SCOPE OF WORK

SIDEWALK REPAIR AT KALAU PLACE, WAIMANALO
TMK: 4-1-030:053
RFQ-25-HHL-005

1.0 Existing Conditions:

A. TMK: 4-1-030:053 located on Kalau Place, Waimanalo. This lot is part of the Waimanalo Residence Lots, Series 5.

B. Tree roots have lifted and damaged portions of the sidewalk, curb, and gutter area adjacent to the TMK reference above. The C & C requested that the sidewalk be repaired. The tree roots remain under the sidewalk and will need to be removed. The tree that caused the damage has since been removed.

2.0 Scope of Work:

The Contractor shall provide labor, materials, and equipment to remove, repair, and replace the sidewalk, curb and gutter areas damaged by the tree roots at 41-217 Kalau Place, Waimanalo. All replaced sections shall match the existing dimensions, profiles, finishes and materials.

A. **Compliance with Standards:** All construction activities shall adhere to the "Standard Specifications for Public Works Construction" (September 1986) and "Standard Details for Public Works Construction" (September 1984), as amended. This includes subgrade and base preparation, minimum slab thickness and slope, concrete strength, forms, placement, joints, finish, and curing.

B. **Demolition and Removal:**

1. Demolish and remove damaged sidewalk sections as indicated in the provided pictures.

2. Carefully remove damaged sections of curb and gutter to prevent further damage to surrounding infrastructure.

3. Preserve adjacent structure and utilities during demolition.

C. **Subgrade Preparation:**

1. Eliminate all tree roots and excavate the subgrade to a depth of one foot below the current ground level.

2. Re-compact the existing base course.

3. Suppy and install additional base course beneath the sidewalk to achieve the intended final elevation.

4. Ensure all fill and base materials for over-excavated areas are placed in accordance with the standards.

D. **Storm Drain Rehabilitation**

1. Please verify the state and condition of the existing storm drain vault connected to the curb & gutter.
2. If necessary and appropriate, please make all appropriate rehab and reconstruction to meet City and County Standards (attached).

E. **Concrete Installation:**

1. Supply and install new sidewalk to match existing dimensions, profiles, and materials.

2. Verify the adequacy of the subgrade and make necessary adjustments for stability.

3. Excavate the base to the required depth, ensuring proper compaction and alignment to match existing grades.

4. Supply and install new curb and gutter sections to match existing dimensions, profiles, and materials.

F. **Utility Box Managment:**

1. Identify and protect utility boxes within the construction area.

2. Monitor utility boxes throughout the project to prevent damage.

3. Ensure the functionality of utility boxes is maintained during and after construction.

4. If the utility box condition requires, please rehab and reconstruct utility boxes to City and County Standards (attached).

G. **Site Management:**

1. Haul out and dispose of removed and generated spoil materials off-site.

2. Erect and maintain barriers to prevent access to the project area for seven days after the concrete sidewalk has been poured.

3. Provide and maintain alternative passageways for pedestrian traffic during the construction period.

4. Repair and restore all disturbed landscaping and hardscape to their original condition as soon as practicable.

3.0 General Conditions:

A. Licenses and Experience:

Bidders and subcontractors must possess all required valid State of Hawaii licenses and specialty licenses and be in good standing. Contractors shall have at least five years of work experience in Hawaii within their specialty.

B. Work Hours and Impact:

Minimize impact to surrounding residential houses. Work hours are from 7:30am to 3:30pm.

C. Environmental Compliance:

Cover all costs associated with best management practices for water pollution control as required by local, state, and federal regulations.

D. Safety and Cleanliness:

Maintain a clean and safe construction area at all times. If construction activities pose a hazard, rope off the area and post warning signs.

E. Damage and Repairs:

Repair any damage caused by construction activities at no additional cost to DHHL. Document the existing condition of the area before begining work to verify any damage claims.

F. Material Specificaitons:

Submit material specifications and MSDS/SDS datasheets for all proposed procucts and chemicals to the DHHL Project Manager for approval before delivery to the job site.

G. Regulatory Compliance:

1. Ensure compliance with all applicable OSHA and HIOSH requirements.

2. Adhere to HRS, Chapter 104 Prevailing Wages Laws for this project.

H. **Project Completion and Warranty:**

1. The time of performance for this project will be to complete all work within 45 calendar days from the date of the Notice to Proceed.

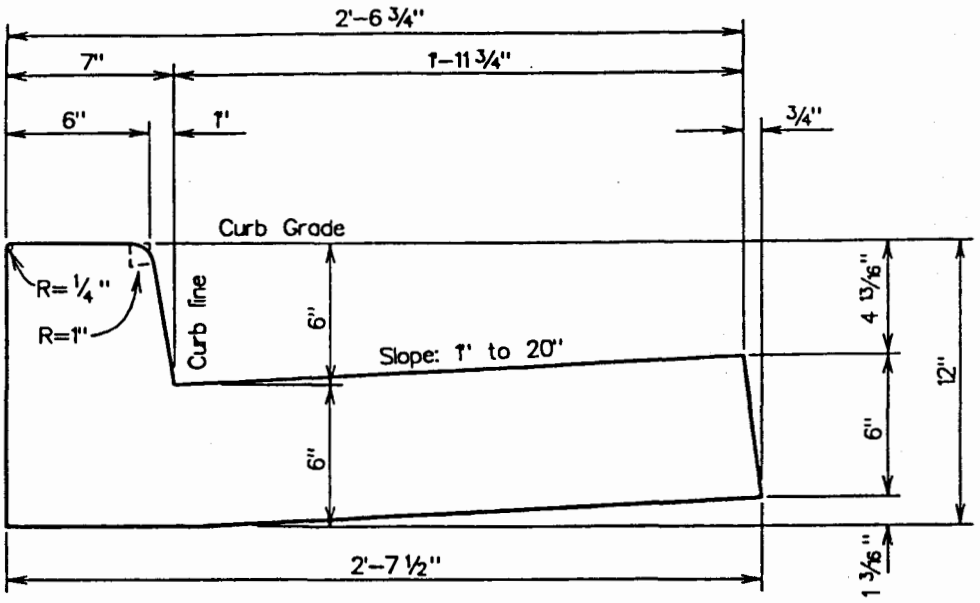
2. Contractor to provide a one-year warranty for materials and workmanship upon project completion.

I. **Additional Work:**

Any additional work not covered by this scope of work must be approved by the DHHL Project Manager prior to commencement. Additional work will be compensated at actual cost plus a 20 percent markup, inclusive of all taxes, overhead, profit, and incidental expenses.

PHOTOS FROM SITE AT 41-217 KALAU PL, WAIMANALO TMK 4-1-030:053

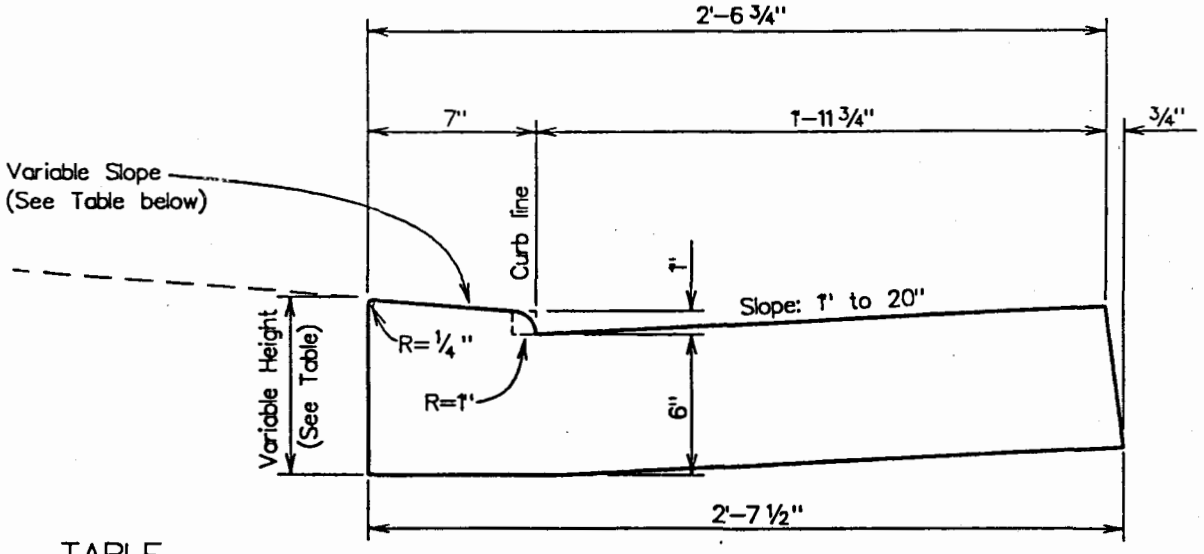

WATER SUPPLY
WATER METER



Class "A" Concrete quantity = 0.0584 cu. yd./lin. ft.

CAST IN PLACE INTEGRAL CURB AND GUTTER

Scale: 1 1/2" = 1'-0"



Class "A" Concrete quantity = 0.0506 cu. yd./lin. ft.

TABLE

DIST. CURB LINE TO ℄	SLOPE	HEIGHT
12'	11/16" to 12"	7 3/8"
10'	3/4" to 12"	7 7/16"
8'	7/8" to 12"	7 1/2"
7'	15/16" to 12"	7 9/16"
6'	1 1/16" to 12"	7 5/8"
3'	1 15/16" to 12"	8 1/8"

CAST IN PLACE INTEGRAL DRIVEWAY CURB AND GUTTER

Scale: 1 1/2" = 1'-0"

R-4 REVISED	STANDARD DETAILS	INTEGRAL CURB AND GUTTER INTEGRAL DRIVEWAY CURB AND GUTTER JANUARY 1995 SCALE: 1-1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

SECTION 41 - CONCRETE CURB AND GUTTER

41.1 DESCRIPTION

This work shall consist of constructing concrete curb and gutter to the established line and grade. The gutter shall be cast in place on a prepared subgrade, and the curb shall be of precast units or cast in place as an integral structure with the gutter.

41.2 MATERIALS

All curbs and gutters shall be constructed with Class "B" concrete containing an admixture conforming to ASTM C 494, Type D, unless designated otherwise on the plans or in the special provisions.

A. Precast Curb Blocks. The dimension of the curb blocks shall conform to the dimensions shown in the Standard Details. The front and top exposed faces and the top 2 inches of the back face of the curb block shall be smoothly finished. No air pockets or exposed rock shall appear on any surface.

Any precast curb block which does not conform to the standard dimensions or surface finish shall not be used.

B. Cast-in-Place Gutter or Cast-in-Place Curb and Gutter. Concrete gutter or integral curb and gutter shall be formed on a prepared subgrade or subbase and shall be true to the established line and grade. The dimensions and slope shall conform to the Standard Details and as shown on the construction plans.

All through gutters across street intersections and wherever specified on the plans shall be reinforced with galvanized welded wire fabric with a minimum cover of 2 inches. Unless specified otherwise in the Standard Details for the County, the wire fabric shall be 6"x6"-6/6.

C. Forms. Form materials shall be free from warps, bends, twists, or other defects which will impair the appearance of the completed work.

Wood forms shall be surfaced on the upper edges and on the sides against which the concrete is to be placed.

Form sections when set in place shall possess adequate strength and rigidity to remain true to the established line and grade.

41.3 DETAILS

A. Subgrade. Before erecting the forms, the subgrade or subbase shall be graded and compacted. Wherever unsuitable material is encountered, it shall be removed and replaced with select borrow and compacted to the required elevation in accordance with the requirements under Section 12, "Roadway Excavation."

B. Erecting Forms. All forms, wood or metal, shall be clean and oiled prior to setting in place. The erected forms shall be adequately secure to prevent movement in any direction during placement of the concrete.

C. Placing Precast Curb Blocks. All curb blocks shall be placed on a prepared subgrade, well bedded and true to the established line and grade. The joints between blocks shall be 1/2 inch wide. The joints shall be filled with mortar for the full depth and height of the blocks. After the mortar has gained sufficient strength, the backfill shall be thoroughly and carefully tamped into place.

D. Placing Concrete. Prior to pouring concrete, the prepared subgrade or subbase shall be dampened. The concrete shall be poured, spaded, and tamped thoroughly into the forms.

E. Finishing. Within a few hours after placing of concrete, the gutter or the integral curb and gutter forms shall be removed and the exposed faces shall be hand finished with a steel trowel and all irregularities corrected. All exposed edges shall be rounded with an edging tool.

On grades exceeding 6%, the gutter surface shall be lightly broomed in the direction parallel to the curb face.

F. Joints. Transverse weakened plane joints shall be formed on the gutter or on the integral curb and gutter spaced as shown on the plans. The joints shall not exceed 12-foot intervals. The joints may be formed with a removable metal strip or by sawing. Construction joints shall be keyed with a minimum of one #3 tie bar 15 inches long.

G. Curing and Protecting. The newly formed concrete curb and gutter shall be cured as specified under Section 39, "Portland Cement Concrete."

Barriers shall be erected and maintained for at least 5 days to prevent accidental damage to the curb and gutter.

H. Maintenance. The Contractor shall repair and clean, at his own expense, all curb and gutter damaged, discolored, or splashed with asphalt or concrete during construction. Damaged section shall be removed entirely and reconstructed. No patching or refinishing shall be permitted.

41.4 MEASUREMENT AND PAYMENT

Measurement for payment shall be by the lineal foot based on the actual work completed in place.

Payment for curb and gutter shall be made at the unit price bid per lineal foot and shall be full compensation for furnishing all material, tools, equipment, and labor necessary to construct the work including the subgrade preparation.

SECTION 42 - CONCRETE SIDEWALK

42.1 DESCRIPTION

This work shall consist of constructing concrete sidewalks and other walkways to the established line and grade.

42.2 MATERIALS

Unless specified otherwise on the plans, Class "B" concrete containing an admixture conforming to ASTM C 494, Type D, and/or ASTM C 260, shall be used in constructing the sidewalks. Premolded expansion joint filler shall conform to the requirements under ASTM D 1751.

42.3 DETAILS

A. Subgrade. The sidewalk area shall be graded to the required cross section, watered and thoroughly compacted to the established subgrade. Whenever unsuitable material is encountered, it shall be removed to a depth of 6 inches below the subgrade surface and replaced with select borrow and thoroughly compacted.

B. Forms. Metal or wood forms shall be free from warp, and shall be clean and oiled before setting in place. The forms shall be true to established line, grade and cross slope. The forms shall be sturdy and rigidly held in place by stakes, clamps, spreaders or braces to insure against movement during and after placement of concrete.

C. Placing and Finishing. Prior to pouring of concrete, the subgrade shall be dampened. Concrete shall be poured continuously and shall be thoroughly tamped and floated to a smooth and even surface. The pouring and constructing of alternating blocks shall not be permitted.

The finished surface shall be scored into squares with sides equal to the sidewalk width, in 4-foot squares, or as shown on the plans.

D. Joints. Expansion joints shall be constructed at every 96- to 100-foot spacing and at the beginning and at the end of curb returns. The joints shall be constructed with premolded expansion type filler. Contraction joints shall be spaced no farther than 30 feet apart. Construction shall be as specified under Section 37, "Portland Cement Concrete Pavement."

E. Curing and Protecting. The finished concrete sidewalk shall be cured as specified under Section 39, "Portland Cement Concrete," and shall be protected against damage or defacement of any kind. Sidewalk which is not acceptable by the Engineer because of damage or defacement shall be removed and replaced by the Contractor at his own expense.

42.4 MEASUREMENT AND PAYMENT

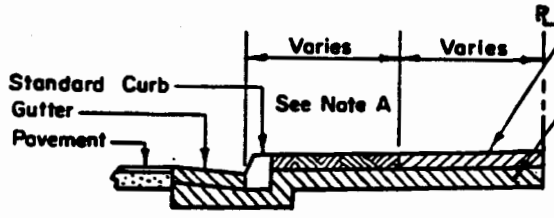
Concrete sidewalk shall be measured for payment by the square foot. Payment shall be made at the unit price bid and shall be full compensation for furnishing the material, tools and labor necessary to complete the work, including the preparation of the subgrade.

STANDARD SIDEWALK WIDTHS

Sidewalk widths for sidewalks in districts described in the Comprehensive Zoning Code for the City and County of Honolulu shall conform to the following:

District	Paved Sidewalk Width
All Residential	4 feet minimum
A-1, A-2, and A-3 Apartment	4 feet minimum
A-4 and A-5 Apartment	6 feet minimum
H-1 Resort Hotel	4 feet minimum; required width for each location shall be determined by the Chief Engineer.
H-2 Hotel	Full width unless determined otherwise by the Chief Engineer.
B-1 Business	4 feet minimum
B-2, B-3, and B-5 Business	6 feet minimum
B-4 Business	Full width
All Industrial	4 feet minimum
All Planned Development (For streets to be dedicated to the City.)	4 feet minimum

SIDEWALK WITH STANDARD CURB & GUTTER



TYPICAL SECTION

4" Class B concrete broom finish perpendicular to curb. Standard slope 1/4" per L.F. Chief Engineer may authorize different slope to suit special conditions.

6" select borrow under sidewalk, curb and gutter wherever expansion value of subgrade exceeds 3%.

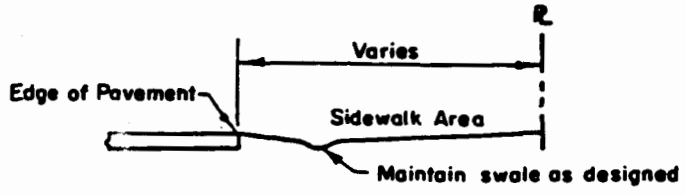
All utility installations shall be identified with the name of the utility company on the frame or cover. Checkered metal covers installed in sidewalks with slopes exceeding 10% shall be painted with non-skid paint.

Where concrete curb or sidewalk exists or is to be constructed, driveways shall be of concrete.

NOTE A:

1. Full-width concrete sidewalks may be permitted when constructed for the entire block.
2. Lawn grass or vegetative ground cover of a type with a maximum growth height of 4" or of a type that will grow at a trimmed height of 4" except vines or other planting which may be a tripping hazard. 4" topsoil required.
3. In lieu of lawn grass the Chief Engineer may authorize:
   (a) Acceptable artificial turf, with proper bases,
   (b) Precast masonry units laid closely in a uniform pattern (bricks, tile caps, etc.) with proper base,
   (c) Asphalt concrete on proper base,
   (d) Concrete- poured separately from the concrete sidewalk, and of similar thickness, and
   (e) Loose aggregates, such as basaltic, coral or limestone chips.
4. Street trees including existing trees may be permitted in sidewalk areas subject to the approval of the Department of Parks and Recreation.
5. Sprinklers, set flush with the surface, may be permitted by the Chief Engineer.
6. In areas where curbs exist with unpaved sidewalks, temporary asphalt concrete walkways may be installed, if authorized by the Chief Engineer.
7. Deviation from this standard and other sidewalk standards may be permitted upon written approval of the Chief Engineer.

SIDEWALK AREA WITHOUT CURB OR GUTTER



GENERAL NOTE:

Mailbox support shall be of a type which causes minimal obstruction to traffic.

R-28 REVISED	STANDARD DETAILS	SIDEWALK DETAILS SEPTEMBER 1984	CITY & COUNTY OF HONOLULU

September 1984

Storm Drains

PART 2

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SCALE: 1/4" = 1'-0"

TYPE "A" CATCH BASIN

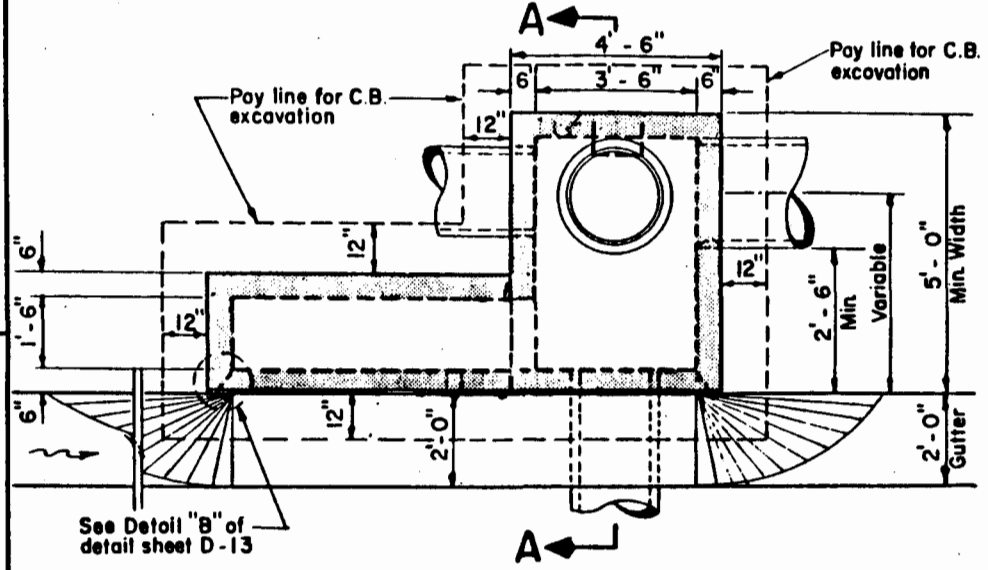
SEPTEMBER 1984

STANDARD DETAILS

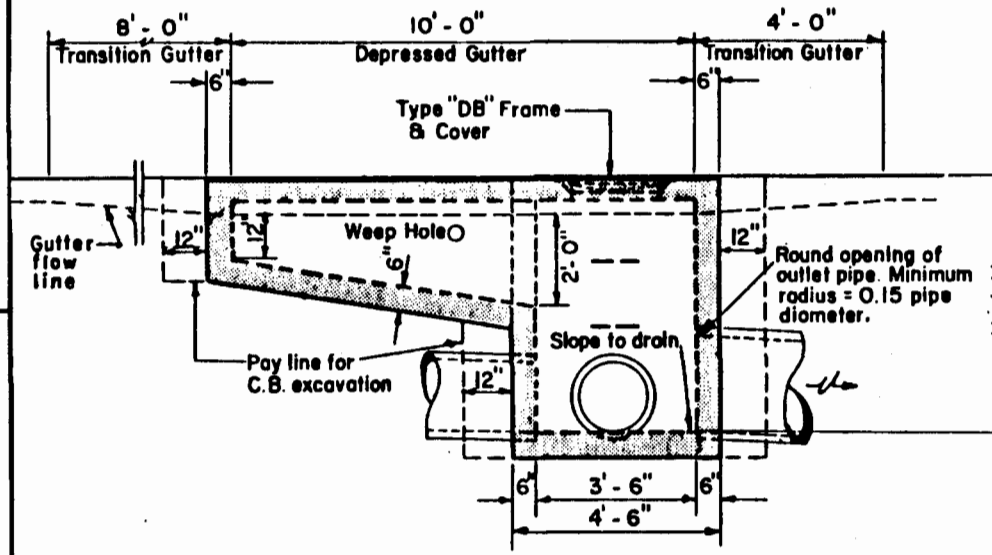
D-1

TYPE "A" CATCH BASIN

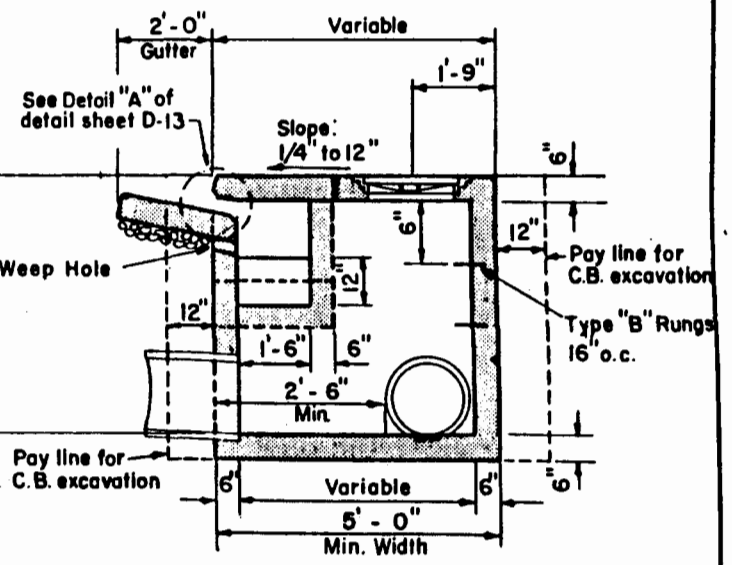
SCALE: 1/4" = 1'-0"



PLAN



ELEVATION



SECTION A-A

NOTES:

1. Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.
2. C.B. wing shall be installed to favor upstream of gutter flow.
3. See sheet D-2 for reinforcement details.
4. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2' - 0" above the invert.

D-2

STANDARD DETAILS

TYPE "A" CATCH BASIN REINFORCEMENT DETAILS

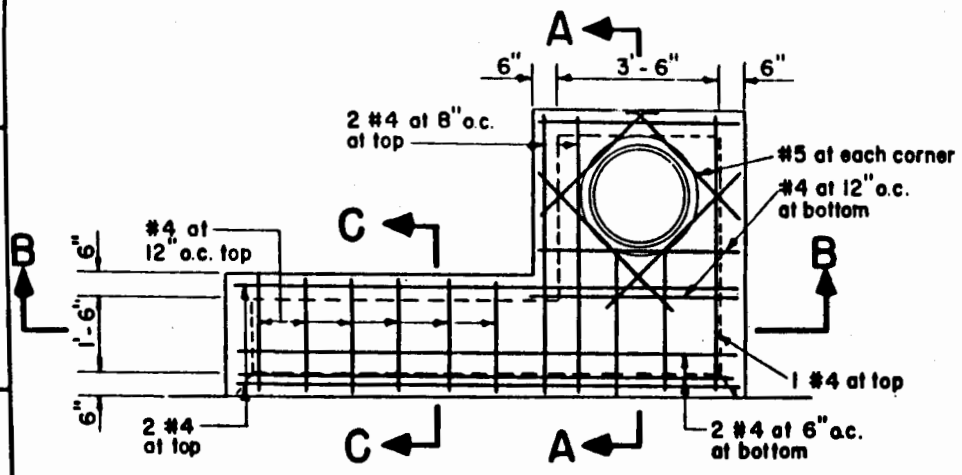
SEPTEMBER 1984

SCALE: 1/4" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "A" CATCH BASIN REINFORCEMENT DETAILS

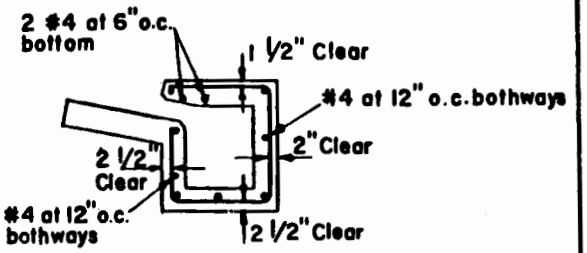
SCALE: 1/4" = 1'-0"



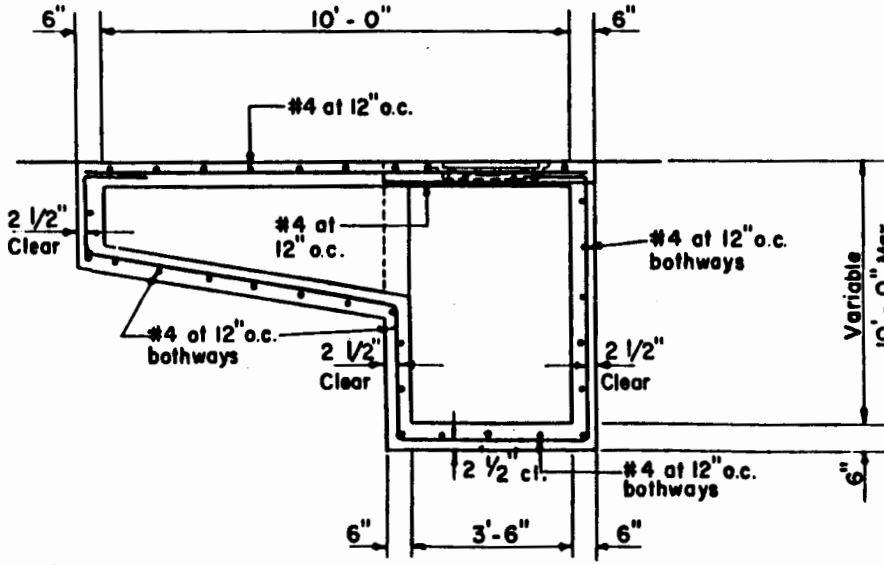
PLAN

NOTES:

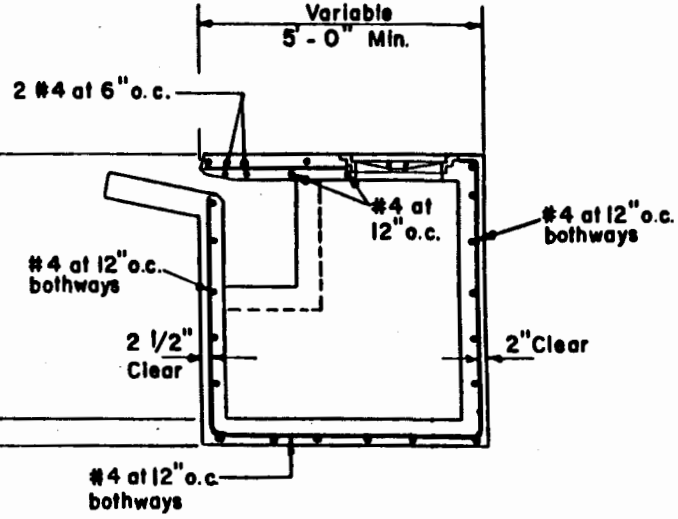
1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.



SECTION C-C



SECTION B-B



SECTION A-A

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "E" CATCH BASIN

SCALE: 1/4" = 1'-0"

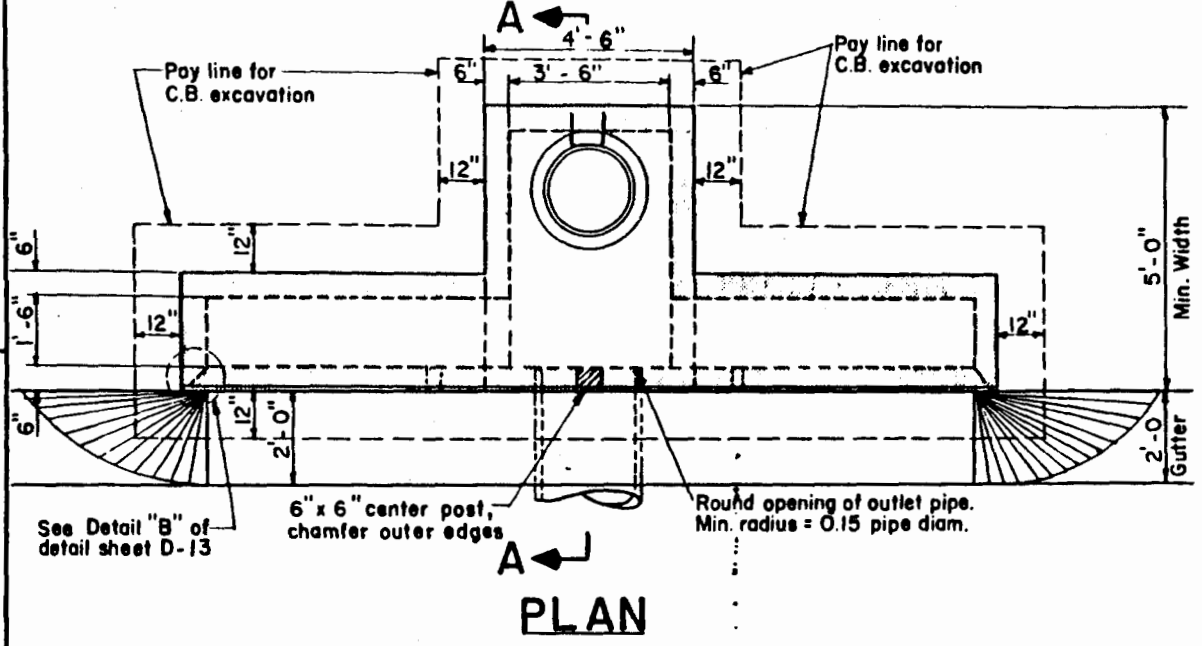
SEPTEMBER 1984

STANDARD DETAILS

D-3

TYPE "E" CATCH BASIN

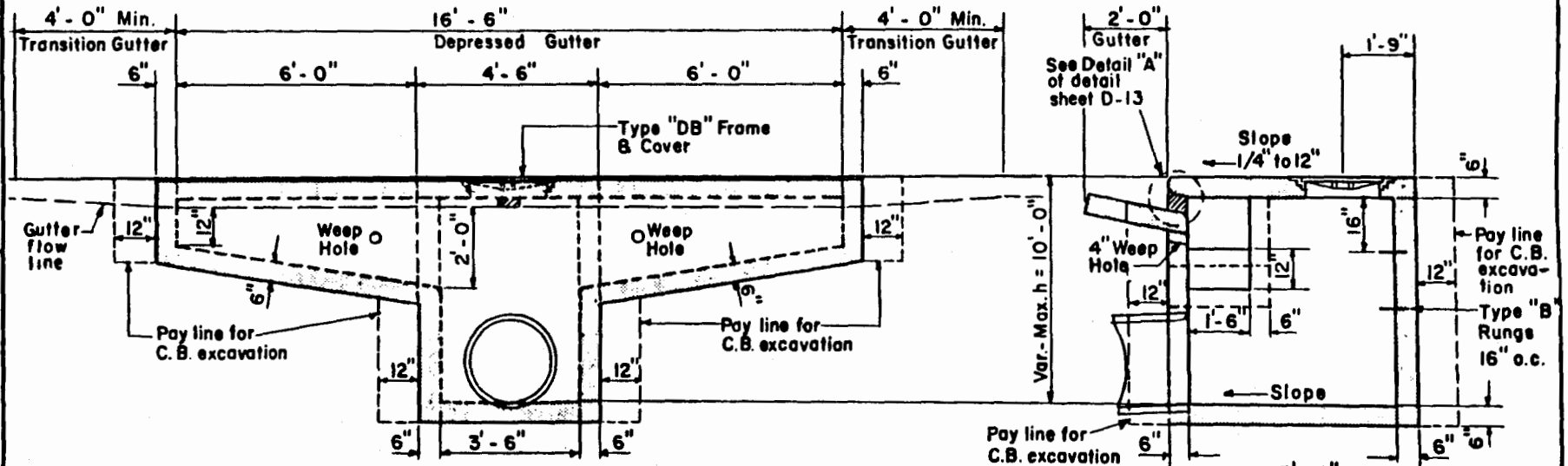
SCALE: 1/4" = 1'0"



PLAN

NOTES:

1. Provide 2 cu. ft. of crushed rock (Rock Sand), ASTM size #9, at weep holes.
2. See sheet D-4 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.
4. This catch basin shall be used with drain pipes 60 inches or less in diameter.



ELEVATION

SECTION A-A

D-4

STANDARD DETAILS

TYPE "E" CATCH BASIN REINFORCEMENT DETAILS

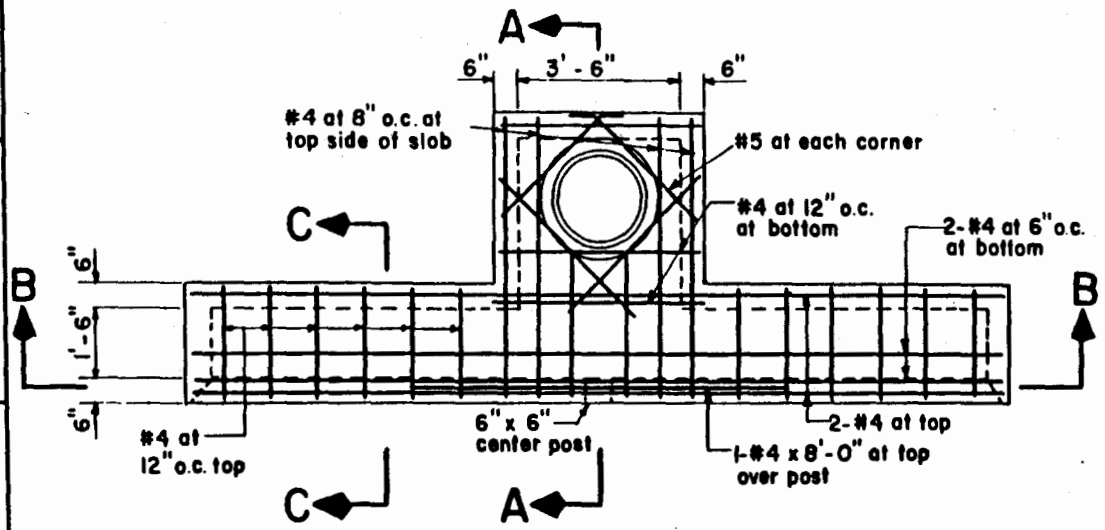
SEPTEMBER 1984

SCALE: 1/4" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "E" CATCH BASIN REINFORCEMENT DETAILS

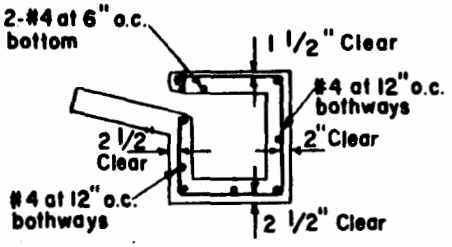
SCALE: 1/4" = 1'-0"



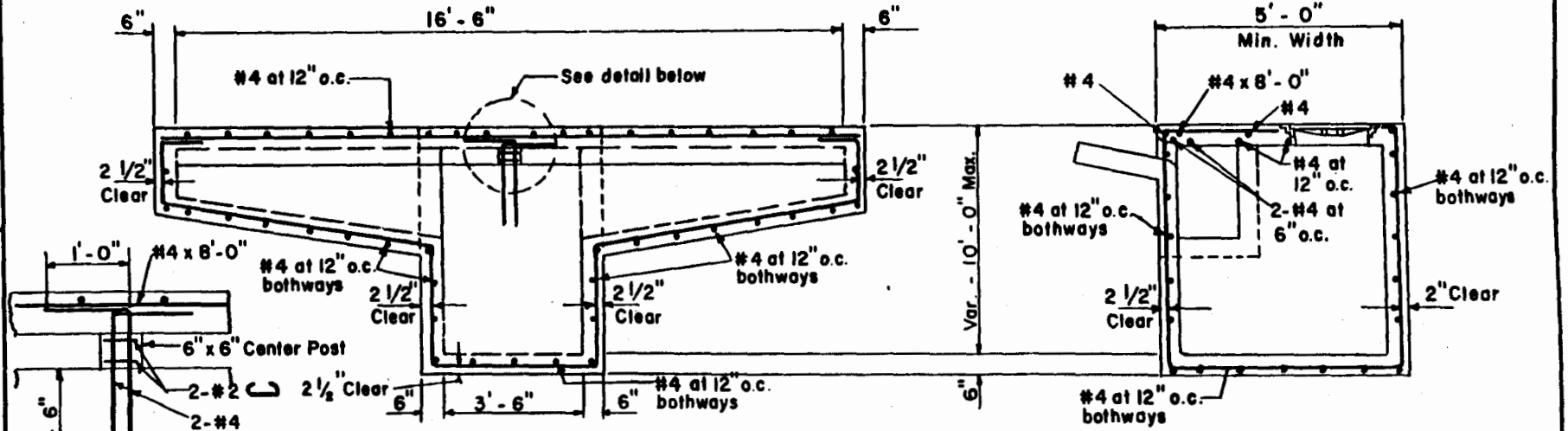
PLAN

NOTES:

1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.



SECTION C-C



DETAIL

SECTION B-B

SECTION A-A

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "B" CATCH BASIN

SCALE: 1/4" = 1'-0"

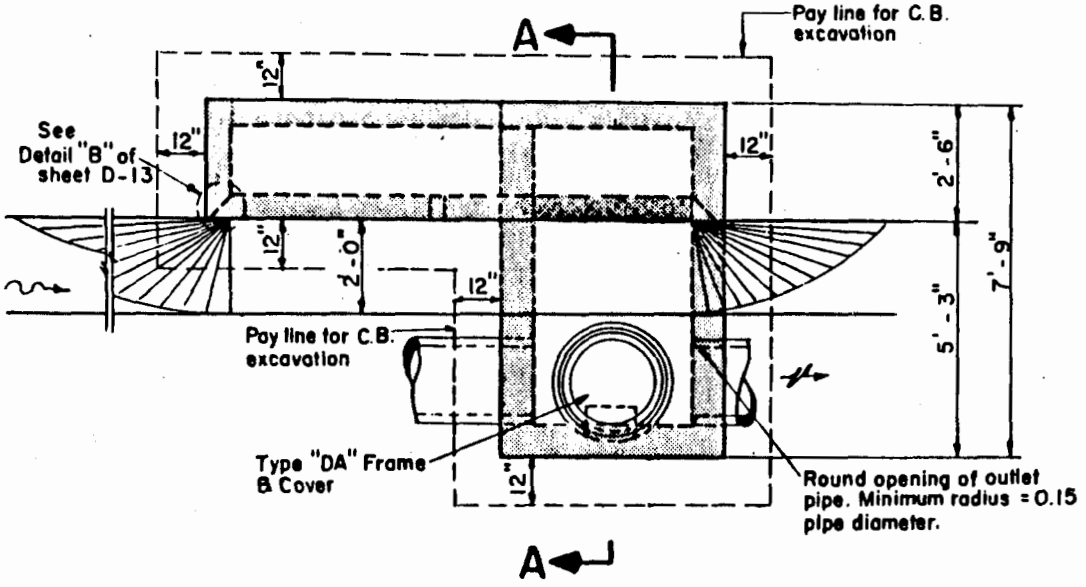
SCALE: 1/4" = 1'-0"

TYPE "B" CATCH BASIN

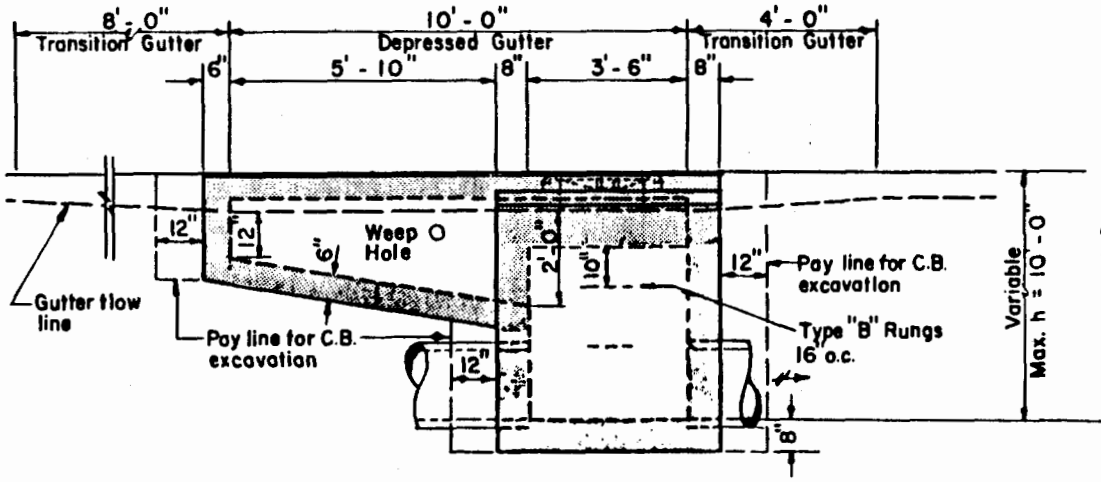
SEPTEMBER 1984

STANDARD DETAILS

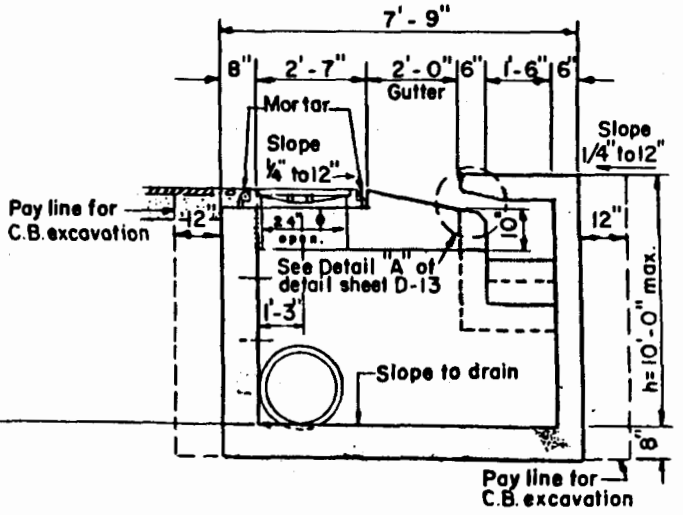
D-5



PLAN



ELEVATION



SECTION A-A

NOTES:

1. Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.
2. C.B. wing shall be installed to favor upstream of gutter flow.
3. See sheet D-6 for reinforcement details.
4. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.

D-6

STANDARD DETAILS

TYPE "B" CATCH BASIN REINFORCEMENT DETAILS

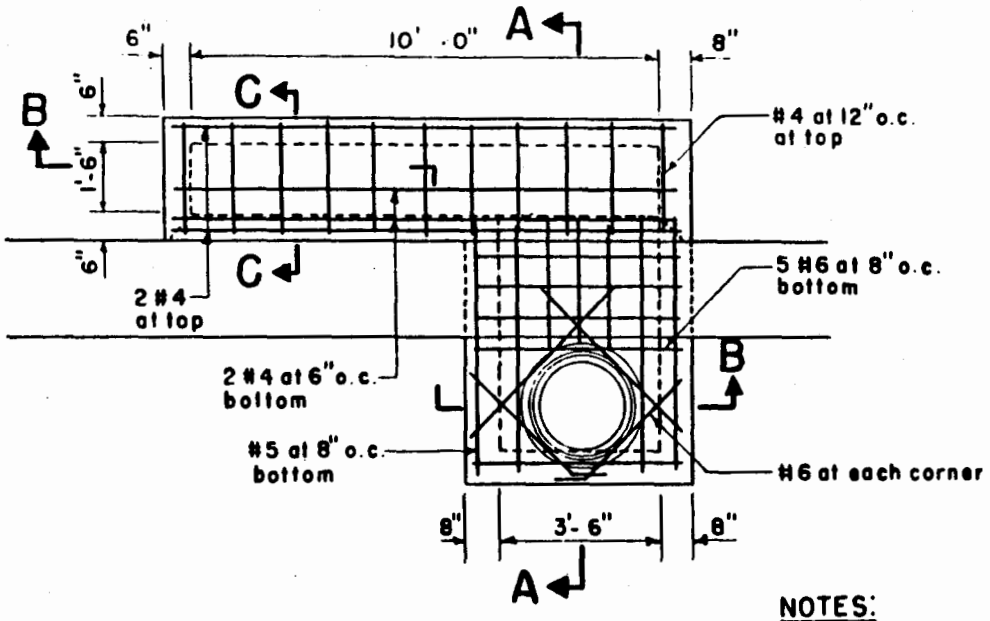
SEPTEMBER 1984

SCALE: 1/4" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "B" CATCH BASIN REINFORCEMENT DETAILS

SCALE: 1/4" = 1'- 0"

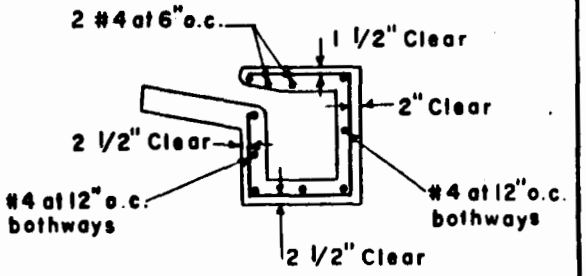


PLAN

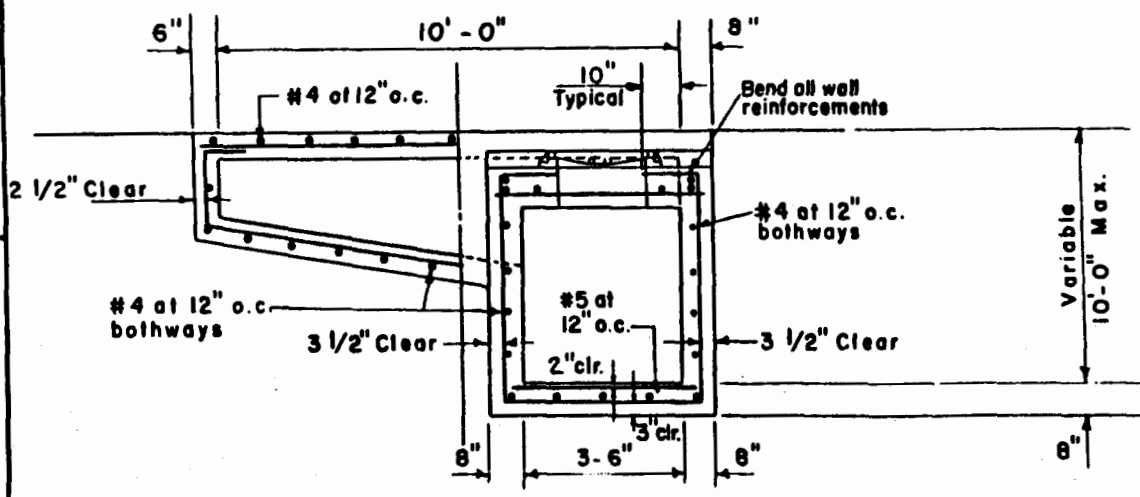
NOTES:

1 See sheet D-13 for reinforcement at pipes and corners.

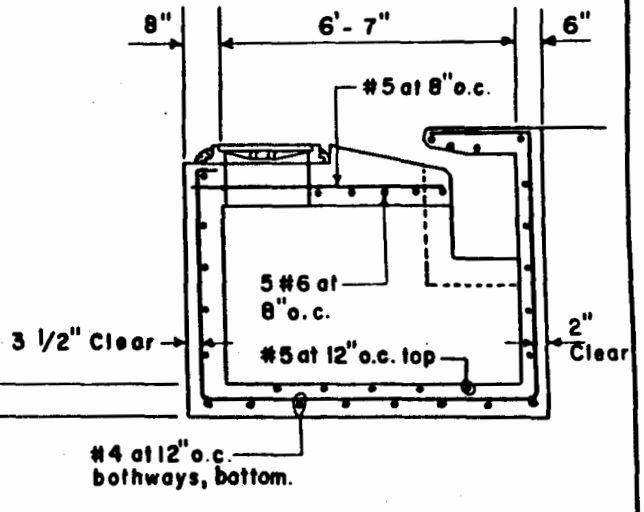
2. Spliced reinforcing bars shall be lapped at least 30 diameters.



SECTION C-C



SECTION B-B



SECTION A-A

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SCALE: 1/4" = 1'-0"

TYPE "F" CATCH BASIN

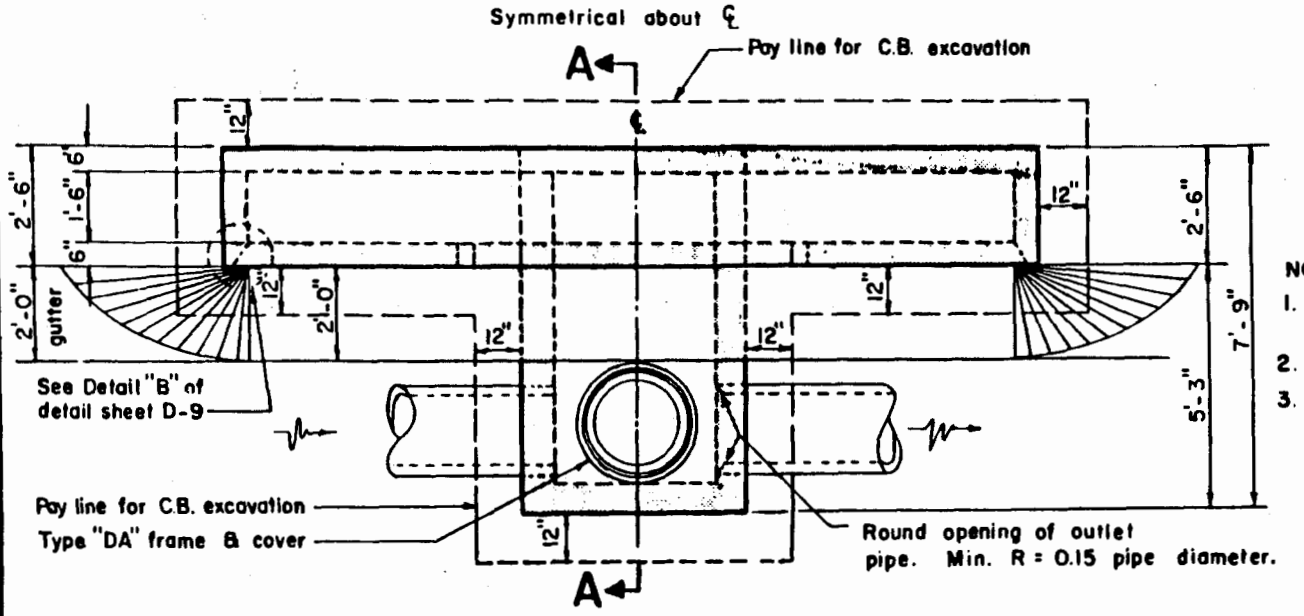
SEPTEMBER 1984

STANDARD DETAILS

D-7

TYPE "F" CATCH BASIN

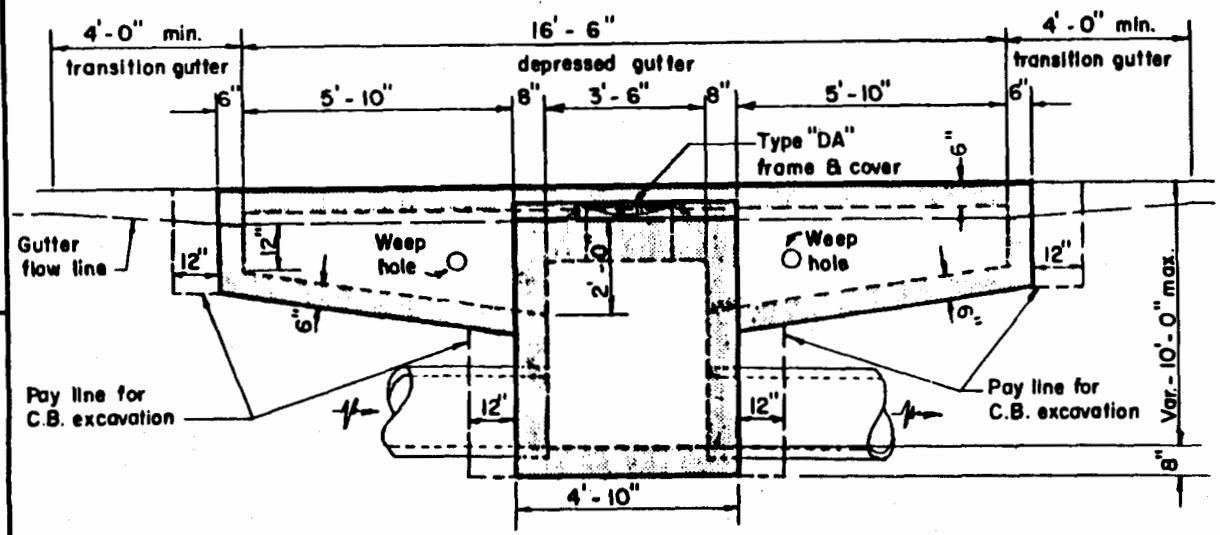
SCALE: 1/4" = 1'-0"



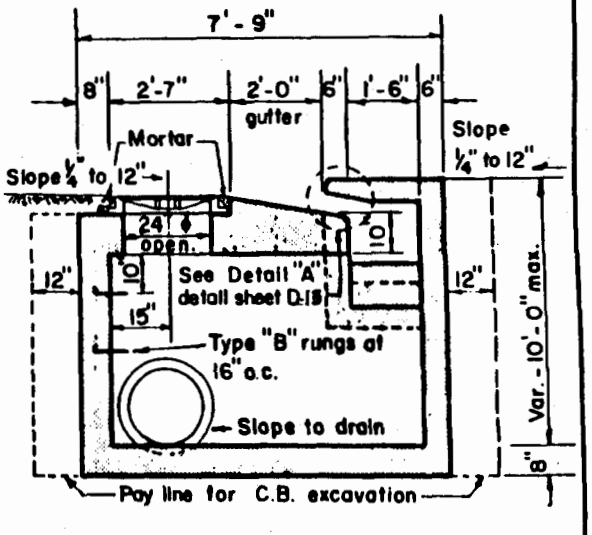
PLAN

NOTES:

1. Provide 2 cu. ft. of crushed rock (Rock Sand) ASTM size #9, at weep holes.
2. See sheet D-8 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.



ELEVATION



SECTION A-A

D-8

STANDARD DETAILS

TYPE "F" CATCH BASIN REINFORCEMENT DETAILS

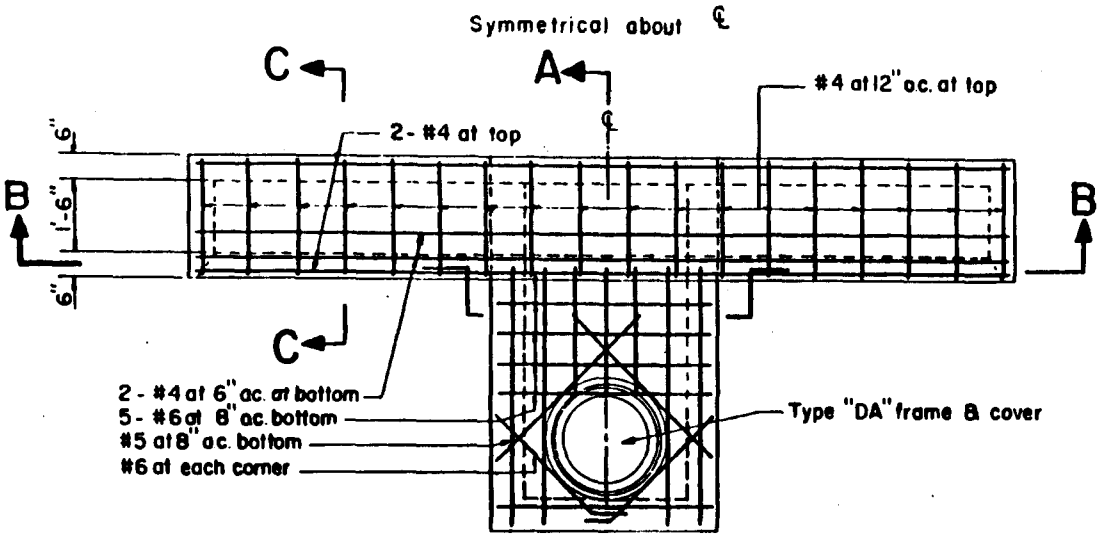
SCALE: 1/4" = 1'-0"

SEPTEMBER 1984

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "F" CATCH BASIN REINFORCEMENT DETAILS

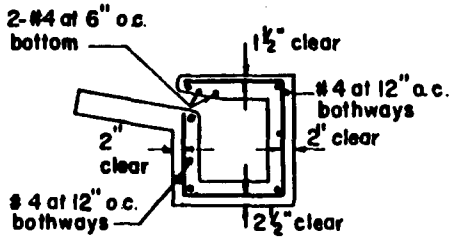
SCALE: 1/4" = 1'-0"



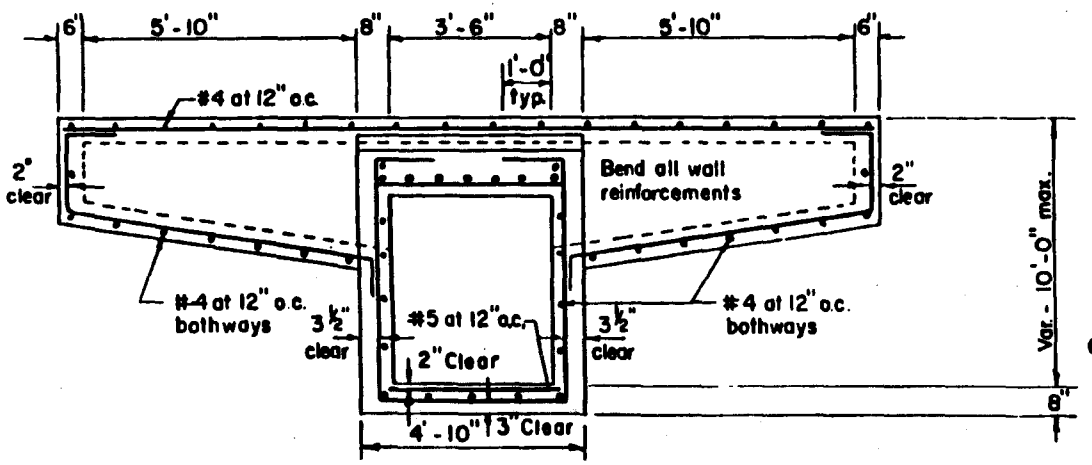
PLAN

NOTES:

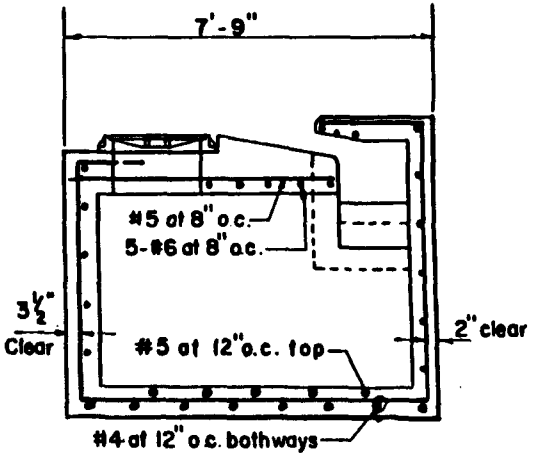
1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.



SECTION C-C



SECTION B-B



SECTION A-A

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SCALE: 3/8" = 1'-0"

TYPE "C" CATCH BASIN

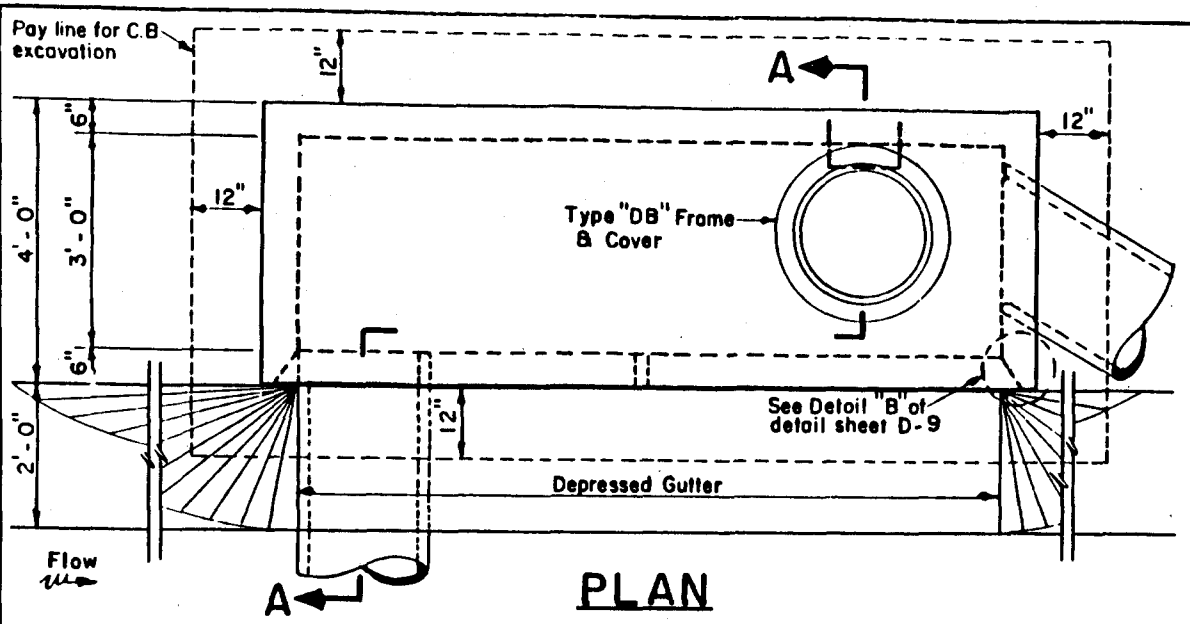
SEPTEMBER 1984

STANDARD DETAILS

D-9

TYPE "C" CATCH BASIN

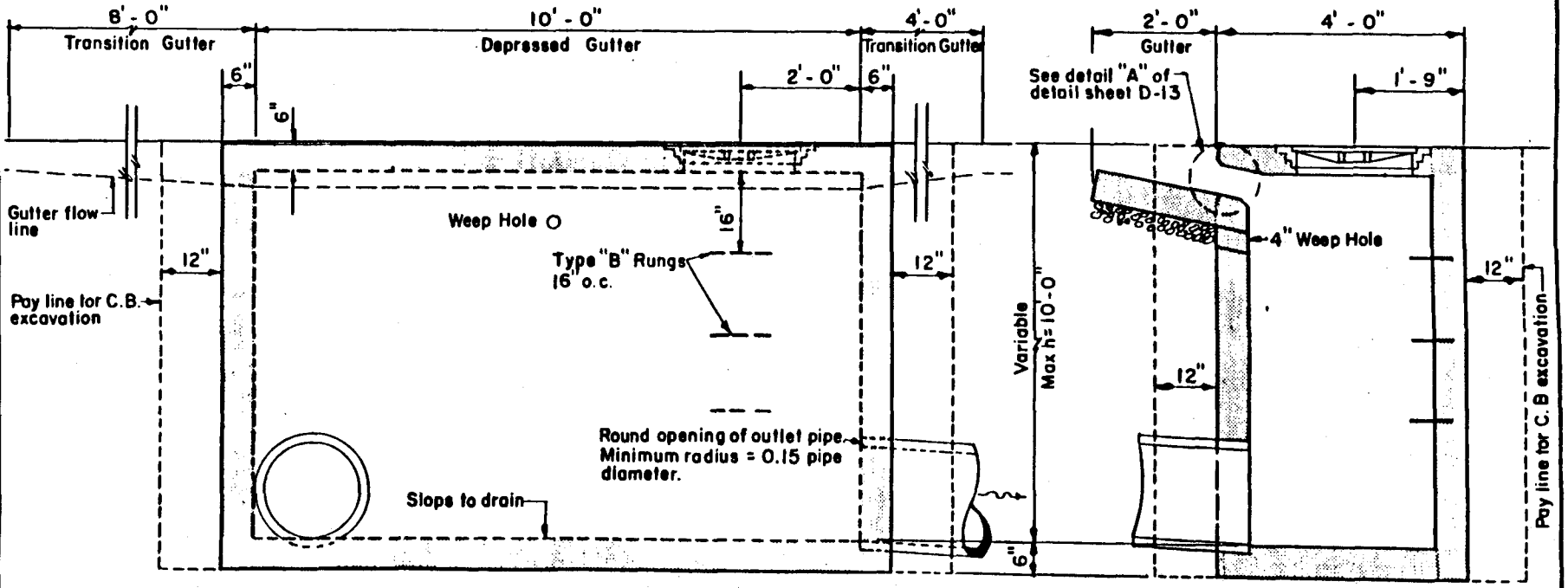
SCALE: 3/8" = 1'-0"



PLAN

NOTES:

1. Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.
2. See sheet D-10 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.



ELEVATION

SECTION A-A

D-10

STANDARD DETAILS

TYPE "C" CATCH BASIN REINFORCEMENT DETAILS

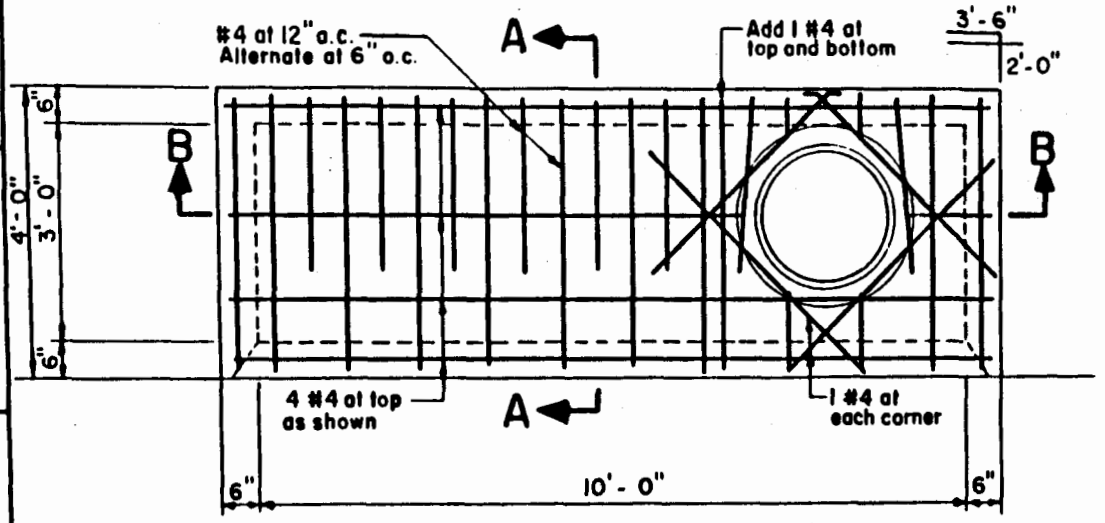
SEPTEMBER 1984

SCALE: 3/8" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "C" CATCH BASIN REINFORCEMENT DETAILS

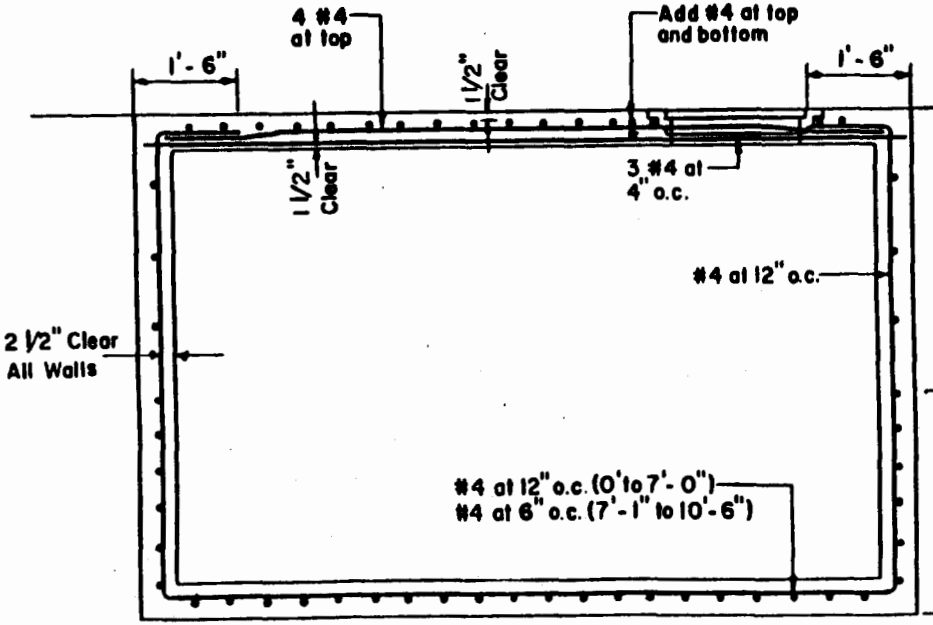
SCALE: 3/8" = 1'-0"



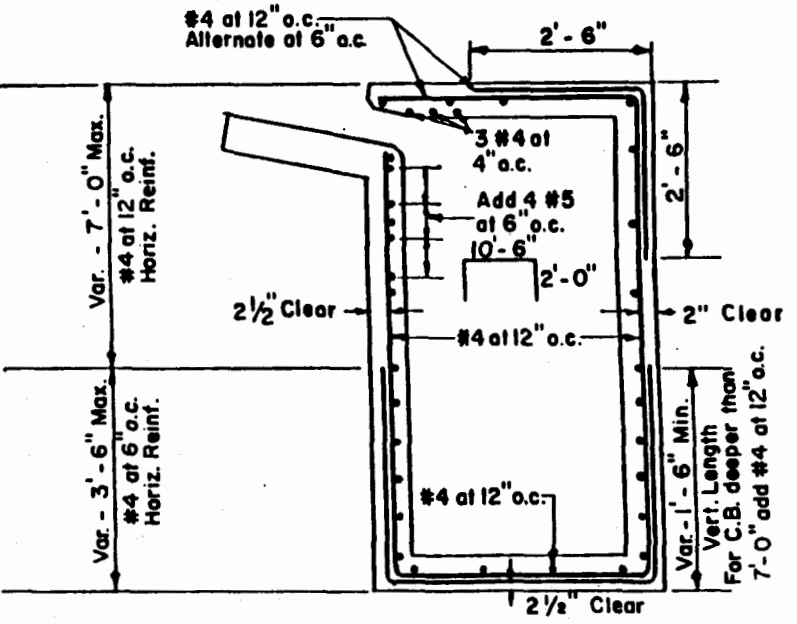
PLAN

NOTES:

1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.



SECTION B-B



SECTION A-A

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SCALE: 3/8" = 1'-0"

TYPE "D" CATCH BASIN

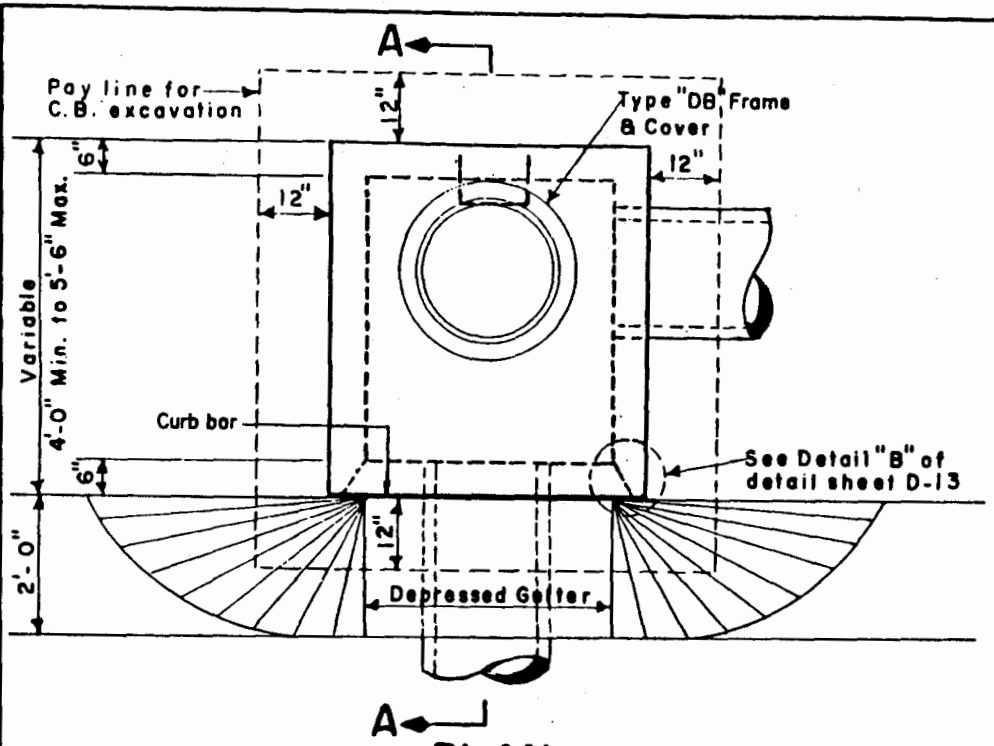
SEPTEMBER 1984

STANDARD DETAILS

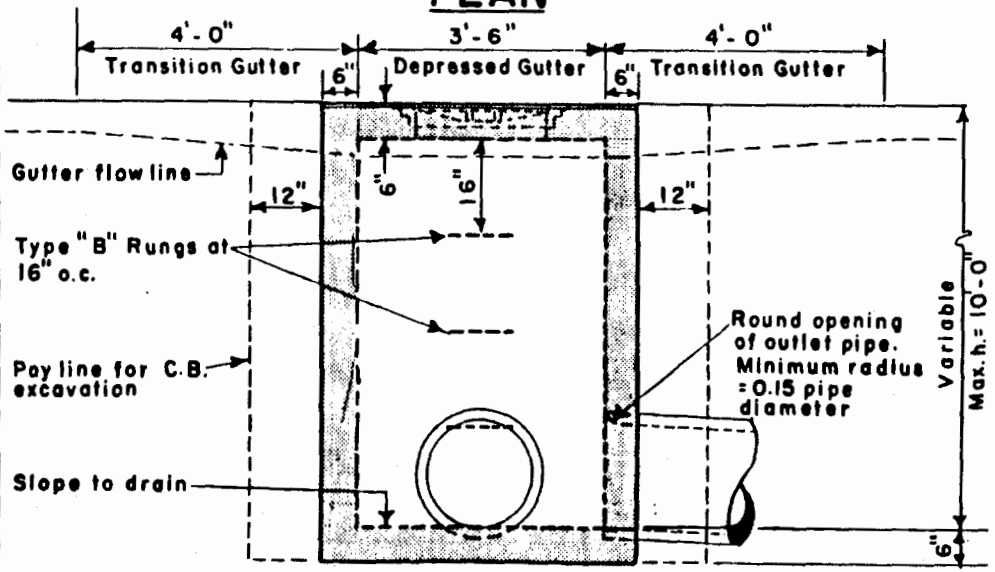
D-11

TYPE "D" CATCH BASIN

SCALE: 3/8" = 1'-0"



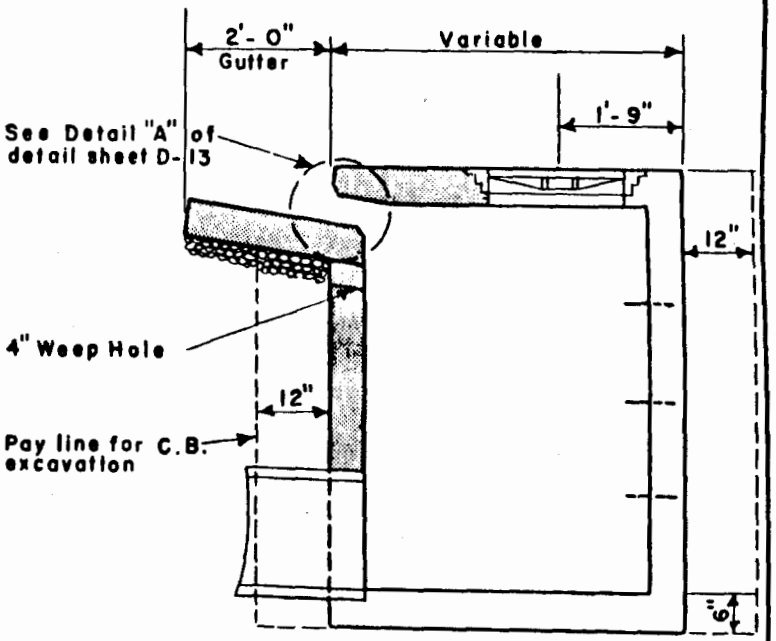
PLAN



ELEVATION

NOTES:

1. Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.
2. See sheet D-12 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.



SECTION A-A

D-12

STANDARD DETAILS

TYPE "D" CATCH BASIN REINFORCEMENT DETAILS

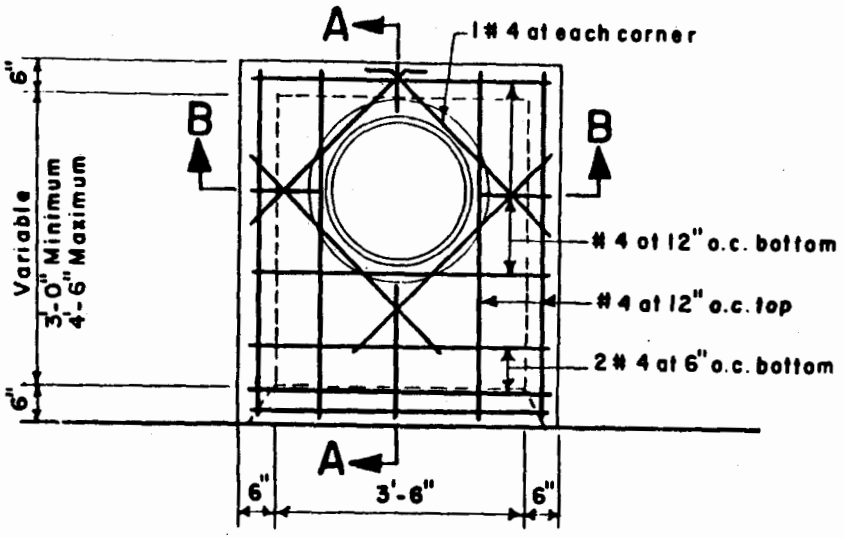
SEPTEMBER 1984

SCALE: 3/8" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

TYPE "D" CATCH BASIN REINFORCEMENT DETAILS

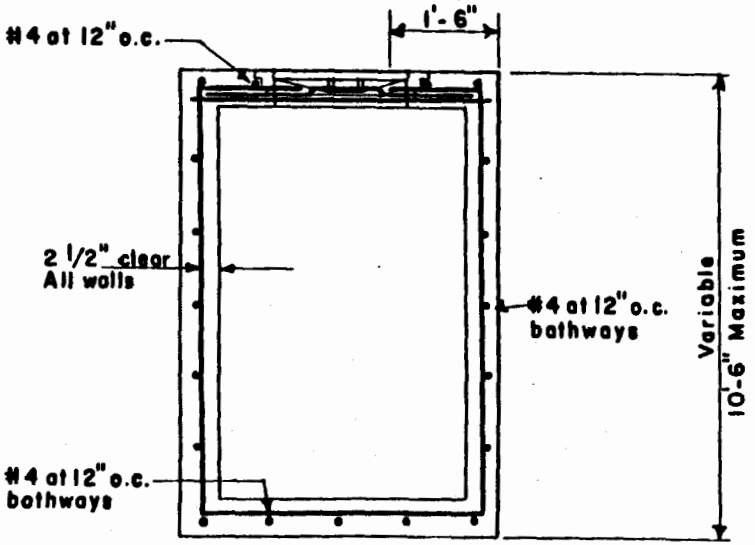
SCALE: 3/8" = 1'-0"



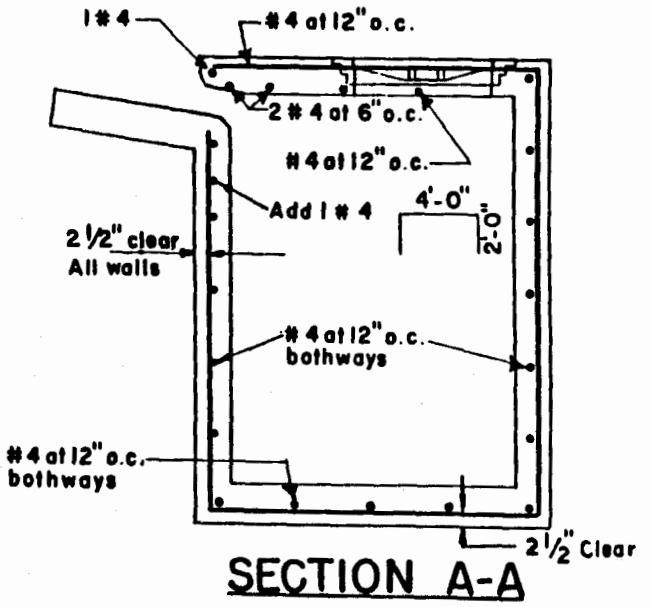
PLAN

NOTES:

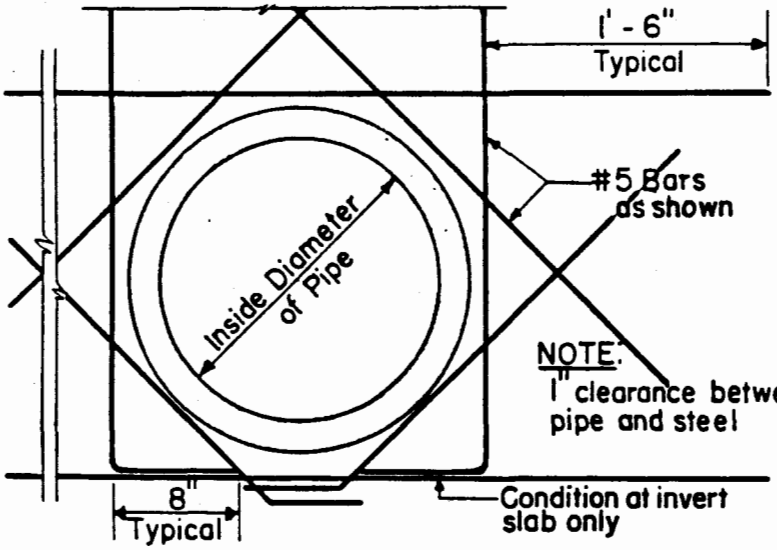
1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.



SECTION B-B

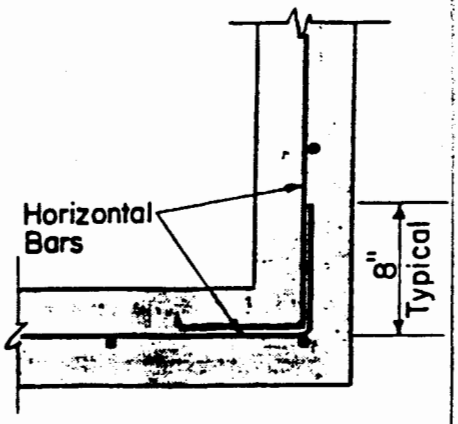


SECTION A-A



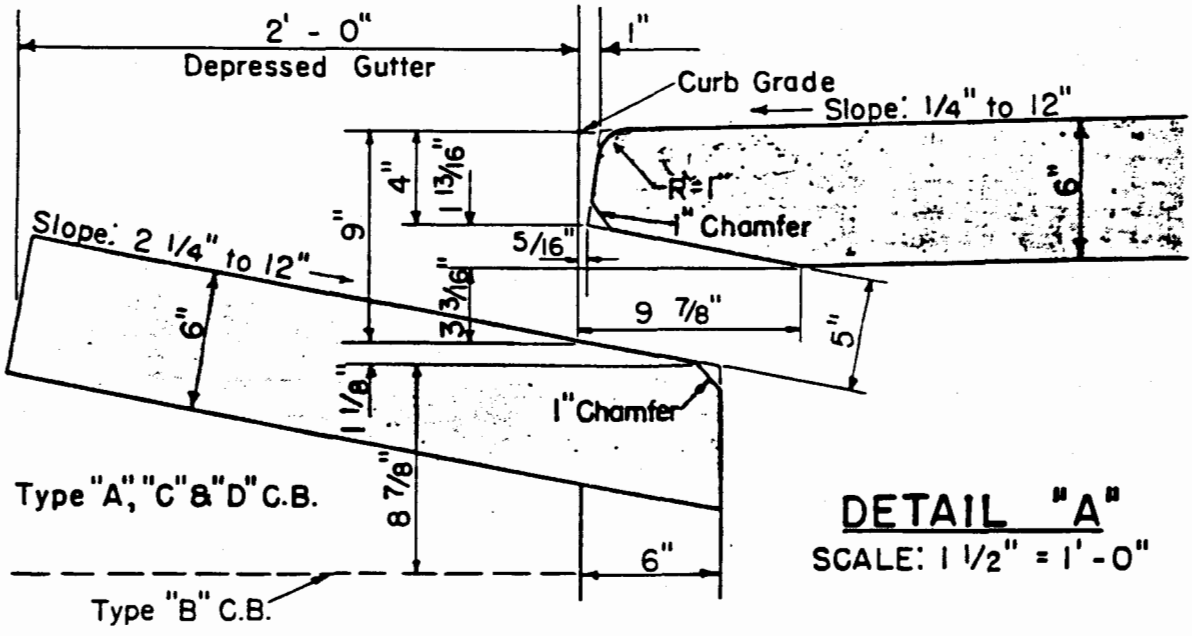
TYPICAL REINFORCEMENT AT PIPES

SCALE: 1" = 1' - 0"



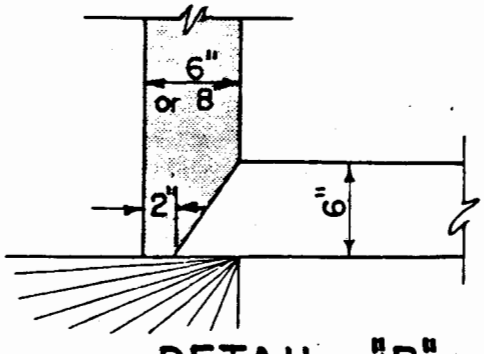
TYPICAL CORNER REINFORCEMENT LAPPING

SCALE: 1" = 1' - 0"



DETAIL "A"

SCALE: 1 1/2" = 1' - 0"

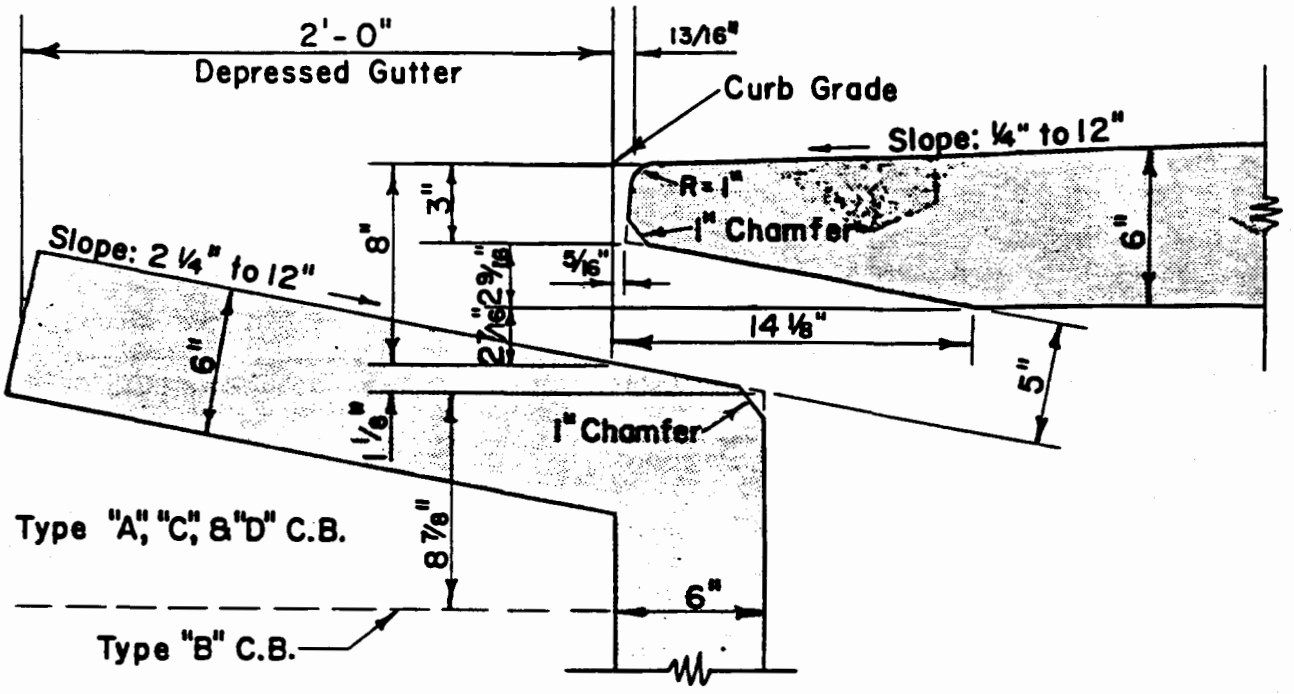


DETAIL "B"

SCALE: 1" = 1' - 0"

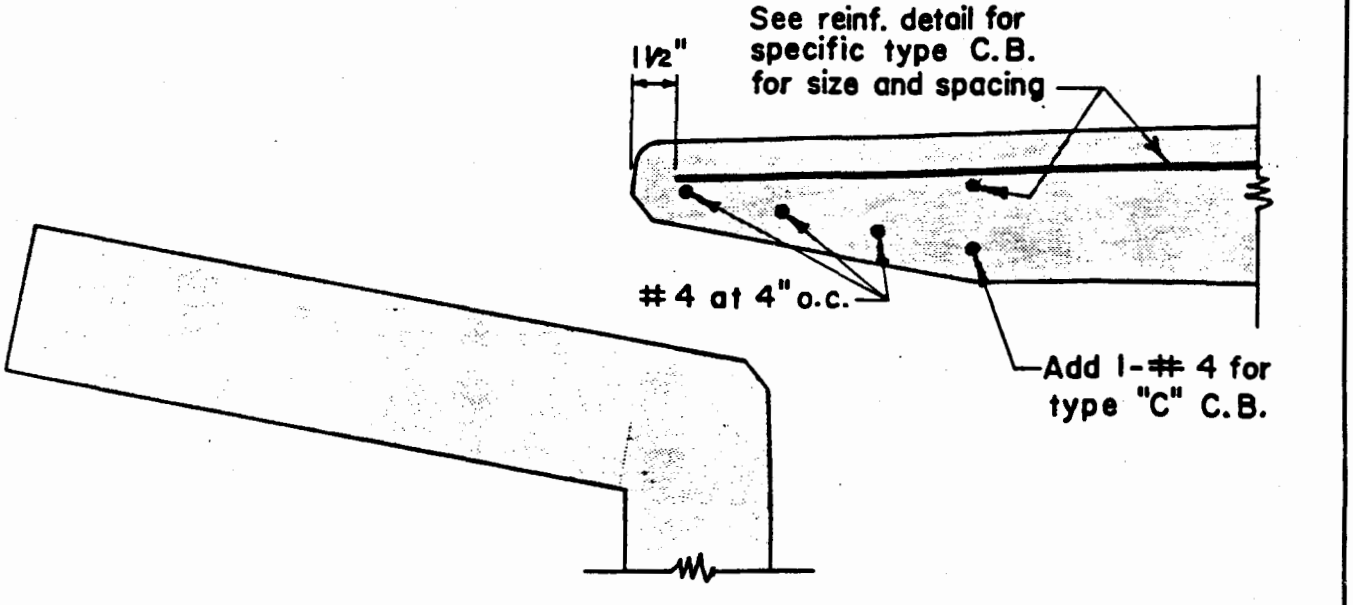
CATCH BASIN DETAILS

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	CATCH BASIN DETAILS SCALE: AS NOTED SEPTEMBER 1984	STANDARD DETAILS	D-13



DETAIL "A_1"

SCALE: 1 1/2" = 1'-0"



REINFORCEMENT FOR DETAIL "A_1"

SCALE: 1 1/2" = 1'-0"

DETAILS FOR CATCH BASIN WITH 5" CURB

D-14	STANDARD DETAILS	DETAILS FOR CATCH BASIN WITH 5" CURB SEPTEMBER 1984 SCALE: 1-1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

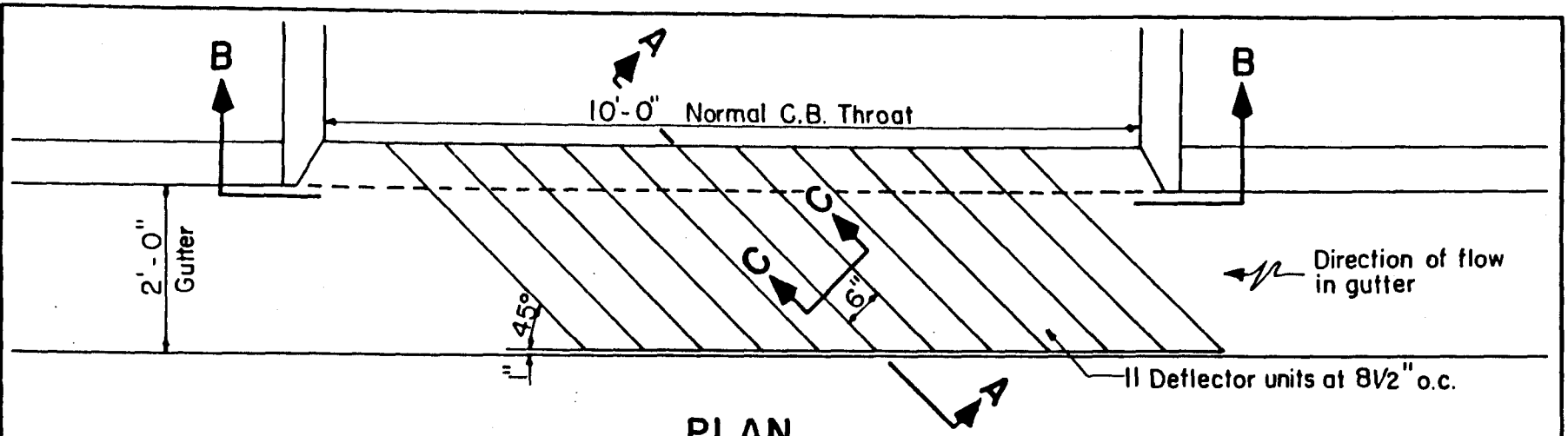
DEFLECTOR INLET FOR CATCH BASIN

SCALE: AS NOTED

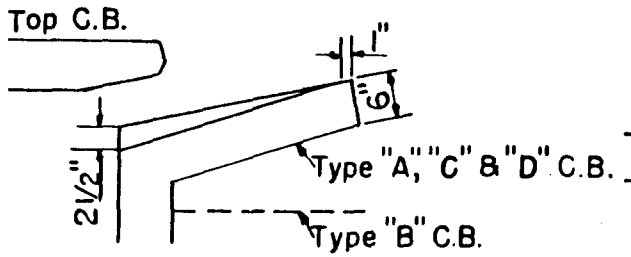
SEPTEMBER 1984

STANDARD DETAILS

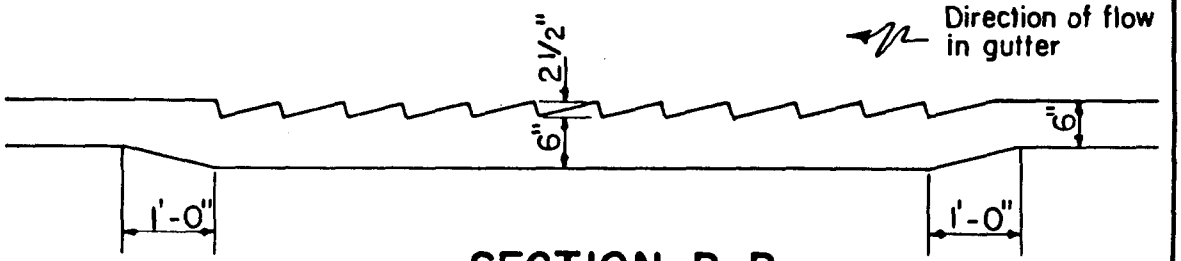
D-15



PLAN

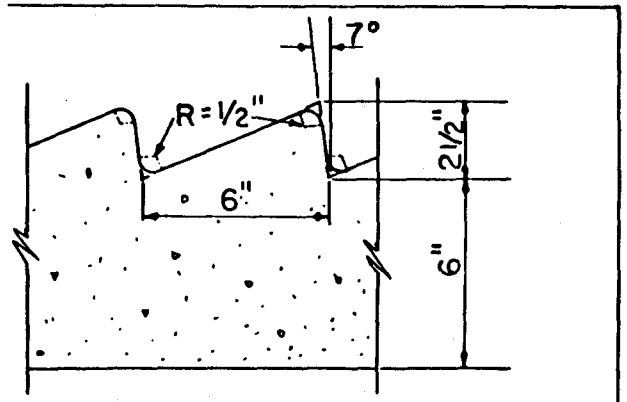


SECTION A-A



SECTION B-B

NOTE:
For 3'-6" C.B. throat construct
3 deflector units at 8 1/2" o.c.



SECTION C-C
SCALE: 2" = 1'-0"

DEFLECTOR INLET FOR CATCH BASIN

SCALE: 1/2" = 1'-0"

D-16

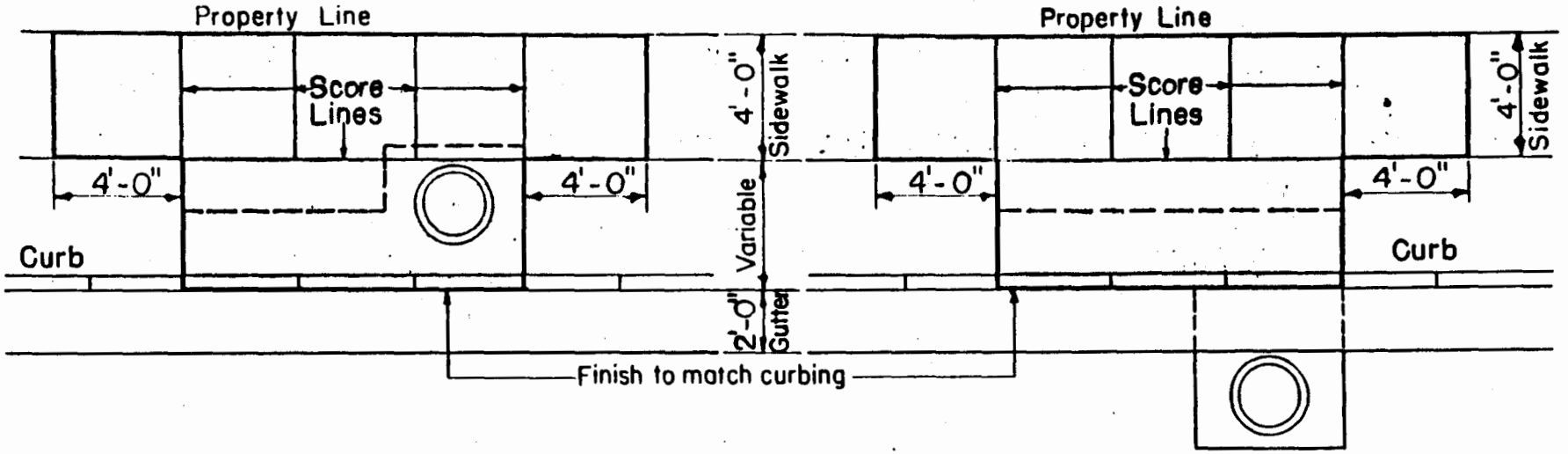
STANDARD DETAILS

MONOLITHIC CONSTRUCTION OF CATCH BASIN TOP SLAB AND SIDEWALK

SEPTEMBER 1984

SCALE: 3/16" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII



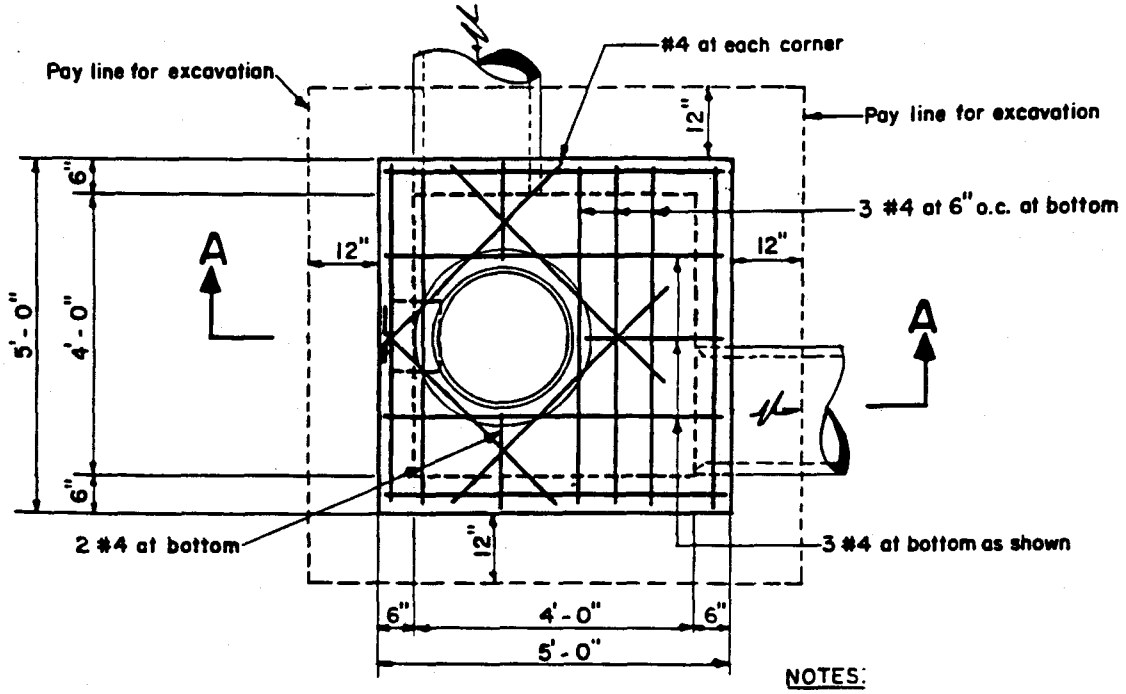
TYPE "A" CATCH BASIN

TYPE "B" CATCH BASIN

NOTES

1. A four foot section of sidewalk, on both sides of the catch basin, shall be poured monolithically with the top deck of the catch basin.
2. Pour top deck of catch basin after the curb and gutter are installed.
3. Scoring shall be done according to the drawing.
4. Monolithic construction of types "C" and "D" catch basins and sidewalk shall be similar to detail for type "B" catch basin.

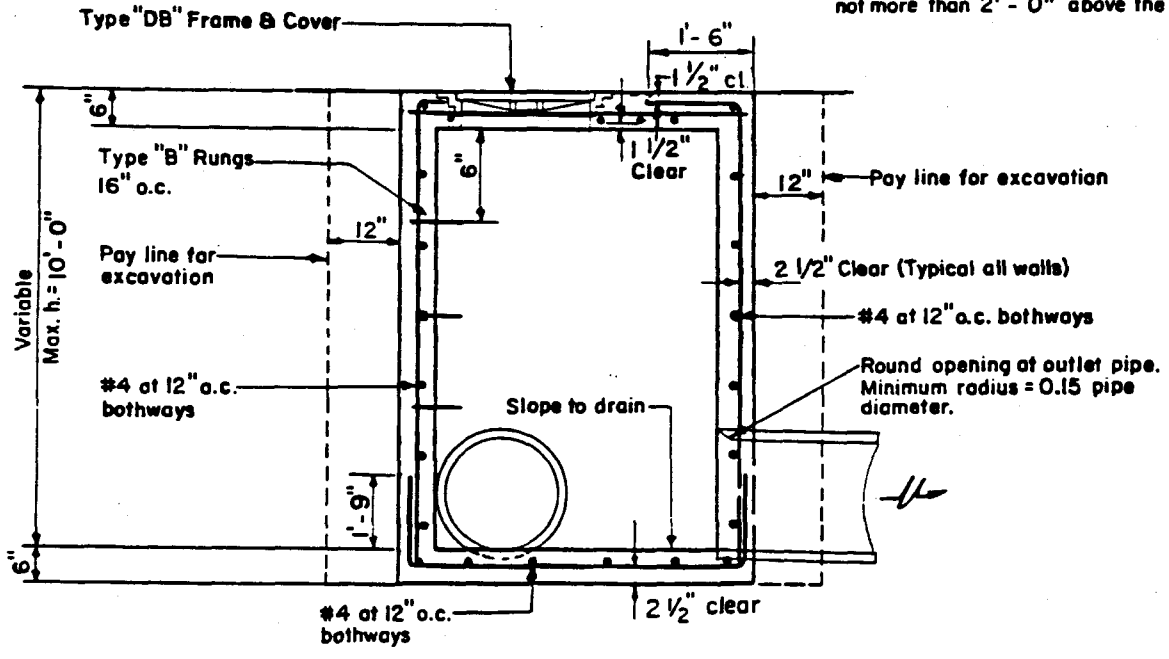
MONOLITHIC CONSTRUCTION OF CATCH BASIN TOP SLAB AND SIDEWALK



PLAN

NOTES:

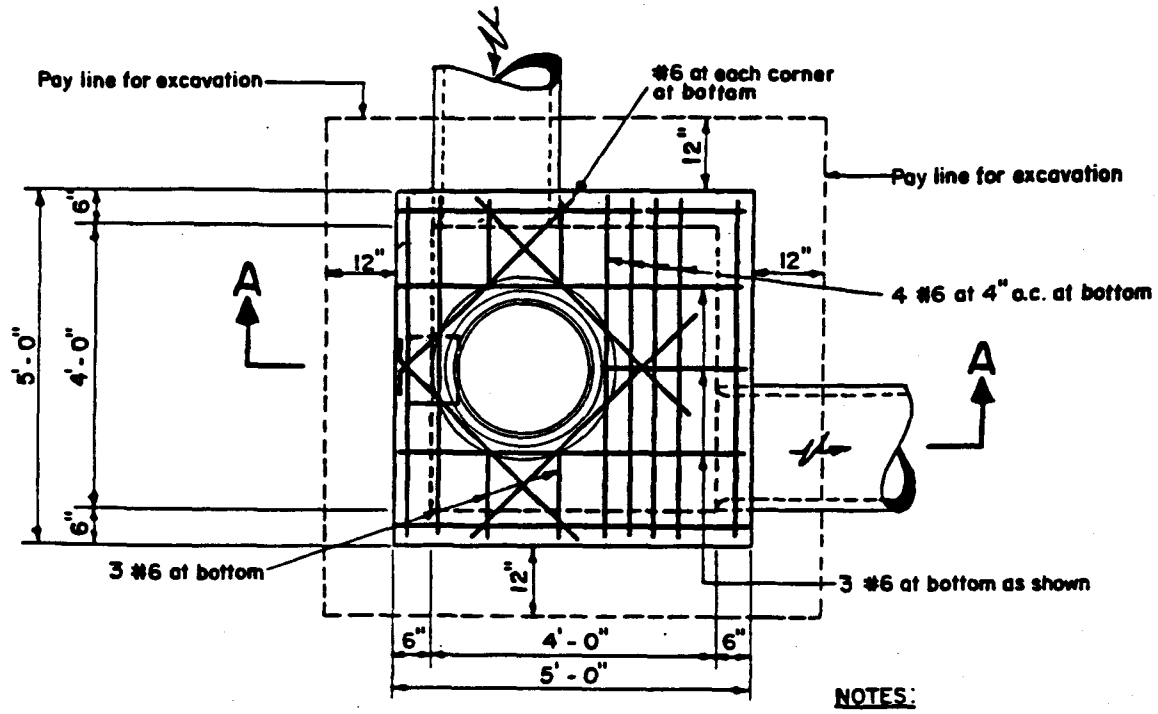
1. See sheet D-26 for channelizing detail.
2. See sheet D-13 for reinforcement at pipes and at corners.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.



SECTION A-A

SHALLOW DRAIN MANHOLE FOR SIDEWALK AREA

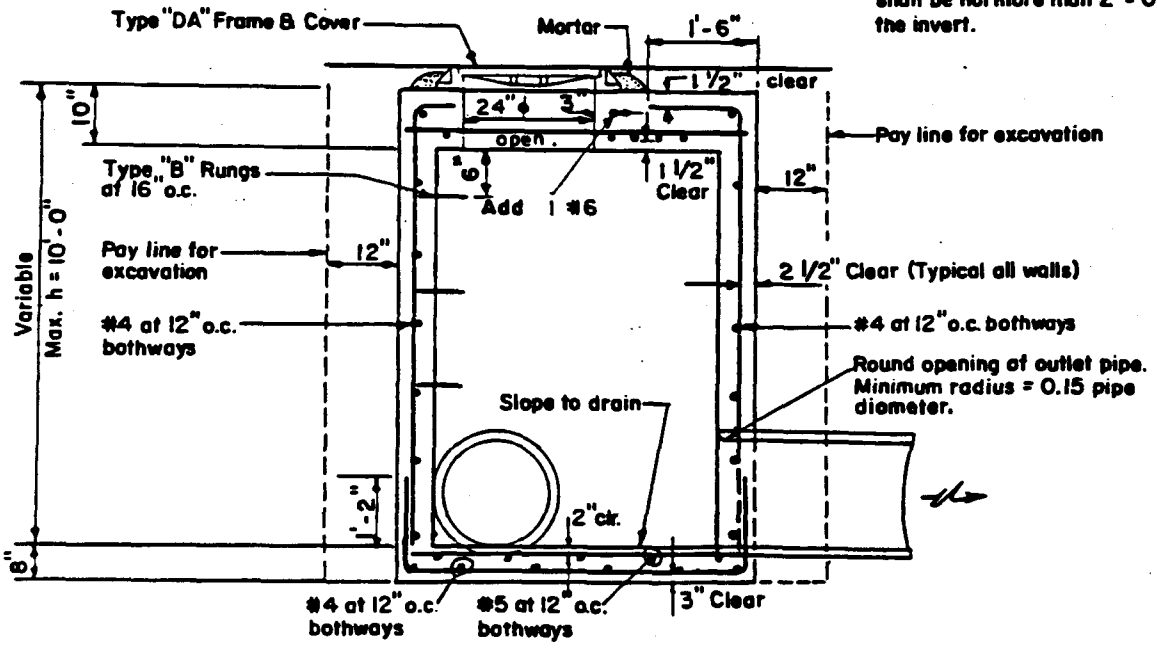
COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	SHALLOW DRAIN MANHOLE FOR SIDEWALK AREA SCALE: 3/8" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-17



PLAN

NOTES:

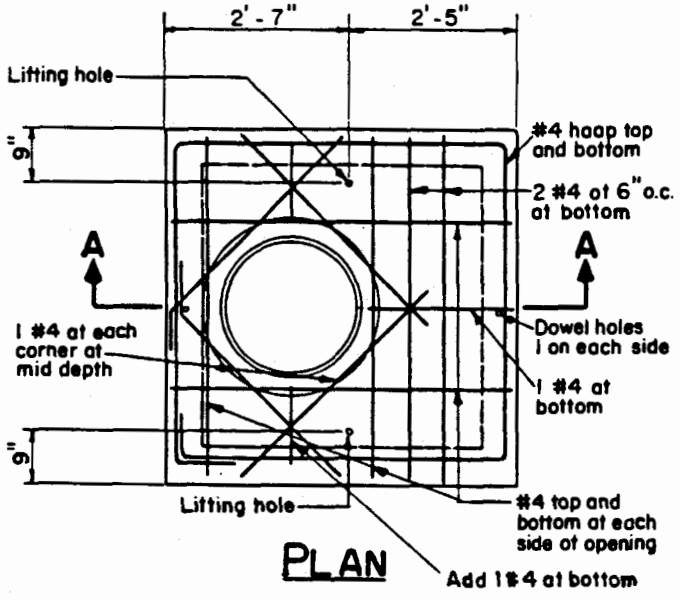
1. See sheet D-26 for channelizing detail.
2. See sheet D-13 for reinforcement at pipes and corners.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.



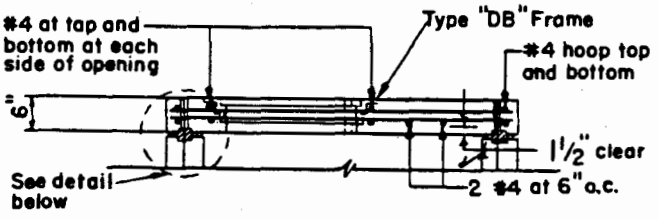
SECTION A-A

SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA

D-18	STANDARD DETAILS	SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA SEPTEMBER 1984 SCALE: 3/8" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII



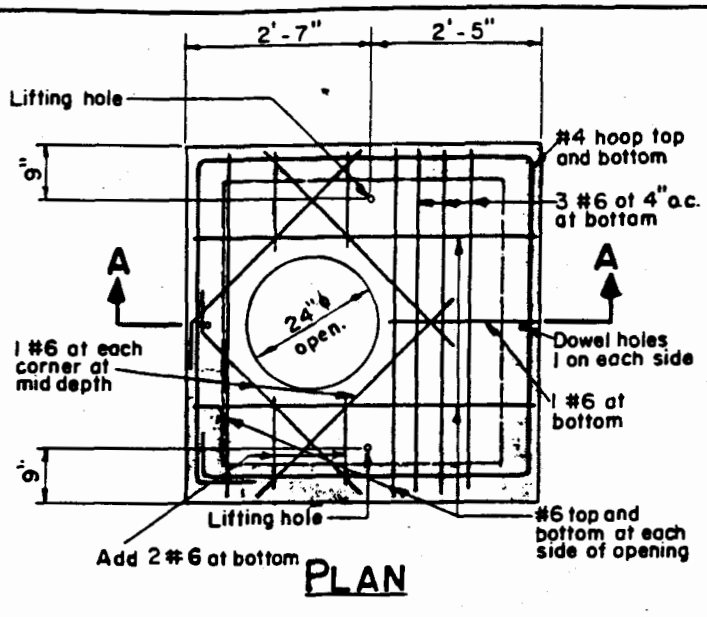
PLAN



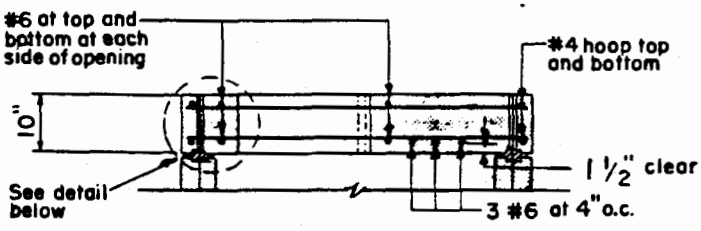
SECTION A-A

FOR SIDEWALK AREA

SCALE: 3/8" = 1'-0"



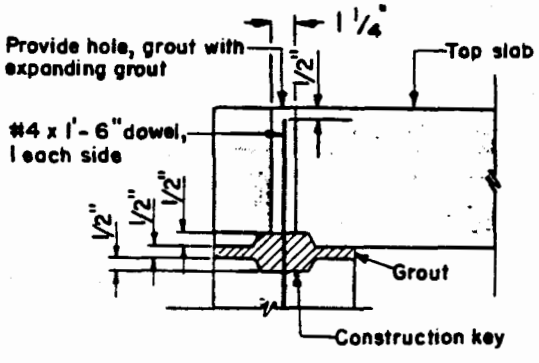
PLAN



SECTION A-A

FOR PAVEMENT AREA

SCALE: 3/8" = 1'-0"

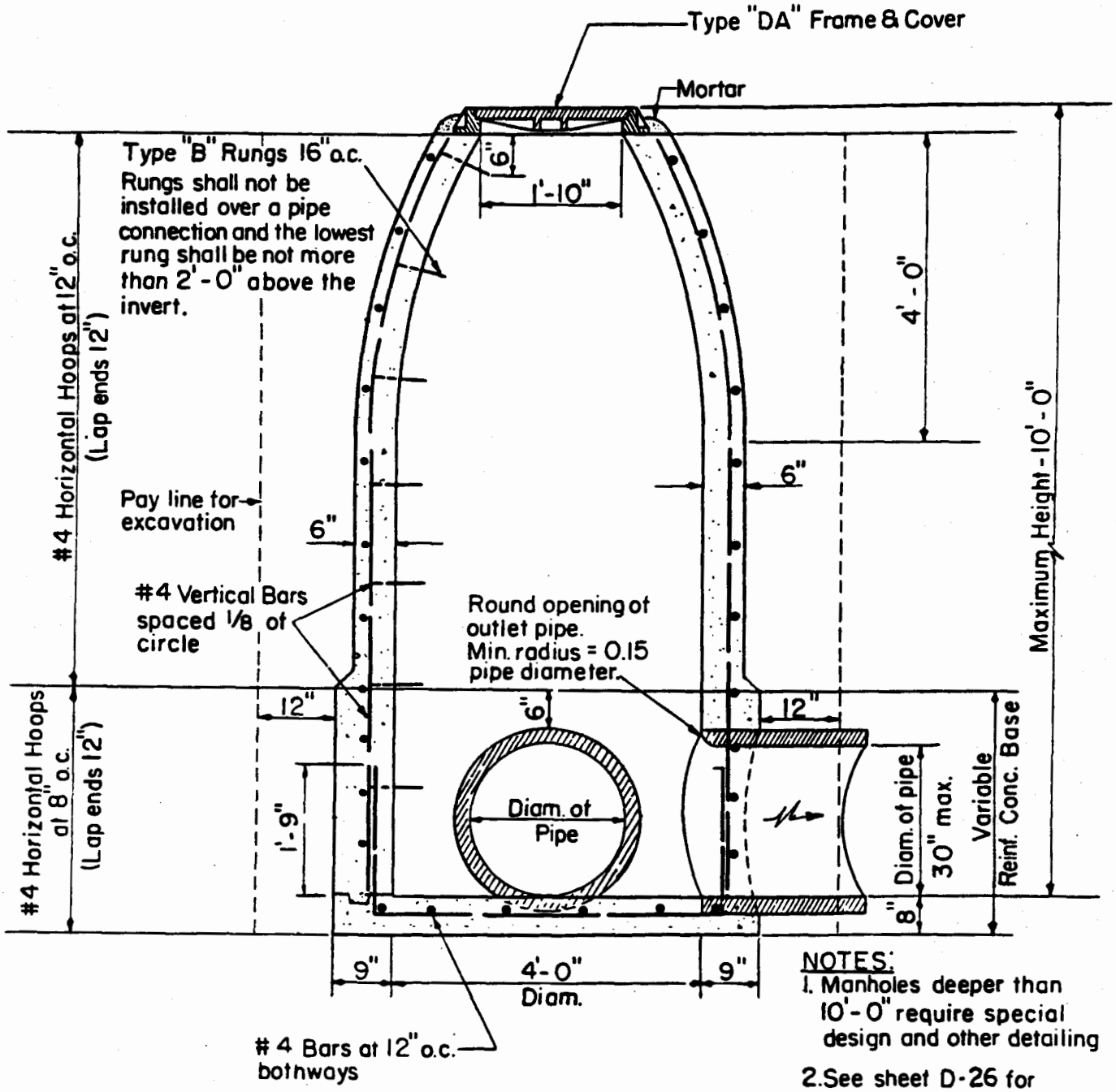


DETAIL

SCALE: 1 1/2" = 1'-0"

PRE-CAST TOP SLAB FOR SHALLOW DRAIN MANHOLE

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	PRE-CAST TOP SLAB FOR SHALLOW DRAIN MANHOLE SCALE: AS NOTED SEPTEMBER 1984	STANDARD DETAILS	D-19



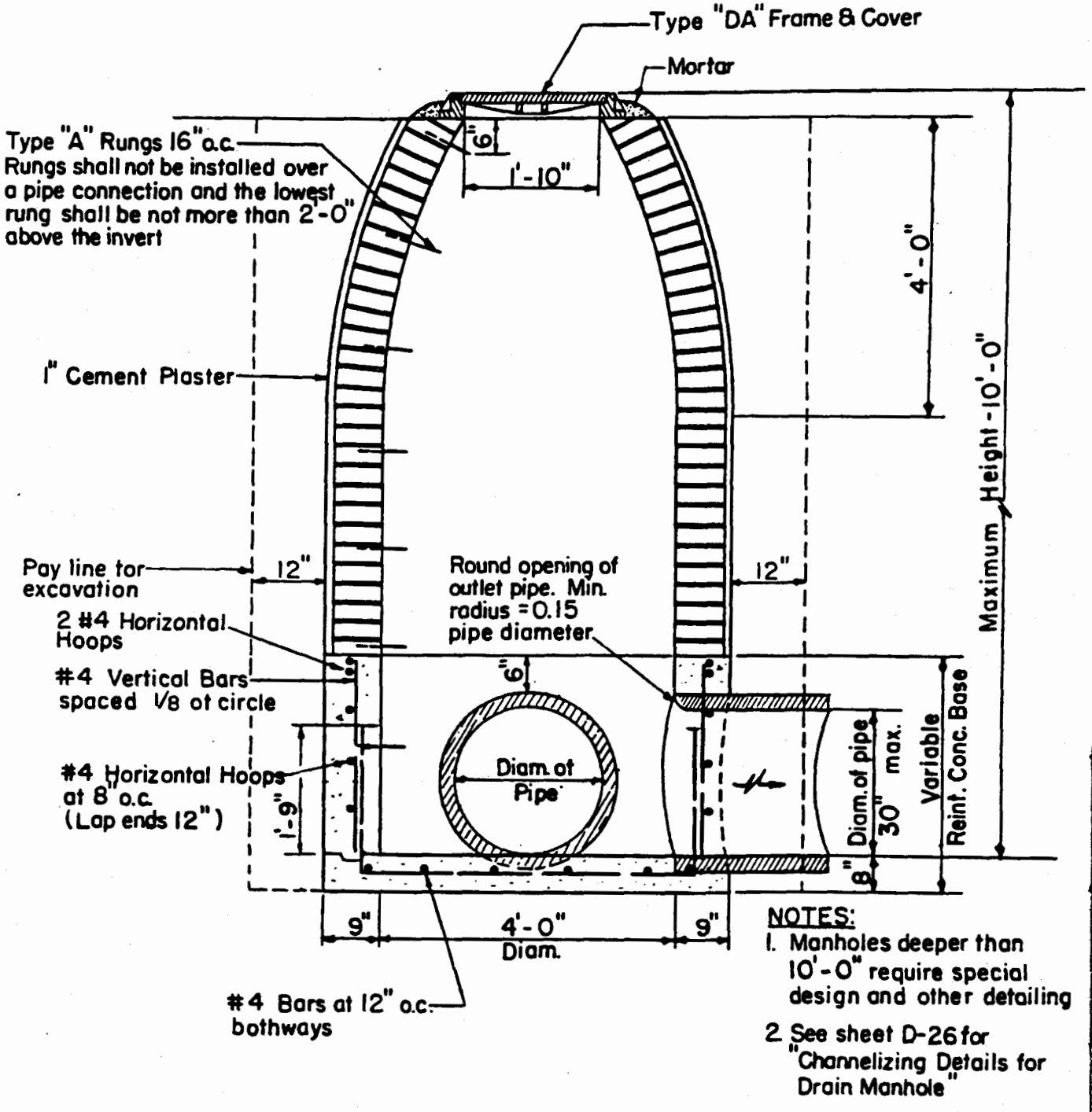
NOTES:

1. Manholes deeper than 10'-0" require special design and other detailing
2. See sheet D-26 for "Channelizing Details for Drain Manhole"

CONCRETE WALL DRAIN MANHOLE

SCALE: 1/2" = 1'-0"

D-20	STANDARD DETAILS	CONCRETE WALL DRAIN MANHOLE SEPTEMBER 1984 SCALE: 1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII



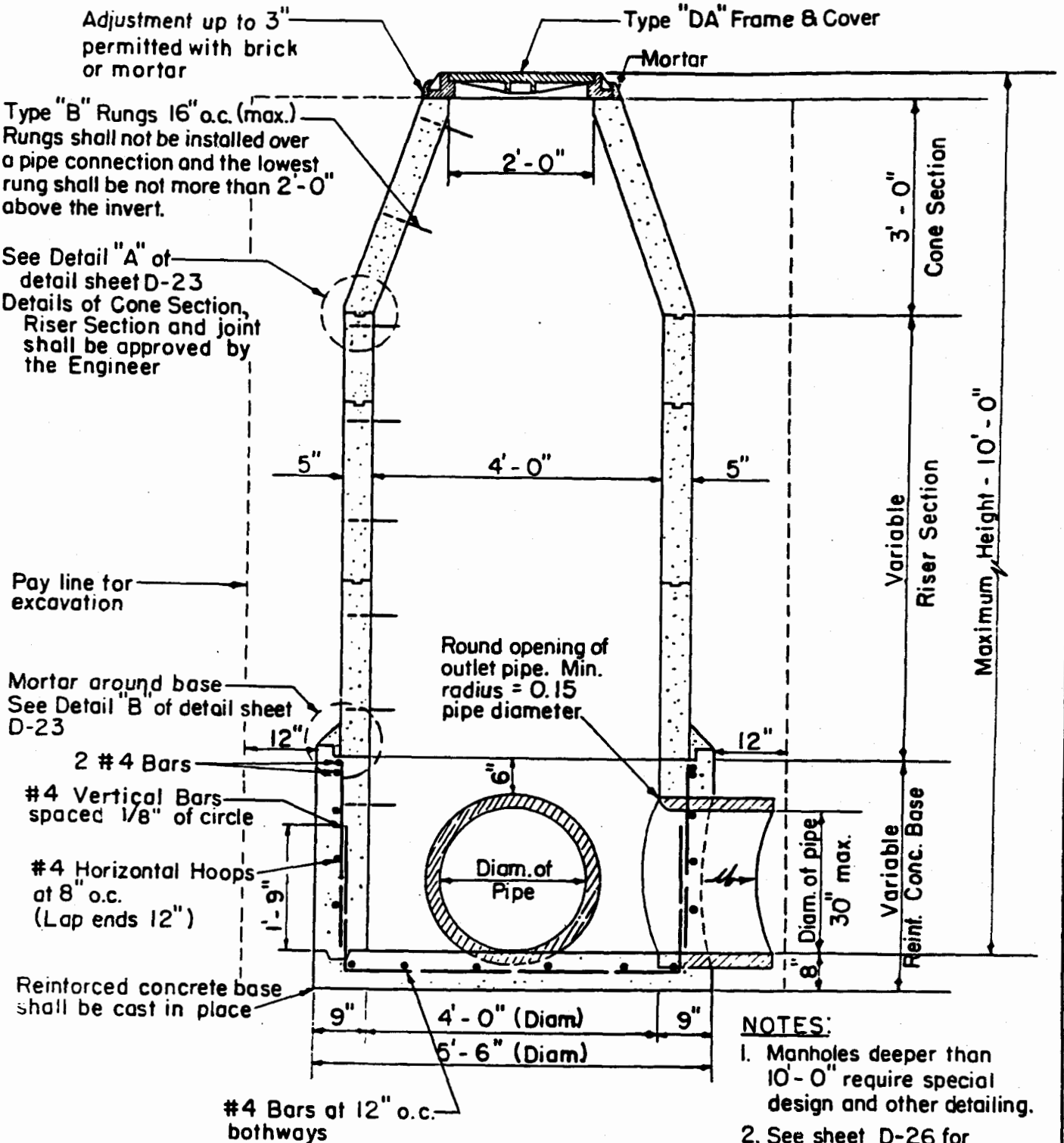
NOTES:

1. Manholes deeper than 10'-0" require special design and other detailing
2. See sheet D-26 for "Channelizing Details for Drain Manhole"

BRICK WALL DRAIN MANHOLE

SCALE: 1/2" = 1'-0"

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	BRICK WALL DRAIN MANHOLE SCALE: 1/2" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-21



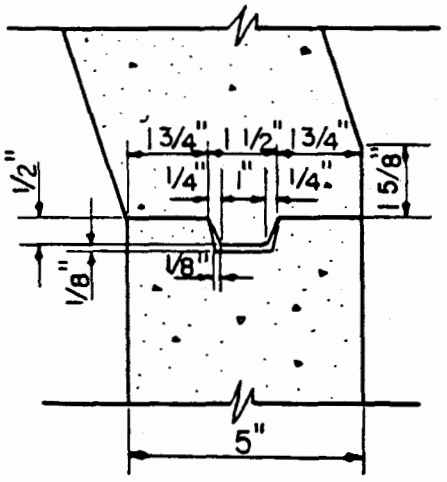
NOTES:

1. Manholes deeper than 10'-0" require special design and other detailing.
2. See sheet D-26 for "Channelizing Details for Drain Manhole"

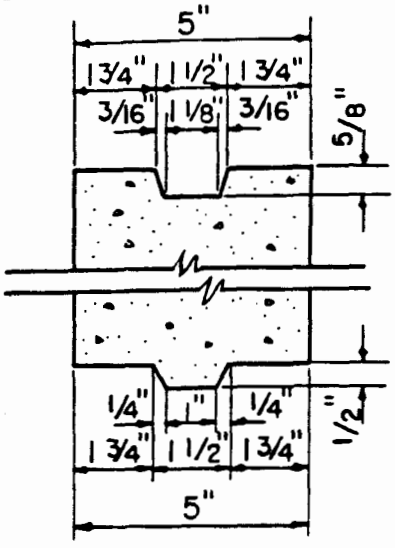
PRE-CAST CONCRETE DRAIN MANHOLE

SCALE: 1/2" = 1'-0"

D-22	STANDARD DETAILS	PRE-CAST CONCRETE DRAIN MANHOLE SEPTEMBER 1984 S 1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

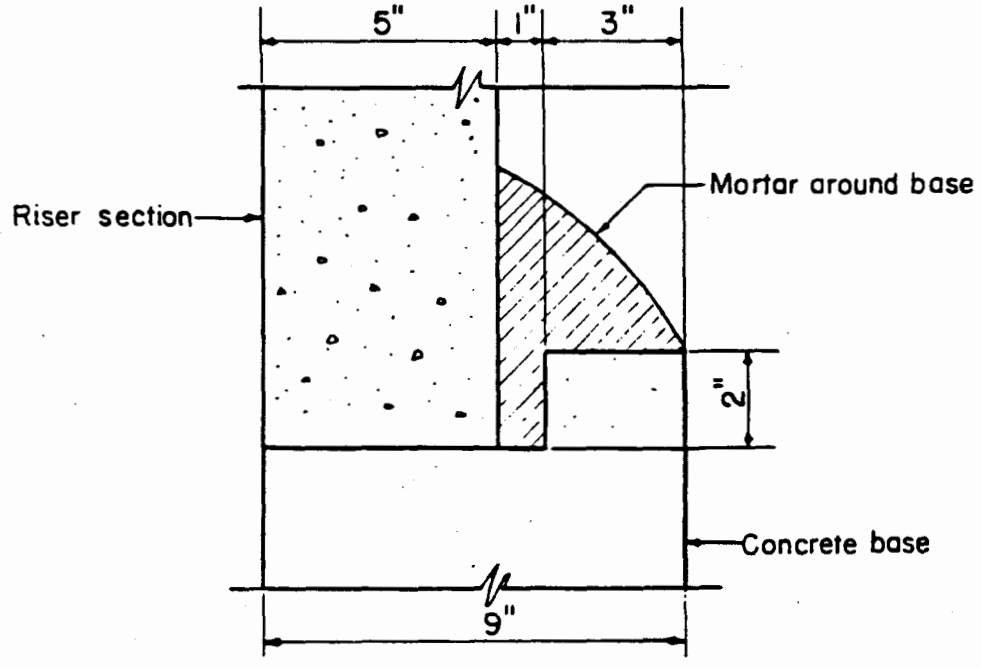


CONE SECTION



RISER SECTION

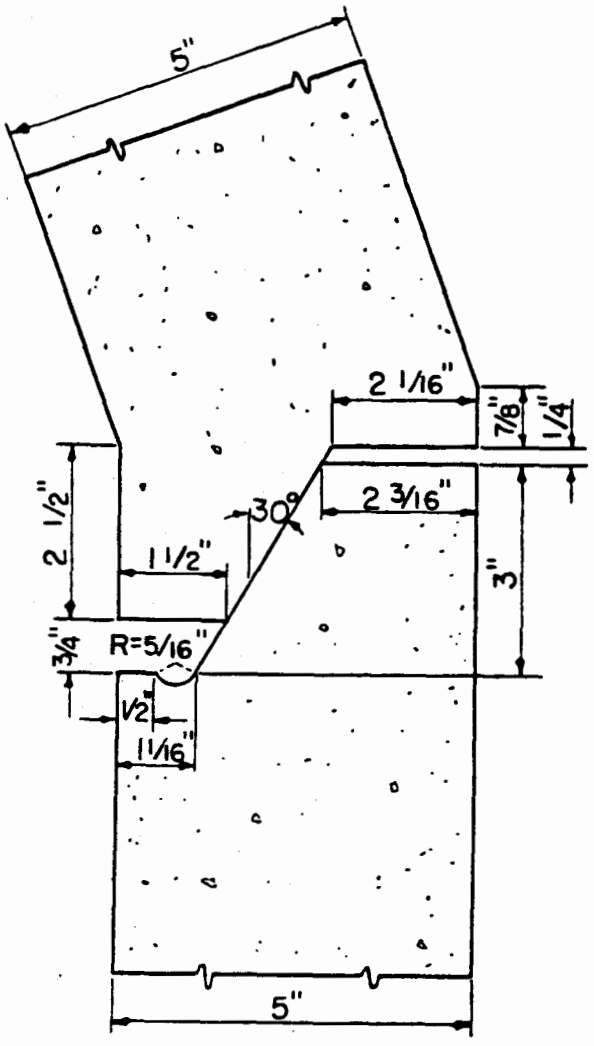
DETAIL "A"



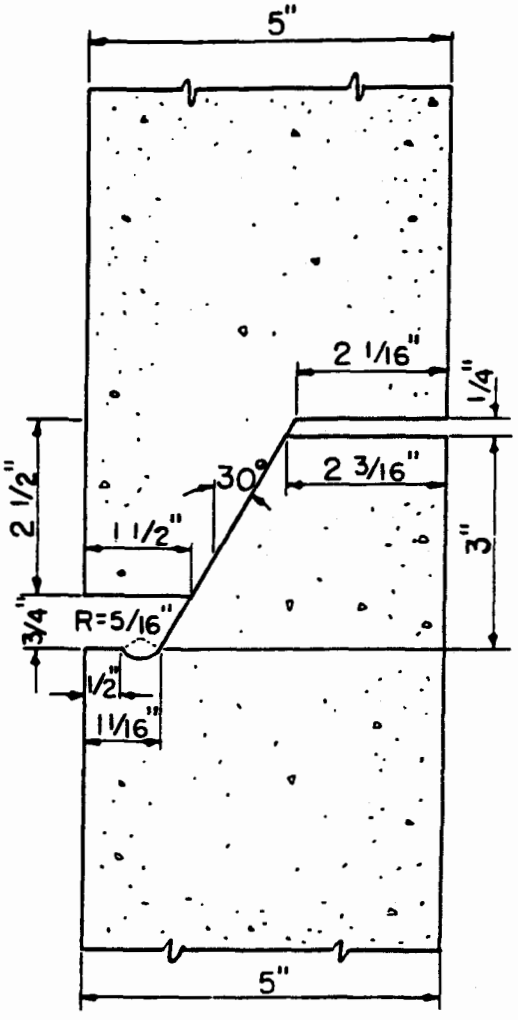
DETAIL "B"

PRE-CAST CONCRETE DRAIN MANHOLE DETAILS

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	PRE-CAST CONCRETE DRAIN MANHOLE DETAILS SCALE: 3" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-23



CONE SECTION



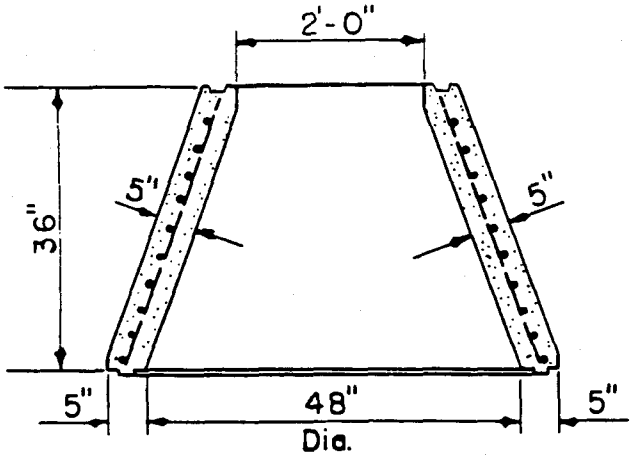
RISER SECTION

ALTERNATE DETAIL "A"

PRE-CAST CONCRETE DRAIN MANHOLE DETAILS

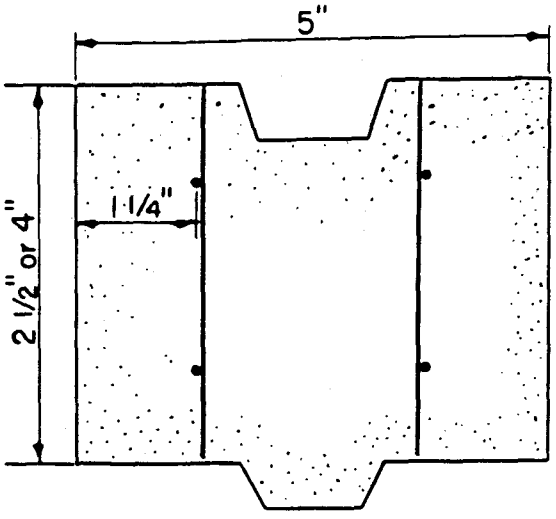
SCALE: 4 1/2" = 1'-0"

D-24	STANDARD DETAILS	PRE-CAST CONCRETE DRAIN MANHOLE DETAILS SEPTEMBER 1984 SCALE: 4-1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII



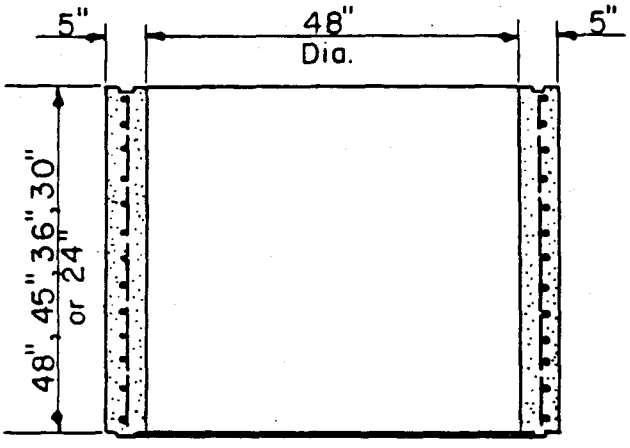
36" CONE

SCALE: 1/2" = 1'-0"



GRADE RING

SCALE: 1/2" = 1"



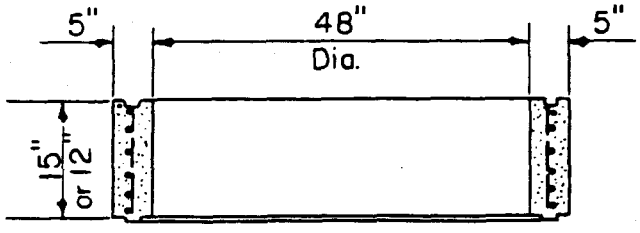
RISER

SCALE: 1/2" = 1'-0"

SECTION	A_s/L.F.	TOTAL WT. LB.
48" x 48" Riser	0.15	2,752
48" x 45" Riser	0.15	2,580
48" x 36" Riser	0.15	2,064
48" x 30" Riser	0.15	1,720
48" x 24" Riser	0.15	1,376
48" x 15" Riser	0.15	860
48" x 12" Riser	0.15	688
48" x 24" x 36" Cone	0.16	2,100
22" x 4" Grade Ring	0.12	200
22" x 2 1/2" Grade Ring	0.12	95
48" x 32" Riser	0.15	2,691
48" x 16" Riser	0.15	1,345

NOTES

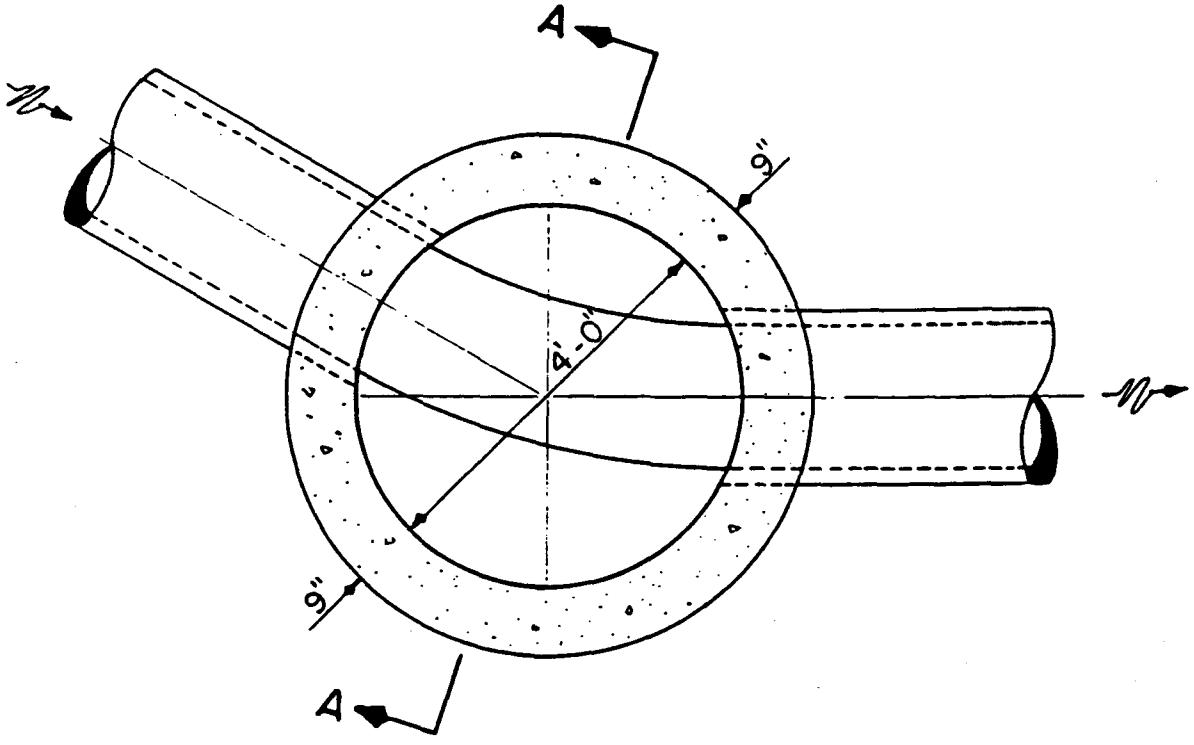
1. Pre-cast sections shall conform to ASTM C 478 - 61T.
2. Manufacturers may submit to the Engineer for approval, prior to manufacturing, designs other than those shown on this sheet.



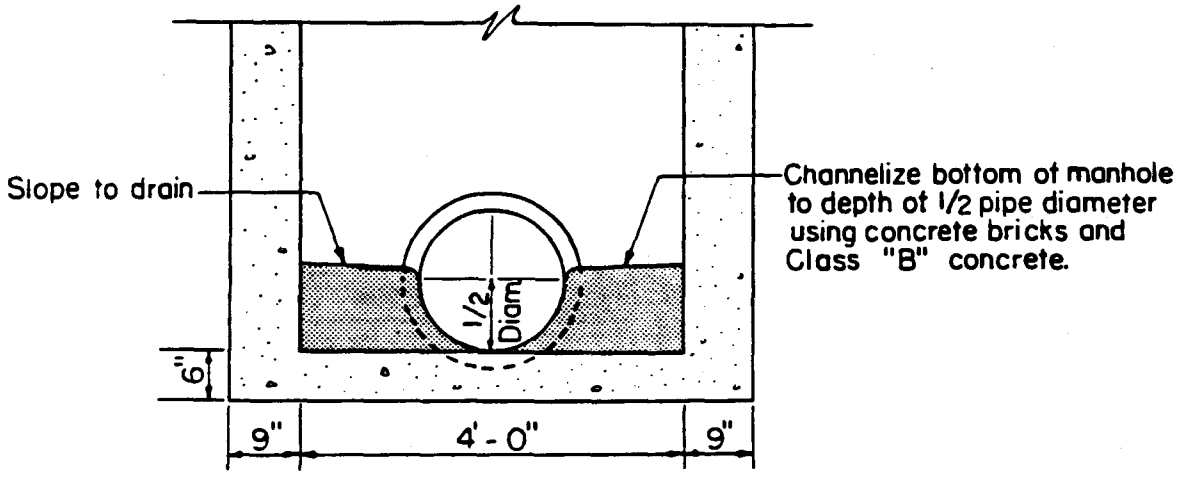
RISER

SCALE: 1/2" = 1'-0"

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	PRE-CAST CONCRETE DRAIN MANHOLE DETAILS SCALE: 1/2" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-25



PLAN

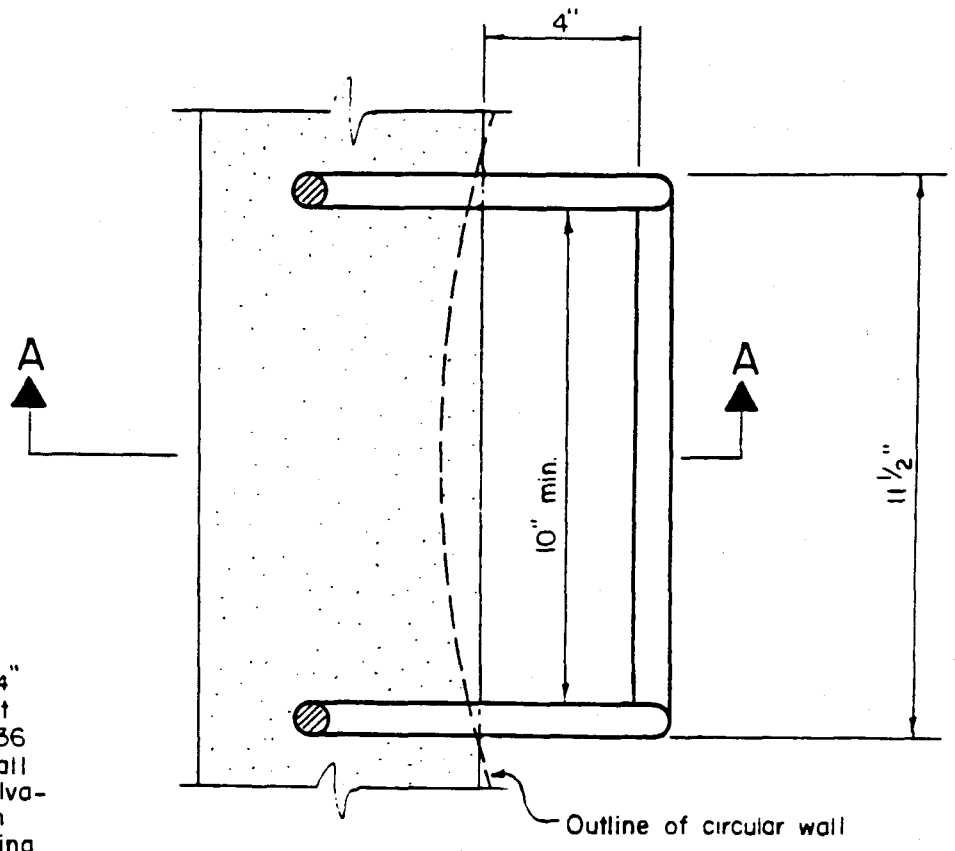


SECTION A-A

CHANNELIZING DETAILS FOR DRAIN MANHOLE

SCALE: 1/2" = 1'-0"

D-26	STANDARD DETAILS	CHANNELIZING DETAILS FOR DRAIN MANHOLE SEPTEMBER 1984 SCALE: 1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII



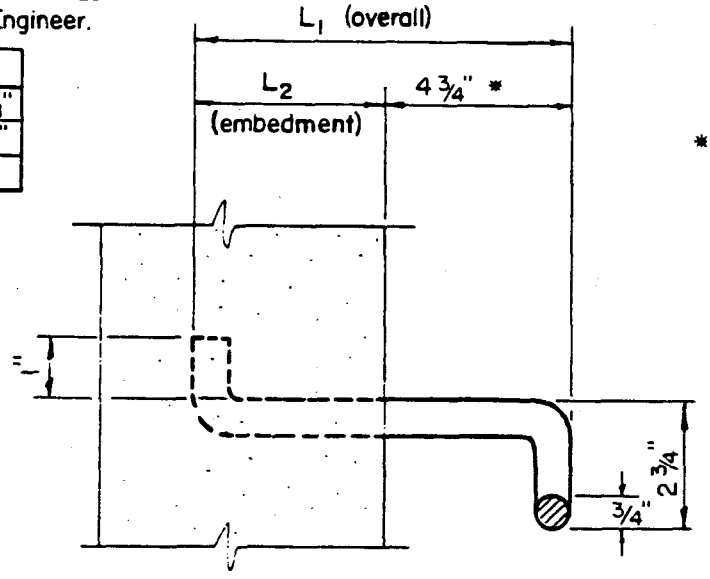
SECTION

NOTES:

1. Rungs shall be ¾" diameter wrought iron or ASTM A36 steel rods and shall be hot-dipped galvanized or cadmium plated after bending.

2. Any deviation from these details must be approved by the Chief Engineer.

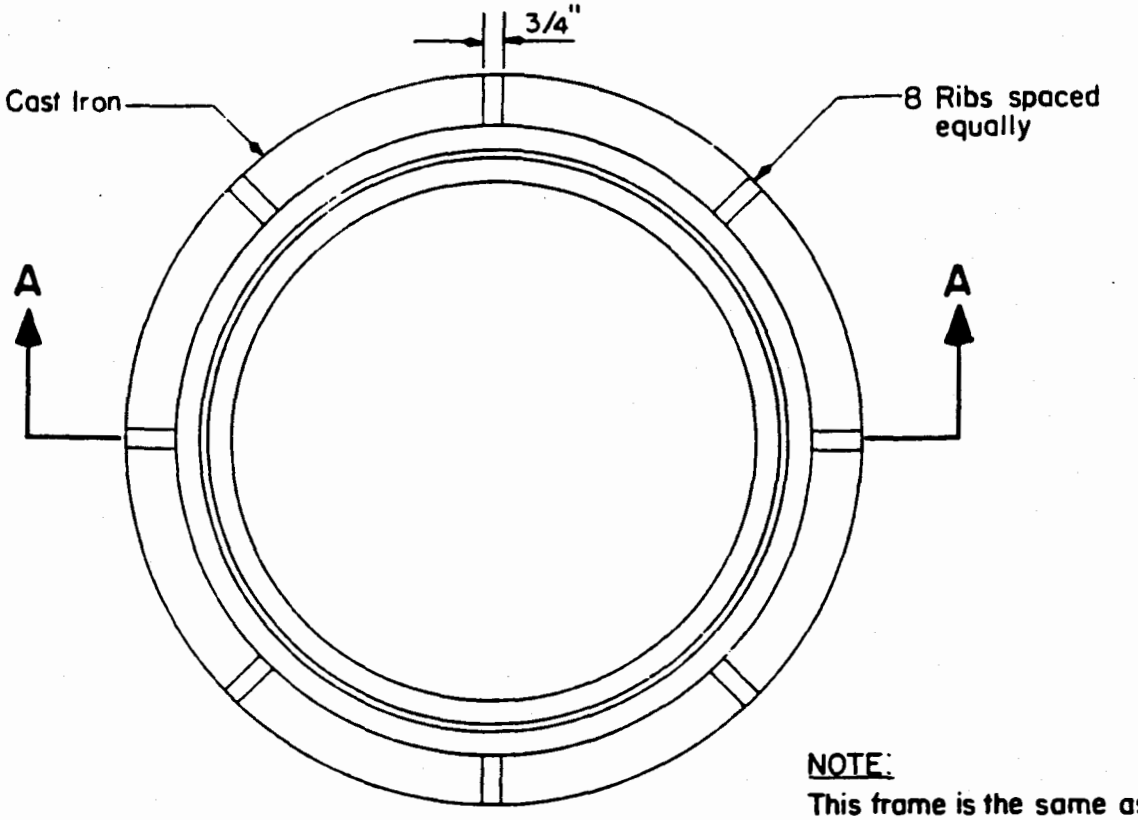
TYPE	WALLS	L_1	L_2
Type A	Brick	13 1/8"	7 5/8"
Type B	Concrete	9"	4 1/4"
Type C	Precast	7 3/4"	3"



* 3" for one rung at top of opening.

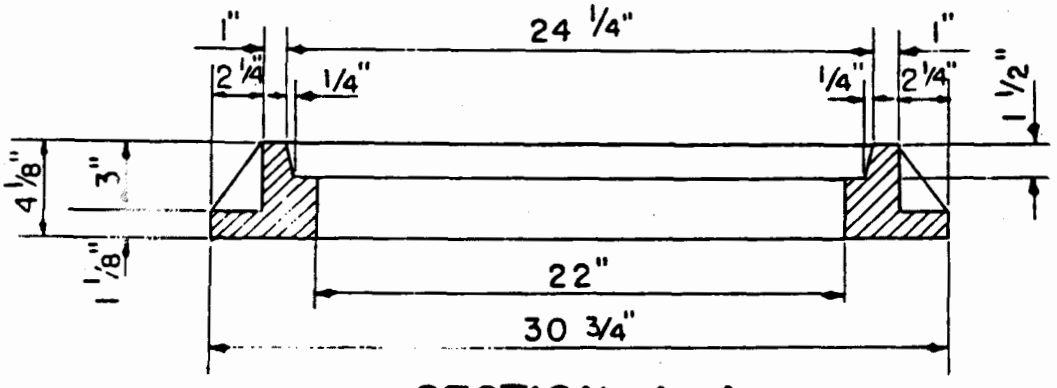
SECTION A-A

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	RUNGS FOR CATCH BASINS AND MANHOLES SCALE: 3" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-27



NOTE:
This frame is the same as sewer manhole frame Type "SA".

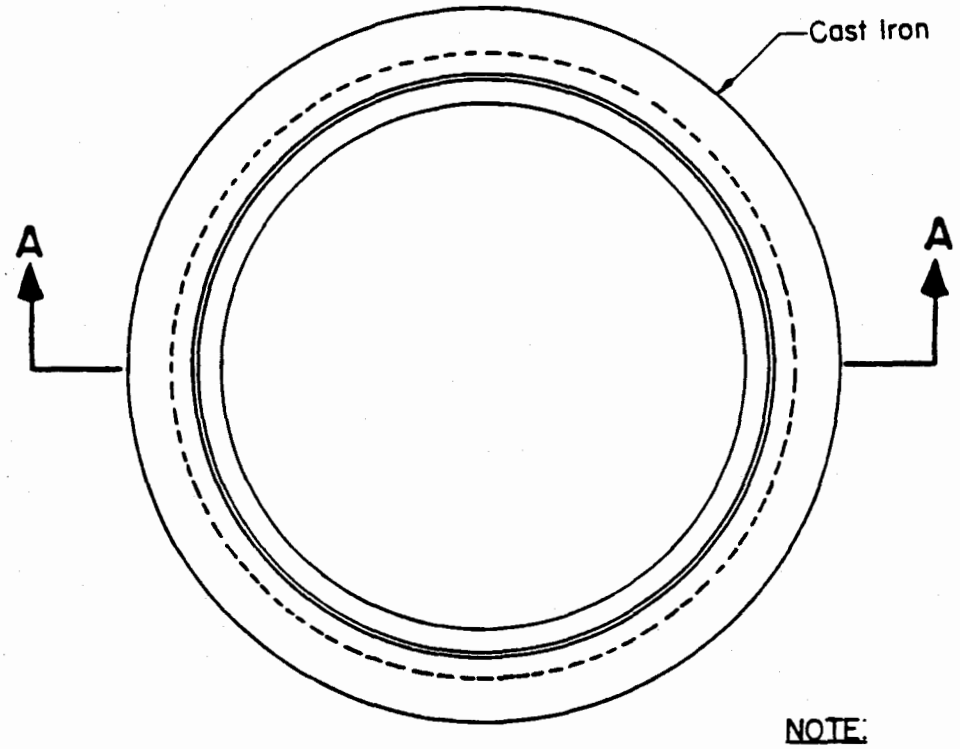
PLAN



SECTION A-A

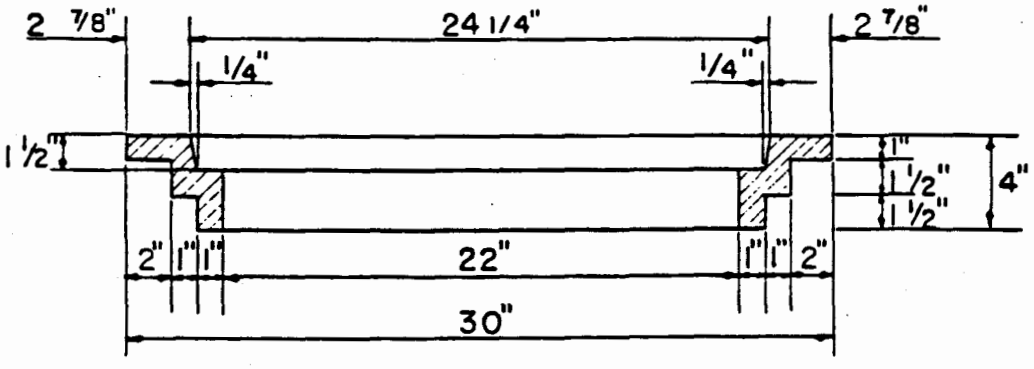
TYPE "DA" FRAME FOR CATCH BASIN AND MANHOLE

D-28	STANDARD DETAILS	TYPE "DA" FRAME FOR CATCH BASIN AND MANHOLE SEPTEMBER 1984 SCALE: 1-1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII



PLAN

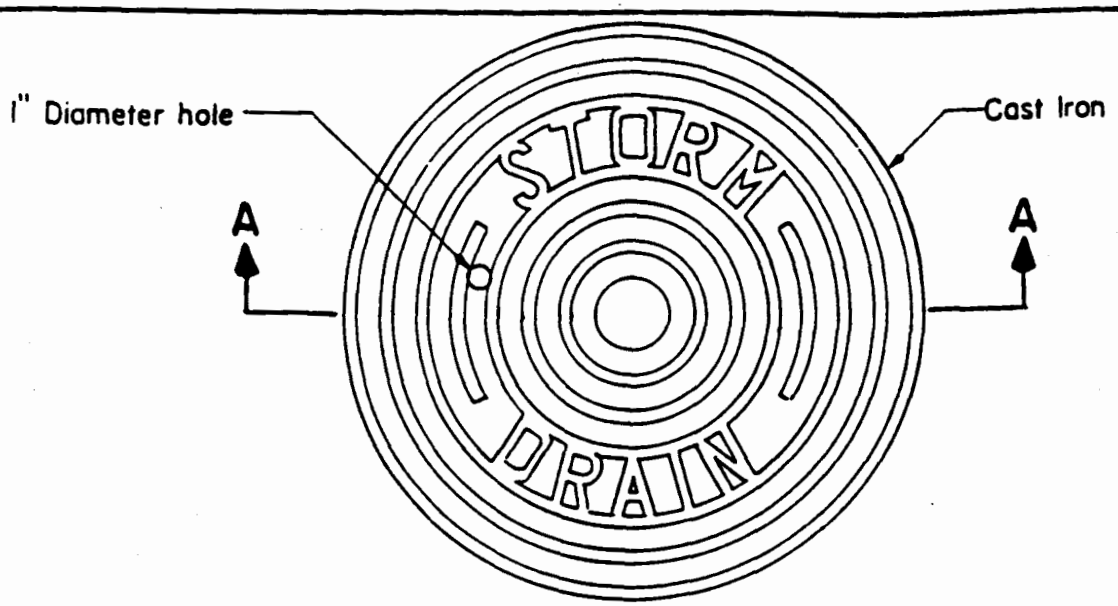
NOTE:
This frame is the same as sewer manhole frame Type "SD".



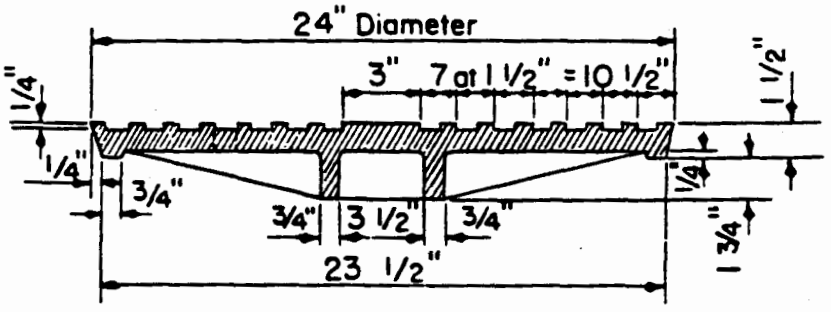
SECTION A - A

TYPE "DB" FRAME FOR CATCH BASIN AND MANHOLE

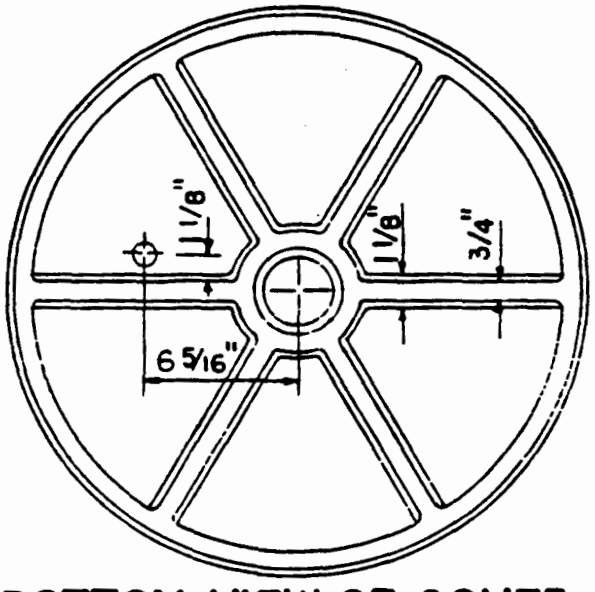
COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	TYPE "DB" FRAME FOR CATCH BASIN AND MANHOLE SCALE: 1-1/2" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-29



PLAN



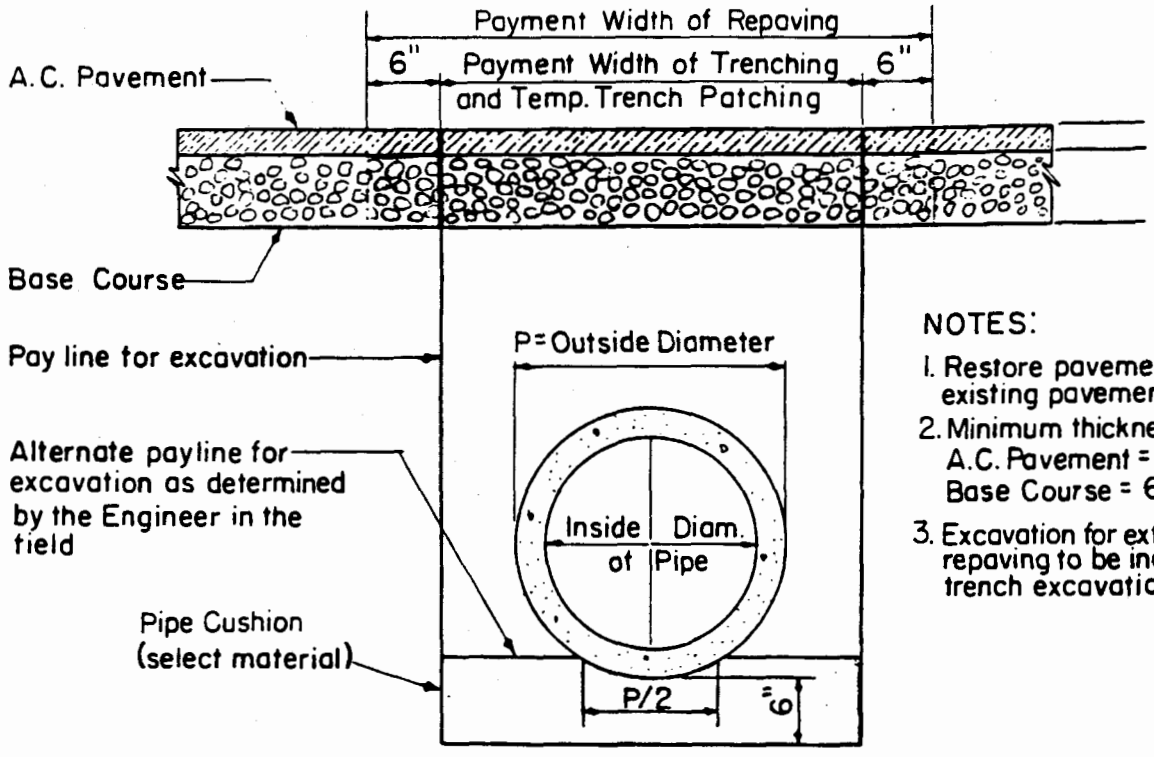
SECTION A - A



BOTTOM VIEW OF COVER

CATCH BASIN AND MANHOLE COVER

D-30	STANDARD DETAILS	CATCH BASIN AND MANHOLE COVER SEPTEMBER 1984 SCALE: 1-1/2" = 1'-0"	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII



NOTES:

1. Restore pavement to match existing pavement.
2. Minimum thickness of pavement:
   A.C. Pavement = 2"
   Base Course = 6"
3. Excavation for extra 6" width of repaving to be included with trench excavation.

ELEVATION

SCALE: 3/4" = 1'-0"

DRAIN PIPE SIZE	PAYMENT WIDTH OF TRENCHING	WIDTH OF REPAVING
18"	36"	48"
24"	48"	60"
30"	56"	68"
36"	64"	76"
42"	72"	84"
48"	80"	92"
54"	88"	100"
60"	96"	108"

PAYMENT TRENCH WIDTH AND REPAVING FOR DRAIN PIPES

COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII	PAYMENT TRENCH WIDTH AND REPAVING FOR DRAIN PIPES SCALE: 3/4" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-31

D-32

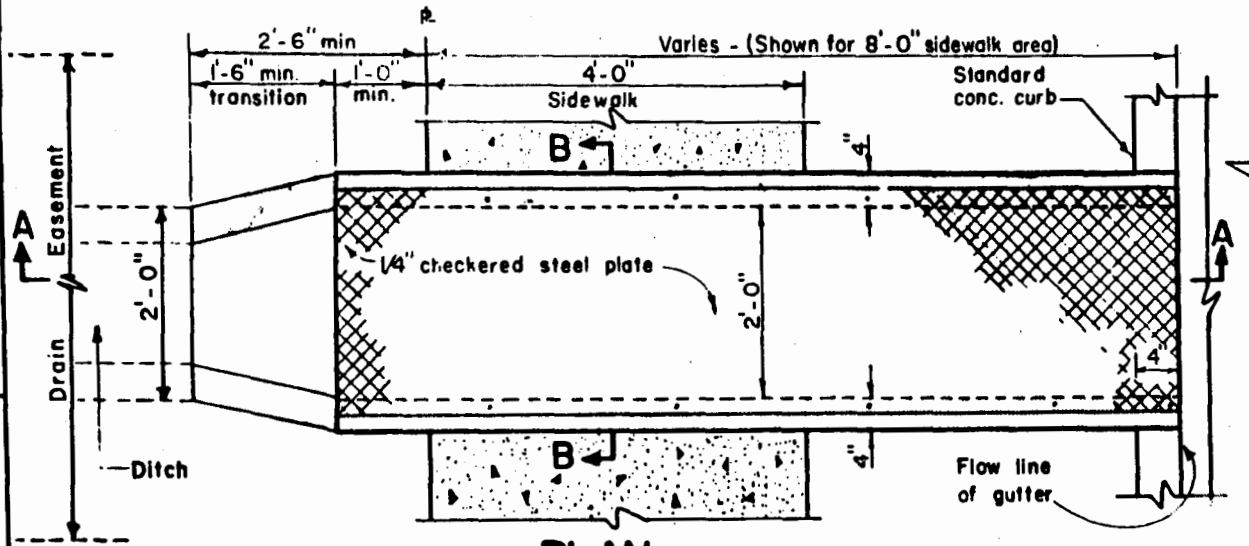
STANDARD DETAILS

SIDEWALK CULVERT

SEPTEMBER 1984

SCALE: AS NOTED

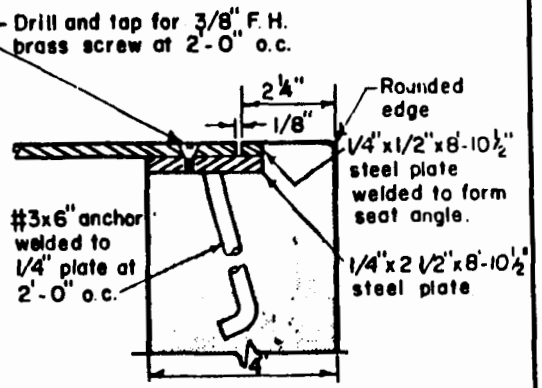
COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII



PLAN

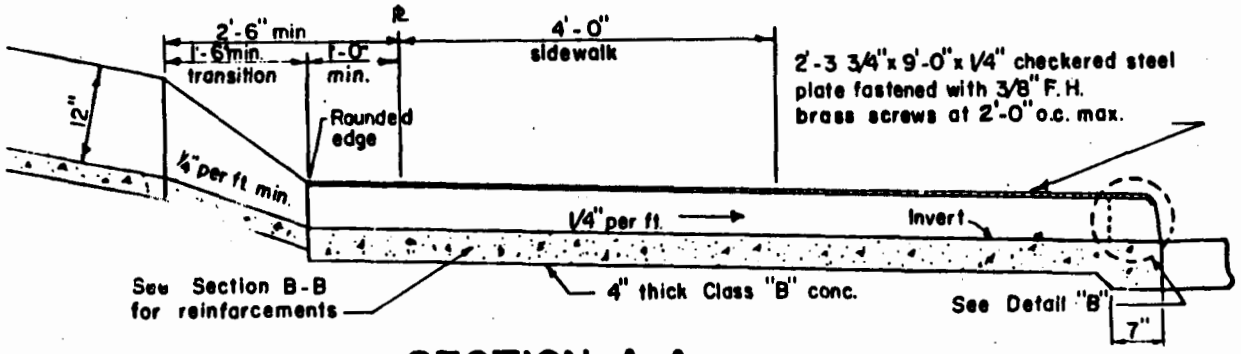
SCALE: 1/2" = 1'-0"

NOTE:
All steel parts to be galvanized.



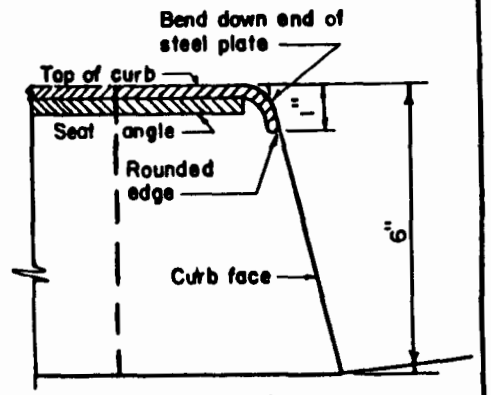
DETAIL "A"

SCALE: 3" = 1'-0"



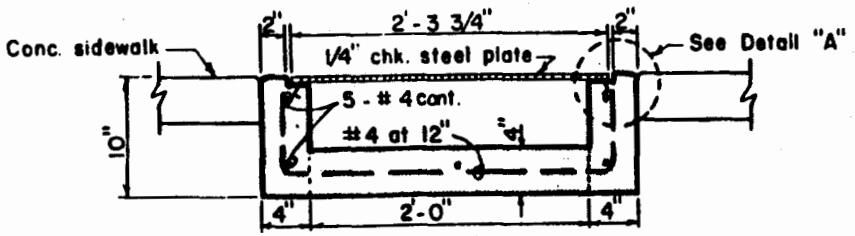
SECTION A-A

SCALE: 1/2" = 1'-0"



DETAIL "B"

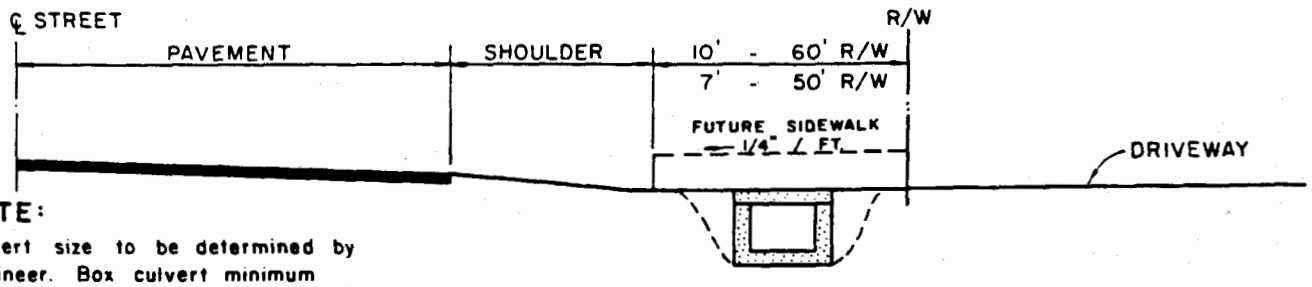
SCALE: 3" = 1'-0"



SECTION B-B

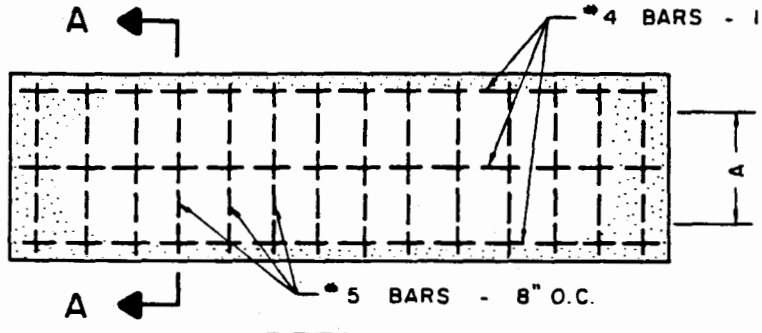
SCALE: 3/4" = 1'-0"

SIDEWALK CULVERT

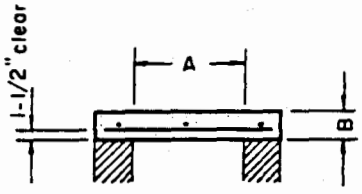


NOTE:
Culvert size to be determined by Engineer. Box culvert minimum inside dimensions 16" deep x 24" wide. All form materiol to be removed upon completion of construction.

SECTION



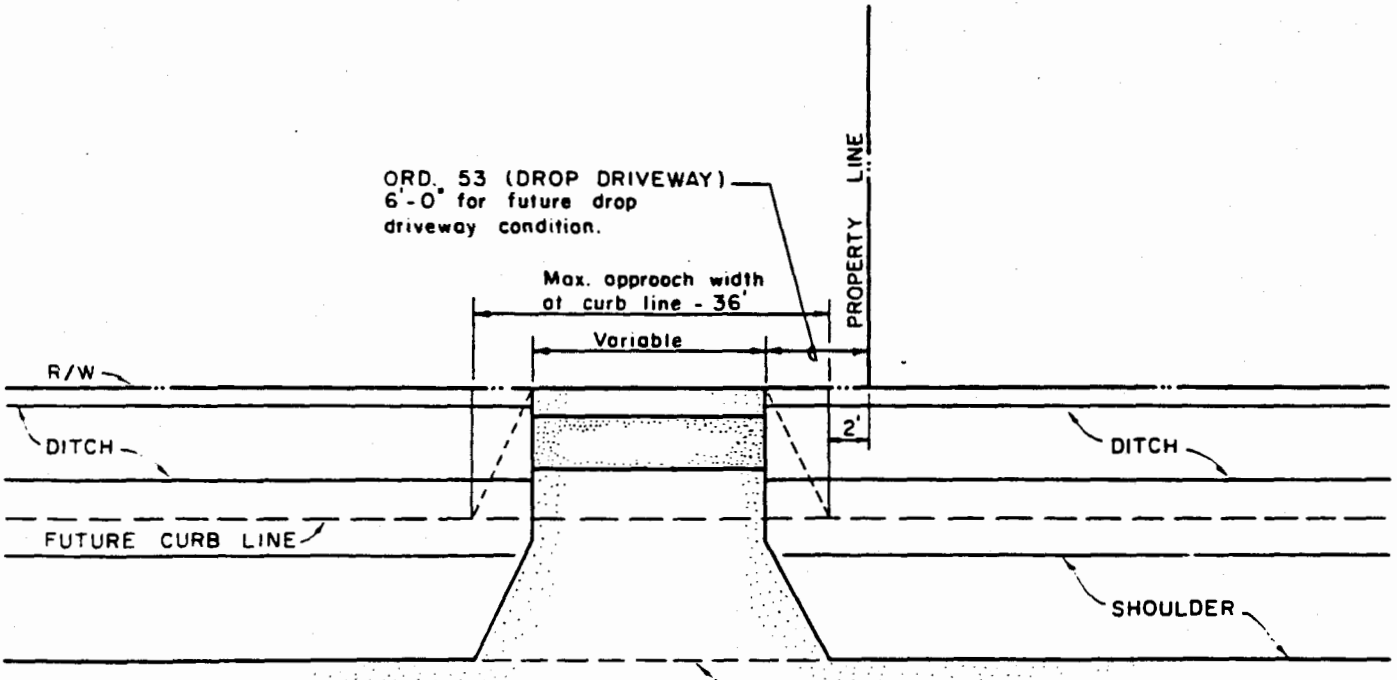
DETAIL



SECTION A-A

A	B
2'	4"
3'	5"
4'	6"
5'	6"

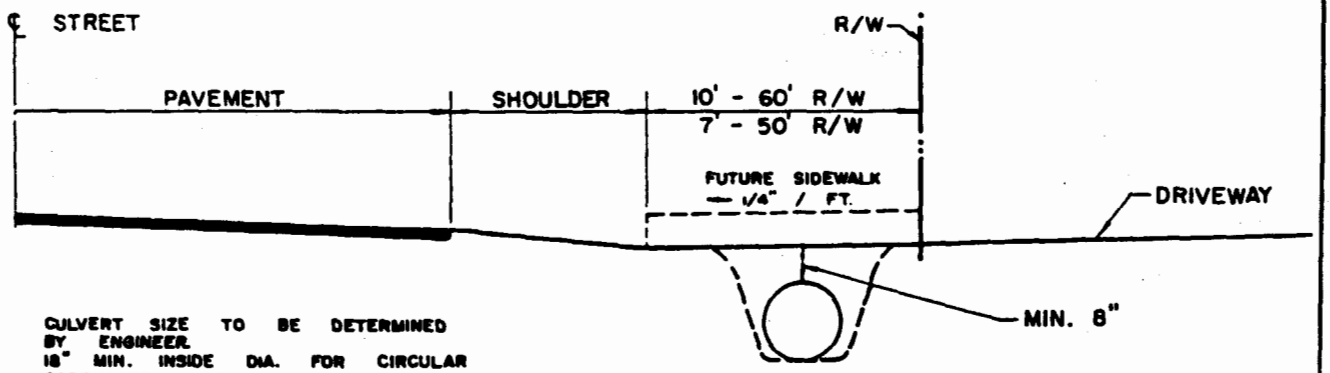
#4 BAR = 1/2" DIA.
#5 BAR = 5/8" DIA.



SEE DETAIL ABOVE FOR CULVERT REINFORCEMENT REQUIREMENTS.

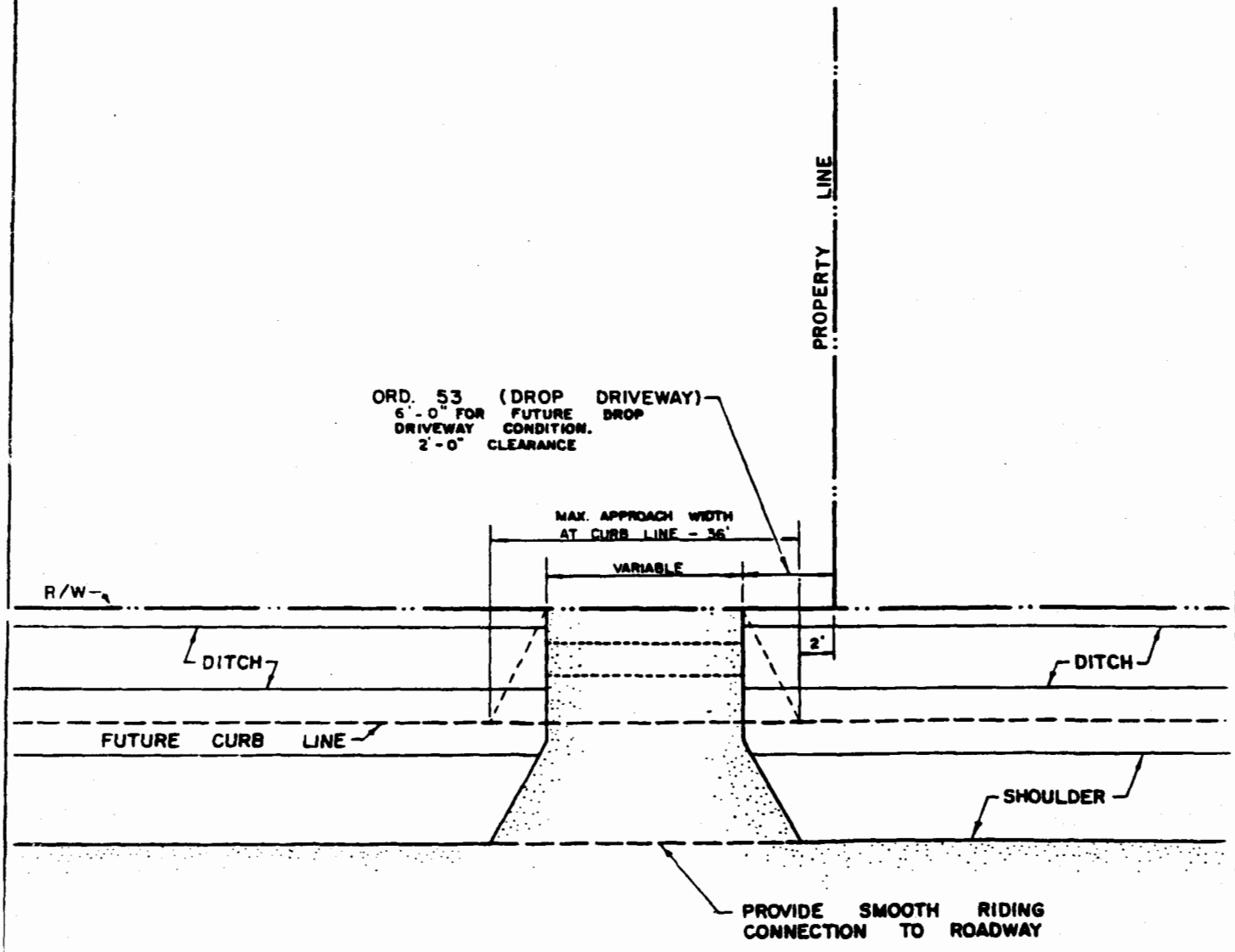
PLAN

COUNTY OF HAWAII	DRIVEWAY DRAINAGE - BOX CULVERT NOT TO SCALE — SEPTEMBER 1984	STANDARD DETAILS	D-33



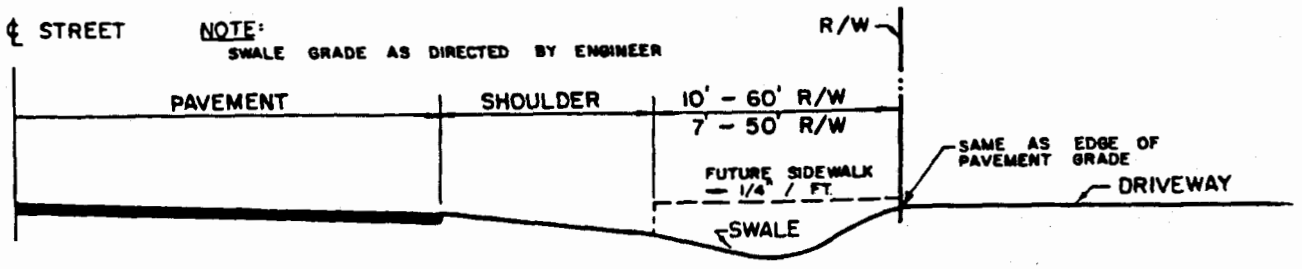
CULVERT SIZE TO BE DETERMINED BY ENGINEER.
18" MIN. INSIDE DIA. FOR CIRCULAR CORRUGATED IRON OR CONCRETE CULVERT.

SECTION

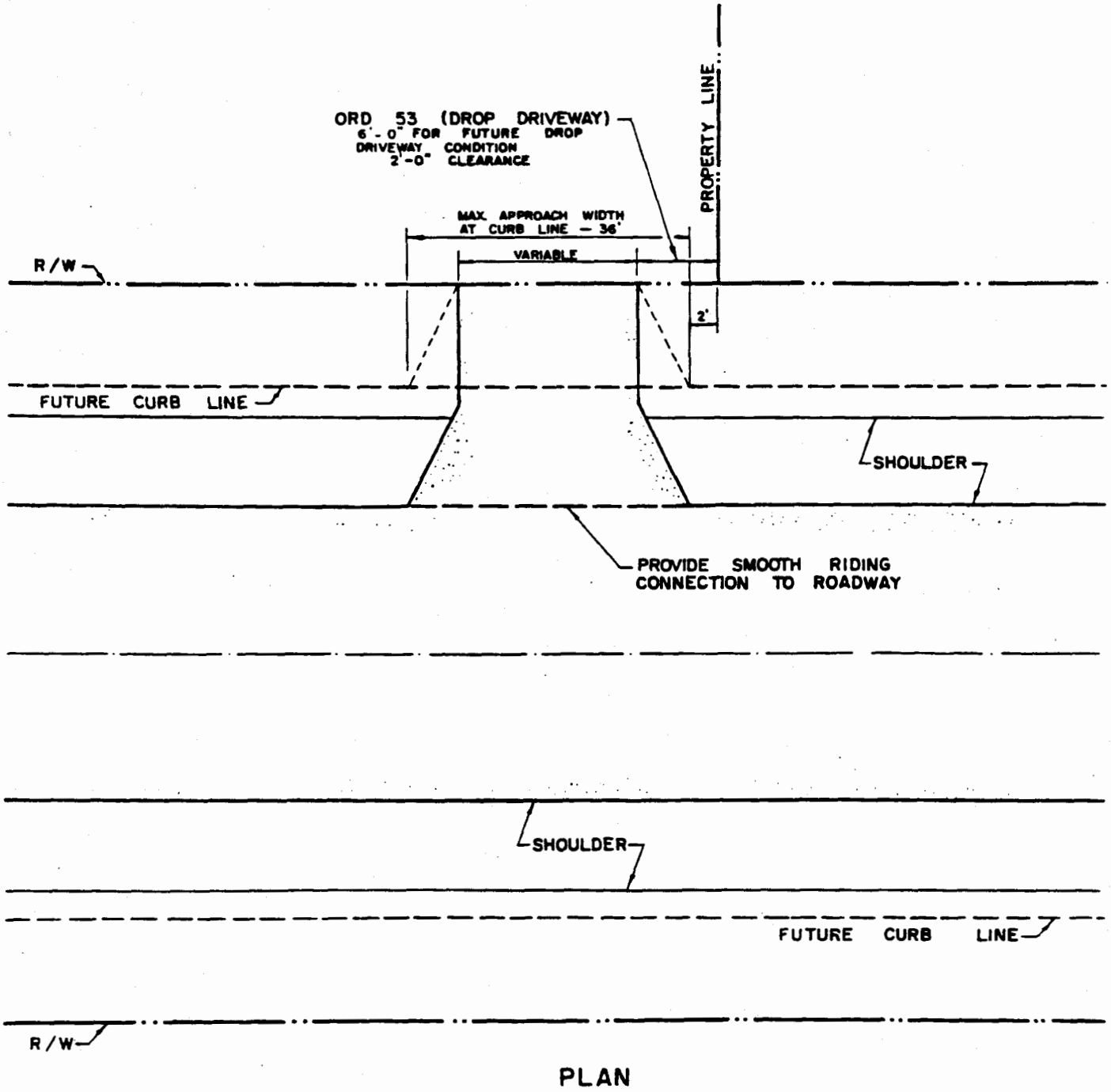


PLAN

D-34	STANDARD DETAILS	DRIVEWAY DRAINAGE - PIPE CULVERT	COUNTY OF HAWAII
		SEPTEMBER 1984 NOT TO SCALE	

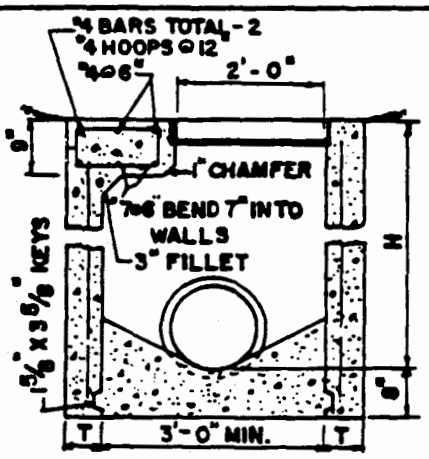


SECTION



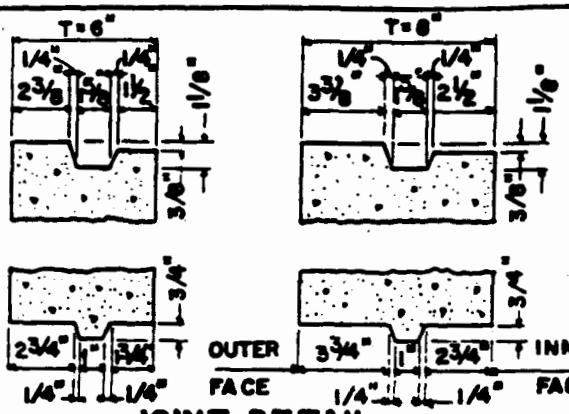
PLAN

COUNTY OF HAWAII	DRIVEWAY DRAINAGE - SWALE NOT TO SCALE SEPTEMBER 1984	STANDARD DETAILS	D-35



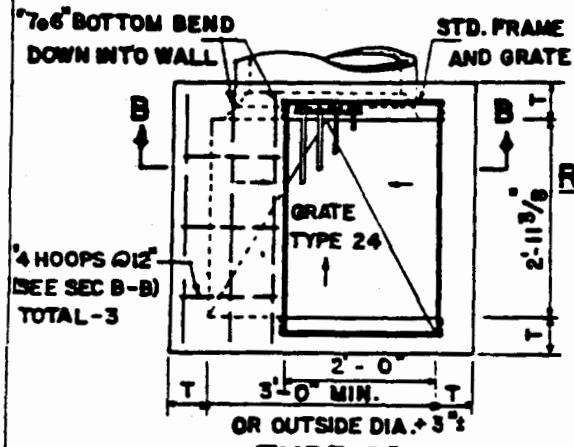
(SHOWING SMALL PIPE)

SECTION B-B

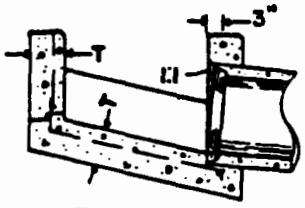


H	T
8'-0" OR LESS	6"
8'-1" TO 20'-0"	8"

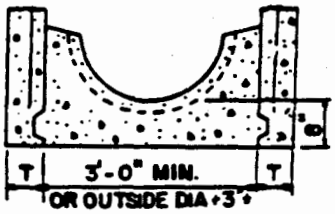
JOINT DETAIL



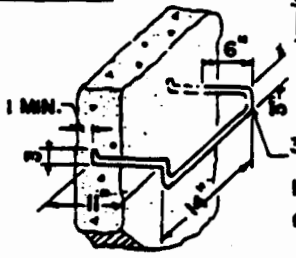
TYPE G2



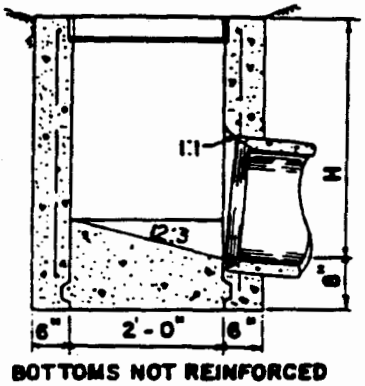
ALTERNATIVE REINFORCED BOTTOM



ALTERNATIVE HALF ROUND BOTTOM

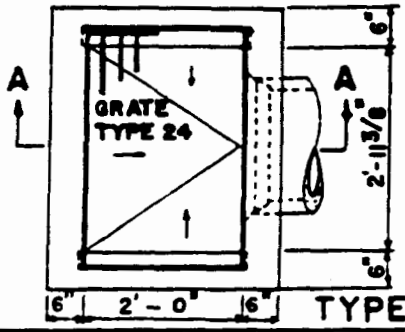


STEP DETAIL



BOTTOMS NOT REINFORCED

SECTION A-A



TYPE G1

GENERAL NOTES

1. "H" IS THE DIFF. IN ELEV. BETWEEN THE OUTLET PIPE FLOW LINE AND THE NORMAL GUTTER GRADE LINE UNDERPRESSED AT THE CURB FACE.
2. FOR "T" WALL THICKNESS, SEE TABLE.
3. REINFORCING STEEL IN WALLS SHALL BE #4 BARS @ 18" CENTERS, PLACED 1½" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.
4. STEPS - NONE REQUIRED WHERE "H" IS 3'-6" OR LESS. INSTALL ONE STEP 16"± ABOVE FLOOR WHEN "H" IS MORE THAN 3'-6" AND LESS THAN 5'-0". WHERE "H" IS MORE THAN 5'-0", STEPS SHALL BE EVENLY SPACED @ 12"± INTERVALS FROM 16"± ABOVE FLOOR TO WITHIN 12" OF THE TOP OF THE BOX. PLACE STEPS IN WALL WITHOUT PIPE OPENING.
5. DETAILS SHOWN APPLY TO BOTH METAL AND CONCRETE PIPE.
6. PIPE(S) CAN BE PLACED IN ANY WALL.
7. CURB SECTIONS SHALL MATCH ADJACENT CURB.
8. BASIN FLOORS SHALL HAVE WOOD TROWEL FINISH AND A MINIMUM SLOPE OF 12:3 FROM ALL DIRECTIONS TOWARD OUTLET PIPE.
9. GALVANIZING – SEE STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS.
10. CAST-IN-PLACE OR PRECAST ALTERNATIVE IS OPTIONAL WITH CONTRACTOR.
11. SET INLET SO THAT GRATE BARS ARE PARALLEL TO DIRECTION OF PRINCIPAL SURFACE FLOW.
12. SEE "STANDARD GRATE DETAIL" FOR GRATE AND FRAME DETAILS.
13. USE G1 WHEN H≤4'-0".

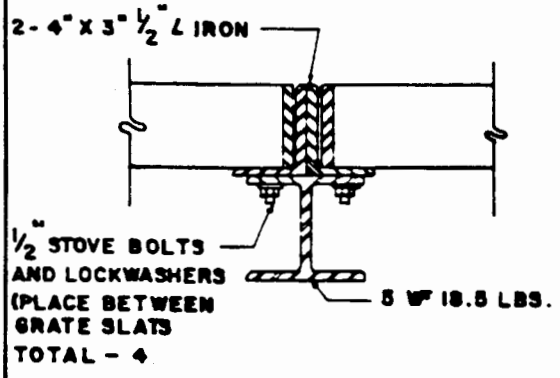
D-36	STANDARD DETAILS	TYPE G1 AND TYPE G2 DRAINAGE INLETS SEPTEMBER 1984 NOT TO SCALE	COUNTY OF KAUAI

TABLE A

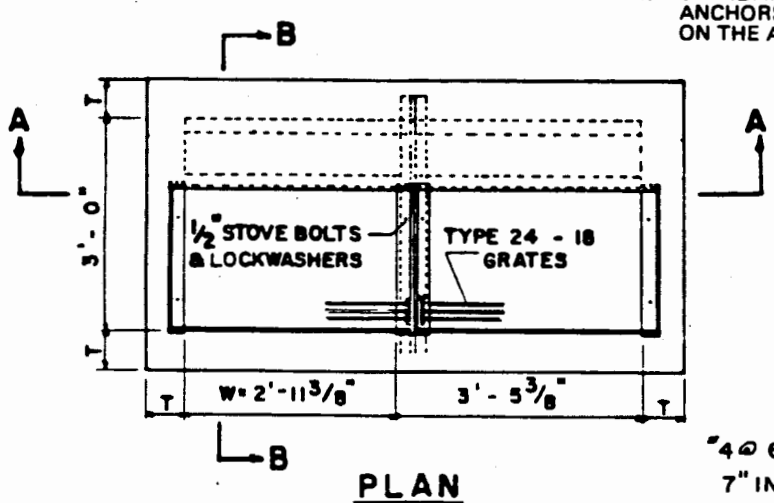
H	T
8' - 0" OR LESS	6"
8' - 1" TO 20' - 0"	8"

GENERAL NOTES

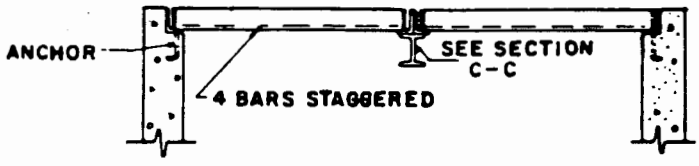
1. "H" IS THE DIFF. IN ELEV. BETWEEN THE OUTLET PIPE FLOW LINE AND THE NORMAL GUTTER GRADE LINE UNDEPRESSED.
2. FOR "T" WALL THICKNESS, SEE TABLE A.
3. REINFORCING STEEL IN WALLS SHALL BE #4 BARS @ 18"± CENTERS PLACED 1½" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.
4. STEPS - NONE REQUIRED WHERE "H" IS 3'-6" OR LESS. INSTALL ONE STEP "H" ABOVE FLOOR WHEN 16"± IS MORE THAN 3'-6" AND LESS THAN 5'-0". WHERE "H" IS MORE THAN 5'-0", STEPS SHALL BE EVENLY SPACED @ 12"± INVERVALS FROM 16"± ABOVE FLOOR TO WITHIN 12"± OF THE TOP OF THE BOX. PLACE STEPS IN WALL WITHOUT PIPE OPENINGS.
5. WHEN SHOWN ON THE PROJECT PLANS, PLACE A #6 PROTECTION BAR HORIZONTALLY ACROSS THE LENGTH OF THE OPENING AND BEND BACK 4" INTO THE INLET WALL ON EACH SIDE.
6. PIPE(S) CAN BE PLACED IN ANY WALL.
7. BASIN FLOORS SHALL HAVE WOOD TROWEL FINISH AND A MINIMUM SLOPE OF 12:1 FROM ALL DIRECTIONS TOWARDS OUTLET PIPE.
8. GALVANIZING - SEE STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS.
9. W=2'-11 3/8" FOR ONE GRATE, ADD 3'-5 3/8" FOR ADDITIONAL GRATES IN TANDEM.
10. FULL PENETRATION BUTT WELDS MAY BE SUBSTITUTED FOR THE FILLET WELDS ON ALL ANCHORS.
11. STANDARD SQUARE, HEXAGON, ROUND OR EQUIVALENT HEADED ANCHORS MAY BE SUBSTITUTED FOR THE RIGHT ANGLE HOOKS ON THE ANCHORS SHOWN ON THIS PLAN.



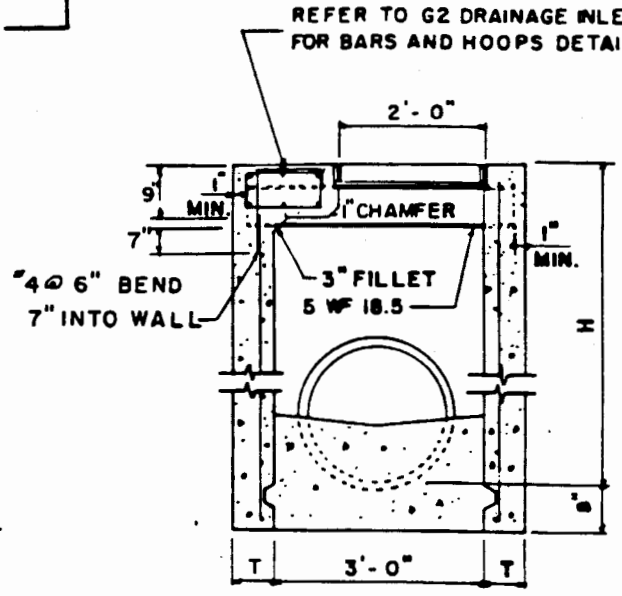
SECTION C-C



PLAN

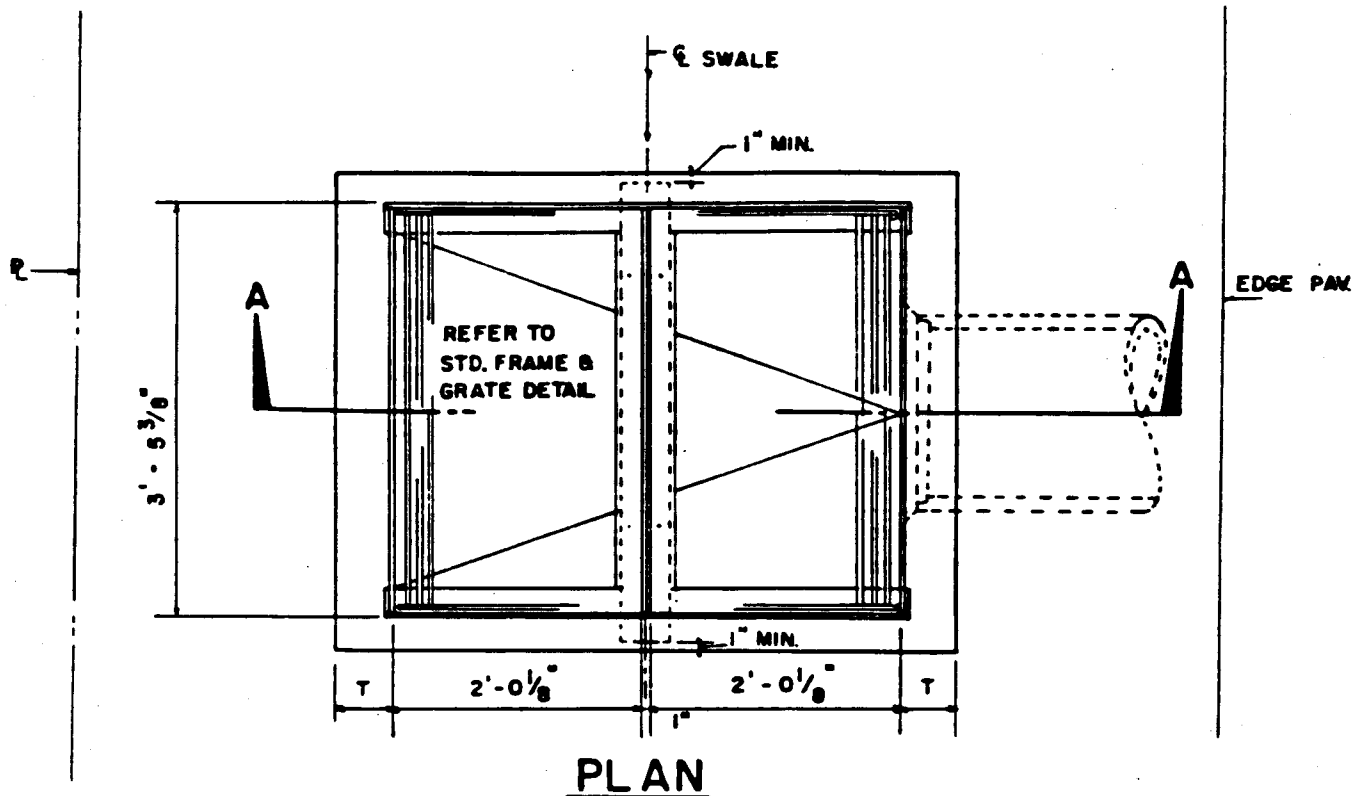


SECTION A-A



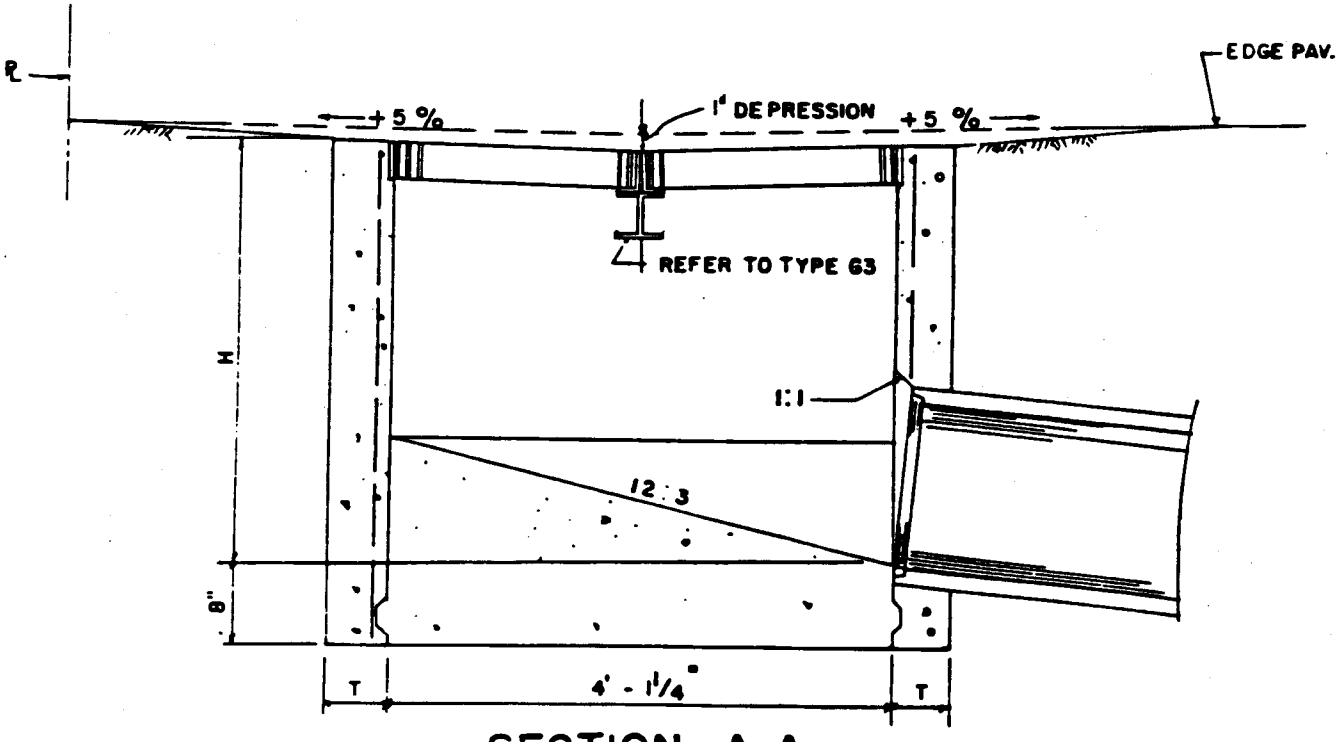
SECTION B-B

COUNTY OF KAUAI	TYPE G3 DRAINAGE INLET	STANDARD DETAILS	D-37
	SCALE: 3/8" = 1'-0" SEPTEMBER 1984		



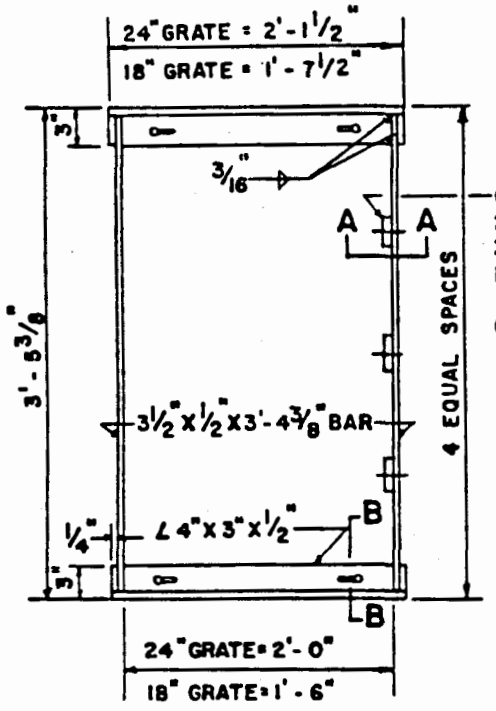
PLAN

REFER TO TYPES G1, G2 & G3 DRAINAGE INLET NOTES, TABLES, SECTIONS & DETAILS



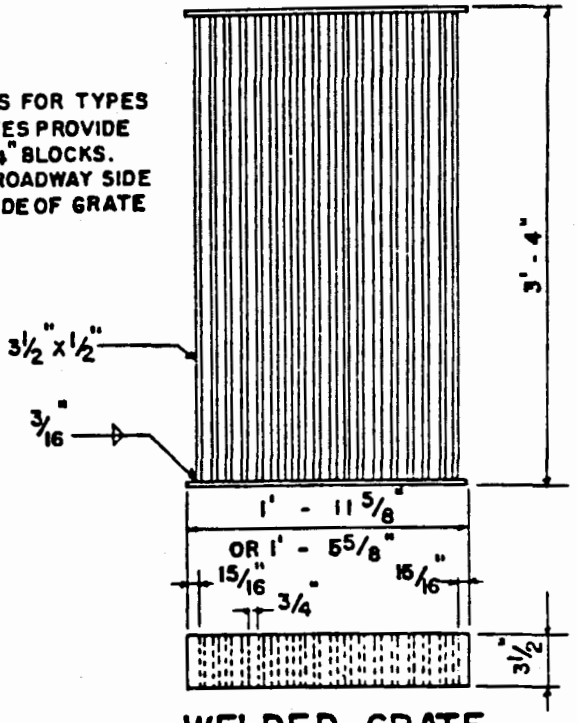
SECTION A-A

D-38	STANDARD DETAILS	TYPE G4 DRAINAGE INLET SEPTEMBER 1984 SCALE: 5/8" = 1'-0"	COUNTY OF KAUAI

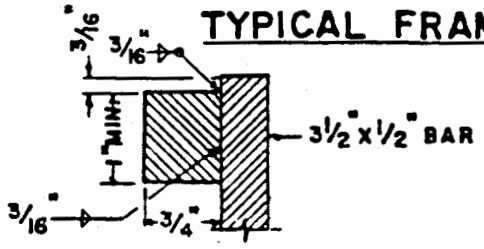


ON FRAMES FOR TYPES 24-18 GRATES PROVIDE 3-3" X 1" X 3/4" BLOCKS. PLACE ON ROADWAY SIDE OR HIGH SIDE OF GRATE OPENING.

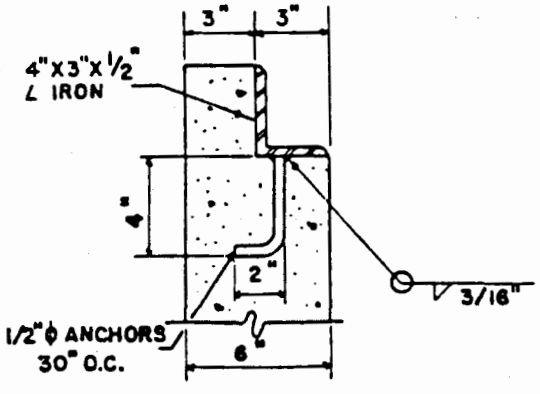
TYPICAL FRAME



WELDED GRATE



SECTION A-A

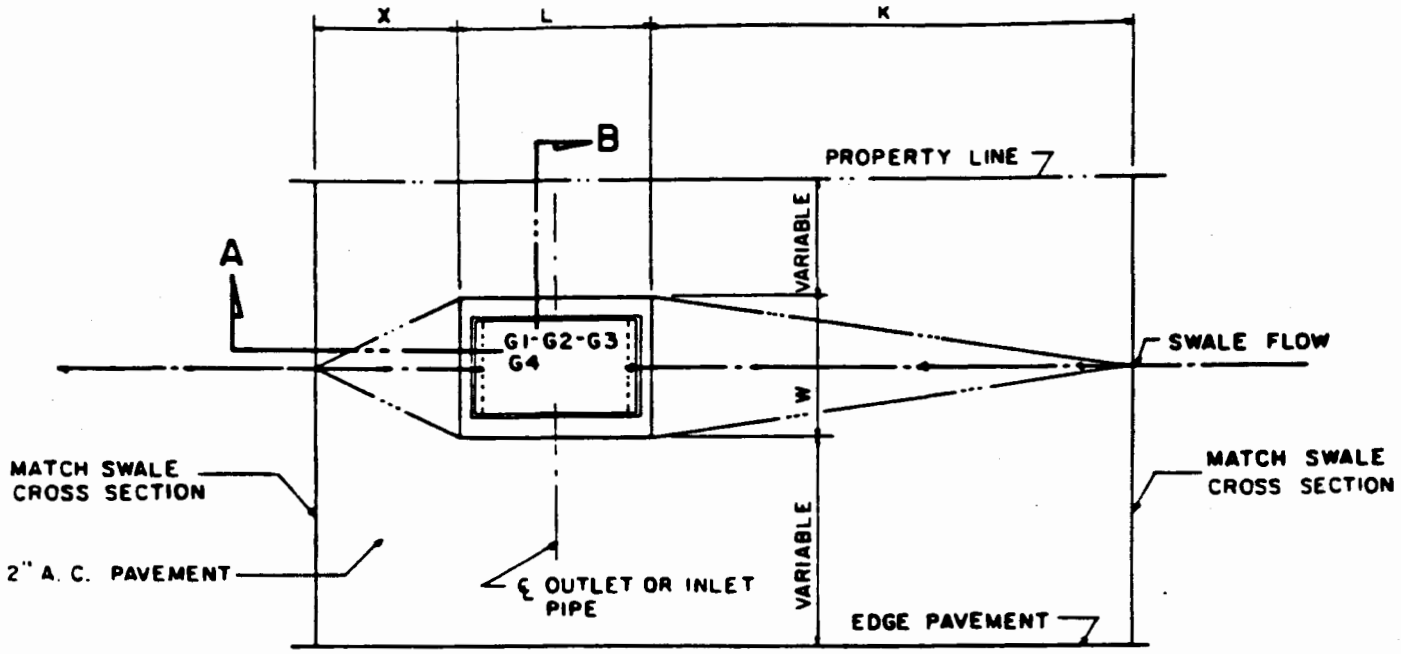


SECTION B-B

GENERAL NOTES

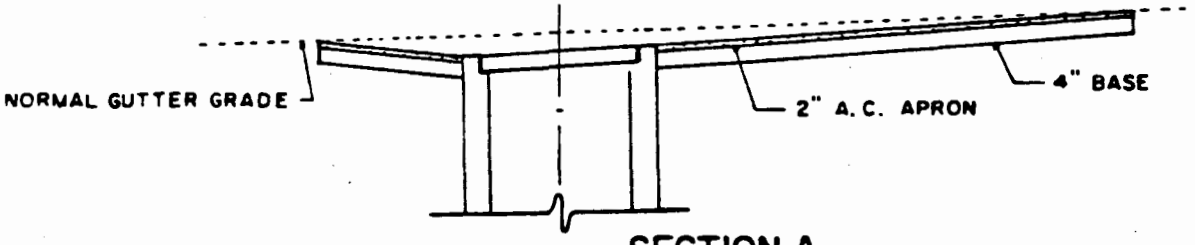
1. CONTRACTOR HAS THE OPTION OF USING CAST NODULAR IRON, CAST STEEL, WELDED, BOLTED, OR CAST END BLOCK GRATE.
2. GRATES AND FRAMES SHALL BE GALVANIZED.
3. ROUNDED TOP OF BARS OPTIONAL ON ALL GRATES.
4. PIPE DROP INLETS WITH A GRATE SHALL BE PLACED SO THAT BARS PARALLEL DIRECTION OF PRINCIPLE SURFACE FLOW.

COUNTY OF KAUAI	STANDARD FRAME AND GRATE NOT TO SCALE SEPTEMBER 1984	STANDARD DETAILS	D-39

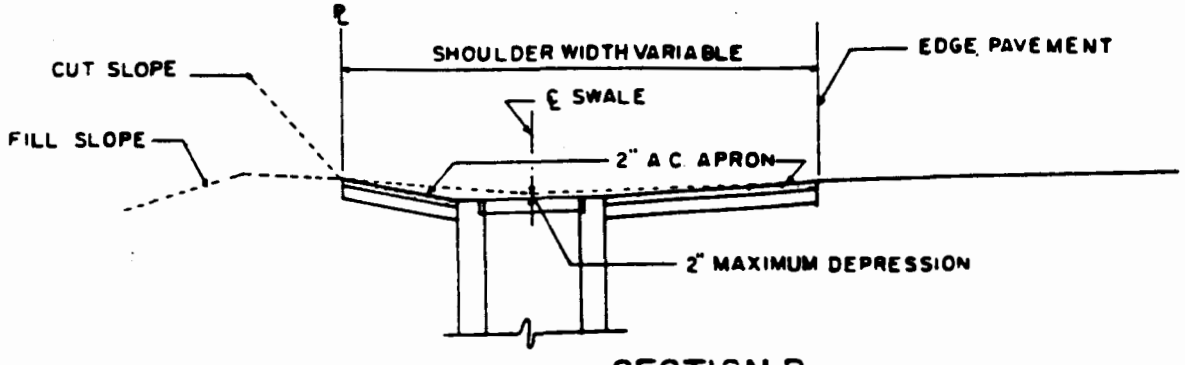


1. W = WIDTH OF CATCH BASIN
2. L = LENGTH OF CATCH BASIN
3. K = 6'-0" MIN. UNLESS OTHERWISE SPECIFIED } NORMAL SECTION
4. X = 3'-0" MIN. UNLESS OTHERWISE SPECIFIED }
5. IN SUMP CONDITIONS K = X = 6'-0" MIN.

PLAN

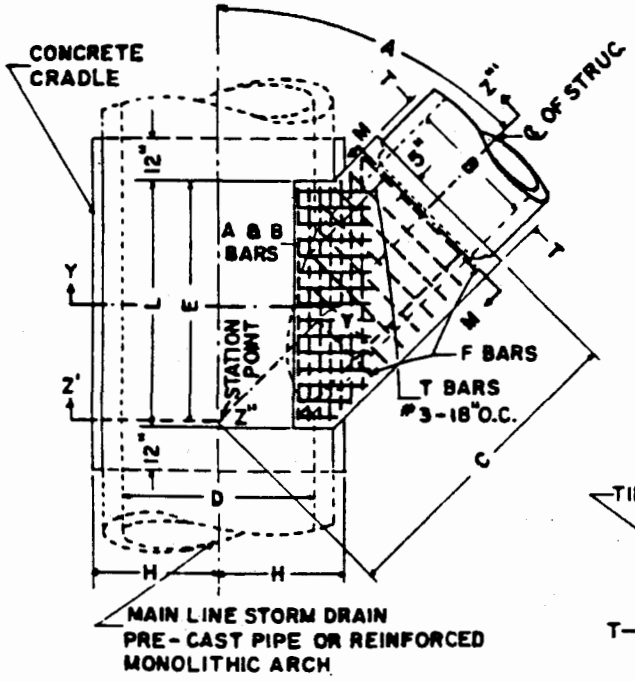


SECTION A

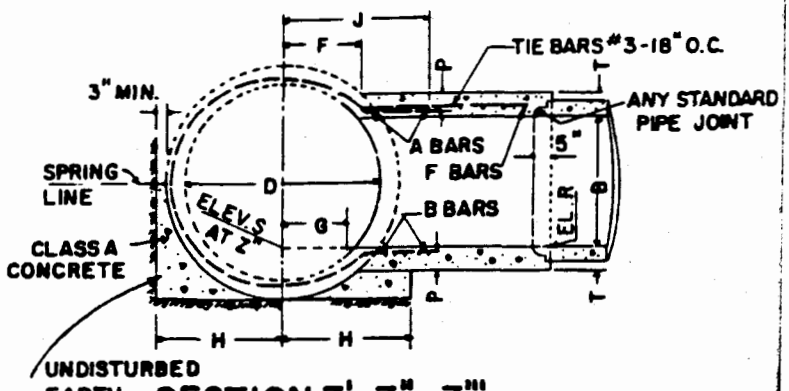


SECTION B

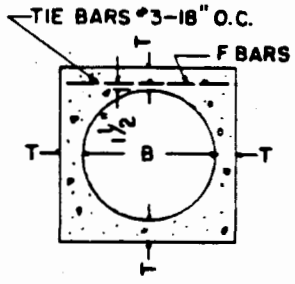
D-40	STANDARD DETAILS	LOCAL DEPRESSION WITHOUT CURB AND GUTTER SEPTEMBER 1984 SCALE: 1/4" = 1'-0"	COUNTY OF KAUAI



PLAN



SECTION Z'-Z"-Z"'
PROJECTED ON Y-Y-Z



SECTION M-M

TABLE OF VALUES FOR T	
B	T
12"	4"
15"	4 1/4"
18"	4 1/2"
21"	5"
24"	5 1/4"
27"	5 1/2"
30"	6"
33"	6 1/4"
36"	6 1/2"
39"	7"

MINIMUM DEPTH OF TOP AND BOTTOM SLABS SHALL BE $\frac{D}{12}+2"$

NOTES

VALUES FOR A, B, C, D, E, F, G, L, ELEV. R AND ELEV. S SHOWN ON IMPROVEMENT PLAN.

H: PIPE SHALL BE CRADLED IN CLASS A CONCRETE EXTENDING LONGITUDINALLY TO POINT 1 FT. BEYOND THE LIMITS OF L. H = ½ OUTSIDE DIA. OF PIPE +3" AS A MIN. CRADLE MAY BE OMITTED ON SIDE OPPOSITE LATERAL INLET WHEN CONSTRUCTED IN CONNECTION WITH EXISTING PIPE STORM DRAIN.

J: A AND B BARS SHALL BE CARRIED TO POINT NOT LESS THAN J DIST. FROM ℄ = 7D/12+6".

L: RECTANGULAR OPENING IN MAIN LINE PIPE SHALL BE CUT IN WITHIN THESE LIMITS NORMAL TO PIPE SURFACE WITHOUT DAMAGING STEEL. VALUES FOR F, G, AND L ON IMPROVEMENT PLAN.

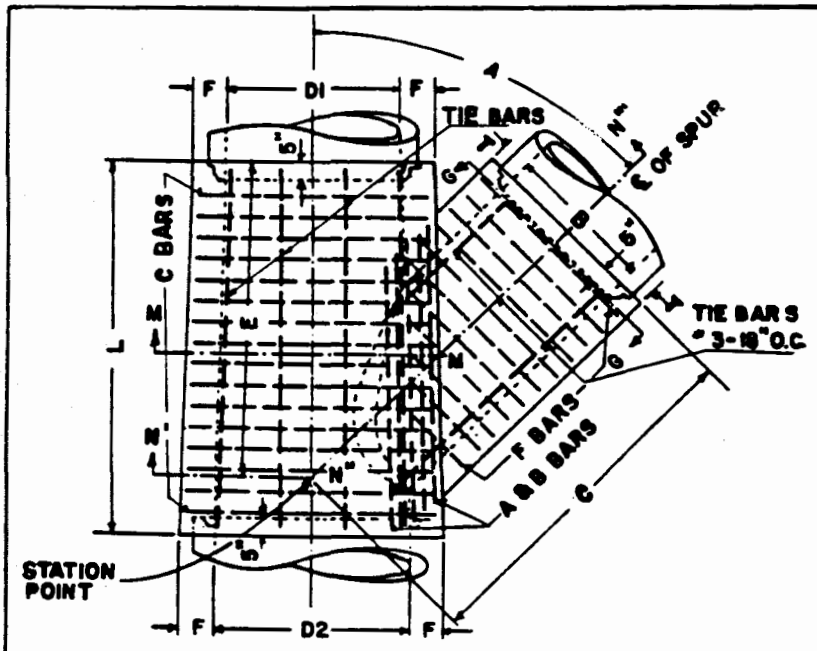
P: TRANSVERSE REINFORCEMENT IN PIPE SHALL BE CUT IN CENTER OF OPENING AND BENT TO UNIFORM DISTANCE FROM TOP AND BOTTOM OF JUNCTION STRUCTURE.

T: TABLE OF VALUES FOR T SHOWN ON THIS PLAN.

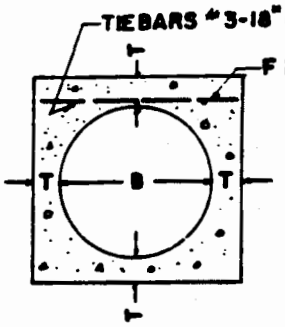
1. OPTIONAL CONSTRUCTION: WHEN JUNCTION STRUCTURE B IS SPECIFIED ON IMPROVEMENT PLAN, THE CONTRACTOR SHALL HAVE THE OPTION OF CONSTRUCTING JUNCTION C, IN WHICH CASE CONSTRUCTION DATA WILL BE FURNISHED BY THE ENGINEER.
2. CONCRETE SHALL BE CLASS A.
3. REINFORCING STEEL SHALL BE ROUND, DEFORMED, STRAIGHT BARS 1½" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
4. STEEL SCHEDULE: A & B BARS – #5 @ 3" O.C.
   F BARS – #4 @ 6" O.C.
5. MONOLITHIC ARCH: WHEN JUNCTION STRUCTURE B IS SPECIFIED WITH REINFORCED MONOLITHIC ARCH STORM DRAIN, VALUE D SHALL REFER TO THE CLEAR SPAN OF ARCH. REINFORCING STEEL SHALL BE CUT AND BENT INTO JUNCTION STRUCTURE THE SAME AS FOR PIPE. CONCRETE CRADLE UNDER REINFORCED MONOLITHIC ARCH IS NOT REQUIRED.
6. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.
7. ELEVATION S APPLIES AT CENTER OF MAIN LINE ON PROLOGATION OF INVERT OF SPUR.

COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII	JUNCTION STRUCTURE B SCALE: 1/4" = 1'–0" SEPTEMBER 1984	STANDARD DETAILS	D-41

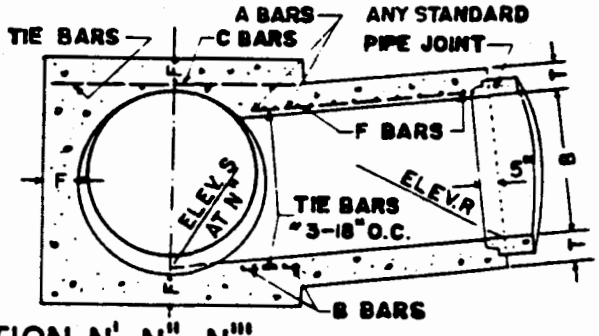
DIAM. B OR D2	A OR B-BARS	C OR F-BARS
12" TO 39"	#5 @ 3"	#4 @ 6"
42" TO 84"	#6 @ 3"	#5 @ 6"



PLAN



SECTION G-G



SECTION N'-N"-N"' PROJECTED ON M-M-N

TABLE OF VALUES FOR F AND T

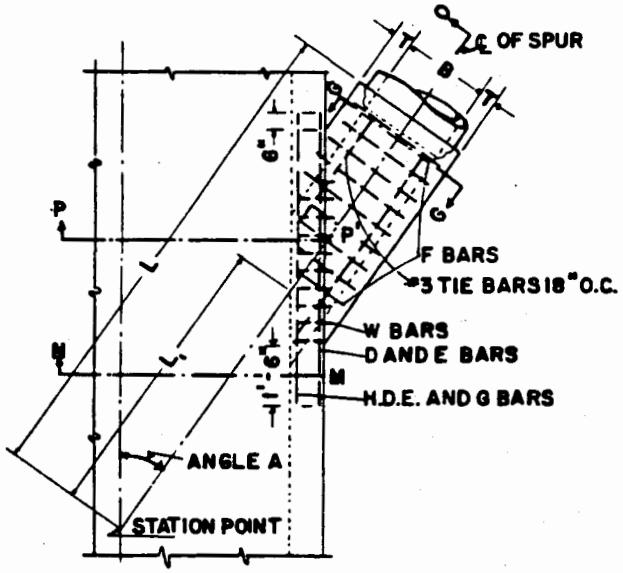
D2	F
12"	4"
15"	4 1/4"
18"	4 1/2"
21"	5"
24"	5 1/4"
27"	5 1/2"
30"	6"
33"	6 1/4"
36"	6 1/2"
39"	7"
42"	7 1/2"
45"	7 3/4"
48"	8"
51"	8 1/2"
54"	9"
57"	9 1/4"
60"	9 1/2"
63"	10"
66"	10 1/4"
69"	10 3/4"
72"	11"
78"	11 3/4"
84"	12 1/2"
90"	13 1/4"
96"	14"

B	T
12"	4"
15"	4 1/4"
18"	4 1/2"
21"	5"
24"	5 1/4"
27"	5 1/2"
30"	6"
33"	6 1/4"
36"	6 1/2"
39"	7"
42"	7 1/2"
45"	7 3/4"
48"	8"
51"	8 1/2"
54"	9"
57"	9 1/4"
60"	9 1/2"
63"	10"
66"	10 1/4"
69"	10 3/4"
72"	11"

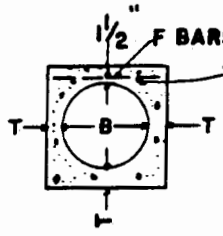
NOTES

1. VALUES FOR A, B, C, D_1, D_2, E, L, ELEV. R AND ELEV. S ARE SHOWN ON IMPROVEMENT PLAN TABLE OF VALUES FOR F AND T SHOWN ON THIS PLAN.
2. OPTIONAL CONSTRUCTION: WHEN JUNCTION STRUCTURE B IS SPECIFIED ON IMPROVEMENT PLAN, THE CONTRACTOR SHALL HAVE THE OPTION OF CONSTRUCTING JUNCTION STRUCTURE C, IN WHICH CASE CONSTRUCTION DATA WILL BE FURNISHED BY THE ENGINEER.
3. CONCRETE SHALL BE CLASS A.
4. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.
5. REINFORCING STEEL SHALL BE ROUND, DEFORMED, STRAIGHT BARS, 1½" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
   TIE BARS SHALL BE 3/8" ϕ AND SPACED 18" O.C. OR CLOSER. A AND B BARS NEED NOT BE LONGER THAN THE OUTSIDE DIAGONAL WIDTH OF LATERAL SPUR.
6. STEEL SCHEDULE DETAILED ON IMPROVEMENT PLAN.
7. ELEVATION S APPLIES AT CENTER OF MAIN LINE ON PROLONGATION OF INVERT OF SPUR.
8. JUNCTION STRUCTURE SHALL BE POURED IN ONE CONTINUOUS OPERATION, EXCEPT THAT THE CONTRACTOR SHALL HAVE THE OPTION OF PLACING AT THE SPRING LINE A CONSTRUCTION JOINT WITH A LONGITUDINAL KEYWAY.
9. LENGTH L SHOWN ON IMPROVEMENT PLAN.
10. STATIONS OF MANHOLES SHOWN ON IMPROVEMENT PLAN APPLY AT INTERSECTION OF MAIN LINE AND SPUR. ELEV. SHOWN AT THIS POINT REFER TO PROLONGED INVERT GRADE LINES, EXCEPT THAT WHEN INTERSECTION OF CENTER LINES FALLS OUTSIDE OF STRUCTURE, THE ELEV. ARE SHOWN AND APPLY AT EXTREME LOWER END OF THE STRUCTURE.
11. LATERALS - WHERE LATERALS ENTER ON BOTH SIDES OF STRUCTURE, THEY SHALL BE DESIGNATED ON THE IMPROVEMENT PLAN AS RIGHT OR LEFT, FACING IN THE DIRECTION OF STATIONING.

D-42	STANDARD DETAILS	JUNCTION STRUCTURE C SEPTEMBER 1984 NOT TO SCALE	COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII



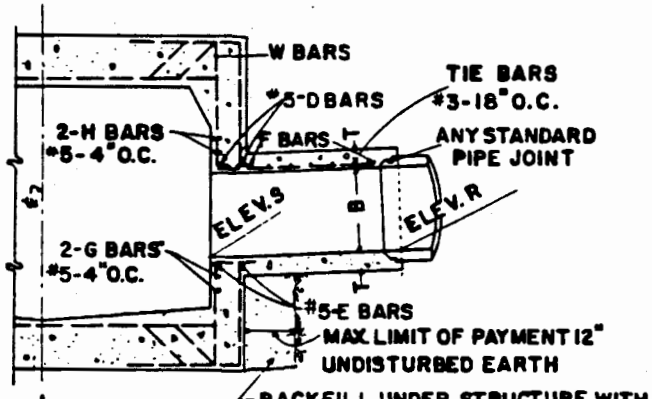
PLAN



SECTION G-G

TABLE OF VALUES FOR T

B	T
12"	4"
15"	4 1/4"
18"	4 1/2"
21"	5"
24"	5 1/4"
27"	5 1/2"
30"	6"
33"	6 1/4"
36"	6 1/2"
39"	7"
42"	7 1/2"
48"	7 3/4"
48"	8"
51"	8 1/2
54"	9"
57"	9 1/4"
60"	9 1/2"
63"	10"
66"	10 1/4"
69"	10 3/4"
72"	11"

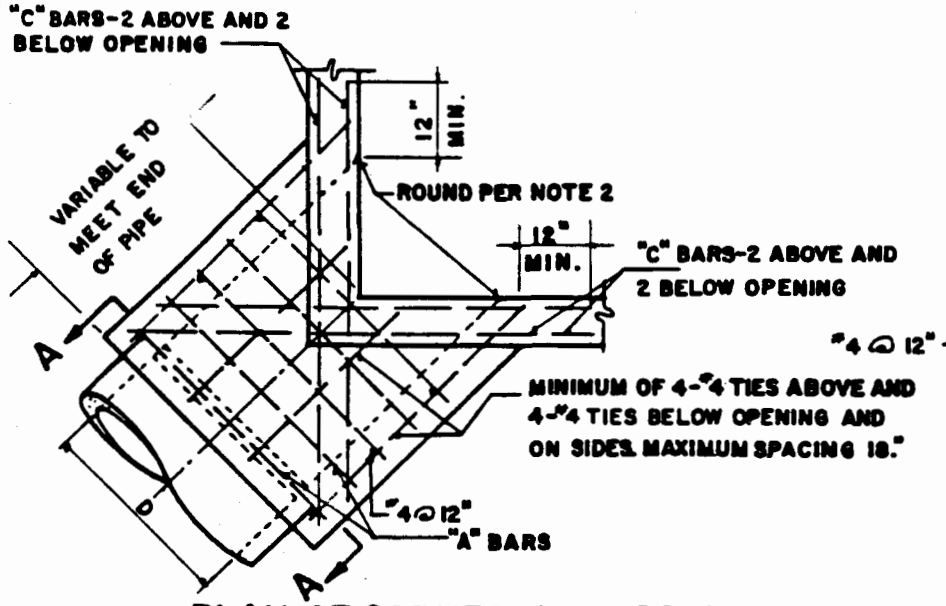


SECTION N-M-P'-O
PROJECTED ON P-P'-O

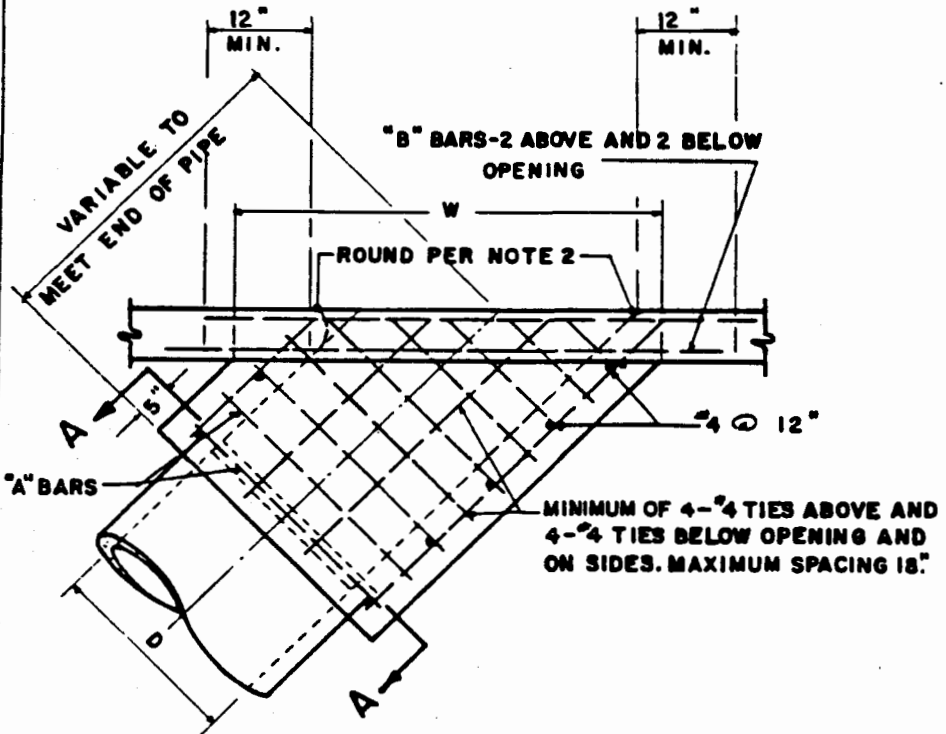
NOTES

1. VALUES FOR A, B, L, L_1, ELEVATION R AND ELEVATION S ARE SHOWN ON IMPROVEMENT PLAN. TABLE OF VALUES FOR T SHOWN ON THIS PLAN.
2. STATIONS SPECIFIED ON IMPROVEMENT PLAN APPLY AT INTERSECTION OF CENTER LINES OF MAIN LINE AND LATERAL, EXCEPT THAT STATIONS FOR CATCH BASIN CONNECTIONS APPLY AT INSIDE WALL OF STRUCTURE.
3. CONCRETE SHALL BE CLASS A EXCEPT AS OTHERWISE NOTED.
4. REINFORCING STEEL SHALL BE ROUND, DEFORMED, STRAIGHT BARS 1½" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
   W BARS ARE OF SIZE AND SPACING SPECIFIED FOR WALL STEEL ON IMPROVEMENT PLAN, AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
   OMIT H BARS WHEN SOFFIT OF SPUR IS 1 FT. OR LESS BELOW SOFFIT OF MAIN LINE, AND OMIT G BARS WHEN INVERT OF SPUR IS 1 FT. OR LESS ABOVE FLOOR OF MAIN LINE.
   OMIT ALL STEEL EXCEPT F BARS AND TIE BARS WHEN JUNCTION STRUCTURE IS SPECIFIED WITH MANHOLE, UNLESS OTHERWISE SHOWN ON IMPROVEMENT PLAN.
   STEEL SCHEDULE DETAILED ON IMPROVEMENT PLAN.
5. JUNCTION STRUCTURE SHALL BE POURED MONOLITHIC WITH MAIN LINE STORM DRAIN OR MANHOLE.
6. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.

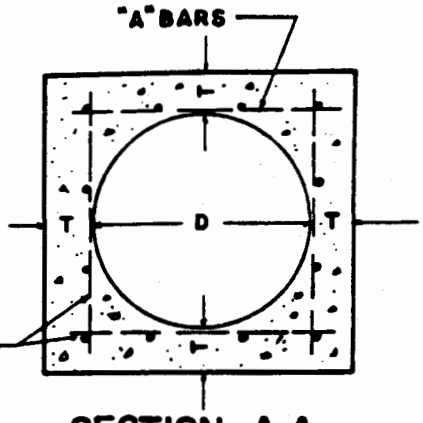
COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII	JUNCTION STRUCTURE D NOT TO SCALE SEPTEMBER 1984	STANDARD DETAILS	D-43



PLAN OF CORNER CONNECTION



PLAN OF SIDE CONNECTION



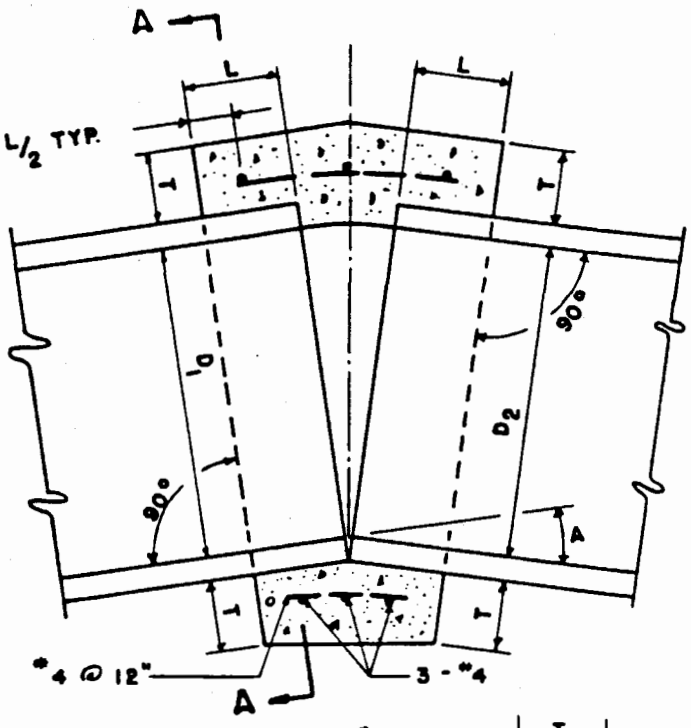
SECTION A-A

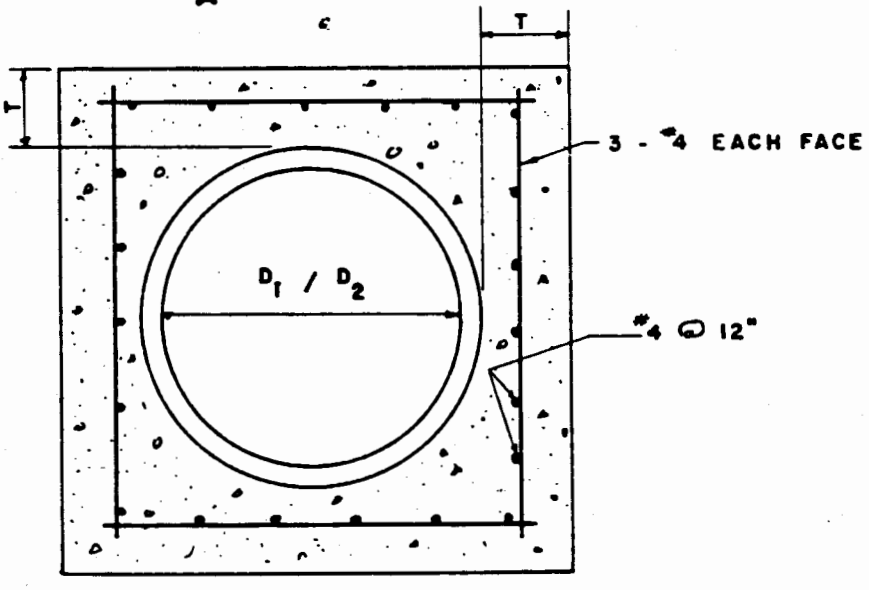
D	T	"A"	"B"-"C"
12"	4-1/2"	#4 @ 6"	#5
15"	4-1/2"		
18"	5"		
21"	5-1/2"		
24"	6"		
27"	6-1/2"		
30"	7"		
33"	7"		
36"	7-1/2"		
39"	8"		
42"	8"		
45"	8"	#5 @ 6"	#6
48"	8"		
51"	8"		
54"	8"		
57"	10"		
60"	10"		
63"	10"		
66"	11"		
69"	11"		
72"	11"		

NOTES

1. ROUND EDGE OF OUTLET 3" RADIUS.
2. REINFORCEMENT SHALL BE 1½" INCHES CLEAR FROM THE FACE OF CONCRETE.
3. IN CONNECTING TO AN EXISTING STRUCTURE BREAK OUT PORTIONS OF THE EXISTING STRUCTURE 6 INCHES OUTSIDE ITS INTERSECTION WITH THE NEW CONNECTION. BEND ENDS OF #4 BARS OVER CONNECTION OPENING AS REQUIRED.

D-44	STANDARD DETAILS	MONOLITHIC CATCH BASIN CONNECTION FOR PIPES 12" TO 72" SEPTEMBER 1984 NOT TO SCALE	COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII





SECTION A-A

D	L	T
12"	1.0'	4"
18"	1.0'	5"
24"	1.0'	6"
36"	1.5'	8"
48"	1.5'	10"
54"	1.5'	10"
60"	1.75'	11"
66"	1.75'	11"
72"	2.0'	12"

NOTES

1. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE D= D_1 OR D_2 WHICHEVER IS GREATER.
2. FOR PIPES SIZE NOT LISTED USE NEXT LARGER SIZE.
3. OMIT REINFORCING ON PIPES 24" AND LESS IN DIAMETER AND ON ALL PIPES WHERE ANGLE A IS LESS THAN 10°.
4. JOIN PIPES AT INVERTS.
5. REINFORCEMENT SHALL BE PLACED 1½" CLEAR FROM OUTSIDE DIAMETER OF PIPE.

COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII	CONCRETE COLLAR DETAILS NOT TO SCALE SEPTEMBER 1984	STANDARD DETAILS	D-45

SPAN	2'	2'	3'	3'	4'	4'	4'	5'	5'	5'	5'	6'	6'	6'	6'	6'	6'
HEIGHT	1'6"	2'	2'	3'	2'	3'	4'	2'	3'	4'	5'	2'	3'	4'	5'	6'	7'
STRENGTH CLASSIFICATION	A	A	A	A B	A	A B	A B C	A B	A B	A B C D	A B C D	A B	A B	A B C	A B C D	A B C D E	A B C D E
MAX FILL OVER TOP	80		30	30 60	20	20 37	20 37 50	12 27	12 27	11 26 39 46	11 25 39 48	10 18	10 18	10 18 25	9 18 25 36	9 17 25 36 43	9 17 25 36 43
Conc. — Top Slab T_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Bottom Slab T_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Sidewalls T_3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reinf. Steel — "a" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reinf. Steel — "a" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Reinf. Steel — "a" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Dist Bars — Top Slab No. of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Dist Bars — Bottom Slab No. of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"e" Bars — Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spacers — Number	12	12	12	12	12	12	14	14	14	14	16	12	12	14	16	18	18
Concrete CY per lin ft	17	18	23	27 31	29	33 36	36 40 43	32 37	36 41	40 44 51 54	43 48 55 57	40 42	43 46	47 50 58	52 54 60 66	56 58 65 71 78	59 61 70 76 88
Reinf lbs per lin ft	27	29	34	38 48	44	45 47	48 52 64	57 58	59 57	61 60 68 75	63 65 77 87	64 63	66 65	69 67 74	70 70 80 91	73 78 92 112 127	81 90 99 120 139
Hydraulics — Area A	3	4	6	9	8	12	16	10	15	20	25	12	18	24	30	36	42
Hydraulic Radius R	.43	.50	.60	.75	.67	.86	1.00	.71	.94	1.11	1.25	.75	1.00	1.20	1.36	1.50	1.62
Neutral Slope S	.83	.91	.73	.62	.84	.70	.77	.59	.62	.67	.73	.59	.56	.59	.62	.63	.71
Head Factor h	1.30	1.07	.85	.63	.79	.59	.49	.69	.49	.39	.34	.843	.63	.336	.305	.271	.247
Entrance Capacity Q_n	11	17	28	46	15	64	99	43	80	123	178	32	86	140	207	272	343
Design Discharge Q_d	10	20	43	79	38	107	183	71	132	203	284	88	130	244	341	440	585

Note

For boxes of height less than that shown in table, use next greater table height slabs, wall dimensions and reinforcing steel, and make necessary changes in bar lengths, number of spacers and quantities.

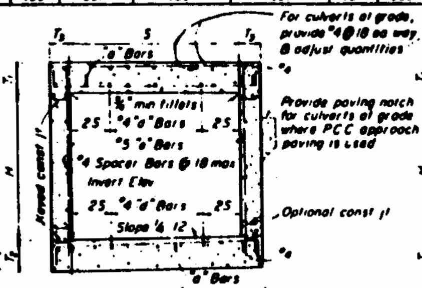
SPAN	7'	7'	7'	7'	7'	8'	8'	8'	8'	8'	8'
HEIGHT	3'	4'	5'	6'	7'	3'	4'	5'	6'	7'	8'
STRENGTH CLASSIFICATION	A B	A B	A B C	A B C	A B C	A B	A B	A B	A B C	A B C	A B C
MAX FILL OVER TOP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Top Slab T_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Bottom Slab T_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Sidewalls T_3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"a" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"a" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"a" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Dimension "x"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Dimension "y"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Dimension "y"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Bars — Top Slab No. of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Bars — Bottom Slab No. of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"e" Bars Spacing	10 10	10 10	10 10 10	10 10 10	10 10 10	10 10	10 10	10 10	10 10 10	10 10 10	10 10 10
Spacers Total Number	24	26	28	32	36	28	32	32	36	40	40
Concrete CY per lin ft	47 56	51 60	55 64 78	58 68 84	62 73 89	52 65	56 70	60 74	65 79 100	69 83 106	73 88 112
Reinf lbs per lin ft	107 130	114 130	118 143 180	125 150 178	132 158 184	110 146	125 154	125 159	136 167 211	143 176 220	147 179 225
Area A	21	28	35	42	49	24	32	40	48	56	64
Hydraulic Radius R	1.05	1.27	1.44	1.62	1.75	1.09	1.33	1.54	1.71	1.87	2.00
Neutral Slope S	0.32	0.34	0.37	0.41	0.44	0.30	0.32	0.34	0.36	0.39	0.42
Head Factor h	0.423	0.338	0.281	0.241	0.224	0.404	0.316	0.262	0.225	0.200	0.180
Entrance Capacity Q_n	112	173	241	317	400	120	197	276	362	457	550
Design Discharge Q_d	183	283	380	383	839	212	328	435	597	735	921

SPAN	10'	10'	10'	10'	10'	10'	10'	12'	12'	12'	12'	12'	12'
HEIGHT	4'	5'	6'	7'	8'	9'	10'	6'	7'	8'	9'	10'	12'
STRENGTH CLASSIFICATION	A B	A B	A B	A B	A B C	A B C	A B C	A B	A B	A B	A B C	A B C	A B C
MAX FILL OVER TOP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Top Slab T_1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Bottom Slab T_2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Conc. — Sidewalls T_3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"a" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"a" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"a" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Dimension "x"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"b" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Dimension "y"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Size Bar #	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Dimension "y"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"c_1" Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Bars — Top Slab No. of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Bars — Bottom Slab No. of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"e" Bars Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spacers Total Number	32	34	36	38	40	44	48	36	44	44	44	48	52
Concrete CY per lin ft	75 94	82 102	86 108	92 115	97 121 150	106 126 157	118 132 165	99 130	103 144	109 152	118 156 180	130 164 198	141 178 [illegible]
Reinf lbs per lin ft	143 221	160 210	194 233	180 244	184 250 283	170 259 273	178 267 281	205 283	213 304	218 311	225 317 387	231 328 [illegible]	243 341 [illegible]
Area A	40	50	60	70	80	90	100	72	84	96	108	120	144
Hydraulic Radius R	1.43	1.67	1.88	2.06	2.22	2.37	2.50	2.00	2.21	2.40	2.57	2.73	3.00
Neutral Slope S	0.47	0.49	0.51	0.52	0.54	0.56	0.58	0.46	0.48	0.49	0.51	0.52	0.56
Head Factor h	0.288	0.238	0.203	0.183	0.163	0.153	0.145	0.189	0.167	0.151	0.138	0.128	0.114
Entrance Capacity Q_n	247	345	453	571	698	834	976	543	686	838	1000	1170	1540
Design Discharge Q_d	407	568	747	941	1150	1380	1610	896	1130	1380	1650	1930	2540

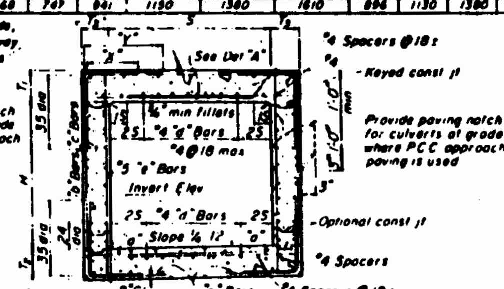
ALTERNATIVE FLAT INVERT

ALTERNATIVE V INVERT

ALTERNATIVE TRAPEZOIDAL INVERT



TYPICAL SECTIONS 2' THRU 6' SPANS



TYPICAL SECTION 7' THRU 12' SPANS

DETAIL "A"

SINGLE BOX CULVERTS

D-46

STANDARD DETAILS

SEPTEMBER 1984

SINGLE BOX CULVERTS

NOT TO SCALE

COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII

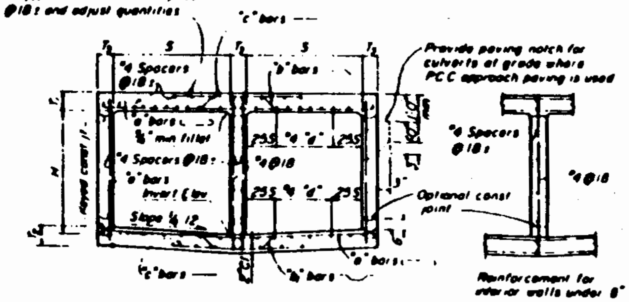
DOUBLE BOX CULVERTS

SPAN	HEIGHT	Area A	Hydraulic Radius R	Neutral Slope S_n	Head Factor k	Entrance Capacity Q_{in}	Design Discharge Q_{dd}
4'	2'	16	0.67	0.64	0.75	70	116
4'	3'	24	0.86	0.70	0.38	128	214
4'	4'	32	1.00	0.77	0.43	180	320
5'	2'	20	0.71	0.50	0.39	66	142
5'	3'	30	0.94	0.62	0.48	180	264
5'	4'	40	1.11	0.67	0.38	246	600
5'	5'	50	1.25	0.73	0.36	344	560
6'	3'	36	1.00	0.56	0.430	196	348
6'	4'	48	1.20	0.59	0.336	290	600
6'	5'	60	1.33	0.62	0.308	610	862
6'	6'	72	1.50	0.66	0.271	844	896
8'	4'	64	1.33	0.52	0.346	304	[illegible]
8'	5'	80	1.54	0.54	0.262	552	910
8'	6'	96	1.71	0.56	0.229	724	1194
8'	7'	112	1.87	0.59	0.208	914	1306
8'	8'	128	2.00	0.62	0.189	1116	1642

SPAN	HEIGHT	Area A	Hydraulic Radius R	Neutral Slope S_n	Head Factor k	Entrance Capacity Q_{in}	Design Discharge Q_{dd}
10'	5'	100	1.67	0.49	0.230	890	1130
10'	6'	120	1.88	0.51	0.200	906	1494
10'	7'	140	2.06	0.52	0.183	1148	1860
10'	8'	160	2.22	0.54	0.183	1390	2300
10'	10'	200	2.50	0.56	0.143	1932	3020
12'	6'	144	2.00	0.46	0.180	1060	1780
12'	7'	168	2.21	0.48	0.167	1372	2200
12'	8'	192	2.40	0.49	0.151	1678	2700
12'	9'	216	2.57	0.51	0.138	2000	3300
12'	10'	240	2.73	0.52	0.120	2340	3900
12'	12'	288	3.00	0.56	0.110	3060	5060

Strength classification (A, B, C, D), max. fill over top, concrete (top slab, bottom slab, sidewalls T_1, T_2, T_3), reinforcing steel ("a", "b", "c", "d", "e" bars: size bar, spacing, length; spacers number) and quantities (concrete C.Y. per lin. ft; steel lbs per lin. ft): [illegible]

For culverts at grade, extend "c" bars full length, top slab only, provide additional spacers @18" and adjust quantities



TYPICAL SECTION
(Showing reinforcement for interior walls 8" and over)

DOUBLE BOX CULVERTS

COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII

NOT TO SCALE

DOUBLE BOX CULVERTS

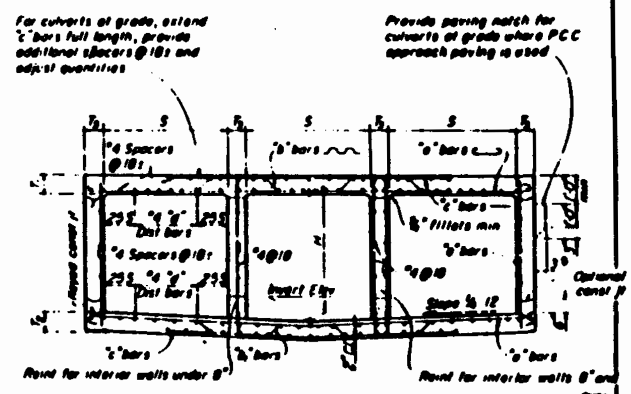
SEPTEMBER 1984

STANDARD DETAILS

D-47

SPAN	4'	4'	4'	5'	5'	5'	5'	6'	6'	6'	6'	8'	8'	8'	8'	8'
HEIGHT	2'	3'	4'	2'	3'	4'	5'	3'	4'	5'	6'	4'	5'	6'	7'	8'
STRENGTH CLASSIFICATION / MAX FILL OVER TOP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dimensions: Top Slab / Bottom Slab / Sidewalls (T₁, T₂, T₃)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Steel: "a", "b", "c" bars — Size Bar #, Spacing, Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Dist Bars: Top Slab / Bottom Slab; "e" Bars: Size Bar, Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spacers No. bar	30	36	42	30	36	36	42	40	50	64	72	58	62	62	66	70
Quantities: Concrete C.Y. per lin ft / Steel Lbs per lin ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Area (A)	24	36	48	30	45	60	75	54	72	90	108	96	120	144	168	192
Hydraulic Radius (R)	67	86	100	71	94	111	125	100	130	138	150	133	154	171	187	200
Neutral Slope (S)	84	70	77	88	82	87	73	84	78	82	84	52	54	58	59	62
Head Factor	75	90	98	63	69	90	94	290	300	305	271	314	281	279	206	189
Entrance Capacity (Qe)	103	188	287	171	240	363	516	380	644	881	816	551	878	1088	1371	1676
Design Discharge (Qd)	170	281	405	213	380	509	838	477	734	1021	1344	976	1383	1787	2239	2783

SPAN	10'	10'	10'	10'	10'	12'	12'	12'	12'	12'	12'
HEIGHT	5'	6'	7'	8'	10'	6'	7'	8'	9'	10'	12'
STRENGTH CLASSIFICATION / MAX FILL OVER TOP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dimensions: Top Slab / Bottom Slab / Sidewalls	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Steel: "a", "b", "c" bars — Size Bar #, Spacing, Length	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
"d" Dist Bars: Top Slab / Bottom Slab; "e" Bars: Size Bar, Spacing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Spacers Number	66	66	72	78	84	102	78	90	100	110	116
Quantities: Concrete C.Y. per lin ft / Steel Lbs per lin ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Area (A)	150	180	210	240	300	216	252	288	324	360	432
Hydraulic Radius (R)	187	188	206	222	250	200	221	240	257	273	300
Neutral Slope (S)	48	51	39	34	38	46	42	40	41	38	36
Head Factor	238	200	183	163	143	180	167	151	138	128	114
Entrance Capacity (Qe)	1050	1350	1713	2094	2950	1870	2050	2514	3000	3310	4420
Design Discharge (Qd)	1700	2240	2823	3430	4630	2880	3390	4160	4880	5790	7620



TYPICAL SECTION

TRIPLE BOX CULVERTS

D-48

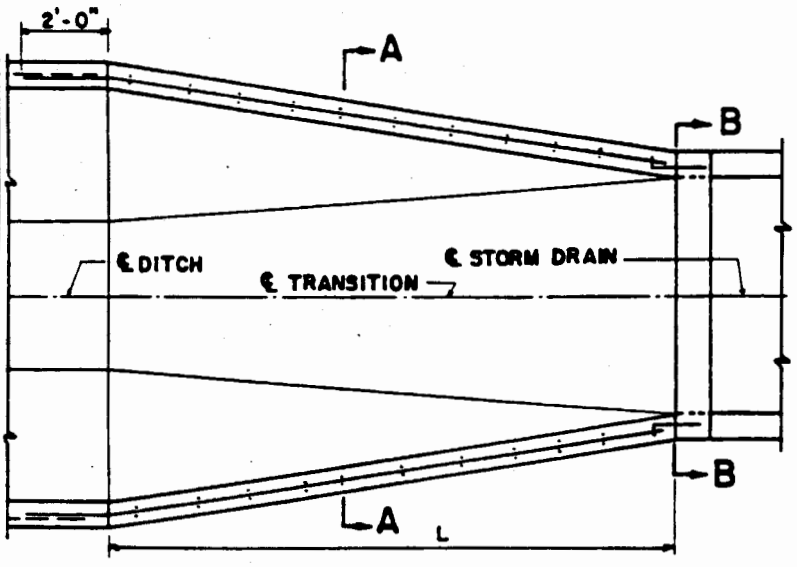
STANDARD DETAILS

SEPTEMBER 1984

TRIPLE BOX CULVERTS

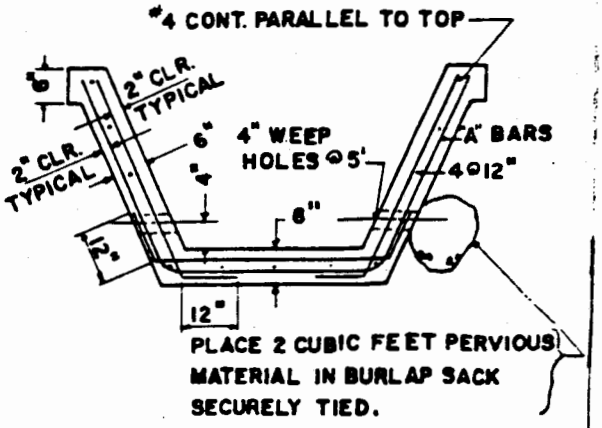
NOT TO SCALE

COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII

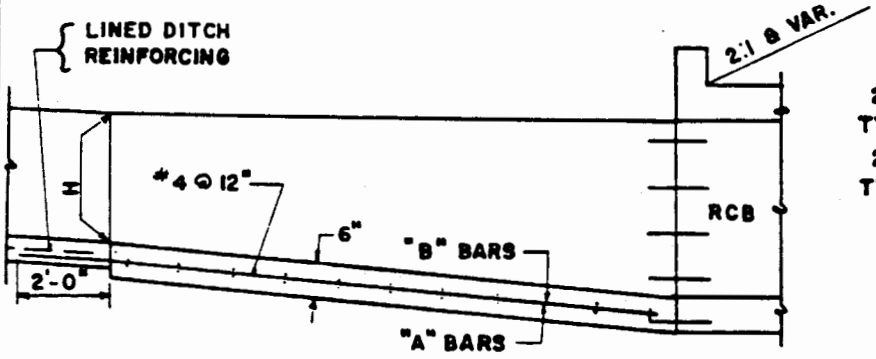


PLAN

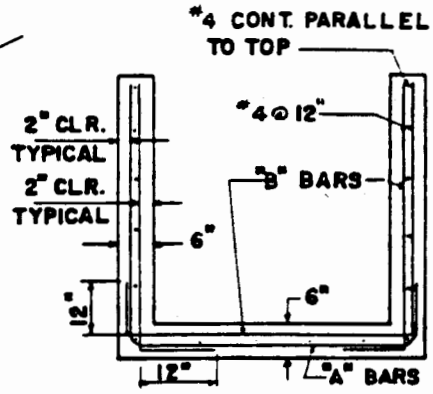
TRANSITION TO RECTANGULAR STORM DRAIN



SECTION A-A



PROFILE



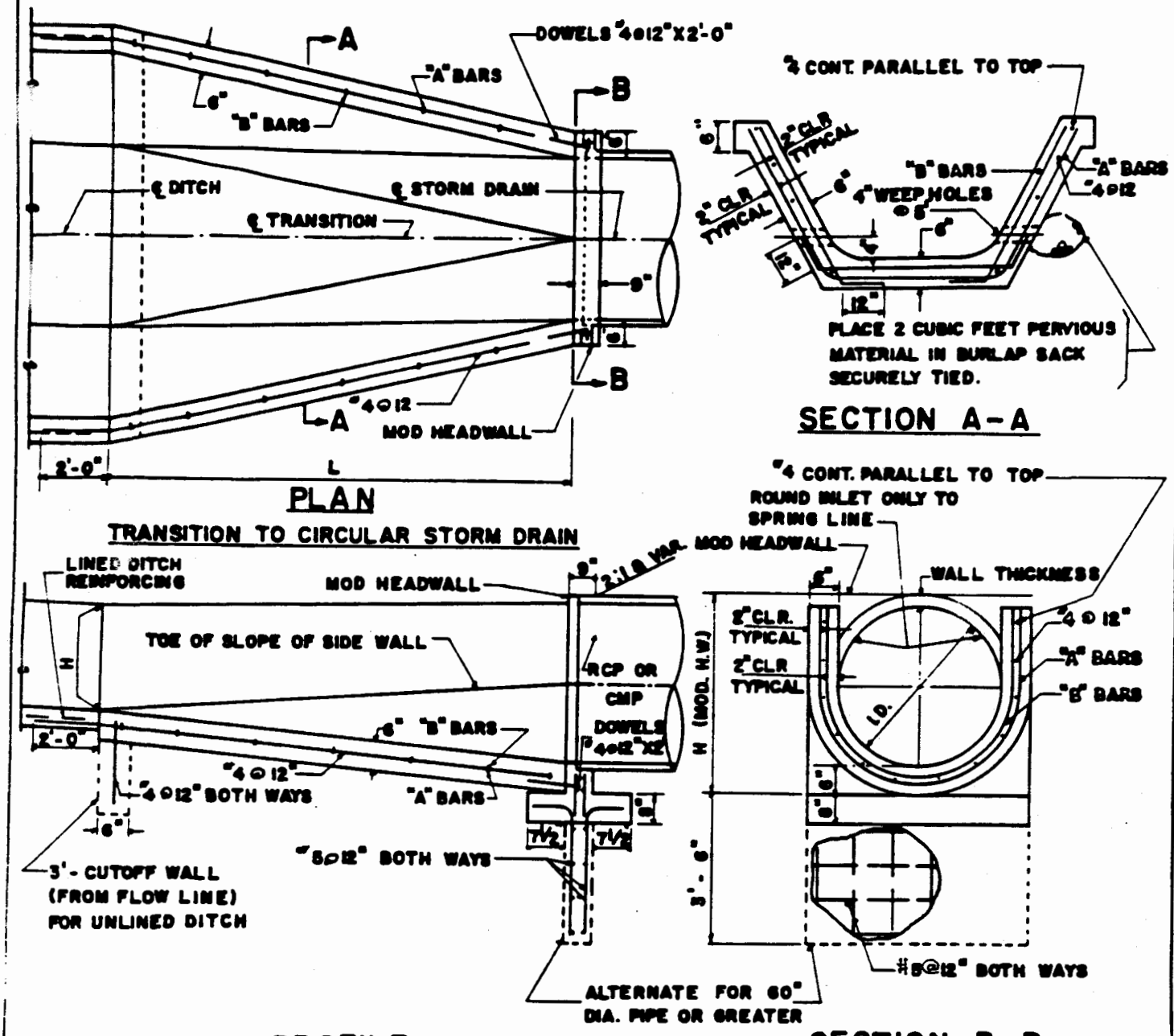
SECTION B-B

H	TRANSITION REINFORCEMENT	H.W. REINFORCEMENT
0'- 4"	#4 @ 12" BOTH WAYS CENTERED	#4 @ 18"
OVER 4'- 6"	"A" BARS #5 @ 24" "B" BARS #5 @ 24"	#4 @ 18"
OVER 6'- 6"	"A" BARS #5 @ 12" "B" BARS #5 @ 12"	#5 @ 12"

NOTES

1. PROVIDE A CONSTRUCTION JOINT BETWEEN THE TRANSITION AND THE STORM DRAIN.
2. EXTEND THE LONGITUDINAL REINFORCING STEEL OF THE TRANSITION 2' INTO THE CHANNEL.
3. IN LIEU OF PLACING THE DOWELS BETWEEN THE TRANSITION AND THE RECTANGULAR STORM DRAIN THE LONGITUDINAL REINFORCING STEEL OF THE STORM DRAIN MAY BE EXTENDED 2' INTO THE TRANSITION STUCTURE.

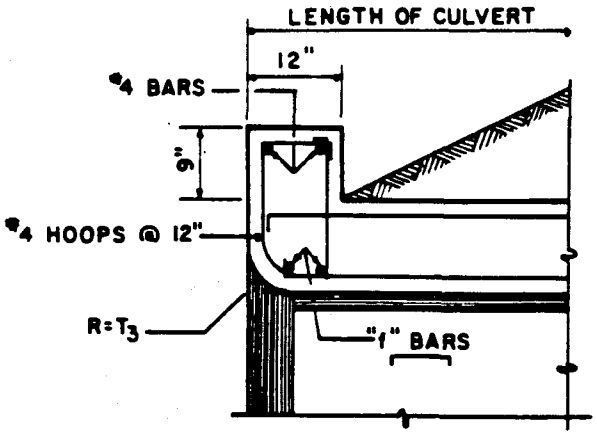
COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII	RECTANGULAR TRANSITION SCALE: 1/4" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-49



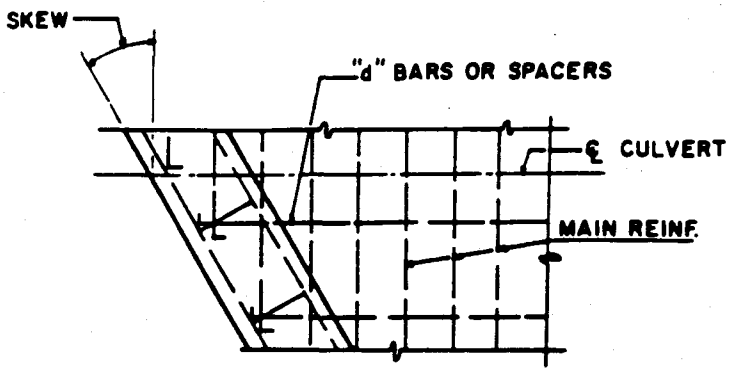
NOTE

SEE RECTANGULAR TRANSITION FOR GENERAL NOTES & STEEL TABLE

D-50	STANDARD DETAILS	CIRCULAR TRANSITION SEPTEMBER 1984 NOT TO SCALE	COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII

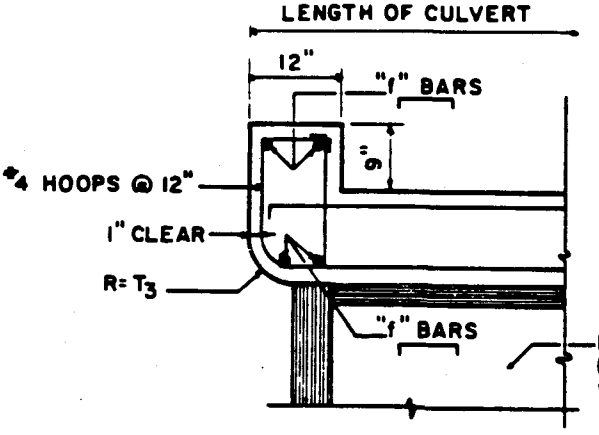


PARTIAL SECTION

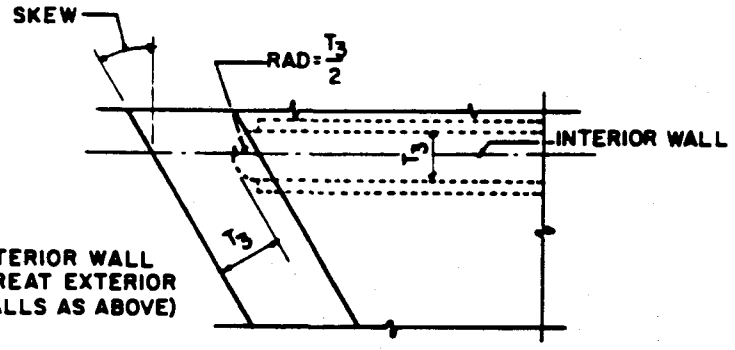


PARTIAL PLAN - SKEWED

PARAPET DETAILS FOR SINGLE SPAN CULVERTS



PARTIAL SECTION



PARTIAL PLAN - SKEWED

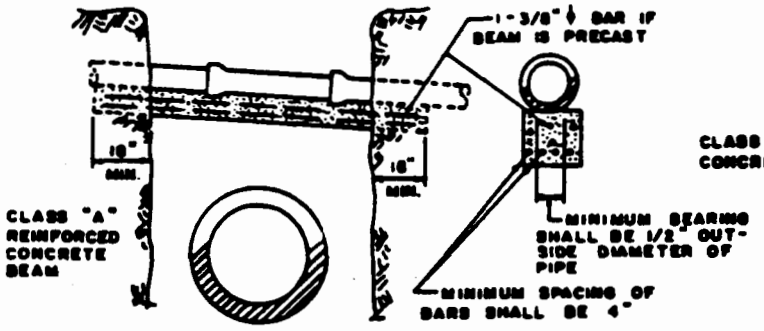
PARAPET DETAILS FOR MUTIPLE SPAN CULVERTS

PARAPET "f" BAR NOS.			
SKEW ANGLE / SPAN	0° TO 15°	16° TO 30°	31° TO 45°
3'	#4	#4	#5
4'	#4	#5	#6
5'	#5	#6	#7
6'	#6	#8	#8
8'	#8	#9	#9
10'	#9	#10	#10
12'	#10	#10	#10

"d" BARS SHALL BE AS NOTED IN THE SINGLE, DOUBLE AND TRIPLE BOX CULVERT DETAILS.

COUNTY OF KAUAI	PARAPET DETAILS FOR BOX CULVERTS SCALE: 1/2" = 1'-0" SEPTEMBER 1984	STANDARD DETAILS	D-51

CASE - 1
REINFORCED CONCRETE BEAM

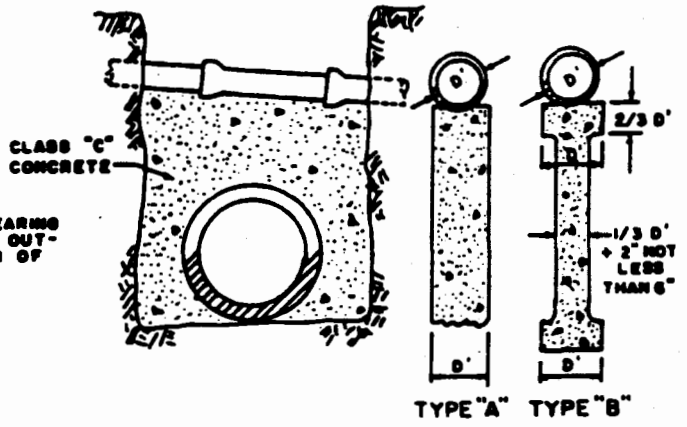


DIMENSIONS OF REINFORCED CONCRETE BEAMS:

TRENCH WIDTH	DEPTH OF BEAM	BAR SIZE	BEAM LENGTH
4'-0" or less	8"	5/8" ϕ	7'-0"
4'-6"	9"	3/4" ϕ	7'-6"
5'-0"	9-1/2"	3/4" ϕ	8'-0"
6'-0"	10-1/2"	3/4" ϕ	9'-0"
7'-0"	12"	7/8" ϕ	10'-0"
8'-0"	13"	7/8" ϕ	11'-0"

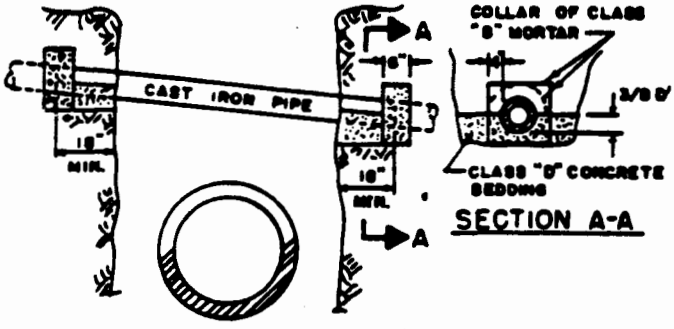
1. WIDTH OF BEAMS SHALL BE NOMINAL DIAMETER OF PIPE PLUS 2".
2. LENGTH OF BEAMS SHALL BE THE WIDTH OF TRENCH PLUS 3'-0".
3. REINFORCING STEEL SHALL BE PLACED 1-1/2" CLEAR FROM THE SIDE AND BOTTOM OF BEAMS.
4. IF BEAMS ARE PRECAST, 18" AT ENDS OF BEAMS SHALL BE BEDDED IN CLASS "D" CONCRETE.
5. CLASS "B" MORTAR SHALL BE PLACED BETWEEN TOP OF BEAMS AND BOTTOM OF PIPE TO GIVE BEARING.

CASE - 2
CONCRETE SUPPORT WALL



1. SUPPORTING WALL SHALL HAVE A FIRM BEARING ON THE SUBGRADE AND AGAINST THE SIDES OF THE EXCAVATION.
2. WALL SHALL BE AT LEAST 2-INCHES FREE AND CLEAR OF ANY GAS OR WATER OR OTHER CONDUIT OR DUCT.
3. EITHER TYPE "A" OR TYPE "B" CROSS SECTION MAY BE USED AT THE CONTRACTOR'S OPTION.
4. WHENEVER SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL PIERCE THE WALL WITH SUITABLE OPENINGS TO PREVENT UNEQUAL PRESSURE RESULTING FROM FLOODING THE BACKFILL. THE VOLUME OF THE PIERCED OPENING SHALL NOT EXCEED 1/8 THE VOLUME OF THE SUPPORTING WALL.

CASE - 3
CAST IRON PIPE

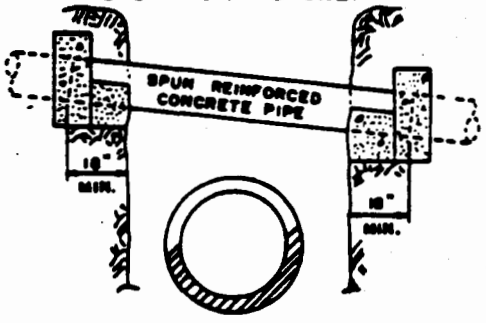


INSIDE OF CAST IRON PIPE:

	CLASS 150 PIPE			CLASS 250 PIPE		
INSIDE DIAMETER	6"	8"	10"	6"	8"	10"
MAXIMUM TRENCH WD.	4'-6"	5'-6"	7'-0"	5'-0"	6'-0"	8'-0"

NOTE: PIPE SHALL BE BEDDED IN 18" OF CONCRETE BEYOND EDGE OF TRENCH.

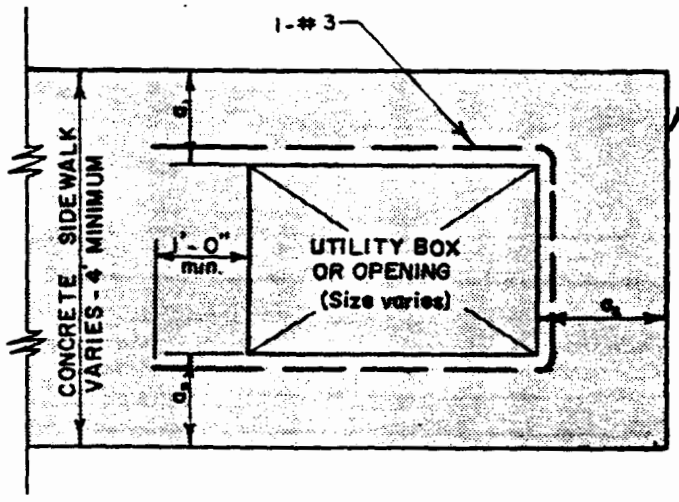
CASE - 4
SPUN REINFORCED CONCRETE PIPE STORM DRAINS ONLY



1. CLASS 2000-D SPUN REINFORCED CONCRETE PIPE OF THE SAME DIAMETER AS STORM MAY BE USED FOR STORM DRAINS ONLY WHERE WIDTH OF TRENCH IS 8'-0" OR LESS.
2. BEARING OF THE PIPE ENDS AND JOINT CLOSURE SHALL BE THE SAME AS FOR CASE 3.

METHODS OF SUPPORTING STORM DRAIN AND SEWER PIPES ACROSS TRENCHES

D-52	STANDARD DETAILS	SUPPORT FOR DRAIN AND SEWER PIPES ACROSS TRENCHES SEPTEMBER 1984 NOT TO SCALE	COUNTY OF KAUAI COUNTY OF MAUI COUNTY OF HAWAII

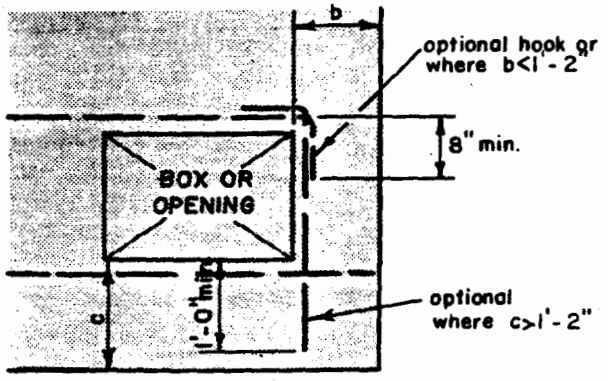


PLAN

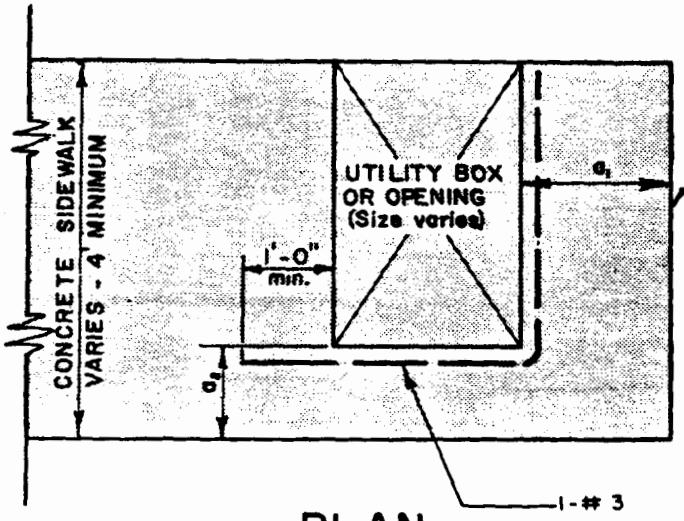
OPENING WITHIN SIDEWALK
SCALE: 1/2" = 1'-0"

NOTE

1. Reinf. bars not required where $a_1, a_2, a_3 > 2'-0"$

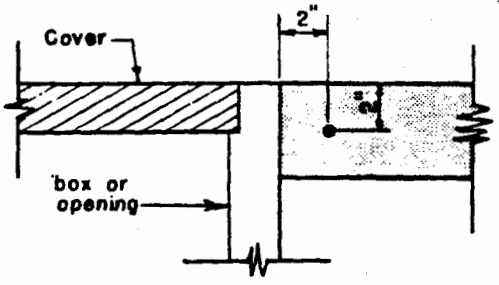


OPTIONAL BAR DETAIL
SCALE: 1/2" = 1'-0"



PLAN

OPENING AT EDGE OF SIDEWALK
SCALE: 1/2" = 1'-0"



TYPICAL SECTION
SCALE: 1 1/2" = 1'-0"

SIDEWALK REINFORCEMENT DETAILS AT UTILITY BOXES OR OPENINGS

R-16	STANDARD DETAILS	SIDEWALK REINFORCEMENT DETAILS AT UTILITY BOXES OR OPENINGS SEPTEMBER 1984 SCALE: AS NOTED	COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII


FilmHawaii
TMK Finder for Film Office
Search by Address or TMK
Poliala St
Nakini St
Poliala St
Nakini St
Poliala St
TMK_state: 141030053
TMK: 141030053
Real Property: More info
Acres: 0.33
Zoom to
Kalau Pl
Hekilliki Pl
Kalau Pl
Laulii Way
Lilioa Pl
100ft
-157.695 21.326 Degrees
Resource Mapping Hawaii | County of Hawaii; City and County of Hon...
POWERED BY esri