Details for Trapezoidal Channel (with Flap Gate)
Sheet 1 of 2

US Army Corps of Engineers
Los Angeles District

MEMORANDUM FOR RECORD

SUBJECT: H&H Policy Memorandum Number 1
Side Drain Connections into Flood Control Channels



Pipe Dia (in)	Angle of Entry	W (Ft-in)	DIMENSIONS (ft-in)								
			Z = 2.0			Z = 2.5			Z = 3.0		
			C	H	L	C	H	L	C	H	L
12	90	2 - 0	2 - 4 1/2	4 - 7 1/2	9 - 7	2 - 4 1/2	4 - 4 1/2	11 - 4 1/2	2 - 4 1/2	4 - 2	13 - 4 1/2
15	90	2 - 3	2 - 3 1/2	4 - 10 1/2	10 - 2 1/2	2 - 3 1/2	4 - 7 1/2	12 - 2	2 - 3 1/2	4 - 5 1/2	14 - 4
18	90	3 - 0	3 - 0	5 - 7 1/2	11 - 8	3 - 0	5 - 3 1/2	13 - 10 1/2	3 - 0	5 - 1/2	18 - 2 1/2
21	90	3 - 3	3 - 4 1/2	6 - 1/2	12 - 7 1/2	3 - 4 1/2	5 - 8 1/2	14 - 11 1/2	3 - 4 1/2	5 - 5 1/2	17 - 8
24	90	3 - 6	3 - 7 1/2	8 - 6 1/2	13 - 6 1/2	3 - 7 1/2	8 - 1 1/2	16 - 1	3 - 7 1/2	5 - 10 1/2	18 - 9 1/2
24 *	60 *	3 - 8	3 - 9 1/2	6 - 5	15 - 3	3 - 9 1/2	5 - 11 1/2	18 - 2 1/2	3 - 9 1/2	5 - 8 1/2	21 - 4 1/2
30	90	4 - 0	4 - 3	7 - 5	15 - 5 1/2	4 - 3	6 - 11 1/2	18 - 3 1/2	4 - 3	6 - 9 1/2	21 - 4 1/2
30 *	60 *	4 - 0	4 - 5 1/2	7 - 2 1/2	17 - 4	4 - 5 1/2	6 - 9 1/2	20 - 8 1/2	4 - 5 1/2	6 - 6	24 - 3 1/2
36	45	5 - 0	5 - 9	7 - 10 1/2	23 - 4 1/2	5 - 9	7 - 5 1/2	28 - 1	5 - 9	7 - 2	32 - 11 1/2
42	45	5 - 8	6 - 6 1/2	8 - 9 1/2	28 - 2 1/2	6 - 6 1/2	8 - 4	31 - 5 1/2	6 - 6 1/2	8 - 1/2	36 - 10 1/2
48	45	6 - 0	7 - 2 1/2	9 - 7 1/2	28 - 8 1/2	7 - 2 1/2	9 - 1 1/2	34 - 4 1/2	7 - 2 1/2	8 - 9 1/2	40 - 4
54	45	6 - 6	7 - 10	10 - 6 1/2	31 - 4 1/2	7 - 10	9 - 11 1/2	37 - 7	7 - 10	9 - 7	44 - 1
60	30	8 - 0	10 - 5 1/2	11 - 1 1/2	47 - 8 1/2	10 - 5 1/2	10 - 7 1/2	58 - 1/2	10 - 5 1/2	10 - 2 1/2	68 - 10 1/2
66	30	8 - 6	11 - 4	11 - 11 1/2	51 - 2 1/2	11 - 4 1/2	11 - 4 1/2	62 - 2 1/2	11 - 4	10 - 11 1/2	73 - 10
72	30	9 - 0	12 - 2 1/2	12 - 9	54 - 8	12 - 2 1/2	12 - 1 1/2	66 - 5	12 - 2 1/2	11 - 8 1/2	78 - 9 1/2
78	30	9 - 6	13 - 0	13 - 6 1/2	58 - 2 1/2	13 - 0	12 - 10 1/2	78 - 8	13 - 0	12 - 5 1/2	83 - 9 1/2
84	30	10 - 0	13 - 0	13 - 9 1/2	59 - 3	13 - 0	13 - 1 1/2	72 - 1/2	13 - 0	12 - 4 1/2	85 - 5 1/2

* indicates supercritical flow regime

Note:

1. Dimensions were taken from the LAD Permit Manual
2. "C" is the length along the slope
3. "L" is the horizontal length

Side Drain Details for Trapezoidal Channel (with Flap Gate)

Sheet 2 of 2

US Army Corps of Engineers
Los Angeles District