STANDARD DETAILS
FOR PUBLIC WORKS CONSTRUCTION

DEPARTMENTS OF PUBLIC WORKS
COUNTY OF KAUAI
CITY AND COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
OF THE STATE OF HAWAII

REVISED
SEPTEMBER 2000

SEPTEMBER 1984
STANDARD DETAILS

FOR PUBLIC WORKS
CONSTRUCTION

DEPARTMENTS OF PUBLIC WORKS
COUNTY OF KAUAII
CITY AND COUNTY OF HONOLULU
COUNTY OF MAUI
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OF THE STATE OF HAWAII

LAWRENCE KITAMURA
COUNTY ENGINEER
COUNTY OF KAUAII

MICHAEL J. CHUN
DIRECTOR AND CHIEF ENGINEER
CITY AND COUNTY OF HONOLULU

RALPH HAYASHI
DIRECTOR
COUNTY OF MAUI

EDWARD HARADA
CHIEF ENGINEER
COUNTY OF HAWAII
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<td>Pressure Manhole Cover - Type SC</td>
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CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
SEPTEMBER 1984
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<td>Typical Sign Installations in Cul-de-sacs</td>
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</tbody>
</table>
NOTE:
For curb returns use 1'-6" pre-cast concrete curbs.
PLAN

ELEVATION

SECTION A-A

PRE-CAST CONCRETE DRIVEWAY CURB
CAST IN PLACE INTEGRAL CURB AND GUTTER

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

Variable Slope (See Table below)

<table>
<thead>
<tr>
<th>DIST. CURB LINE TO P</th>
<th>SLOPE</th>
<th>HEIGHT</th>
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<tbody>
<tr>
<td>12'</td>
<td>1 7/8&quot; to 12&quot;</td>
<td>7 7/8&quot;</td>
</tr>
<tr>
<td>10'</td>
<td>3 1/2&quot; to 12&quot;</td>
<td>7 3/8&quot;</td>
</tr>
<tr>
<td>8'</td>
<td>7 1/8&quot; to 12&quot;</td>
<td>7 1/2&quot;</td>
</tr>
<tr>
<td>7'</td>
<td>7 7/8&quot; to 12&quot;</td>
<td>7 9/16&quot;</td>
</tr>
<tr>
<td>6'</td>
<td>7 1/8&quot; to 12&quot;</td>
<td>7 5/8&quot;</td>
</tr>
<tr>
<td>3'</td>
<td>1 1/8&quot; to 12&quot;</td>
<td>8 1/8&quot;</td>
</tr>
</tbody>
</table>

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

PUBLISHED COUNTY OF KAUAI
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COUNTY OF HAWAII

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

R-4 STANDARD DETAILS

INTEGRAL CURB AND GUTTER
INTEGRAL DRIVEWAY CURB AND GUTTER

JANUARY 1995

SCALE: 1-1/2" = 1'-0"
CAST IN PLACE INTEGRAL CURB AND GUTTER

Scale: 1½" = 1'-0"

Class "A" Concrete quantity = 0.0828 cu. yd./lin. ft.

4 - #5 Equally Spaced

CAST IN PLACE INTEGRAL DRIVeway CURB AND GUTTER

Scale: 1½" = 1'-0"

NOTE:

Use this detail also at catch basins. Modify reinforcing between gutter and catch basin walls, as required.

INTEGRAL CURB AND GUTTER FOR R/W OF 70' OR MORE

STANDARD DETAILS R-4A

REVISED
NOTES

1. Rolled curb shall not be permitted:
   a. Where road gradients are greater than 10 percent.
   b. On other than minor streets in residential zones.
   c. At major intersections, bridges and approaches.

2. For transition lengths to standard vertical curb, see R-6.
### TABLE

<table>
<thead>
<tr>
<th>STREET GRADE</th>
<th>TRANSITION LENGTH *</th>
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<tbody>
<tr>
<td>0.6%</td>
<td>16’ Min.</td>
</tr>
<tr>
<td>0.7%</td>
<td>12’</td>
</tr>
<tr>
<td>0.8%</td>
<td>10’</td>
</tr>
<tr>
<td>0.9%</td>
<td>9’</td>
</tr>
<tr>
<td>1.0%</td>
<td>8’</td>
</tr>
<tr>
<td>1.1%</td>
<td>7’</td>
</tr>
<tr>
<td>1.2-10.0%</td>
<td>6’</td>
</tr>
</tbody>
</table>

* Apply to 5” and 6” curbs

---

NOTE:
1. Minimum lengths indicated in table are applicable only when flow is as shown.
2. Use minimum length of 6’ for all street grades when flow is opposite to that shown.
3. Curb height of standard curb is 1” higher than rolled curb.
4. Use 6’ at upstream side and 4’ at downstream side for transition to catchbasin with 5” curb height.

---

**ROLLED CURB TRANSITION**

**NOT TO SCALE**
Provide keyed joints both sides. (See Detail "A", Sht. R-29 for new construction.)

Variable driveway width

A

Construction joint at R as req'd

Property line

Saw cut min. 1" for joint to exist sidewalk.


Score lines to be spaced equally. Maximum spacing 4'-0".

Variable approach width

Note: 6x6-10/10 Galv. Welded Wire Fabric permitted for Hawaii, Kauai & Maui only.

PLAN

SCALE: \( \frac{1}{4}" = 1' - 0" \)

Property line grade

Variable

Top of Rolled Curb

ELEVATION

SCALE: \( \frac{1}{4}" = 1' - 0" \)

SECTION A-A

SCALE: \( \frac{3}{8}" = 1' - 0" \)

DRIVEWAY APRON WITH CAST IN PLACE ROLLED CURB

(RESIDENTIAL ZONE)

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

DRIVEWAY APRON WITH ROLLED CURB

STANDARD DETAILS

R-7
**NOTE:**

Construction joints shall be keyed construction joints with tie bars per detail on sheet R-II.

**PLAN**

**SCALE:** 1" = 20'

**SECTION A - A**

**SCALE:** 1" = 1' - 0"

**THRU GUTTER**
CONSTRUCTION NOTES

1. Transverse joints shall be either weakened plane contraction joints or construction joints with dowels and shall be evenly spaced approximately 15 feet apart.

2. Expansion joints with dowels shall be located at intersections only.

3. Longitudinal joints shall be either weakened plane joints or keyed construction joints with tie bars. Maximum spacing between joints shall be as provided in the Standard Specifications.

4. Gutters constructed monolithically with the pavement shall be delineated with a score line. Gutters constructed separately shall have a longitudinal keyed construction joint with tie bars. Tie bars shall also be provided where gutters are constructed monolithically. For monolithic gutters, slope shall be 1/4" to 12".

5. Gutters on grades at 12% or less shall be steel trowel finished and gutters on grades greater than 12% shall be broom finished longitudinally.

6. Pavement on grades at 12% or less shall be broom finished transversely and pavement on grades greater than 12% shall be bristle brush finished.
Saw cut or formed groove  
Fill with joint sealer

TRANSVERSE CONTRACTION JOINT  
Scale: 1/8" = 1'-0"

Saw cut or formed groove  
Fill with joint sealer

LONGITUDINAL JOINT  
Scale: 1/8" = 1'-0"

CONSTRUCTION NOTES

1. Weakened plane joints may be constructed by sawing, forming dummy groove (see Detail 'A') or inserting ribbon or premolded strip.
2. All joints shall be slightly under filled with joint sealer paving asphalt, grade 85-100, AASHTO Designation: M-20.
3. All dowels shall be painted and greased. Expansion joint dowels shall be equipped with metal caps.
4. Expansion joints without dowels shall be constructed at junctions of concrete pavement and rectangular structure.
5. Construction joints at unplanned locations shall be keyed joints with tie bars (Detail "B").
EXPANSION JOINT WITH DOWELS

TRANVERSE CONSTRUCTION JOINT WITH DOWELS

LONGITUDINAL AND TRANSVERSE KEYED CONSTRUCTION JOINT WITH TIE BARS
Finish with Lamp Black to match A.C. pavement.

Diam. or square

Top of pavement

8" W.L. or C.L. Pipe filled with crushed rock.
ASTM size #6
(Nominal size 3/4" - 3/8")

3" Galv. Pipe filled with concrete

NOTE:
Where the excavation extends into solid rock the depth may be decreased if approved by the Engineer.

STREET SURVEY MONUMENT

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

R-12
STANDARD DETAILS

STREET SURVEY MONUMENT

CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

COUNTY OF KAUAII

SEPTEMBER 1984
SCALE: 1-1/2" = 1'-0"
PLAN

ELEVATION

CENTERLINE MONUMENT

STANDARD DETAILS

COUNTY OF KAUAʻI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SEPTEMBER 1984

NOT TO SCALE
TEMPORARY WOODEN BARRICADE

NOTE:
1. Reflectors shall be "paste-on" type.
2. Treatment shall be for termites and wood rot.

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAU'I
COUNTY OF HAWAII

STANDARD DETAILS
R-15

SCALE: 3/8" = 1'-0"
SEPTEMBER 1984
PLAN
OPENING WITHIN SIDEWALK
SCALE: $\frac{1}{2}'' = 1' - 0''$

NOTE
1. Reinf. bars not required where $a_2 > 2' - 0''$

OPTIONAL BAR DETAIL
SCALE: $\frac{1}{2}'' = 1' - 0''$

PLAN
OPENING AT EDGE OF SIDEWALK
SCALE: $\frac{1}{2}'' = 1' - 0''$

TYPICAL SECTION
SCALE: $1\frac{1}{2}'' = 1' - 0''$

SIDEWALK REINFORCEMENT DETAILS
AT UTILITY BOXES OR OPENINGS

R-16
STANDARD DETAILS
AT UTILITY BOXES OR OPENINGS

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MA'UI
COUNTY OF HAWAII

SEPTEMBER 1984
PLAN
SCALE: 3/4" = 1'-0"

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

TREE WELL WITH CONCRETE COVER
NOTES:
1. Posts and braces shall be Schedule 40 (standard weight) pipe. Sizes specified are outside diameter.
2. All fencing material shall be galvanized steel.
3. Top rail coupling shall be located within 6" of line posts.
4. Top of concrete footing shall be crowned to shed water.

DIAGRAM:
- Post cap
- Rail end
- Knuckled selvage
- 14 ga. Galv. steel wire ties at 16" o.c.
- 1 7/8" O.D. pipe (2.72 lb./ft.)
- 3/8" Ø rod with turnbuckle
- 2 7/8" O.D. pipe (3.65 lb./ft.)
- Top rail 1 7/8" O.D. pipe (1.68 lb./ft.)
- 1/4" x 3/4" stretcher bar with stretcher bar band at 14" o.c. max.
- 2" mesh, 11 gage chain link fabric
- Conc. footing - class "B" conc., neat excavation
- Twisted and barbed selvage
- 7 gage galv. tension wire with galv. steel wire ties at 24" o.c.

FIRST LINE POST
SLOPE, CORNER, END
or PULL POST
FIRST LINE POST
NOTES:
1. Posts and braces shall be Schedule 40 (standard weight) pipe. Sizes specified are outside diameter.
2. All fencing material shall be galvanized steel.
3. Top rail couplings shall be located within 6" of line posts.
4. Top of concrete footing shall be crowned to shed water.
NOTES:
1. All fencing material including gate hardware shall be galvanized steel.
2. Posts, braces, and gate frames shall be schedule 40 (standard weight) pipe. Sizes specified are outside diameter.
3. Gate shall be provided with provisions for padlocking.
4. Corner fittings for gate frames may be used in lieu of welding.
5. For 3' or 4' high gate, eliminate all horizontal bracing and attach truss rod to top of adjacent line post. Chain link fabric shall be 2' mesh, 9 gage. 
6. Gate shall have knuckled selvage top and bottom.
7. Top of concrete footing shall be crowned to shed water.
TYPICAL DOUBLE SWING GATE

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

NOTES:
1. All fencing material including gate hardware shall be galvanized steel.
2. Posts, braces, and gate frames shall be schedule 40 (standard weight) pipe. Sizes specified are outside diameter.
3. Gate shall be provided with tubular plunger bar, 1 lock keeper, 1 lock keeper guide, 2 latch forks, 2 fork catches, 1 catch for plunger bar, and 2 gate stops located as directed by the engineer.
4. Corner fittings for gate frames may be used in lieu of welding.
5. For 3' or 4' high gate, eliminate all horizontal bracing and attach truss rod to top of adjacent line post. Chain link fabric shall be 2" mesh, 11 gage.
6. Gate shall have knuckled selvage top and bottom.
7. Top of concrete footing shall be crowned to shed water.
TYPE A BOLT

Splice Bolt

Rai Bolt for Conc. Post (No Block)

Rail Bolt for Metal Block or Metal Post

TYPE B BOLT

Post Bolt for Conc. Post with Metal Blocks

Post Bolt for Metal Post with Metal Block

### Splice Rail and Post Bolts

**TYPE A BOLT**

- **D**
- **L**

**TYPE B BOLT**

- **D**
- **L**

**SPLICE RAIL AND POST BOLTS**

*Scale: \( \frac{1}{4} \) Size*

**HEXAGON NUT**

*Scale: \( \frac{1}{4} \) Size*

**SPLICE BOLT SLOT**

*Scale: \( \frac{1}{4} \) Size*

**SPLICE BOLT SLOT FOR ALL ENDS**

*Scale: \( \frac{1}{4} \) Size*

**SPLICE BOLT SLOT FOR SPECIAL END SHOE**

*Scale: \( \frac{1}{4} \) Size*

**POST BOLT SLOT**

*Scale: \( \frac{1}{4} \) Size*

**RAIL WASHER**

*Scale: \( \frac{1}{4} \) Size*

**RAIL SPLICE**

*Scale: \( \frac{1}{4} \) = 1'-0"*

**RAIL ELEMENT SECTION**

*Scale: 3" = 1'-0"*
Metal spacer block W6 x 8.5

Post bolt Galv. ½" x 1½" bolt, nut & washer. Two req'd per block at alt. side of web.

Metal spacer block W6 x 8.5

Post bolt Galv. ½" x 1½" bolt, nut & washer. Two req'd per block at alt. side of web.

Metal spacer block W6 x 8.5

Metal post - W6 x 8.5

Hardware some as for concrete post.

Reinf. conc. post. See detail.

Scale: ½" = 1'-0"

3½" G.I. pipe sleeve in each post or hole formed in concrete by use of grease bolts or other means.

ELEVATION

CONC. POST WITH SPACER BLOCK

Scale: ½" = 1'-0"

Mini metal post - W6 x 8.5 x 5' - 9" min.

Rail bolt - ¾" x 2" bolt, nut & washer. One req'd.

ELEVATION

METAL POST WITH SPACER BLOCK

Scale: ½" = 1'-0"

Rail bolt - ¾" x 2" bolt, nut & washer. One req'd.

ELEVATION

METAL POST WITHOUT SPACER BLOCK

Scale: ½" = 1'-0"

Note: All metal shall be galvanized

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

METAL GUARDRAIL DETAILS

SCALE: AS NOTED

STANDARD DETAILS

R-23

SEPTEMBER 1984
NOTES

1. When necessitated by existing physical conditions, alternate curb ramps may be used subject to engineer's approval.

2. Subject to field conditions, the engineer shall determine the final location of the curb ramp.

3. Where necessary, pullboxes, manholes, manholes, etc. Shall be adjusted to match curb ramp grade. Adjustments shall be considered incidental to curb ramp construction, unless otherwise noted.

4. For an existing sidewalk, entire sidewalk between nearest score lines shall be removed.

5. For curbs > 6" high, flares shall be constructed at a max ratio of 12H:V. However, if "X" > 48", flares shall be constructed at a max ratio of 10H:V.
NOTES

1. When necessitated by existing physical conditions, custom-designed curb ramps should be used subject to city's approval.

2. Subject to field conditions, the city shall determine the final location of the curb ramp.

3. At intersections curb ramps for each crosswalk are preferred and shall be in line and within the crosswalk. However, a single curb ramp for diagonal crosswalks can be approved if the design detail is acceptable by the city.

4. For an existing sidewalk, entire sidewalk between nearest score lines shall be removed.

5. For sidewalk widths less than 12', use detail for ramp at narrow sidewalks.

6. This detail is intended as a guideline for new curb ramp construction. A site specific detail that meets these requirements shall be shown on the plans.

7. In addition, passing spaces along new sidewalks shall be provided at maximum 200' intervals as required by ADA guidelines. The passing area shall be a minimum 5' wide by 5' long as feasible.

8. No pullboxes, handholes, manholes, etc. shall be allowed if they contain any openings > 1/2" and are of a potentially slippery surface.

9. Transitions from ramps to gutters and streets shall be flush and free of abrupt changes in level. The maximum slopes of adjoining gutters, road surface immediately adjacent to the curb ramp, or accessible route shall not exceed 20:1.

CITY & COUNTY OF HONOLULU

CURB RAMP

STANDARD DETAILS

R-25A

SCALE: AS NOTED

APRIL 2000

SUPERSEDES R-25 * FOR C&C OF HONOLULU
CONSTRUCTION NOTES

1. Asphaltic concrete pavement shall be 1 1/2" thick min. and constructed over a 4" thick base course.
2. Reinforced concrete pavement shall be 4" thick min., reinforced with 6 x 6 - 6/6 galvanized welded wire fabric and constructed on compacted subgrade.
3. Rolled coral driveway ramp shall be 3" thick min.
4. For all fill slopes use 4" top soil on fill material.

SECTION A - A

PRIVATE DRIVEWAY RAMP

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
Score lines shall be spaced equally between expansion joints to nearest 4'.

NOTES
1. Sidewalk shall be broom finished perpendicular to curb line.
2. Premoulded expansion joint filler shall be 1/2" thick.

PLAN
SCALE: 1" = 10'-0"

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

FULL WIDTH SIDEWALK AT CURB RETURN
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:

<table>
<thead>
<tr>
<th>District</th>
<th>Paved Sidewalk Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Residential: A-1, A-2, and A-3 Apartment</td>
<td>4 feet minimum</td>
</tr>
<tr>
<td>A-4 and A-5 Apartment</td>
<td>4 feet minimum</td>
</tr>
<tr>
<td>H-1 Resort Hotel</td>
<td>6 feet minimum</td>
</tr>
<tr>
<td>H-2 Hotel</td>
<td>4 feet minimum</td>
</tr>
<tr>
<td>B-1 Business</td>
<td>Full width</td>
</tr>
<tr>
<td>B-2, B-3, and B-5 Business</td>
<td>6 feet minimum</td>
</tr>
<tr>
<td>B-4 Business</td>
<td>Full width</td>
</tr>
<tr>
<td>All Industrial</td>
<td>4 feet minimum</td>
</tr>
<tr>
<td>All Planned Development</td>
<td>4 feet minimum</td>
</tr>
</tbody>
</table>

NOTE A:
1. Full-width concrete sidewalks may be permitted when constructed for the entire block.
2. Lawn grass or decorative 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.
PLANT
SCALE: 1/8" = 1'-0"

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

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

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

STANDARD DRIVEWAY APRON
COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAI'I

DRIVEWAY APRON
STANDARD DETAILS
R-29

SCALE: AS NOTED
SEPTEMBER 1984
CURB RETURN TYPE DRIVEWAY MAY BE PERMITTED FOR PARKING AREAS EXCEEDING 100 SPACES, FIRE STATIONS AND HOSPITALS.

CITY & COUNTY OF HONOLULU

DRIVEWAY APRON

NOTE:
1. FOR EXTENSION TO EXISTING DRIVEWAY, SCORING AND FINISH SHALL MATCH EXISTING SCORING AND FINISH. FOR DRIVEWAY CONSTRUCTED IN BUILT UP AREAS, SCORING CONFORMING TO SCORING AT ADJACENT DRIVEWAYS MAY BE AUTHORIZED.

2. FOR NEW SUBDIVISIONS, PROVIDE CENTERLINE ROADWAY STATIONING TO THE CENTERLINE OF THE DRIVEWAY (APPLICABLE TO STD DET. R-7).

3. THIS DETAIL IS FOR GUIDANCE ONLY. A DESIGN DETAIL MAY BE REQUIRED FOR EACH SPECIFIC SITE. THE DETAIL MUST COMPLY WITH THE REQUIREMENTS SHOWN.

SUPERS ED R-29 FOR C&C OF HONOLULU *
ALL RESIDENTIAL DISTRICTS

Single driveway width: maximum 25 feet, minimum 12 feet. Two driveways may be constructed per parcel per property frontage provided total width does not exceed 25 feet per frontage. Schools, churches, hospitals and fire stations are exempt. Driveways serving abutting properties may be combined upon the mutual consent of the property owners.

BUSINESS, INDUSTRIAL, HOTEL & APARTMENT DISTRICTS

1. Total driveway width excluding flares on any street shall not exceed 30 feet or 45 per cent of the property frontage on that street, whichever is greater.
2. No driveway excluding flares shall be less than 12 feet or exceed 50 feet in width. Minimum width for two-way traffic shall be 20 feet.
3. No limit on number of driveways provided total width excluding flares does not exceed limit provided in "Note 1" above.

GENERAL NOTES:

1. Deviation from this standard and other driveway standards may be permitted upon approval of the Chief Engineer.
2. Upon approval by the Joint Pole Committee, the City Traffic Engineer, and the Chief Engineer, driveways may encroach into the 15 foot reserve area.
3. No portion of the driveway or flare shall encroach into the curved portion of the curb return except that on government initiated widening or improvement of streets where an existing driveway is located on the return and it is physically impossible to relocate the driveway away from the return, such driveway may be reconstructed on the return.
4. 2" Asphalt Concrete on 6" base course may be used in place of reformed concrete in unimproved areas or where installation of concrete sidewalks are pending. The grade of driveways in unimproved areas shall follow the typical planned section of the sidewalk area.
5. No driveway shall interfere with or be constructed within 2 feet of any utility installation, catch basin, fire hydrant, or other government installation.
6. Where property frontage is less than 15 feet, flares may extend beyond the projection of property lines.
7. Fire stations exempt from width requirements.

STANDARD DRIVEWAY LAYOUT
**TYPE "A" WALL**

Note: Details applicable only for areas with granular soil containing some silt sized material or better soils.

**STEP FOOTING DETAIL**

**TYPE "B" WALL**

**TYPE "C" WALL**

**TYPE "D" WALL**

CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
GRADE ADJUSTMENT WALLS

SCALE: 1/2" = 1'-0"
September 1984
NOTE:
All R/W widths shown hereon are minimum.
See R-34 for Road Pavement and Sidewalk Detail.

STREET CROSS SECTIONS
WITH SIDEWALK

R-32
STANDARD
DETAILS

CUL-DE-SAC

"T" TURNAROUND

CIRCULAR TURNAROUND

STREET CROSS SECTIONS
WITH SIDEWALK

COUNTY OF HAWAII

SEPTEMBER 1984

NOT TO SCALE
PRIMARY ARTERIALS

SECONDARY ARTERIALS

BUSINESS & INDUSTRIAL STS.

COLLECTOR STREETS

MINOR STREETS & CUL-DE-SAC

Provide Parabolic Curve Connection

NOTE:
All R/W widths shown hereon are minimum.
See R-34 for Road Pavement and Shoulder Detail.

STREET CROSS SECTIONS
WITHOUT SIDEWALK
The invert shall not coincide with the utility pole location.

6" Aggregate Subbase with Seal Coat Type III treatment at 0.75 gal./sq. yd. or 2" A.C. on 4" min. Aggregate Base Course.

NOTE:
Provide full width sidewalk at commercial, industrial and resort areas or as modified by the Chief Engineer.
TYPICAL ROADWAY UTILITY LOCATION
WITH SIDEWALK
NOTE:
UTILITY BOXES SHALL BE CONSTRUCTED
FLUSH WITH THE FINISHED GRADE OF
THE SWALE.
NOTES:
Concrete Pavement
1. 4" (Residential) - reinforced with 6 x 6-10/10 wire fabric, 5" (Commercial) - reinforced with 6 x 6-6/6 wire fabric, shall be constructed with 4" (min.) base course.
2. Provide construction joint at property line.

Asphalt Concrete Pavement
1. The structural section shall consist of 2" o.c. with 4" min. base course.

RESIDENTIAL DRIVEWAY WITHOUT CURB & GUTTER
NOTES:

1. FOR NON-CURBED AREAS, DRIVEWAY APRON SHALL CONFORM WITH STANDARD DETAIL D-33, D-34 OR D-35 DEPENDING ON THE EXISTING DRAINAGE CONDITIONS FRONTING THE PROPERTY.

2. NO DRIVEWAY APPROACH SHALL INTERFERE WITH MUNICIPAL FACILITIES OR OTHER STREET STRUCTURES.

3. NO DRIVEWAY APPROACH SHALL INTERFERE WITH PROPER RUN-OFF OF SHOULDER WATERS.

* NO MINIMUM IF RADIUS IS MORE THAN 30 FEET.
** NO MINIMUM IF FRONTAGE IS LESS THAN 20 FEET.
NOTES:

1. This street is only for areas zoned A-3 and over.
2. The oil-treatment shall conform to Section 409 - Seal Coat Type 3 of the Dept. of Transportation Std. Specs. for Road & Bridge Construction, except that .4 gal./sq. yd. shall be used for the first application and .35 gal./sq. yd. shall be used for the second application.
3. Where grades are 8% or greater, the roadway section shall be paved as shown in Detail R-34.
4. See Std. Detail R-33 for applicable minimum R/W and pavement widths.

AGRICULTURAL STREET

NOTES:

1. This street is for residential and Ag-1 lots and shall not provide access to more than six (6) lots.
2. Minimum pavement and R/W widths shall be as follows:
<table>
<thead>
<tr>
<th>Access (Lots)</th>
<th>Pavement Width</th>
<th>R/W Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8'</td>
<td>12'</td>
</tr>
<tr>
<td>2</td>
<td>12'</td>
<td>16'</td>
</tr>
<tr>
<td>3</td>
<td>14'</td>
<td>18'</td>
</tr>
<tr>
<td>4 to 6</td>
<td>16'</td>
<td>20'</td>
</tr>
</tbody>
</table>
3. Maximum grade = 20%.
4. 4" thick concrete reinforced by 6x6-10/10 WWM on 4" min. Aggregate Base Course may be used in lieu of the above section.
5. The existing drainage pattern shall not be altered with respect to adjoining properties.

PRIVATE DEAD-END STREET

NON-DEDICABLE STREETS
SECTION A-A

3/8" x 1" x 3'-0" Bars Welded To Each Grate Bar
1/2" x 4" x 3'-0"
5'-0"
1/2" x 2'-4" x 2'-11"
Flat Bars, 1-1/2" ac
1-1/2" clear

SECTION C-C

4-1/2" x 6" A.B.
Welded to 4, Eq. Sp.

SECTION B-B

NOTES:
1. All weld 5/16".
2. All steel shall be structural grade.
3. Grates and frame 4's shall be hot dip galvanized after fabrication in accordance with ASTM A 123.
4. Minimum depth shall be 20'-0" or as directed by the Engineer.
5. RM-1 Delineator shall be placed as directed by the Engineer.

DRY WELL COVER

R-40
STANDARD DETAILS
COUNTY OF HAWAII
SEPTEMBER 1984
NOT TO SCALE
MAJOR THOROUGHFARES

MAJOR STREET

COLLECTOR STREET

MINOR STREET

DEAD END STREET
MINIMUM PAVEMENT WIDTH FOR AGRICULTURAL ROADWAYS IS 16 FEET.

MAJOR STREET

COLLECTOR STREET

MINOR STREET

DEAD END STREETS
COUNTY OF KAULI
ROAD PAVEMENTS AND SHOULDERS
STANDARD DETAILS
R-43

HALF SECTION OF STREET WITH SHOULDER

HALF SECTION OF STREET WITH SIDEWALK

NOT TO SCALE
SEPTEMBER 1984
NOTES:
1. MAINLINE UTILITIES SHALL HAVE A MINIMUM COVER OF 2.5' UNLESS OTHERWISE SPECIFIED.
2. * WHEREVER POSSIBLE THE STORM DRAIN SHALL HAVE A MINIMUM COVER OF 3.0'.
3. ** ALTERNATE LOCATION OF UTILITIES.
NOTES
1. WHEN ELECTRICAL TRANSFORMERS INTERFERES WITH LOCATION THE UTILITIES SHALL BE PLACED OUTSIDE THE TRANSFORMER AT THE DISTANCES NOTED ON THE PLANS.
2. WHENEVER POSSIBLE STORM DRAIN INLETS AND MANHOLES SHALL BE LOCATED AWAY FROM THE COMMON PROPERTY BOUNDARY LINES.

SECTION

LEGEND
C TV CABLE
D STORM DRAIN
E ELECTRIC (UNDERGROUND)
G GAS
S SANITARY SEWER
T TELEPHONE (UNDERGROUND)
W WATER
E PROPERTY LINE
FIRE HYDRANT
NOTES:

CONCRETE PAVEMENT
1. 4" (RESIDENTIAL), 6" (COMMERCIAL) - REINFORCED WITH 6X6-6/6 WIRE FABRIC SHALL BE CONSTRUCTED.
2. PROVIDE CONSTRUCTION JOINTS AT EDGE PAVEMENT AND PROPERTY LINE.
3. THE MINIMUM WIDTH (W) AT THE EDGE OF PAVEMENT FOR ANY WIDTH OF DRIVEWAY SHALL BE NOT LESS THAN 29 FEET NOR MORE THAN 40 FEET.

ASPHALT CONCRETE PAVEMENT
1. THE STRUCTURAL SECTION SHALL CONSIST OF 2" A C WITH 4" BASE COURSE
NOTES:

1. BUSINESS & INDUSTRIAL
   Total driveway width excluding flares on any street shall not exceed 25 feet or 40 percent of the property frontage on that street, whichever is greater. No driveway excluding radius shall exceed 36 feet in width.

2. RESIDENTIAL, MULTIPLE FAMILY, HOTEL, AGRICULTURE AND FARMING DISTRICTS
   Single driveway width: Maximum 22 feet, Minimum 10 feet.

3. Driveways may encroach into the 15 foot reserve area, upon approval by the Director of Public Works.

4. No portion of the driveway or flare shall encroach into the curved portion of the curb return except that on government initiated widening or improvement of streets where an existing driveway is located on the return and it is physically impossible to relocate the driveway away from the return, such driveway may be reconstructed on the return.

5. No driveway shall interfere with or be constructed within 2 feet of any utility installation, catch basin, fire hydrant, or other government installation.

6. Driveway flare not to extend beyond property line extension with the exception of property frontage less than 18 feet.

7. Driveway layouts not covered in this standard, may be constructed upon approval by the Director of Public Works.

STANDARD DRIVeway LAYOUTS
FOR CONCRETE CURB STREETS

COUNTY OF MAUI DRIVeway LAYOUTS FOR CONCRETE CURB STREETS STANDARD DETAILS R-49

NOT TO SCALE SEPTEMBER 1984
NOTES:

1. BUSINESS & INDUSTRIAL
   Total driveway width excluding flares on any street shall not exceed 25 feet or 40 percent of the property frontage on that street, whichever is greater. No driveway excluding radius shall exceed 36 feet in width.

2. RESIDENTIAL, MULTIPLE FAMILY, HOTEL, AGRICULTURE AND FARMING DISTRICTS
   Single driveway width: Maximum 22 feet, Minimum 10 feet.

3. Driveways may encroach into the 35 foot reserve area, upon approval by the Director of Public Works.

4. No portion of the driveway or flare shall encroach into the curved portion of the curb return except that on government initiated widening or improvement of streets where an existing driveway is located on the return and it is physically impossible to relocate the driveway away from the return, such driveway may be reconstructed on the return.

5. No driveway shall interfere with or be constructed within 2 feet of any utility installation, catch basin, fire hydrant, or other government installation.

6. Driveway flare not to extend beyond property line extension with the exception of property frontage less than 22 feet.

7. Driveway layouts not covered in this standard, may be constructed upon approval by the Director of Public Works.

STANDARD DRIVEWAY LAYOUTS FOR NONCURB STREETS
NOTES:
1. For length less than 3'-6", remove existing sidewalk and construct standard concrete driveway. See sheet R-3.
2. Broom finish may be permitted.
TYPICAL SECTION
GRAVEL ROAD - AGRICULTURAL

NOTES:

1. Prime coat (SS-1) shall be applied at the rate of approximately 0.35 gal. per sq. yd. after basecourse has been compacted.

2. After the bituminous material has been absorbed, RS-1 shall be applied at the rate of 0.35 gal. per sq. yd.

3. Size 8 rocks (chips) shall then be spread in a uniform layer at the rate of approximately 20 lbs. per sq. yd. and rolled.

ROADWAY
TYPICAL SECTIONS
Not to Scale
Swale - Design & Construction Standards
(Areas w/o Curb & Gutters)
Scale: 1/2" = 1'-0"

GRASSED SWALE

ASPHALTIC CONC. SWALE

REINF. CONC. SWALE

ROADWAY SWALES
NOTE:

1. 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 trim height of 4" except vines or other planting which may be a tripping hazard. 4" topsoil required.

2. In lieu of lawn grass, Director of Public Works 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.
   (e) Loose aggregates, such as basaltic, coral or limestone chips.

3. Street tree including existing trees may be permitted in sidewalk areas subject to the approval of the Department of Public Works.

4. Sprinklers, set flush with the surface, may be permitted by the Director of Public Works.

SIDEWALK WITH STANDARD CURB & GUTTER

SIDEWALK WITH CURBS ONLY
TYPICAL

OFFSET

TEMPORARY CUL-DE-SAC

SCALE: 1 INCH = 50 FEET

COUNTY OF MAUI CUL-DE-SAC STANDARD DETAILS R-57

SCALE: 1" = 60'

SEPTEMBER 1984
NOTES:

1. The telephone, cable TV and electric services are to be located at one property line with the gas, sewer and water occupying an alternate property line as indicated on the "Typical Location Plan" whenever possible. The relative locations of the services with respect to the property lines shall conform to the dimensions indicated on the "Plan View".

2. For cases where all the utilities are to be located at the common property lines, the relative locations of the services to the property lines shall also conform to the dimensions indicated on the "Plan View".

SPACE ALLOCATION FOR UNDERGROUND SERVICES AT PROPERTY LINES IN NEW SUBDIVISION AREAS
SPACE ALLOCATION FOR UNDERGROUND UTILITIES

STREET

PLAN VIEW

SECTION A-A
ELEVATION OF SERVICES AT PROPERTY LINE

NOTE: FOR RURAL AREAS, DEPTH OF WATER, ELECTRIC & TELEPHONE SHALL BE INCREASED 6".

SPACE ALLOCATION FOR UNDERGROUND SERVICES AT PROPERTY LINES IN NEW SUBDIVISION AREAS
STANDARD DETAILS for Public Works Construction

Storm Drains

PART 2
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 not be more than 2'-0" above the invert.

PLAN

ELEVATION

SECTION A-A
TYPE "A" CATCH BASIN
REINFORCEMENT DETAILS

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

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
TYPE "E" CATCH BASIN

SCALE: 1/4" = 1' 0"

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.

PLAN

See Detail "B" of detail sheet D-13
6" x 6" center post, chamfer outer edges
Round opening of outlet pipe. Min. radius = 0.15 pipe diam.

ELEVATION

SECTION A-A
NOTES:
1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.
**TYPE "B" CATCH BASIN**

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

**NOTES:**
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.

---

**PLAN**

- Transition Gutter
- Depressed Gutter
- Transition Gutter

- Weep Hole
- Gutter flow line

- Pay line for C.B. excavation
- Type "B" Rungs 16 o.c.

**ELEVATION**

- Pay line for C.B. excavation

**SECTION A-A**

- Pay line for C.B. excavation
TYPE "B" CATCH BASIN
REINFORCEMENT DETAILS

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

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

PLAN

SECTION C-C

SECTION B-B

SECTION A-A
**TYPE "F" CATCH BASIN**

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

**NOTES:**
1. Provide 2 cu. ft. of crushed rock (Rock Sand) ASTM size ⅝, 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.

**PLAN**

- Symmetrical about \( \xi \)
- Pay line for C.B. excavation
- See Detail "B" of detail sheet D-9
- Round opening of outlet pipe. Min. R = 0.15 pipe diameter.
- Type "DA" frame & cover

**ELEVATION**

- 4'-0" min. transition gutter
- 16'-6" depressed gutter
- 4'-0" min. transition gutter

**SECTION A-A**

- Mortar
- Type "S" rungs at 16" o.c.
- See Detail "A" detail sheet D-18
- Slope \( \frac{1}{4} \) to 12"
Symmetrical about "C"

2- #4 at 6" ac bottom
5- #6 at 6" ac bottom
#5 at 8" ac bottom
#6 at each corner

Type "DA" frame & cover

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
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.

Type "C" CATCH BASIN
SCALE: 3/8" = 1'-0"

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

Type "C" CATCH BASIN
SCALE: 3/8" = 1'-0"

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
**TYPE "C" CATCH BASIN REINFORCEMENT DETAILS**

**PLAN**

- #4 at 12" o.c.
- Alternate at 6" o.c.
- 4 #4 at top as shown
- 1 #4 at each corner
- Add 1 #4 at top and bottom

**SECTION B-B**

- #4 at 12" o.c.
- 2 1/2" Clear
- All Walls

**SECTION A-A**

- #4 at 12" o.c.
- 2 1/2" Clear

**NOTES:**

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

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

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**CITY & COUNTY OF HONOLULU**

**COUNTY OF HAWAI'I**

**TYPE "C" CATCH BASIN REINFORCEMENT DETAILS**

**SCALE:** 3/8" = 1' - 0"
Provide 2 cu. ft. of crushed rock, ASTM size #9 Rock Sand, at weep hole.

See sheet D-12 for reinforcement details.

Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.
TYPE "D" CATCH BASIN
REINFORCEMENT DETAILS

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

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

PLAN

SECTION B-B

SECTION A-A
TYPICAL REINFORCEMENT AT PIPES
SCALE: 1" = 1' - 0"

Typical

TYPICAL CORNER REINFORCEMENT LAPPLING
SCALE: 1" = 1' - 0"

TYPICAL CORNER REINFORCEMENT LAPPLING
SCALE: 1" = 1' - 0"

CATCH BASIN DETAILS

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

DETAIL "B"
SCALE: 1" = 1' - 0"

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

CATCH BASIN DETAILS

CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SCALE: AS NOTED
SEPTEMBER 1984
DETAIL "A_1"
SCALE: 1½" = 1'-0"

Add 1(#) 4 for type "C" C.B.

See reinf. detail for specific type C.B. for size and spacing.

DETAILS FOR CATCH BASIN WITH 5" CURB

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

SEPTEMBER 1984
SCALE: 1-1/2" = 1'-0"
DEFLECTOR INLET FOR CATCH BASIN

SECTION A-A

SECTION B-B

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

SECTION C-C

SCALE: \( \frac{1}{2}'' = 1' - 0'' \)

SCALE: 2' = 1'-0''

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

DEFLECTOR INLET FOR CATCH BASIN

For 3 - 6" CB throat construct 3 deflector units at 8 1/2" o.c.

Note: For each deflector unit, the angle of the deflector and the direction of flow should be as shown in the diagram.
MONOLITHIC CONSTRUCTION OF CATCH BASIN

TOP SLAB AND SIDEWALK

TYPE "A" 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.

TYPE "B" CATCH BASIN

Finish to match curbing

Curb

Property Line

Score Lines

Variable

4'-0"

Sidewalk

4'-0"

Property Line

Score Lines

Curb

4'-0"

4'-0"

4'-0"

2'-0"

Gutter

Curb
Plan

Pay line for excavation

#4 at each corner

3 #4 at 6" o.c. of bottom

2 #4 at bottom as shown

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 no more than 2" - 0" above the invert.

SECTION A-A

SHALLOW DRAIN MANHOLE
FOR SIDEWALK AREA

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SHALLOW DRAIN MANHOLE
FOR SIDEWALK AREA

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

SEPTERMBIR 1984

STANDARD DETAILS
D-17
PLAN

NOTES:
1. See sheet D-26 for channelizing detail.
2. See sheet D-15 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

COUNTY OF KAUAʻI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
Type "B" Rungs 16" o.c.
Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.

Pay line for excavation

#4 Vertical Bars spaced 1/6 of circle

Round opening of outlet pipe. Min. radius = 0.15 pipe diameter.

#4 Bars at 12" o.c. bothways

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
COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII
Type "A" Rungs 16" O.C.
Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.

Pay line for excavation
2 #4 Horizontal Hoops
#4 Vertical Bars spaced 1/8 at circle
#4 Horizontal Hoops at 8 O.C. (Lap ends 12")

Round opening of outlet pipe. Min. radius = 0.15 pipe diameter

NOTES:
1. Manholes deeper than 10'-0" require special design and other detailing
2. See sheet D-26 for "Channelizing Details for Drain Manhole"
Adjustment up to 3" permitted with brick or mortar.

Type "B" Rungs 16" o.c. (max.)

Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2'-0" above the invert.

See Detail "A" on detail sheet D-23 Details of Cone Section, Riser Section and joint shall be approved by the Engineer.

Pay line for excavation

Mortar around base

See Detail "B" on detail sheet D-23

2 # 4 Bars

#4 Vertical Bars spaced 1/8" of circle

#4 Horizontal Hoops at 8" o.c. (Lap ends 12"

Reinforced concrete base shall be cast in place

#4 Bars at 12" o.c. bothways

Round opening of outlet pipe. Min. radius = 0.15 pipe diameter.

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"
DETAIL "A"

CONE SECTION

RISER SECTION

DETAIL "B"

PRE-CAST CONCRETE DRAIN MANHOLE DETAILS
ALTERNATE DETAIL "A"

PRE-CAST CONCRETE DRAIN
MANHOLE DETAILS

SCALE: 4 1/2" = 1'-0"
PRE-CAST CONCRETE DRAIN MANHOLE DETAILS

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.
PLAN

SECTION A - A

CHANNELIZING DETAILS FOR DRAIN MANHOLE

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

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

Slope to drain

Channelize bottom of manhole to depth of 1/2 pipe diameter using concrete bricks and Class "B" concrete.

4'-0"
9"
9"
NOTES:

1. Rungs shall be 3/4" 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.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>WALLS</th>
<th>L₁</th>
<th>L₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>Brick</td>
<td>13 1/2&quot;</td>
<td>7 5/8&quot;</td>
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<tr>
<td>Type B</td>
<td>Concrete</td>
<td>9&quot;</td>
<td>4 3/4&quot;</td>
</tr>
<tr>
<td>Type C</td>
<td>Precast</td>
<td>7 3/4&quot;</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>

* 3" for one rung at top of opening.

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

SECTION A-A

TYPE "DA" FRAME
FOR CATCH BASIN AND MANHOLE
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 KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUl
COUNTY OF HAWAII
D-30

I" Diameter hole

Cast Iron

PLAN

24" Diameter

3" 7 at 1 1/2" = 10 1/2"

1/4"

1/4"

3/4"

3/4"

3/4"

3/4"

3/4" 3 1/2" 3/4"

23 1/2"

SECTION A - A

BOTTOM VIEW OF COVER

CATCH BASIN AND MANHOLE COVER

STANDARD DETAILS

CATCH BASIN AND MANHOLE COVER

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

SEPTEMBER 1984

SCALE: 1-1/2" = 1'-0"
Payment Width of Repaving

A.C. Pavement

Base Course

Pay line for excavation

Alternate pay line for excavation as determined by the Engineer in the field

Pipe Cushion (select material)

P = Outside Diameter

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"

<table>
<thead>
<tr>
<th>DRAIN PIPE SIZE</th>
<th>PAYMENT WIDTH OF TRENCHING</th>
<th>WIDTH OF REPAVING</th>
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</thead>
<tbody>
<tr>
<td>18&quot;</td>
<td>3.6&quot;</td>
<td>48&quot;</td>
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<td>6.0&quot;</td>
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<td>30&quot;</td>
<td>5.6&quot;</td>
<td>6.8&quot;</td>
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<td>36&quot;</td>
<td>6.4&quot;</td>
<td>7.6&quot;</td>
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<td>9.2&quot;</td>
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<tr>
<td>54&quot;</td>
<td>8.8&quot;</td>
<td>10.0&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>9.6&quot;</td>
<td>10.8&quot;</td>
</tr>
</tbody>
</table>

PAYMENT TRENCH WIDTH AND REPAVING FOR DRAIN PIPES
NOTE:
All steel parts to be galvanized.

Varieties - (Shown for 8'-0" sidewalk area)

Standard conc. curb

Drain

Ditch

Easement

PLAN

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

V/4" checkered steel plate

Flow line of gutter

SECTION A-A

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

V/4" per ft

Invert

SECTION B-B

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

Conc. sidewalk

V/4" ch. steel plate

See Detail "A"

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

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

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

SECTION

A

4 BARS - 12" O.C.

5 BARS - 8" O.C.

DETAIL

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

ORD. 53 (DROP DRIVEWAY)
6'-0" for future drop driveway condition.

Max. approach width
at curb line: 36"

Property Line

R/W

Ditch

Future Curb Line

Provide smooth riding connection to roadway.

SEE DETAIL ABOVE FOR CULVERT REINFORCEMENT REQUIREMENTS.

PLAN

COUNTY OF HAWAII

DRIVEWAY DRAINAGE - BOX CULVERT

STANDARD DETAILS D-33

NOT TO SCALE

SEPTEMBER 1984
STREET

PAVEMENT

SHOULDER

10' - 60' R/W

7' - 50' R/W

FUTURE SIDEWALK

MIN. 8"

STREET

PAVEMENT

SHOULDER

10' - 60' R/W

7' - 50' R/W

FUTURE SIDEWALK

MIN. 8"

SECTION

ORD. 53 (DROP DRIVEWAY)

6' - 0" FOR FUTURE DROP

DRIVEWAY CONDITION,

2' - 0" CLEARANCE

MAX. APPROACH WIDTH

AT CURB LINE - 36"

VARIABLE

R/W

PROPERTY LINE

DITCH

FUTURE CURB LINE

SHOULDER

DITCH

FUTURE CURB LINE

SHOULDER

PROVIDE SMOOTH RIDING CONNECTION TO ROADWAY

PLAN

D-34

STANDARD DETAILS

DRIVEWAY DRAINAGE - PIPE CULVERT

COUNTY OF HAWAII

SEPTEMBER 1984

NOT TO SCALE

COUNTY OF HAWAII

SEPTEMBER 1984

NOT TO SCALE
NOTE: SWALE GRADE AS DIRECTED BY ENGINEER

PAVEMENT

SHOULDER

10' - 60' R/W

7' - 50' R/W

FUTURE SIDEWALK = 1/4' FT

SAME AS PAVEMENT GRADE

DRIVEWAY

SECTION

ORD 53 (DROP DRIVEWAY)

6' FOR FUTURE DROP

DRIVEWAY CONDITION

2'-0" CLEARANCE

MAX. APPROACH WIDTH

AT CURB LINE = 36

VARIABLE

PROPERTY LINE

R/W

FUTURE CURB LINE

SHOULDER

PROVIDE SMOOTH RIDING

CONNECTION TO ROADWAY

R/W

FUTURE CURB LINE

SHOULDER

COUNTY OF HAWAII

DRIVEWAY DRAINAGE - SWALE

STANDARD DETAILS

D-35

NOT TO SCALE

SEPTEMBER 1984
"H" IS THE DIFF. IN ELEV. BETWEEN THE OUTLET PIPE FLOW LINE AND THE NORMAL GUTTER GRADE LINE UNDERPRESSED AT THE CURB FACE.

1. FOR "T" WALL THICKNESS, SEE TABLE.
2. REINFORCING STEEL IN WALLS SHALL BE #4 BARS @ 18" CENTERS, PLACED 1½" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.
3. 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.
4. DETAILS SHOWN APPLY TO BOTH METAL AND CONCRETE PIPE.
5. PIPE(S) CAN BE PLACED IN ANY WALL.
6. CURB SECTIONS SHALL MATCH ADJACENT CURB.
7. BASIN FLOORS SHALL HAVE WOOD TROWEL FINISH AND A MINIMUM SLOPE OF 12:3 FROM ALL DIRECTIONS TOWARD OUTLET PIPE.
8. GALVANIZING - SEE STANDARD SPECIFICATIONS OR SPECIAL PROVISIONS.
9. CAST-IN-PLACE OR PRECAST ALTERNATIVE IS OPTIONAL WITH CONTRACTOR.
10. SET INLET SO THAT GRATE BARS ARE PARALLEL TO DIRECTION OF PRINCIPAL SURFACE FLOW.
11. SEE "STANDARD GRATE DETAIL" FOR GRATE AND FRAME DETAILS.
12. USE G1 WHEN "H" IS 4'-0".
**TABLE A**

<table>
<thead>
<tr>
<th>N</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>8' - 0&quot; OR LESS</td>
<td>6&quot;</td>
</tr>
<tr>
<td>8' - 1&quot; TO 20' - 0&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

**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"± intervals 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**

**SECTION A-A**

**SECTION B-B**

**COUNTY OF KAULI**

**TYPE G3 DRAINAGE INLET**

**STANDARD DETAILS**

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

**SEPTEMBER 1984**

**D-37**
REFE TO TYPES G1, G2 & G3 DRAINAGE INLET NOTES, TABLES, SECTIONS & DETAILS

SECTION A-A

REBAL SWALE

1" MIN.

REFER TO STD. FRAME & GRATE DETAIL

PLAN

DEPRESSION +5% +5%

REFER TO TYPE G3

EDGES PAV.

D-38
STANDARD DETAILS
TYPE G4 DRAINAGE INLET
COUNTY OF KAULAI

SEPTEMBER 1984
SCALE: 5/8" = 1'-0"
GENERAL NOTES

1. CONTRACTOR HAS THE OPTION OF USING CAST MODULAR 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.
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
Plan

Undisturbed earth section projected on Y-Y-Z

Section M-M

Notes


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 \( \frac{d}{6} = \frac{7D}{12} + 6" \).

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 1 ¼" 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 prolongation of invert of spur.
NOTES

1. VALUES FOR A, B, C, D1, D2, 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, 1¾" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN. TIE BARS SHALL BE 3/8" Ø 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.

<table>
<thead>
<tr>
<th>TABLE OF VALUES FOR F AND T</th>
<th>F</th>
<th>T</th>
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<tr>
<td>95</td>
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</tr>
</tbody>
</table>
1. VALUES FOR A, B, L, L1, 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.

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.
NOTES

1. ROUND EDGE OF OUTLET 3" RADIUS.
2. REINFORCEMENT SHALL BE 1/2" 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 "A" BARS OVER CONNECTION OPENING AS REQUIRED.

D-44 STANDARD DETAILS MONOLITHIC CATCH BASIN CONNECTION FOR PIPES 12" TO 72"

COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII

SEPTEMBER 1984 NOT TO SCALE
NOTES

1. Where pipes of different diameters are joined with a concrete collar, L and T shall be those of the larger pipe D1 or D2 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 \( \frac{1}{2}'' \) clear from outside diameter of pipe.
**Double Box Culverts**

<table>
<thead>
<tr>
<th>Size</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Spacing</th>
<th>Grade</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>12' x 12'</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>1</td>
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<tr>
<td>15' x 15'</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>7</td>
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<tr>
<td>18' x 18'</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Typical Section**

- Dimensions: 12' x 12' x 6'
- Spacing: 6'
- Grade: 1%
- Notes: Suitable for light traffic areas

---

**County of Maui**

---

**County of Kauai**

---

*Double Box Culverts Details* (as per the table above)
**(PLAN)

**TRANSITION TO RECTANGULAR STORM DRAIN**

LINED DITCH REINFORCING

**SECTION A-A**

**PROFILE**

**SECTION B-B**

<table>
<thead>
<tr>
<th>H</th>
<th>TRANSITION REINFORCEMENT</th>
<th>HW. REINFORCEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0'- 4''</td>
<td>&quot;4 @ 12&quot; BOTH WAYS CENTERED</td>
<td>&quot;4 @ 18&quot;</td>
</tr>
<tr>
<td>OVER 4'- 6''</td>
<td>&quot;A&quot; BARS &quot;6 @ 24&quot; &quot;B&quot; BARS &quot;5 @ 24&quot;</td>
<td>&quot;4 @ 18&quot;</td>
</tr>
<tr>
<td>OVER 6'- 6&quot;</td>
<td>&quot;A&quot; BARS &quot;5 @ 12&quot; &quot;B&quot; BARS &quot;5 @ 12&quot;</td>
<td>&quot;5 @ 12&quot;</td>
</tr>
</tbody>
</table>

**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.
PLAN

TRANSITION TO CIRCULAR STORM DRAIN

SECTION A-A

NOTE

SEE RECTANGULAR TRANSITION FOR GENERAL NOTES & STEEL TABLE

SECTION B-B

D-50

STANDARD DETAILS

CIRCULAR TRANSITION

SEPTEMBER 1984

COUNTY OF KAULAI
COUNTY OF MAUI
COUNTY OF HAWAII

COUNTY OF OAHU
PARAPET DETAILS FOR SINGLE SPAN CULVERTS

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

<table>
<thead>
<tr>
<th>PARAPET &quot;i&quot; BAR NOS.</th>
<th>SKEW ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0° TO 15°</td>
</tr>
<tr>
<td>3'</td>
<td>4</td>
</tr>
<tr>
<td>4'</td>
<td>4</td>
</tr>
<tr>
<td>5'</td>
<td>5</td>
</tr>
<tr>
<td>6'</td>
<td>6</td>
</tr>
<tr>
<td>8'</td>
<td>8</td>
</tr>
<tr>
<td>10'</td>
<td>9</td>
</tr>
<tr>
<td>12'</td>
<td>10</td>
</tr>
</tbody>
</table>

|                      | 15° TO 30° |
| 3'                   | 4          |
| 4'                   | 5          |
| 5'                   | 6          |
| 6'                   | 8          |
| 8'                   | 9          |
| 10'                  | 10         |
| 12'                  | 10         |

|                      | 30° TO 45° |
| 3'                   | 4          |
| 4'                   | 5          |
| 5'                   | 6          |
| 6'                   | 8          |
| 8'                   | 9          |
| 10'                  | 10         |
| 12'                  | 10         |

COUNTY OF KAUAII

PARAPET DETAILS FOR BOX CULVERTS

STANDARD DETAILS

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

SEPTEMBER 1984

D-51
CASE - 1
REINFORCED CONCRETE BEAM

CLASS "A" REINFORCED CONCRETE BEAM

MINIMUM BEARING SHALL BE 1/2" OUTSIDE DIAMETER OF PIPE
MINIMUM SPACING OF SLOTS SHALL BE 4"

CASE - 2
CONCRETE SUPPORT WALL

CLASS "C" CONCRETE

CASE - 3
CAST IRON PIPE

CASE - 4
SPUN REINFORCED CONCRETE PIPE

COUNTY OF KAUA\いい
COUNTY OF MAUI
COUNTY OF HAWAI

METHODS OF SUPPORTING STORM DRAIN AND SEWER PIPES ACROSS TRENCHES

COUNTY OF KAUAIG
COUNTY OF MAUI
COUNTY OF HAWAI
Limit of payment for trench repavement

Payment trench width

See table below

NOTE:
Payment width of cradle shall be payment trench width.

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>PAYMENT TRENCH WIDTH</th>
<th>CRUSHED ROCK CRADLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>24&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>24&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>24&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>30&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>38&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>41&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>21&quot;</td>
<td>45&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>50&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>27&quot;</td>
<td>53&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>57&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>69&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>76&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>84&quot;</td>
<td>12&quot;</td>
</tr>
<tr>
<td>54&quot;</td>
<td>91&quot;</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>
NOTE:
Payment width of cradle shall be payment trench width.

DIMENSIONS OF CONCRETE CRADLE

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>&quot;a&quot;</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>3&quot;</td>
<td>24&quot;</td>
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<td>24&quot;</td>
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<td>3&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>4&quot;</td>
<td>38&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>5&quot;</td>
<td>41&quot;</td>
</tr>
<tr>
<td>21&quot;</td>
<td>5&quot;</td>
<td>45&quot;</td>
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<tr>
<td>24&quot;</td>
<td>6&quot;</td>
<td>50&quot;</td>
</tr>
<tr>
<td>27&quot;</td>
<td>7&quot;</td>
<td>53&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>7&quot;</td>
<td>57&quot;</td>
</tr>
</tbody>
</table>
METHOD OF USING BRICKS UNDER CONCRETE BLOCKS
Not to Scale

ELEVATION SHOWING
METHOD OF LAYING PIPE
Not to Scale

Contractor shall set Concrete Blocks on undisturbed ground. Where ground is too low, the contractor shall not heap up dirt under the Concrete Block but use Concrete Bricks to take up the deficiency, scraping away beneath Concrete Block to give sufficient room for Brick.
DETAIL OF PRECAST CONCRETE PIPE BLOCK

CONCRETE BLOCK DIMENSIONS

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>1&quot;</td>
<td>2&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
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<td>1&quot;</td>
<td>7&quot;</td>
<td>6&quot;</td>
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<td>12&quot;</td>
<td>1&quot;</td>
<td>9&quot;</td>
<td>6&quot;</td>
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<td>10&quot;</td>
<td>6&quot;</td>
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<td>6&quot;</td>
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<td>2&quot;</td>
<td>0&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2&quot;</td>
<td>3&quot;</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

DIM. OF REINF. CONCRETE BLOCK

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>&quot;X&quot;</th>
</tr>
</thead>
<tbody>
<tr>
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<td>8&quot;</td>
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<td>15&quot;</td>
<td>1&quot;</td>
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<tr>
<td>18&quot;</td>
<td>1&quot;</td>
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<tr>
<td>21&quot;</td>
<td>1&quot;</td>
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<tr>
<td>24&quot;</td>
<td>2&quot;</td>
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<tr>
<td>27&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

NOTE:
Add brick for larger size pipe.
NOTE:
Reinforcing bars of laterals shall be lapped 40 dia. to reinforcing bars of mains.

DETAIL OF CONCRETE JACKET
FOR PIPES 12" AND SMALLER
Scale: 3/4" = 1 - 0"

DETAIL OF REINFORCED CONCRETE CRADLE ON WOOD PILES
(FOR 6, 8, 10, AND 12 IN. V. C. PIPE)
Scale: 1/8" = 1 - 0"

DETAIL OF REINFORCED CONCRETE CRADLE WITHOUT PILES
SIMILAR EXCEPT FOR WOOD PILES AND PILE CAPS

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAI'I

CONCRETE JACKET,
REINFORCED CONCRETE CRADLE

STANDARD DETAILS

SCALE: AS NOTED
SEPTEMBER 1984
NOTE:
Permission is to be secured from property owner before construction at property line is started.

* 4' for Maui only

DETAIL AT PROPERTY LINE
AND AT MAIN LINE
**ADVANCE RISER CONNECTION**

Not to Scale
Stone or broken pavement in street areas (See Specs.)

Top soil in lawn areas (See Specs.)

Suitable excavated materials (See Specs.)

Select material hand shoveled into trench (See Specs.)

NOT TO SCALE
No machine backfilling between these points. Backfill to be brought up evenly on each side of chimney by hand shoveling.

Double "Y" may be replaced by one or two single wyes with inverts as noted on the plans.

NOTE:
All reinforcing rods #4 except lateral ties. Laps - 40 diameters.
INDEX TO SEWER MANHOLE DETAILS

Type "SA" Cover
Sht. S-31
Type "SA" Frame
Sht. S-32

Type "SE" Cover
Sht. S-45
Type "SE" Rungs
Sht. S-45

Precast Grade
Ring - Sht. S-21
36" Precast
Cone - Sht. S-21

Precast Riser
Sht. S-21
Butt Joint
Sht. S-16

Precast Base
Sht. S-14

PLAIN M.H.
(BRICK & CAST-IN-PLACE)
SHTS. S-26, S-27

Precast Wall to
Brickwall Adapter
Ring - Sht. S-23

PLAIN M.H.
(PRECAST) SHT. S-13

SHALLOW DROP M.H.
SHTS. S-15, S-28

Precast Eccentric
Cone - Sht. S-22

Type "SB" Cover
Shts. S-33, S-34
Type "SB" Frame
Sht. S-35

22" Precast Cone
Sht. S-21
Precast Wall
Joints - Sht. S-24
Precast Wall &
Ball Joint
Sht. S-24

Chimney
Frame &
Cover
Sht. S-41

Brick Adjustment
Sht S-25

DROP M.H.
SHTS. S-17, S-18,
S-29, S-30

ADDITIONAL DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Sht. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type SC Pressure M.H. Frame &amp; Cover</td>
<td>S-37, S-38, S-39</td>
</tr>
<tr>
<td>Type &quot;SD&quot; Frame</td>
<td>S-40</td>
</tr>
<tr>
<td>Type &quot;SC&quot; Rung</td>
<td>S-43</td>
</tr>
<tr>
<td>Type &quot;SD&quot; Rung</td>
<td>S-44</td>
</tr>
<tr>
<td>Modified &quot;SB&quot; (Press) Frame &amp; Cover</td>
<td>S-36</td>
</tr>
</tbody>
</table>

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

PLAIN M.H.
36" TO 48" DIA. PIPES
SHTS. S-19, S-20

COUNTY OF KAPAA
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SEPTEMBER 1984

S-10 STANDARD DETAILS
MANHOLE NOTES

BASES
1. When precast concrete bases are used, a leveling concrete grout of 2" minimum thickness shall be placed.

WALLS
1. When precast walls are used, the height adjustment shall be in the bottom section.
2. The precast manhole riser section shall be cast with openings whenever sewer pipes must pass thru.
3. Openings in manhole walls shall be patched with epoxy grout when required.
4. Precast cones shall not be used in easement areas unless approved by the Engineer.
5. Manhole walls of reinforced concrete shall be to a height 1' above normal ground water table.

FRAMES AND COVERS
1. Generally type "SA" is used. Type "SD" frame is used in sidewalk or slab areas. Types "SB" and "SC" shall be used only when indicated.

RUNGS
1. Rungs shall be placed in all manholes unless otherwise indicated.
2. One type "SA" rung is used as a grab bar at the top of the manhole.
3. Type "SE" rungs are generally used unless otherwise indicated.
4. Type "SC" rungs shall be used in corrosive conditions in lieu of "SE" when specified.
5. Rungs shall not be aligned above any flow line except in drop manholes, where two rungs are located below the drop pipe opening and level with the rungs on the opposite wall.
6. Rungs shall not be placed in manholes less than 3' high.
7. Type "SE" or designated rungs shall be evenly spaced. Maximum spacing shall be 16" on center.
DROP CONNECTIONS

1. Pipe shall be of vitrified clay or cast iron except PVC may be used if PVC pipeline is permitted.

MANHOLE CHIMNEYS

1. Pipe shall be vitrified clay except PVC may be used if PVC pipeline is permitted.

STUBS AND ENTRY PIPE

1. All pipes entering or leaving a manhole shall have joints within 2' of the manhole wall. Joints within 2' of the manhole wall may be omitted when approved resilient manhole connectors are used.

2. When providing for future alignment, the bell of the stub shall be flush with the outside of the manhole wall and capped.

3. Where the sewer pipe runs straight thru the manhole, the Contractor may lay the pipe thru the manhole with the manhole invert and base poured together. After the concrete has hardened, the upper portion of the pipe within the manhole shall be carefully broken out and any unevenness shall be patched with mortar.

4. Drop manholes shall have a bell joint flush with the exterior wall of the drop.

5. When not otherwise noted, manhole stubs shall be sloped as follows:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Rise Per Foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>1/8&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>3/32&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>1/16&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>1/16&quot;</td>
</tr>
</tbody>
</table>

TRANSITION RING

1. A transition ring shall be used whenever a brick wall or cone is placed above a precast concrete wall.

REINFORCING STEEL

1. All reinforcing bars interfering with pipes shall be bent to clear them.
NOTE:
1. See sheet S-14 for section A-A.

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

PLAIN MANHOLE
PRE-CAST CONCRETE

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

#5 bars 12" o.c. bothways

5'-10' Minimum

5'-0" Max. from top of bench

6' Min.

2'-0" Max. from top of bench

4

Cone Section

3'-0"

Maximum height 30'

Varies
**ALTERNATE BASE**

**PRE-CAST CONCRETE M.H.**

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

---

Pipe wall plus 3" (Min.)

Pipe wall plus 10"

*5 bars 12" a.c. bothways

Base may be circular or rectangular

Height of base "0" and height of bottom riser section to be adjusted as required

---

SECTION A-A

Scale: 1/2" = 1'-0"
SHALLOW DROP MANHOLE
FOR DROP UNDER 5.0 FEET
PRE-CAST CONCRETE

Scale: 1/2" = 1'-0"
C. I. or V. C. pipe

Solidly rammed caulking yarn

3" Minimum of Atlas J.C. - 60 joint compound or approved equal

CAULKED JOINT

Stainless Steel Compression Band

Rubber Sleeve

RUBBER COMPRESSION JOINT

BUTT JOINT DETAILS

Scale: 1" = 1' - 0"

PRE-CAST CONCRETE SHALLOW DROP MANHOLE - BUTT JOINT DETAILS

COUNTY OF KAUAII CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

S-16 STANDARD DETAILS

SEPTEMBER 7, 1984 SCALE: 1" = 1' - 0"
NOTE:

DROP MANHOLE
FOR DROPS OVER 5.0 FEET
PRE-CAST CONCRETE
SECTION A - A
Scale: 1/2" = 1' - 0"

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

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

SECTION D - D
Scale: 1/2" = 1' - 0"
SECTION A-A
Scale: 1/2" = 1'-0"

2-#4 at Each Corner

3-#4 at Each Side

NOTE:
See sheet No. S-20 for section.

PLAN
PLAIN MANHOLE FOR R.C. PIPE (PRE-CAST CONC.)
27" TO 48"

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

PRE-CAST CONCRETE PLAIN MANHOLE
FOR 27" TO 48" R.C. PIPE

STANDARD DETAILS
S-19

SCALE: 1/2" = 1'-0"
SEPTEMBER 1984
SECTION B-B
Scale: 1/2" = 1'-0"

PLAIN MANHOLE FOR R.C. PIPE

(PRE·CAST CONCRETE)
27" TO 48" DIA. INCLUSIVE

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

PRE-CAST CONCRETE PLAIN MANHOLE
FOR 27" TO 48" R.C. PIPE - SECTION

S-20
STANDARD DETAILS

SEPTEMBER 1984
SCALE: 1/2" = 1'-0"
1. Pre-cast sections shall conform to ASTM C478.

2. Manufacturers may submit to the Engineer for approval prior to manufacturing, designs other than those shown on this sheet.
Type SA manhole frame and cover

Mortar

Type SA rung

Type SE rung

Scale: 1" = 1'-0"

See sheet S-21 and S-24 for pre-cast manhole riser detail

COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII

SEPTEMBER 1984
COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

PRE-CAST CONCRETE MANHOLE WALL
TO BRICK WALL ADAPTER RING

SCALE: 3/4" = 1'-0"
SEPTEMBER 1984

S-23
CONE SECTION

RISER SECTION

CONE SECTION (Alternate Detail)

RISER SECTION (Alternate Detail)

Scale: 3" = 1'-0"

Riser Section
Mortar around base
Concrete base

RISER AND MANHOLE BASE JOINT

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

S-24
STANDARD DETAILS

PRE-CAST CONCRETE MANHOLE WALL JOINTS

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

SEPTEMBER 1984
SCALE: AS NOTED
Type SA manhole frame and cover

Type SA rung

Cone section

**SHOWN WITHOUT GRADE RING**

Scale: $3'' = 1' - 0''$

Type SA manhole frame and cover

Type SA rung

Adjustment up to 3" permitted with bricks

Cone section

**SHOWN WITH GRADE RING**

PRE - CAST MANHOLE

DETAIL AT TOP RUNG

SCALE: $3'' = 1' - 0''$
Type SA manhole frame and cover.

Type SA rungs

Type SE rungs

Mortar

1" cement plaster

Interior to be bagged or plastered smooth

Max. 2'-0"
May be omitted when approved resilient manhole connectors are used.

#5 bars
12" a.c. bothways

(MAXIMUM HEIGHT - 10.0 FEET)

PLAIN MANHOLE (BRICK)

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

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
Type SA manhole frame and cover

- 4 Horizontal bars 12" o.c.

Cement plaster

Type SA rung

Brick

Type SE rungs

Interior to be bagged or plastered smooth

- 4 Vertical bars spaced 1/8 of circle

Bend bottom slab bars up 24°. All rods interfering with pipes shall be bent to clear them.

#5 bars 12" o.c. bothways

PLAIN MANHOLE (CAST-IN-PLACE)

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

SECTION A-A

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

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

PLAIN MANHOLE

STANDARD DETAILS

S-27

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

SEPTEMBER 1984
FOR DROPS UNDER 50 FEET
(SHALLOW) DROP MANHOLE (CAST-IN-PLACE)

NOTES:
Manhole wall to be of reinforced concrete to height 1' above normal ground water table.

Scale: 1/2" = 1'-0"
NOTE:
2 minimum cover on reinforcing steel
See sheet No. S-30 for sections.

(FOR DROPS OVER 50 FEET)
DROP MANHOLE (CAST-IN-PLACE)
SECTION A-A
Scale: 1/2" = 1'-0"

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

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

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

DROP MANHOLE

STANDARD DETAILS

DROP MANHOLE - SECTIONS

SEPTEMBER 1984
SCALE: 1/2" = 1'-0"
PLAN OF MANHOLE COVER

Scale: 1\(\frac{1}{2}\)" = 1'-0"

SECTION A-A

Scale: 1\(\frac{1}{2}\)" = 1'-0"

NOTE:
This cover is used with the SA or SD frame.

SECTION B-B

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

MANHOLE COVER - TYPE SA

Scale: 1\(\frac{1}{2}\)" = 1'-0"

Approx. weight 158 pounds
PLAN OF MANHOLE FRAME

Scale: 1\(\frac{1}{2}\)" = 1'-0"

SECTION A-A

Scale: 1\(\frac{1}{2}\)" = 1'-0"

Approx. weight 156 pounds
PLAN
SPECIAL MANHOLE COVER

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

SECTION A-A

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

Approx. Weight 260 Pounds
BOTTOM VIEW OF COVER

Scale: 1\frac{1}{2}'' = 1' - 0''

SECTION A - A

Scale: 1\frac{1}{2}'' = 1' - 0''
PLAN
SPECIAL MANHOLE FRAME

Scale: 11/2" = 1'-0"

Approx. Weight 480 Pounds

SECTION A-A

COUNTY OF KAUAʻI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAIʻI

MANHOLE FRAME - TYPE SB

STANDARD DETAILS

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

SEPTEMBER 1984

S-35
5/8" C.I. PRESSURE PLATE COVER

SECTION C

30" TYP.

12 - 3/4" Ø Drilled Holes

Drill and Tap for 1/2" x 13/8" Long Stainless Steel Hex. Head Cap Screws

C.I. PRESSURE PLATE COVER RING

3' - 10" dia.

9 1/8"

2' - 3 3/4" dia.

HALF SECTION-MODIFIED

TYPE "SB" MH FRAME & COVER
NOTES:

1. Gaskets shall be from 1/16 inch thick Crandall No. 1906 or Garlock No. 19.
2. The Pressure Plate and Cap Screws shall be stainless steel ASTM Designation A 240 or A 167, AISI type 316 or 321.
4. All parts of the manhole frame and cover and the pressure plate shall be coated with Inertol No. 49.
5. Maximum Allowable Pressure - 25' Head of water.
BOTTOM VIEW OF PRESSURE MANHOLE COVER
Not to Scale

PLAN OF PRESSURE PLATE
Not to Scale
NOTE:
For details of Section E-E see Sheet No. S-37

HALF PLAN - MANHOLE FRAME

Eye bolt. See Detail "A" below

Top slab

SECTION - MANHOLE FRAME & COVER

DETAIL "A"

PRESSURE MANHOLE FRAME & COVER

DETAIL "B"
NOTE:
Type SA Cover is used with this frame.

SECTION A-A

TYPE SD FRAME

Approx. weight 156 pounds

SCALE: 1 1/2" = 1'

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUl
COUNTY OF HAWAII

SEPTEMBER 1984
PLAN OF COVER

BOTTOM OF COVER

ELEVATION

SECTION

DROP MANHOLE CHIMNEY CASTINGS

Scale: 1/12" = 1'-0"

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

DROP MANHOLE CHIMNEY CASTING

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

SEPTEMBER 1984

STANDARD DETAILS

S-41
1" dia. Wrought Iron or 3/4" Stainless Steel rod shaped as shown.

* Types 302, 304, or 316

**SECTION "AA"**

Scale: 3" = 1'-0"
3/4" Dia. Type 302, 304 or 316 Stainless Steel. Rod Shaped As Shown

PLAN

SECTION "AA"

TYPE SC MANHOLE RUNG DETAILS
(STAINLESS STEEL)

Scale: 3" = 1'-0"

S-43
- 1/4" Rod welded to insert
- S1'd 3/4" threaded insert
- 2" x 2" x 1/4" Stainless Steel Plate
- Stainless Steel Pipe Sleeve
- Stainless Steel Rung
- 2" x 2" x 3/4" S.S. Plate
- S.S. Bolt

**FOR FLAT SURFACES**

**FOR ROUND MANHOLES**

- 3/4" dia. Hex head S.S. bolt 6" long
- 2" x 2" x 3/4" S.S. Plate
- S.S. Bolt

**PLAN**

- 4" Square welding strip fused to wall lining
- Gas-tight seal between plate & welding strip (Adhesive band)

**FRONT ELEVATION**

- Drill 3/4" dia. hole through plastic lining and push bolt through for tight fit.
- 1/4" Rod welded to insert
- S1'd 3/4" threaded insert
- Plastic with locking anchor

**SIDE ELEVATION**

**NOTES:**

1. All items exclusive of insert to be stainless steel Type 316, 304 or equal.
2. Welding of plate & bar to fabricate rung shall result in joints with equal strength & corrosion resistance as the S.S. materials being welded.
3. Grind all sharp edges.

**TYPE SD MANHOLE RUNG DETAILS**

S-44

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
Tread to be scored in 1/4" squares

Corners of tread to be rounded

C - C

SECTION A-A

SECTION B-B

SECTION C-C

METHOD OF INSTALLATION

TYPE SE MANHOLE RUNGS

CAST IRON OR DUCTILE IRON

Scale: 3" = 1'-0"

COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAU'I
COUNTY OF HAWAII

MANHOLE RUNG DETAILS - TYPE SE

SCALE: 3" = 1'-0"

STANDARD DETAILS

S-45

SEPTEMBER 1984
Plan:

1. Insertion of a 3/4" threaded insert.
2. 3/4" stainless steel bar welded to the insert.
3. 4 1/2"x 1 1/2"x 5/8" stainless steel plate welded to the inserted bar.
4. 3/4"x 2 1/2" S.S. bolt with washer.

Notes:
1. All items exclusive of insert to be stainless steel Type 316, 304 or equal.
2. Welding of plate and bar to fabricate rung shall result in joints with equal strength and corrosion resistance as the S.S. materials being welded.

Side Elevation:
CLASS A BEDDING
NOT TO SCALE

CLASS B BEDDING
NOT TO SCALE

CLASS C BEDDING
NOT TO SCALE

BEDDING REQUIREMENTS
(6” to 12” I.D. PIPES)

DEPTH OF COVER, C
IN FEET

BEDDING CLASS

C \leq 4
A

4 < C \leq 17
B

17 < C \leq 30
C

C > 30
Special Design

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

PVC PIPE - BEDDING REQUIREMENTS

STANDARD DETAILS

S-47
SECTION THRU
MANHOLE WALL

S.M.H. INSIDE WALL

FILL WITH NEAT CEMENT GROUT

TAPER AT PIPE SPIGOT

S.M.H. COUPLING

GASKET

PVC PIPE
Sewage Pump Stations & Treatment Plants

PART 4
NOTE:
Details may vary with the model selected.

BACKFLOW PREVENTER

Gate Valve
Pressure Regulator installed here if required.

Strainer
Blow off valve

Pipe Support (See Detail)

Ground line

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Install Union here if not flanged.

NOTE:

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Gate Valve
Pressure Regulator installed here if required.

Strainer
Blow off valve

Pipe Support (See Detail)

Ground line

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Install Union here if not flanged.

NOTE:
Details may vary with the model selected.

BACKFLOW PREVENTER

Gate Valve
Pressure Regulator installed here if required.

Strainer
Blow off valve

Pipe Support (See Detail)

Ground line

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Install Union here if not flanged.

NOTE:
Details may vary with the model selected.

BACKFLOW PREVENTER

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Pressure Regulator installed here if required.

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Blow off valve

Pipe Support (See Detail)

Ground line

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NOTE:
Details may vary with the model selected.

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Strainer
Blow off valve

Pipe Support (See Detail)

Ground line

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Install Union here if not flanged.

NOTE:
Details may vary with the model selected.

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Pipe Support (See Detail)

Ground line

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Ground line

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Pipe Support (See Detail)

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Pipe Support (See Detail)

Ground line

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Details may vary with the model selected.

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Pipe Support (See Detail)

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Pipe Support (See Detail)

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Pipe Support (See Detail)

Ground line

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Strainer
Blow off valve

Pipe Support (See Detail)

Ground line

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Install Union here if not flanged.

NOTE:
Details may vary with the model selected.

BACKFLOW PREVENTER

Gate Valve
Pressure Regulator installed here if required.

Strainer
Blow off valve

Pipe Support (See Detail)

Ground line

Backflow preventor, (Some size as pipeline) complete with gate valve and fittings.

Install Union here if not flanged.

NOTE:
Details may vary with the model selected.
FENCE AND GATE DETAILS

NOTES

1. Fencing materials shall be of aluminum or galvanized steel as called for in the specifications.
2. Posts, braces, and gate frames shall be schedule 40 (standard weight) pipe. Sizes specified are nominal diameter.
3. Double Swing Gate shall be provided with Tubular Plunger Bar, 1 Lock keeper, 1 Lock Keeper Guide, 2 Latch Forks, 2 Fork Catches, 1 Catch for plunger bar, and 2 Gate Stops located as directed by the Engineer.
4. Walkway Gate shall be provided with Fork Latch assemblies with provisions for padlocking.
5. Padlocks of the approved type keyed to the Division of Sewers master key system shall be provided for gate locks.
6. Posts, caps and other necessary fence fittings shall be as manufactured by the fence manufacturer or equal except hinges shall be of galvanized steel.
7. Posts shall be spaced equidistant but not more than 10' o.c.
8. Aluminum posts embedded in concrete shall be coated inside and outside to depth of embedment plus 4" with zinc chromate primer and aluminum pigmented bituminous paint.
9. Where galvanized steel hinges are used on aluminum posts they shall be insulated to prevent galvanic action.
NOTES:
All piping on the oil seals shall be tested before the sealing units are installed. All leaks shall be repaired by the Contractor before the tanks are filled with oil.
Anchor plate to floor with 3/8" x 4" machine bolts.

NOTE:
All piping on the oil seals shall be tested before the sealing units are installed. All leaks shall be repaired by the Contractor before the tanks are filled with oil.

SIDE ELEVATION
OIL SEALS & RELATED PIPINGS

Scale: 1" = 1'-0"

COUNTY OF KAUAII
CITY & COUNTY OF HONOLULU

SEPTEMBER 1984
ITEMS FOR OIL SEALS & RELATED PIPINGS

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM</th>
<th>QUANT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/4&quot; galv. steel plate 8&quot; x 22&quot;</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Floor flange, Brass 1&quot;</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Pipe, 8 1/2&quot; long, Brass 1&quot; (Plugged)</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Cross, Brass 1&quot;</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Nipple, 3&quot; long, Brass 1&quot;</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>Tee, Brass 1&quot;</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Gate valves, O1C, Bronze with 3/4&quot; hose nipple</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Gate valve, screwed ends, Brass 1&quot;</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Union, Brass 1&quot;</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Pipe cap, Galv. Malleable Iron 6&quot;</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>Pipe, 19&quot; long, Wrought Iron 6&quot;</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Lunkenheimer gauge glass Fig. No. 460 bronze 3 rods with 3/8&quot; pipe threads and 1/2&quot; x 12&quot; long glass.</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>Elbow, 90° 1&quot; brass with 1&quot; nipple</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>Pipe, 5&quot; long, brass 1&quot;</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>Cap, brass, 1&quot;</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Aircock, Tee handle, brass 1/4&quot; with male end bibb hose or 90° elbow</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>Pipe, 12&quot; long, brass 1&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>
See Detail "A"

Opening

1/2" diam. chain with snap hook at one end. Secure other end to U bolt.

U bolt welded to post

1/2" removable pipe

Temporary curb retainer where no curb provided

2"x 6" brass pipe

1/4" brass Plate

Face of opening

2 1/2" x 2 1/2" x 3/16" L - 4" long

3/16" x 4" plate welded to pipe post & angle

1/4" thick x 4" high portable curb

DETAIL "A"

TEMPORARY CURB RETAINER

SECTION

1 1/2" brass pipe with 1/4" brass plate cap

2"x 6" brass pipe with base

DETAIL

COVER PLATE

REMOVABLE POST & CHAIN DETAILS

P-6 STANDARD DETAILS

REMOVABLE POST AND CHAIN DETAILS

SEPTMBER 1984

NOT TO SCALE

CITY & COUNTY OF HONOLULU

COUNTY OF KAUAII
ELEVATIONS

1 1/2 x 1/8 plates welded to post

3/8 x 2 1/2 bolt with nut and washer (bronze)

PLAN

SECTION A-A

REMOVABLE RAILING DETAILS
Fill opening with concrete after pipe is in place.

**INTAKE PIPE THROUGH WALL DETAILS**

**TYPICAL WALL SLEEVE DETAILS**
NOTES:

1. 1/2" piping is shown. Size shall be as specified.
2. Box dimensions & details may vary with arrangement and location.
3. Hydraulic Control valves shall be normally closed valve.

ELEVATION

SPRINKLER VALVE CONNECTION

COUNTY OF KAUAIII CITY & COUNTY OF HONOLULU

SPRINKLER VALVE CONTROL

STANDARD DETAILS

P-9

NOT TO SCALE

SEPTMBE: 1984
VERTICAL MOTOR SHAFT & COUPLING

DETAIL
MOTOR SHAFT COUPLING

DETAIL
VERTICAL MOTOR SHAFT

SECTION Y-Y
Dimensions to suit shaft arrangement

Bolt holes with nuts welded to back side

Frame work and filler material (see general notes)

Holes for anchor bolts

Coupling access door if necessary

Latch assembly

TYPICAL PUMP MOTOR DRIVE SHAFT GUARD

No Scale

CITY & COUNTY OF HONOLULU

TYPICAL PUMP MOTOR DRIVE
SHAFT GUARD

STANDARD DETAILS

P-11
PLAN VIEW

$D_1$ - Shaft diameter plus 1 inch

$D_1$ - To suit pump installation

Bolt locations to suit bolts of pump

Filler materials - (see general notes)

$1/2''$ Min. dia. bar

$1''$ x $1/8''$ Min. flat bar

$1/4''$ Min. steel plate

TYPICAL PUMP COUPLING GUARD

No Scale
Note: All dimensions to suit shaft arrangement

TYPICAL HORIZONTAL PUMP SHAFT GUARD No. 1

No Scale
Frame work and filler material (see general notes)

Note: All dimensions to suit shaft arrangement

TYPICAL HORIZONTAL PUMP SHAFT GUARD No. 2
No Scale

CITY & COUNTY OF HONOLULU
SEPTEMBER 1984
NOT TO SCALE
SAFETY GUARDS

GENERAL NOTES

A. Framework

1. Guards thirty (30) inches or less in height and with a total surface area not in excess of ten (10) square feet may have a frame work of 3/8 in. solid rod, 3/4 in. x 3/4 in. x 1/8 in. angle iron, or metal construction of equivalent strength.

2. Minimum dimensions of materials of all guards except as noted in paragraph 1 shall be angle iron 1 in. x 1 in. x 1/8 in., metal pipe of 3/4 in. inside diameter, or metal construction of equivalent strength.

3. The frame work for all guards fastened to the floor or working platform and without other support or bracing shall consist of 1/2 in. x 1/2 in. x 1/8 in. angle iron, metal pipe of 1/2 in. inside diameter, or metal construction of equivalent strength. All rectangular guards shall have at least four upright frame members each of which shall be carried to the floor and be securely fastened. Cylindrical guards shall have at least three supporting members carried to the floor.

B. Filler Material

<table>
<thead>
<tr>
<th>Material</th>
<th>Clearance from moving part at all points (Inches)</th>
<th>Largest mesh or opening allowable (Inches)</th>
<th>Minimum gauge or thickness (U.S. STD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woven wire</td>
<td>Under 2</td>
<td>3/8</td>
<td>No. 16</td>
</tr>
<tr>
<td></td>
<td>2-4</td>
<td>1/2</td>
<td>No. 16</td>
</tr>
<tr>
<td></td>
<td>4-15</td>
<td>2</td>
<td>No. 12</td>
</tr>
<tr>
<td>Expanded metal</td>
<td>Under 4</td>
<td>1/2</td>
<td>No. 18</td>
</tr>
<tr>
<td></td>
<td>4-15</td>
<td>2</td>
<td>No. 13</td>
</tr>
<tr>
<td>Perforated metal</td>
<td>Under 4</td>
<td>1/4</td>
<td>No. 20</td>
</tr>
<tr>
<td></td>
<td>4-15</td>
<td>2</td>
<td>No. 14</td>
</tr>
<tr>
<td>Sheet metal</td>
<td>Under 4</td>
<td>2</td>
<td>No. 22</td>
</tr>
<tr>
<td></td>
<td>4-15</td>
<td></td>
<td>No. 22</td>
</tr>
</tbody>
</table>

Note: Materials to be steel. For additional requirements refer to project plans and specifications.
TYPICAL VALVE INSTALLATION ON TANKS

TYPICAL VALVE INSTALLATION ON GROUND

NOTES

1- Gate valves or angle valves with bronze discs or plugs shall be used.
2- Valves shall be rising or non rising stem design.
3- ¾" H.B. and 1¾" gate valve shall be 90° apart.

1½" STAND PIPE DETAIL

No Scale
STANDARD DETAILS for Public Works Construction

Traffic

PART 5
STREET NAME PLATES
SCOTCHLITE REFLECTIVE SHEETING NO. 3277, GREEN, WIDE ANGLE, FLAT TOP OR APPROVED EQUAL. LETTERS SHALL BE 4" WHITE SCOTCHLITE NO. 3290 OR NO. 2290, OR APPROVED EQUAL.

SIGN PLATES
0.080" MINIMUM THICKNESS, ALUMINUM SHEET (ASTM B 209, ALLOY 6061-T6, FLAT SHEET).

STOP SIGN, FACING MINOR ROAD. HIGH INTENSITY REFLECTIVE SHEETING. (REFER TO D.P.W. FOR SPECIFICATIONS)

2" SQUARE TELESPAR TUBING NO. 20 F 12, OR APPROVED EQUAL WITH 7/16" DIAMETER HOLES SPACED 1" ON CENTER.

NOTES
1. THE INSIDE OF THE 2 1/4" ANCHOR POST MUST BE KEPT FREE OF IMPEDIMENTS TO ASSURE EASY INSERTION OF THE 2" SIGN POST.

2. SQUARE TUBE POSTS SHALL BE TELESCOPING PERFORATED TELESPAR TUBING OR APPROVED EQUAL.

3. THE EXACT SIGN DIMENSION WILL BE IN CONFORMANCE WITH THE CURRENT MUTCD, AS AMENDED, OR AS DESIGNATED ON THE PLANS OR BY THE ENGINEER.

4. THE 2 1/4" ANCHOR POST SHALL BE 4' LONG FOR NORMAL OR POOR GROUND CONDITIONS AND 30" FOR ROCKY CONDITIONS.

5. FLANGED CHANNEL POST APPROVED BY STATE HIWAYS DIVISION IS ACCEPTABLE AS APPROVED EQUAL FOR 2" SQUARE TUBING.

6. SIGN POST MUST BE FIRM AND NOT SHAKY, OTHERWISE CONCRETE MUST BE USED TO STABILIZE THE ANCHOR POST.

COUNTY OF MAUI  STREET NAME AND STOP SIGN DETAILS  STANDARD  COUNTY OF HAWAII  DETAILS  T-1
HEIGHT AND LATERAL LOCATION OF SIGNS (TYPICAL INSTALLATIONS)
NOTES:

1. Three R7-1 signs required. Location of signs dependent on lot frontages onto the cul-de-sac.

2. Where a system of streets has only a single access, a "NO OUTLET" (W14-2, 30" x 30") sign must be installed at the access intersection in a similar location as sign W14-1 shown in this drawing.

3. Sign W14-1 (or W14-2) to be located so as to be easily visible from the thru-street.

4. Refer to sheets T-1, T-2, and T-3 for height and lateral clearance for signs.

COUNTY OF MAUI
COUNTY OF HAWAII

TYPICAL SIGN INSTALLATIONS
IN CUL-DE-SACs

NOT TO SCALE

STANDARD DETAILS

T-5
Galvanized flange channel
1/8" x 5/16" rolled section
post with a minimum wt.
of 2 lbs. per ft. or
approved substitute.

1/4" x 2" galvanized carriage
bolt with nut and lock washer

Reflection marker

TYPICAL SECTION

RM-1
WHITE

RM-2
YELLOW

RM-3
YELLOW

RM-1, 2, or 3

USABLE
SHOULDER

NOT LESS
THAN 2'-0"

SECTION
RAISED PAVEMENT MARKERS

TYPE A
NON-REFLECTIVE WHITE MARKER

TYPE J
NON-REFLECTIVE YELLOW MARKER

TYPE C
RED-CLEAR REFLECTIVE MARKER

TYPE D
TWO-WAY YELLOW REFLECTIVE MARKER

TYPE H
ONE-WAY YELLOW REFLECTIVE MARKER
STRIPING NOTES:

1. All striping shall conform to the latest edition of the “MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES for Streets and Highways” (MUTCD).

2. Yellow centerlines shall be striped on all two-way collector or higher streets.

3. 12” white “STOP” lines shall be striped in conjunction with each “STOP” sign.

4. Appropriate “NO PASSING” markings shall be striped for 130’ when collector speed limit is 30 mph or less and 170’ when collector speed limit is 35 mph or more on each approach to an intersection and or as otherwise called for and at other locations designated in the MUTCD.

5. All traffic paint shall be reflectorized and shall be approved by the Engineer.
**4" YELLOW STRIPING**

- 10' x 30' x 10' x 30' x 10'

**RAISED PAVEMENT MARKING**

- 40' x 15' x 10' x 30' x 10'

**TWO-LANE PASSING PERMITTED**

- Type J or 4" Yellow Stripe

**TWO-LANE PASSING PROHIBITED**

- No passing in either direction

**ONE-LANE PASSING PROHIBITED**

- For passing when dashed line is in driver's lane

**STANDARD TRAFFIC STRIPES**

**INTERSECTION OF TWO-LANE ROADS**

- Collector Street
- Minor and Dead End Street

**T-10 STANDARD DETAILS**

- September 1984

**NOT TO SCALE**
COUNTY OF KAULAI

STREET NAME AND STOP SIGN DETAILS

STANDARD DETAILS

T-11

STREET NAME PLATES
SCOTCHLITE REFLECTIVE SHEETING NO. 3277,
GREEN, WIDE ANGLE, FLAT TOP OR APPROVED
EQUAL. LETTERS SHALL BE 4" SILVER
SCOTCHLITE NO. 3270 OR NO. 2270, OR
APPROVED EQUAL.

SIGN PLATES
REFER TO STANDARD SPECIFICATIONS
FOR PUBLIC WORKS CONSTRUCTION.

STOP SIGN, FACING MINOR ROAD
HIGH INTENSITY REFLECTIVE SHEETING
OR APPROVED EQUAL, 30" x 30" WITH 8"
LETTERS.

NOTE:
1. SQUARE TUBE POSTS SHALL BE TELESCOPING
PERFORATED TELESPAR TUBING OR APPROVED
EQUAL.

2. THE EXACT SIGN LOCATION WILL BE DESIGNATED
BY THE ENGINEER.

3. WHERE ANCHOR POST IS TO BE OMITTED, POST
SHALL BE BURIED 2'-6" MIN. AND CONCRETED
AROUND IF NECESSARY.

4. 2" LETTERS SHALL BE USED FOR ST., DR., HWY.,
RD., ETC.

5. STREET NUMBER TO BE DESIGNATED BY THE
DEPARTMENT OF PUBLIC WORKS.

FINISH GROUND

ANCHOR POST CAN BE INSTALLED AT A
MINIMUM DEPTH OF 24" IF ENCASED
WITH A 14" SQUARE OR CIRCULAR SHAPED
CLASS B CONCRETE ANCHOR.
Notes:

STANDARD VEHICLE
1. MINIMUM STALL WIDTH = 9'-6"
2. MINIMUM STALL LENGTH = 19'-0"
3. IN CURBED ISLAND DESIGN, DEDUCT OVERHANG CLEARANCE FROM W2.

COMPACT VEHICLE
1. MINIMUM STALL WIDTH = 7'-6"
2. MINIMUM STALL LENGTH = 16'-0"
3. IN CURBED ISLAND DESIGN, DEDUCT OVERHANG CLEARANCE FROM W2.
NOTES
1. Sign shall be 0.080" min. thickness alum. sheet (ASTM: B-209 alloy 6061-T6 as ammoned flatsheet).
2. Reflective sheets shall be scotchite sheeting *3277 green for face and scotchlite *2270 silver for letters and numbers or equal.

STANDARD STREET NAME SIGN

T-14 STANDARD DETAILS

STANDARD STREET NAME SIGN

COUNTY OF MAUI

SEPTEMBER 1984

NOT TO SCALE