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## Part 1 - Roads and Streets

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### COUNTY OF KAUA'I
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#### STANDARD

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VIII  STANDARD DETAILS  CONTENTS

CITY & COUNTY OF HONOLULU  COUNTY OF MAUI  COUNTY OF HAWAII

SEPTEMBER 1984
NOTE:
For curb returns use 1'-6" pre-cast concrete curbs.
PRE-CAST CONCRETE DRIVEWAY CURB

SECTION A-A

ELEVATION

PLAN

R-2
STANDARD DETAILS

PRE-CAST CONCRETE DRIVEWAY CURB

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

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

ELEVATION

SECTION A-A

PRE-CAST CONCRETE DROP CURB BLOCK

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

PRE-CAST CONCRETE DROP CURB BLOCK

STANDARD DETAILS

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

SEPTEMBER 1984

R-3
CAST IN PLACE INTEGRAL CURB AND GUTTER

Scale: 1½" = 1'-0"

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

CAST IN PLACE INTEGRAL CURB AND GUTTER

Scale: 1½" = 1'-0"

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

CAST IN PLACE INTEGRAL DRIVEWAY CURB AND GUTTER

Scale: 1½" = 1'-0"

<table>
<thead>
<tr>
<th>DIST. CURB LINE TO P</th>
<th>SLOPE</th>
<th>HEIGHT</th>
</tr>
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<tbody>
<tr>
<td>12'</td>
<td>¾&quot; to 12&quot;</td>
<td>7 ¾&quot;</td>
</tr>
<tr>
<td>10'</td>
<td>¾&quot; to 12&quot;</td>
<td>7 ¼&quot;</td>
</tr>
<tr>
<td>8'</td>
<td>¾&quot; to 12&quot;</td>
<td>7 ½&quot;</td>
</tr>
<tr>
<td>7'</td>
<td>¾&quot; to 12&quot;</td>
<td>7 ¼&quot;</td>
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<tr>
<td>6'</td>
<td>¾&quot; to 12&quot;</td>
<td>7 ½&quot;</td>
</tr>
<tr>
<td>3'</td>
<td>¾&quot; to 12&quot;</td>
<td>8 ½&quot;</td>
</tr>
</tbody>
</table>
Class "A" Concrete quantity = 0.0828 cu. yd./lin. ft.  
4 - #5 Equally Spaced

CAST IN PLACE INTEGRAL CURB AND GUTTER

Scale: 1½" = 1'-0"

Variable Slope (See Table below)

Variable Height (See Table)

<table>
<thead>
<tr>
<th>DIST. CURB LINE TO P</th>
<th>SLOPE</th>
<th>HEIGHT</th>
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<tr>
<td>12&quot;</td>
<td>½&quot; to 12&quot;</td>
<td>10 3/8&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>¾&quot; to 12&quot;</td>
<td>10 7/8&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>½&quot; to 12&quot;</td>
<td>10 1/2&quot;</td>
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<td>7&quot;</td>
<td>¾&quot; to 12&quot;</td>
<td>10 9/8&quot;</td>
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<td>6&quot;</td>
<td>1 ⅛&quot; to 12&quot;</td>
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</tr>
<tr>
<td>3&quot;</td>
<td>1⅞&quot; to 12&quot;</td>
<td>11 1/8&quot;</td>
</tr>
</tbody>
</table>

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

STANDARD DETAILS

R-4A
REVISED

CITY & COUNTY OF HONOLULU

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

JANUARY 1995
CAST IN PLACE ROLLED CURB
Scale: \(1\frac{1}{2}'' = 1'-0''\)

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

* Apply to 5" and 6" curbs

**TABLE**

**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 8' at upstream side and 4' at downstream side for transition to catchbasin with 5" curb height.

**ROLLED CURB TRANSITION**

**NOT TO SCALE**

---

**R-6**

**STANDARD DETAILS**

**ROLLED CURB TRANSITION TO CURBS AND CATCH BASINS**

**COUNTY OF KAUAH**

**CITY & COUNTY OF HONOLULU**

**COUNTY OF MAUI**

**COUNTY OF HAWAII**

**SEPTEMBER 1984**

**NOT TO SCALE**
PLAN
SCALE: 1/4" = 1'-0"

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

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

DRIVEWAY APRON WITH CAST IN PLACE ROLLED CURB
(RESIDENTIAL ZONE)
6" thick concrete reinforced with 6x6 - 6/6 galvanized welded wire fabric.

Warp this return gutter to meet thru gutter grades

Construction Joints

Flow Line

NOTE:
Construction joints shall be keyed construction joints with tie bars per detail on sheet R-11

PLAN
SCALE: 1" = 20'

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

THRU GUTTER
PLAN
SCALE: 1" = 1'-0"

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

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.
TRANSVERSE CONTRACTION JOINT
Scale: \(\frac{1}{8''} = 1' - 0''\)

Saw cut or formed groove
Fill with joint sealer

\(\frac{d}{4''}\)

\(\frac{2}{3}''\) to \(\frac{1}{3}''\)

Depth (d)

LONGITUDINAL JOINT
Scale: \(\frac{1}{8''} = 1' - 0''\)

Saw cut or formed groove
Fill with joint sealer

\(\frac{d}{2''}\)

\(\frac{d}{4''}\)

\(\frac{r}{2}''\) to \(\frac{1}{3}''\)

Depth (d)

\(\approx 3 \times 15''\) Deformed Tie Bars
at 30° o.c.

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 point 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").

COUNTY OF HAWAII
COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF KAUA'I
EXPANSION JOINT WITH DOWELS

TRANSVERSE CONSTRUCTION JOINT WITH DOWELS

LONGITUDINAL AND TRANSVERSE KEYED CONSTRUCTION JOINT WITH TIE BARS
STREET SURVEY MONUMENT

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

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

TOP VIEW - STREET SURVEY MONUMENT FRAME AND COVER

SECTIONAL VIEW OF FRAME AND COVER

SECTIONAL VIEW OF ALTERNATE FRAME & COVER

STREET SURVEY MONUMENT CASTINGS

COUNTY OF KAUAHI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

STREET SURVEY MONUMENT CASTINGS

STANDARD DETAILS

R-13

SCALE: 3" = 1'-0"

SEPTEMBER 1964
PLAN

1/2" x 2-1/2" Brass Plug
Feathered at bottom to be set after pavement is completed.

Class "B" Concrete

ELEVATION

CENTERLINE MONUMENT
ELEVATION

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

SIDE ELEVATION

TEMPORARY WOODEN BARRICADE
PLAN

OPENING WITHIN SIDEWALK

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

OPTIONAL BAR DETAIL

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

SIDEWALK REINFORCEMENT DETAILS

AT UTILITY BOXES OR OPENINGS

CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SEPTEMBER 1984
SCALE: AS NOTED
TYPICAL PERSONNEL GATE

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

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 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, 11 gauge.
6. Gate shall have knurled salvage top and bottom.
7. 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 tubular plunger bar, latch 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 gauge.
6. Gate shall have knuckled selvage top and bottom.
7. Top of concrete footing shall be crowned to shed water.
### Type A Bolt

**Splice Rail and Post Bolts**

- **Type A Bolt**
  - Scale: 1/2 Size
  - Splice Bolt Slot
    - Scale: 1/2 Size
    - 2 1/2" 3/4" R
  - Post Bolt Slot
    - Scale: 1/2 Size
    - 3" 1 1/2" R
  - Rail Splice
    - Scale: 1 1/8" = 1'-0"
  - Hexagon Nut
    - Scale: 1/2 Size

### Type B Bolt

- **Deep x Dia. C'Bore**
  - for Type A Bolt only
  - Plain nut for Type B Bolt

- **Type B Bolt**
  - Scale: 1/2 Size
  - Splice Bolt Slot
    - Scale: 1/2 Size
    - 1 1/2" 3/8" R
  - Splice Bolt Slot for All Ends
    - Scale: 1/2 Size
    - 3" 1 1/2" R
  - Splice Bolt Slot for Special End Shoe
    - Scale: 1/2 Size
    - 3" 1 1/2" R
  - Rail Washer
    - Scale: 1/2 Size
    - 8 gage
  - Rail Element Section
    - Scale: 3" = 1'-0"
End section as designated by Engineer.

Post bolt hole

Lap in direction of traffic

Variable

End section as designated by Engineer.

Intermediate post may be omitted with Engineer's approval.

Concrete or metal post with or without spacer block.

Direction of traffic.

TYPICAL ELEVATION

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

Varies

See site plan.

3'-0" min.

Curb line or edge of pavement.

TYPICAL SECTION

Scale: 1/8" = 1'-0"
TYPICAL SECTIONS
SCALE: 1/4" = 1'-0"

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, handholes, 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 ABA GUIDELINES. THE PASSING AREA SHALL BE A MINIMUM 5' WIDE BY 5' LONG AS FEASIBLE.

8. NO PULLBOXES, HANDBOLES, MANHOLES, ETC. SHALL BE ALLOWED IF THEY CONTAIN ANY OPENINGS > 1/2" AND ARE OF A POTENTIALLY SLIPPERY SURFACE.


RAMP FOR 12' MIN. SIDEWALK (TYPE A)
SEE NOTE 5 & 6

RAMP AT CURBED DRIVEWAY
SCALE: 1/8"=1'-0"

RAMP AT NARROW SIDEWALK- UNDER 12' (TYPE B)

CITY & COUNTY OF HONOLULU
CURB RAMP

SCALE: AS NOTED
APRIL 2000

STANDARD DETAILS
R-25A *
CONSTRUCTION NOTES

1. Asphalitic 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

SEPTEMBER 1984
SCALE: 1/4" = 1'-0"
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:</td>
<td>4 feet minimum</td>
</tr>
<tr>
<td>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>6 feet minimum</td>
</tr>
<tr>
<td>H-1 Resort Hotel</td>
<td>4 feet minimum; required width for each location shall be determined by the Chief Engineer.</td>
</tr>
<tr>
<td>H-2 Hotel</td>
<td>Full width unless determined otherwise by the Chief Engineer.</td>
</tr>
<tr>
<td>B-1 Business</td>
<td>4 feet minimum</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 (for streets to be dedicated to the City)</td>
<td>4 feet minimum</td>
</tr>
</tbody>
</table>

SIDEWALK WITH STANDARD CURB & GUTTER

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

SIDEWALK AREA WITHOUT CURB OR GUTTER

GENERAL NOTE:
Mailbox support shall be of a type which causes minimal obstruction to traffic.
NOTES:
1. 6 x 6 x 10/10 galv. wire fabric permitted for Hawaii, Kauai & Maui only.
2. Score lines shown apply to Honolulu only.
   For extension to existing driveway, scoring and finish shall match existing scoring and finish. For driveway constructed in built up area, scoring
conforming to scoring of adjacent driveways may be authorized.

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

ELEVATION
SCALE: 1/4" = 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 1994
CURB RETURN TYPE DRIVEWAY MAY BE PERMITTED FOR PARKING AREAS EXCEEDING 100 SPACES, FIRE STATIONS AND HOSPITALS.

SCORE LINES TO BE SPACED EQUALLY MAXIMUM SPACING 4'-0".

LIMITS OF REINFORCEMENT. 4" THICK CONCRETE REINFORCED WITH 6"X6"-W2.9XW2.9 GALV. WELDED WIRE FABRIC FOR RESIDENTIAL DISTRICTS. 8" THICK FOR ALL OTHER DISTRICTS. SURFACE SHALL BE BROOM FINISHED.

PROPERTY LINE GRADE

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

NOTES:
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.

ALTERNATE DETAIL
SCALE: 3/8"=1'-0"
SUPERSEDES R-29 FOR C&C OF HONOLULU

CITY & COUNTY OF HONOLULU
DRIVEWAY APRON

STANDARD DETAILS
R-29A

APRIL 2000
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 exempted. 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% 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 reinforced 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.
TYPE "A" WALL

Note: For conditions w/o conc. sidewalk, use top of wall detail as shown on Type "B" wall.

Fence or railing as required (See detail in plans)
1 - #4 in K.O. Block

8" conc. block, grout all cells
2" Cr.
Dur-o-Wall or equal at every other course
3" weeps at 10' o.c. w/1 sq. ft. cr. rock cont.
#4 at 24" o.c.
3 - #4 Cont.

NOTE:
Horizontal reinforcement for walls may be 1 - #4 at 24" o.c. in lieu of Dur-o-Wall.

Exist. grd.
Class "B" conc.
8" min
2' - 6" for 4' ht.
2' - 0" for 3' ht.

TYPE "C" WALL

Fence or railing as required (See detail)

TYPE "B" WALL

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

Fence or railing as required (See detail in plans)
1 - #4 in K.O. Block

2" Cr.
6" conc. block, grout all cells
#4 at 24" o.c.
Dur-o-Wall or equal at every other course
3" weeps at 10' o.c. w/1 sq. ft. cr. rock cont.
3 - #4 Cont.

Payline for excavation

TYPE "D" WALL
STREET CROSS SECTIONS WITH SIDEWALK

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

SECONDARY ARTERIALS

BUSINESS & INDUSTRIALSTS.

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
2" Asphaltic Concrete
4" Aggregate Base Course
6" Min. Select Borrow Subbase
or as required by the Engineer.

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 in commercial, industrial and resort areas or as modified by the Chief Engineer.

HALF SECTION OF STREET WITH SIDEWALK

ROAD PAVEMENTS AND SHOULDERS

COUNTY OF HAWAII

SEPTEMBER 1984
NOTE:
UTILITY BOXES SHALL BE CONSTRUCTED FLUSH WITH THE FINISHED GRADE OF THE SWALE.

TYPICAL ROADWAY UTILITY LOCATION
WITHOUT SIDEWALK

- DITCH SECTION: 50' R/W 9'-0", 60' R/W 10'-0" for 50' R/W, 12'-0" for 60' R/W
- SHOULDER: 6'-0" PAVEMENT: 20'-0"
- 15'-0" FOR 60' R/W
- ROADWAY: 12'-0" FOR 50' R/W
- UTILITY POLE: 50' R/W 5'-0", 60' R/W 8'-0"
- WATER: 2'-0" MIN. TO GO 12" BELOW WATER AND CONCRETE JACKETED AT CROSSING
- GAS: 2'-0" MIN
- TELEPHONE: 3'-0"
- SANITARY SEWER: 5'-0"
- ELECTRIC: 1'-0"
NOTES:

Concrete Pavement
1. 4" (Residential)—reinforced with 6x6-6/10 wire fabric, 6" (Commercial)—reinforced with 6x6-6/6 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" a.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-I 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 6 x 6-10/10 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

COUNTY OF HAWAII NON-DEDICABLE STREETS STANDARD DETAILS R-39

NOT TO SCALE SEPTEMBER 1984
NOTES:
1. All weld 5/16".
2. All steel shall be structural grade.
3. Grates and frame \(\angle\)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
**MAJOR STREET**

**COLLECTOR STREET**

*Minimum pavement width for agricultural roadways is 16 feet.*

**MINOR STREET**

**DEAD END STREETS**
HALF SECTION OF STREET WITH SHOULDER

HALF SECTION OF STREET WITH SIDEWALK
40 FT. RIGHT OF WAY — WITH CURB & GUTTER

40 FT. RIGHT OF WAY — WITHOUT CURB & GUTTER

30 FT. RIGHT OF WAY — WITHOUT CURB & GUTTER

R-44
STANDARD DETAILS
CUL-DE-SAC
COUNTY OF KAUAI
SEPTEMBER 1984
NOT TO SCALE
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.

R-46 STANDARD DETAILS TYPICAL ROADWAY UTILITY LOCATION COUNTY OF KAUAI
SEPTEMBER 1984 NOT TO SCALE
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.

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

COUNTY OF KAUAI
SPACE ALLOCATION FOR UNDERGROUND UTILITIES
STANDARD DETAILS
R-47

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

R-48 STANDARD DETAILS
RESIDENTIAL DRIVEWAY WITHOUT CURB AND GUTTER
COUNTY OF KAUAI
SEPTEMBER 1984 NOT TO SCALE
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
NOTES:
1. BUSINESS & INDUSTRIAL
   Total driveway width excluding ditches 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 ditches 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 NON-CURB 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.

SECTION A-A

ALTERNATE DETAIL

STANDARD CONCRETE DRIVEWAY
WITH EXISTING SIDEWALK

COUNTY OF MAUI

CONCRETE DRIVEWAY WITH
EXISTING SIDEWALK

STANDARD DETAILS

R-51

NOT TO SCALE

SEPTEMBER 1984
TYPICAL SECTION
ROADWAY W/O CURBS

TYPICAL SECTION
GRAVEL ROAD - PRIVATE

ROADWAY
TYPICAL SECTIONS
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
TYPICAL SECTION

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

TYPICAL SECTION

SIDEWALK WITH CURBS ONLY
Typical Location Plan

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 SERVICES AT PROPERTY LINES IN NEW SUBDIVISION AREAS

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

SPACE ALLOCATION FOR UNDERGROUND UTILITIES
NOTES:
1. See sheet D-13 for reinforcement at pipes and corners.
2. Spliced reinforcing bars shall be lapped at least 30 diameters.
TYPE "E" CATCH BASIN

SCALE: 1/4" = 1'0"

NOTES:
1. Provide 2 cu.ft. of crushed rock (Rock Sand), ASTM size W9, 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

ELEVATION

SECTION A-A
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
Symmetrical about C.

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.

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

PLAN

ELEVATION

SECTION A-A
NOTE:
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. Runge shall not be installed over a pipe connection and the lowest runge shall be not more than 2'-0" above the invert.

Round opening of outlet pipe: Minimum radius = 0.15 pipe diameter.
TYPE "D"
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-12 for reinforcement details.
3. Rungs shall not be installed over a pipe connection and the lowest rung shall be not more than 2' - 0" above the invert.

PLAN

ELEVATION

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

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

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

SECTION A-A

SECTION B-B

PLAN

D-12
STANDARD DETAILS

TYPE "D" CATCH BASIN REINFORCEMENT DETAILS

CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

SEPTEMBER 1984
SCALE: 3/8" = 1'-0"
TYPICAL REINFORCEMENT AT PIPES
SCALE: 1" = 1' - 0"

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

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

CATCH BASIN DETAILS

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

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

CATCH BASIN DETAILS

STANDARD DETAILS

D-13

SCALE: AS NOTED
SEPTEMBER 1964
PLAN

SECTION A-A

SECTION B-B

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

DEFLECTOR INLET FOR CATCH BASIN

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

SECTION C-C

SCALE: 2" = 1' - 0"
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

MONOLITHIC CONSTRUCTION OF CATCH BASIN

TOP SLAB AND SIDEWALK
PLAN

NOTES:
1. See sheet D-26 for channelizing detail.
2. See sheet D-13 for reinforcement of 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 SIDEWALK AREA
PLAN

NOTES:
1. See sheet D-26 for channelizing detail.
2. See sheet D-13 for reinforcement at pipes and corners.
3. Rungs shall not be installed over 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
SECTION A-A
FOR SIDEWALK AREA
SCALE: 3/8" = 1'-0"

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

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

PRE-CAST TOP SLAB
FOR SHALLOW DRAIN MANHOLE
Type "DA" Frame & Cover

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.

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

#4 Vertical Bars spaced 1/8 of circle
Pay line for excavation

Round opening at 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"

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

D-20
STANDARD DETAILS
CONCRETE WALL DRAIN MANHOLE
SEPTEMBER 1984
SCALE: 1/2" = 1'-0"
BRICK WALL DRAIN MANHOLE

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

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 "A" 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" of 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" of 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"

D-22 STANDARD DETAILS
PRE-CAST CONCRETE DRAIN MANHOLE

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
DET AIL "A"

PRE-CAST CONCRETE DRAIN
MANHOLE DETAILS

CONE SECTION

RISER SECTION

DETAIL "B"

COUNTY OF KAUI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

PRE-CAST CONCRETE DRAIN
MANHOLE DETAILS

STANDARD
DETAILS

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

D-23
ALTERNATE DETAIL "A"

PRE-CAST CONCRETE DRAIN
MANHOLE DETAILS

SCALE: 4\(\frac{1}{2}\)" = 1'-0"

COUNTY OF KAUA'I
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAI'I
36" CONE
SCALE: 1/2" = 1'-0"

GRADE RING
SCALE: 1/2" = 1"

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<th>SECTION</th>
<th>As/L.F.</th>
<th>TOTAL WT. LB.</th>
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<td>0.15</td>
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<td>48&quot; x 24&quot; x 36&quot; Cone</td>
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<td>22&quot; x 4&quot; Grade Ring</td>
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<td>48&quot; x 16&quot; Riser</td>
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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.
.Channelizing bottom of manhole to depth of 1/2 pipe diameter using concrete bricks and Class "B" concrete.
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>
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</thead>
<tbody>
<tr>
<td>Type A</td>
<td>Brick</td>
<td>13 1/8&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 1/4&quot;</td>
</tr>
<tr>
<td>Type C</td>
<td>Precast</td>
<td>7 3/8&quot;</td>
<td>3&quot;</td>
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</table>

* 3" for one rung at top of opening.

SECTION

SECTION A - A

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

RUNGS FOR CATCH BASINS AND MANHOLES

STANDARD DETAILS

SCALE: 3" = 1' - 0"

SEPTEMBER 1984

D-27
NOTE:
This frame is the same as sewer manhole frame Type "SA".

PLAN

SECTION A-A

TYPE "DA" FRAME
FOR CATCH BASIN AND MANHOLE
TYPE "DB" FRAME
FOR CATCH BASIN AND MANHOLE

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

SECTION A - A

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

TYPE "DB" FRAME
FOR CATCH BASIN AND MANHOLE

STANDARD DETAILS
D-29
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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<tbody>
<tr>
<td>18&quot;</td>
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<tr>
<td>60&quot;</td>
<td>9.6&quot;</td>
<td>10.8&quot;</td>
</tr>
</tbody>
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PAYMENT TRENCH WIDTH AND REPAVING FOR DRAIN PIPES
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.

A

#5 BARS - 8" O.C.

SECTION A-A

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td>2'</td>
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<tr>
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<tr>
<td>4'</td>
<td>6&quot;</td>
</tr>
<tr>
<td>5'</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

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'

Variable

PROPERTY LINE

DITCH

FUTURE CURB LINE

SHOULDER

SEE DETAIL ABOVE FOR CULVERT REINFORCEMENT REQUIREMENTS.

PLAN

PROVIDE SMOOTH RIDING CONNECTION TO ROADWAY.

COUNTY OF HAWAII

DRIVEWAY DRAINAGE - BOX CULVERT

NOT TO SCALE

STANDARD DETAILS

D-33

SEPTEMBER 1984
CULVERT SIZE TO BE DETERMINED
BY ENGINEER.
15" MIN. INSIDE DIA. FOR CIRCULAR
CORRUGATED IRON OR CONCRETE
CULVERT.

SECTION

ORD. 53 (DROP DRIVEWAY)
6'-0" FOR FUTURE DROP
DRIVEWAY CONDITION.
2'-0" CLEARANCE

MAX APPROACH WIDTH
AT CURB LINE - 36'
SECTION

ORD 53 (DROP DRIVEWAY)
6'-0" FOR FUTURE DROP
DRIVEWAY CONDITION
2'-0" CLEARANCE

PROVIDE SMOOTH RIDING
CONNECTION TO ROADWAY

PLAN

COUNTY OF HAWAII

DRIVEWAY DRAINAGE - SWALE

STANDARD DETAILS

D-35
GENERAL NOTES

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

2. FOR "T" WALL THICKNESS, SEE TABLE.

3. REINFORCING STEEL IN WALLS SHALL BE #4 BARS @ 18" CENTERS, PLACED 1½" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.

4. STEPS - NONE REQUIRED WHERE "H" IS 3'-6" OR LESS. INSTALL ONE STEP 16" ABOVE FLOOR WHEN "H" IS MORE THAN 3'-6"
AND LESS THAN 5'-0". WHERE "H" IS MORE THAN 5'-0", STEPS SHALL
BE EVENLY SPACED @ 12" INTERVALS FROM 16" ABOVE FLOOR
TO WITHIN 12" OF THE TOP OF THE BOX. PLACE STEPS IN WALL WITHOUT PIPE OPENING.

5. DETAILS SHOWN APPLY TO BOTH METAL AND CONCRETE PIPE.

6. PIPE(S) CAN BE PLACED IN ANY WALL.

7. CURB SECTIONS SHALL MATCH ADJACENT CURB.

8. BASIN FLOORS SHALL HAVE WOOD TROWEL FINISH AND A
MINIMUM SLOPE OF 12:3 FROM ALL DIRECTIONS TOWARD
OUTLET PIPE.

9. GALVANIZING - SEE STANDARD SPECIFICATIONS OR
SPECIAL PROVISIONS.

10. CAST-IN-PLACE OR PRECAST ALTERNATIVE IS OPTIONAL
WITH CONTRACTOR.

11. SET INLET SO THAT GRATE BARS ARE PARALLEL TO DIRECTION
OF PRINCIPAL SURFACE FLOW.

12. SEE "STANDARD GRATE DETAIL" FOR GRATE AND FRAME DETAILS.

13. USE G1 WHEN H≤4'-0".
**TABLE A**

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

Refer to C2 drainage inlet for bars and hoops detail.

**SECTION B-B**

COUNTY OF KAUAI

TYPE G3 DRAINAGE INLET

STANDARD DETAILS

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

SEPTEMBER 1986

D-37
ON FRAMES FOR TYPES 24-18 GRATES PROVIDE 3-3"X1"X3/4" BLOCKS. PLACE ON ROADWAY SIDE OR HIGH SIDE OF GRATE OPENING.

TYPICAL FRAME

SECTION A-A

4"X3"X1/2" L IRON

SECTION B-B

1/2" ANCHORS 30° O.C.

GENERAL NOTES

1. CONTRACTOR HAS THE OPTION OF USING CAST NODULAR IRON, CAST STEEL, WELDED, BOLTED, OR CAST END BLOCK GRATE.

2. GRATES AND FRAMES SHALL BE GALVANIZED.

3. ROUNDED TOP OF BARS OPTIONAL ON ALL GRATES.

4. PIPE DROP INLETS WITH A GRATE SHALL BE PLACED SO THAT BARS PARALLEL DIRECTION OF PRINCIPLE SURFACE FLOW.
1. \( W \) = WIDTH OF CATCH BASIN
2. \( L \) = LENGTH OF CATCH BASIN
3. \( K \) = 6'-0" MIN. UNLESS OTHERWISE SPECIFIED
4. \( X \) = 3'-0" MIN. UNLESS OTHERWISE SPECIFIED
5. IN SUMP CONDITIONS \( K = X = 6' - 0" \) MIN.

**PLAN**

**SECTION A**

**SECTION B**

D-40  STANDARD DETAILS  LOCAL DEPRESSION WITHOUT CURB AND GUTTER  COUNTY OF KAUA'I

SEPTEMBER 1984  SCALE: 1/4" = 1'-0"
VALUES FOR A, B, C, D, E, F, G, L, ELEV. R AND ELEV. S SHOWN ON IMPROVEMENT PLAN.

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.

A AND B BARS SHALL BE CARRIED TO POINT NOT LESS THAN J DIST. FROM 4 = 7D/12 + 6".

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.

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

TABLE OF VALUES FOR T

<table>
<thead>
<tr>
<th>T</th>
<th>12&quot;</th>
<th>16&quot;</th>
<th>10&quot;</th>
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<td>3&quot;</td>
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</tr>
</tbody>
</table>

MINIMUM DEPTH OF TOP AND BOTTOM
SLABS SHALL BE ½ + 2"
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-TROELED TO SPRING LINE.

5. REINFORCING STEEL SHALL BE ROUND, DEFORMED, STRAIGHT BARS, 1/2" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.

6. TIE BARS SHALL BE 3/8" D AND SPACED 18" O.C. OR CLOSER. A AND B BARS NEED NOT BE LONGER THAN THE OUTSIDE DIAGONAL WIDTH OF LATERAL SPUR.

7. STEEL SCHEDULE DETAILED ON IMPROVEMENT PLAN.

8. ELEVATION S APPLIES AT CENTER OF MAIN LINE ON PROLONGATION OF INVERT OF SPUR.

9. 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.

10. LENGTH L SHOWN ON IMPROVEMENT PLAN.

11. 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.

12. 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.
SECTION N-M-P'-O
PROJECTED ON P-P'-O

NOTES

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 1\%" CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN. W BARS ARE OF SIZE AND SPACING SPECIFIED FOR WALL STEEL ON IMPROVEMENT PLAN, AND SHALL BE CUT IN CENTER OF OPENING AND BENT INTO TOP AND BOTTOM OF JUNCTION STRUCTURE.
   OMIT H BARS WHEN SOFFIT OF SPUR IS 1 FT. OR LESS BELOW SOFFIT OF MAIN LINE, AND Omit G BARS WHEN INVERT OF SPUR IS 1 FT. OR LESS ABOVE FLOOR OF MAIN LINE. OMIT ALL STEEL EXCEPT F BARS AND TIE BARS WHEN JUNCTION STRUCTURE IS SPECIFIED WITH MANHOLE, UNLESS OTHERWISE SHOWN ON IMPROVEMENT PLAN. STEEL SCHEDULE DETAILED ON IMPROVEMENT PLAN.
5. JUNCTION STRUCTURE SHALL BE POURED MONOLITHIC WITH MAIN LINE STORM DRAIN OR MANHOLE.
6. FLOOR OF STRUCTURE SHALL BE STEEL-TROWELED TO SPRING LINE.

COUNTY OF KAUAI
COUNTY OF MAUI
COUNTY OF HAWAII

JUNCTION STRUCTURE D

NOT TO SCALE

SEPTEMBER 1984

STANDARD DETAILS

D-43
PLAN OF CORNER CONNECTION

VARIES TO MEET END OF PIPE

PLAN OF SIDE CONNECTION

NOTES
1. ROUND EDGE OF OUTLET 3" RADIUS.
2. REINFORCEMENT SHALL BE 1 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.

SECTION A-A

D | T | "A" | "B"-"C"
---|---|-----|-----
12" | 4 1/2" | #6 | #4
15" | 4 1/2" | #6 | #4
16" | 5" | #6 | #4
21" | 5 1/2" | #6 | #4
24" | 6" | #6 | #4
27" | 6 1/2" | #6 | #4
30" | 7" | #6 | #4
33" | 7" | #6 | #4
36" | 7 1/2" | #6 | #4
39" | 8" | #6 | #4
42" | 8" | #6 | #4
45" | 8" | #6 | #4
48" | 8" | #6 | #4
51" | 8" | #6 | #4
54" | 8" | #6 | #4
57" | 10" | #6 | #4
60" | 10" | #6 | #4
63" | 10" | #6 | #4
66" | 11" | #6 | #4
69" | 11" | #6 | #4
72" | 11" | #6 | #4

MONOLITHIC CATCH BASIN CONNECTION FOR PIPES 12" TO 72"

STANDARD DETAILS

COUNTY OF KAUA'I
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 D+D or D 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 1/2" clear from outside diameter of pipe.

---

<table>
<thead>
<tr>
<th>D</th>
<th>L</th>
<th>T</th>
</tr>
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<tbody>
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<td>66&quot;</td>
<td>1.75'</td>
<td>11&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>2.0'</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>
### STANDARD DETAILS

#### SEPTEMBER 1984

#### COUNTY OF KAUAI

#### COUNTY OF KAUAI

#### TRIPLE BOX CULVERTS

#### TYPICAL SECTION

<table>
<thead>
<tr>
<th>SPAN</th>
<th>4'</th>
<th>5'</th>
<th>6'</th>
<th>7'</th>
<th>8'</th>
<th>9'</th>
<th>10'</th>
<th>11'</th>
<th>12'</th>
<th>13'</th>
<th>14'</th>
<th>15'</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEIGHT</td>
<td>0'</td>
<td>1'</td>
<td>2'</td>
<td>3'</td>
<td>4'</td>
<td>5'</td>
<td>6'</td>
<td>7'</td>
<td>8'</td>
<td>9'</td>
<td>10'</td>
<td>11'</td>
</tr>
<tr>
<td>TRIPLE BOX CULVERTS</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

For culverts at grade, extend 1' box tall begin, provide additional length if needed and adjust quantities.

Provide paving patch for culverts at grade where PCC approach paving is used.

---

TYPICAL SECTION

- For culverts at grade, extend 1' box tall begin, provide additional length if needed and adjust quantities.
- Provide paving patch for culverts at grade where PCC approach paving is used.

---

TRIPLE BOX CULVERTS
PLAN
TRANSITION TO RECTANGULAR STORM DRAIN

PROFILE

<table>
<thead>
<tr>
<th>H</th>
<th>TRANSITION REINFORCEMENT</th>
<th>H.W. 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&quot;</td>
<td>&quot;A&quot; BARS 5 @ 24&quot;</td>
<td>&quot;A&quot; BARS 5 @ 24&quot;</td>
</tr>
<tr>
<td>OVER 6'- 6&quot;</td>
<td>&quot;A&quot; BARS 5 @ 12&quot;</td>
<td>&quot;B&quot; BARS 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

LINED DITCH REINFORCING MOD HEADWALL

TOE OF SLOPE OF SIDE WALL

MOD HEADWALL

"A" BARS

"B" BARS

"012" BOTH WAYS

3'-0" CUTOFF WALL (FROM FLOW LINE) FOR UNLINED DITCH

PROFILE

SECTION A-A

"2 CONT. PARALLEL TO TOP
ROUND INLET ONLY TO SPINDLE LINE"

"4 CONT. PARALLEL TO TOP
PLACE 2 CUBIC FEET PERVERIOUS MATERIAL IN BURLAP SACK SECURELY TIED.

SECTION B-B

NOTE

SEE RECTANGULAR TRANSITION FOR GENERAL NOTES & STEEL TABLE

D-50

STANDARD DETAILS

CIRCULAR TRANSITION

COUNTY OF KAUA'I

COUNTY OF MAUI

COUNTY OF HAWAII

SEPTEMBER 1984

NOT TO SCALE
PARAPET DETAILS FOR SINGLE SPAN CULVERTS

PARAPET DETAILS FOR MULTIPLE SPAN CULVERTS

<table>
<thead>
<tr>
<th>PARAPET &quot;t&quot; BAR NOS.</th>
<th>SKEW ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°</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>

"d" bars shall be as noted in the single, double and triple box culvert details.
CASE 1
REINFORCED CONCRETE BEAM

CLASS "A" REINFORCED CONCRETE BEAM

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

MINIMUM L.T. OF BEAM SHALL BE 8" MIN.
MINIMUM L.T. OF BAR IF BEAM IS PRECAST 3/8" MIN.

DIMENSIONS OF REINFORCED CONCRETE BEAMS:

<table>
<thead>
<tr>
<th>TRENCH WIDTH</th>
<th>DEPTH OF BEAM</th>
<th>BAR SIZE</th>
<th>BEAM LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot; X 10'</td>
<td>8&quot;</td>
<td>3/4&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>4'-6&quot;</td>
<td>9&quot;</td>
<td>3/4&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>10'-0&quot;</td>
<td>3/4&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>10'-0&quot;</td>
<td>3/4&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>7'-0&quot;</td>
<td>11'-0&quot;</td>
<td>7/8&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>12'-0&quot;</td>
<td>7/8&quot;</td>
<td>11'-0&quot;</td>
</tr>
</tbody>
</table>

1. WIDTH OF BEAMS SHALL BE NOMINAL DIAMETER OF PIPE PLUS 2".
2. LENGTH OF BEAMS SHALL BE THE WIDTH OF TRENCH PLUS 2".
3. REINFORCING STEEL SHALL BE PLACED 1/8" CLEAR FROM THE SIDES AND BOTTOM OF BEAMS.
4. IF BEAMS ARE PRECAST, 1/8" AT ENDS OF BEAMS SHALL BE BEDDED IN CLASS "D" CONCRETE.
5. CLASS "B" MORTAR SHALL BE PLACED BETWEEN TOP OF BEAMS AND BOTTOM OF PIPE TO GIVE BEARING.

CASE 2
CONCRETE SUPPORT WALL

CLASS "C" CONCRETE

MINIMUM DIAMETER OF SUPPORT WALL SHALL BE 3'-6".

MINIMUM L.T. OF BEAM SHALL BE 8" MIN. (8" MIN. X 2"")

TYPE "A" TYPE "B"

1. SUPPORTING WALL SHALL HAVE A FIRM BEARING ON THE SUBGRADE AND AGAINST THE SIDES OF THE EXCAVATION.
2. WALL SHALL BE AT LEAST 2" INCHES FREE AND CLEAR OF ANY GAS OR WATER OR OTHER CONDUIT OR DUCT.
3. EITHER TYPE "A" OR TYPE "B" CROSS SECTION MAY BE USED AT THE CONTRACTOR'S OPTION.

CASE 3
CAST IRON PIPE

COLLAR OF CLASS "B" MORTAR

SECTION A-A

CLASS "O" CONCRETE BEDDING

INSIDE OF CAST IRON PIPE:

CLASS ISO PIPE CLASS 2850 PIPE

<table>
<thead>
<tr>
<th>INSIDE DIAMETER</th>
<th>INSIDE DIAMETER</th>
<th>MAXIMUM TRENCH WD</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>5-9&quot;</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>5-9&quot;</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>5-9&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>5-9&quot;</td>
<td>7'-0&quot;</td>
</tr>
</tbody>
</table>

NOTE: PIPE SHALL BE BEDDED IN 1/8" OF CONCRETE BEYOND EDGE OF TRENCH.

CASE 4
SPUN REINFORCED CONCRETE PIPE
STORM DRAINS ONLY

CLASS 2000-D SPUN REINFORCED CONCRETE PIPE OF THE SAME DIAMETER AS STORM MAY BE USED FOR STORM DRAINS ONLY WHERE WIDTH OF TRENCH IS 9'-0" OR LESS.

2. BEARING OF THE PIPE ENDS AND JOINT CLOSURE SHALL BE THE SAME AS FOR CASE 3.

METHODS OF SUPPORTING STORM DRAIN AND SEWER PIPES ACROSS TRENCHES
STANDARDDETAILSforPublicWorksConstruction

Sewers

PART 3
**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>
<th>&quot;Y&quot; Min.</th>
<th>CY/LF</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>24&quot;</td>
<td></td>
<td>4&quot;</td>
<td>.042</td>
</tr>
<tr>
<td>8&quot;</td>
<td>24&quot;</td>
<td></td>
<td>4&quot;</td>
<td>.045</td>
</tr>
<tr>
<td>10&quot;</td>
<td>24&quot;</td>
<td></td>
<td>4&quot;</td>
<td>.047</td>
</tr>
<tr>
<td>12&quot;</td>
<td>30&quot;</td>
<td></td>
<td>5&quot;</td>
<td>.073</td>
</tr>
<tr>
<td>15&quot;</td>
<td>38&quot;</td>
<td></td>
<td>6&quot;</td>
<td>.114</td>
</tr>
<tr>
<td>18&quot;</td>
<td>41&quot;</td>
<td></td>
<td>6&quot;</td>
<td>.130</td>
</tr>
<tr>
<td>21&quot;</td>
<td>45&quot;</td>
<td></td>
<td>7&quot;</td>
<td>.163</td>
</tr>
<tr>
<td>24&quot;</td>
<td>50&quot;</td>
<td></td>
<td>8&quot;</td>
<td>.204</td>
</tr>
<tr>
<td>27&quot;</td>
<td>53&quot;</td>
<td></td>
<td>9&quot;</td>
<td>.238</td>
</tr>
<tr>
<td>30&quot;</td>
<td>57&quot;</td>
<td></td>
<td>10&quot;</td>
<td>.280</td>
</tr>
<tr>
<td>36&quot;</td>
<td>69&quot;</td>
<td></td>
<td>11&quot;</td>
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<td>42&quot;</td>
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<td>48&quot;</td>
<td>84&quot;</td>
<td></td>
<td>12&quot;</td>
<td>.546</td>
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<tr>
<td>54&quot;</td>
<td>91&quot;</td>
<td></td>
<td>12&quot;</td>
<td>.615</td>
</tr>
</tbody>
</table>

**ROCK CRADLE FOR SEWER PIPE**
NOTE:
Payment width of cradle shall be payment trench width.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>&quot;a&quot;</th>
<th>Width</th>
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</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>3&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>3&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<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' - 2&quot;</td>
<td>6&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1' - 5&quot;</td>
<td>6&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>1' - 7&quot;</td>
<td>6&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>1' - 7&quot;</td>
<td>6&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>1' - 8&quot;</td>
<td>6&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>1' - 9&quot;</td>
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<td>4&quot;</td>
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<td>21&quot;</td>
<td>1' - 10&quot;</td>
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<td>4&quot;</td>
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<td>24&quot;</td>
<td>1' - 11&quot;</td>
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<td>4&quot;</td>
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<td>2' - 0&quot;</td>
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<td>4&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2' - 3&quot;</td>
<td>6&quot;</td>
<td>4&quot;</td>
</tr>
</tbody>
</table>

**NOTE:**
Add brick for larger size pipe

ALTERNATE DETAIL OF CONC. PIPE BLOCK FOR REINF. CRADLE

**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>1' - 6&quot;</td>
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<tr>
<td>8&quot;</td>
<td>1' - 6&quot;</td>
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<tr>
<td>10&quot;</td>
<td>1' - 8&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>1' - 10&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>1' - 10&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>1' - 10&quot;</td>
</tr>
<tr>
<td>21&quot;</td>
<td>1' - 10&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>2' - 0&quot;</td>
</tr>
<tr>
<td>27&quot;</td>
<td>2' - 0&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>2' - 0&quot;</td>
</tr>
</tbody>
</table>
**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"

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

**DETAIL OF REINFORCED CONCRETE CRADLE ON WOOD PILES**
(FOR 6, 8, 10, AND 12 IN. V.C. PIPE)
Scale: 1/2" = 1'-0"

**DETAIL OF REINFORCED CONCRETE CRADLE WITHOUT PILES**
SIMILAR EXCEPT FOR WOOD PILES AND PILE CAPS
NOTE:
Permission is to be secured from property owner before construction at property line is started.

* 4' for Maui only

Property Line
Ground

12" Max past end of pipe

2" x 2" Redwood marker or 1/2" PVC pipe cut flush with ground

Excavation line for lateral installation

6" x 4" Reducer (Extra heavy C.I. Soil Pipe or Rubber Band Seal or equal)

1% Min. Slope

6" Lateral for house connection

4" Cap with joint

6" Lateral for house connection

6" Y-Branch Rotate 45° from horizontal unless otherwise directed

DET AT PROPERTY LINE
DET 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.

SECTION B-B
DETAILED OF CHIMNEY

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

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.
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.

PLAIN MANHOLE
PRE-CAST CONCRETE

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

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

PRE-CAST CONCRETE PLAIN MANHOLE
STANDARD DETAILS
S-13
SECTION A-A

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

ALTERNATE BASE
PRE-CAST CONCRETE M.H.

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

#5 bars 12" o.c. bothways

Pipe wall plus 10"

Pipe wall plus 3" (Min.)

Mortar around base

6" Min.

5' - 10" Minimum

Height of base to riser section to be adjusted as required

COUNTY OF KAUAÍ
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII

S-14
STANDARD DETAILS
PRE-CAST CONCRETE PLAIN MANHOLE - SECTION AND ALTERNATE BASE
SEPTEMBER 1984
SCALE: 1/2" = 1' - 0"
SHALLOW DROP MANHOLE
FOR DROP UNDER 5.0 FEET
PRE-CAST CONCRETE

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

RUBBER COMPRESSION JOINT

BUTT JOINT DETAILS

Scale: 1" = 1'-0"
NOTE:

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

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

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

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

STANDARD DETAILS
S-19
SECTION B-B
Scale: 1/2" = 1'-0"

PLAIN MANHOLE FOR R.C. PIPE

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

May be omitted when approved resilient manhole connectors are used.

#5 at 12" both ways
36" CONE
SCALE: 1/2" = 1' - 0"

GRADE RING
SCALE: 3" = 1' - 0"

SECTION

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Aₜ</th>
<th>LF</th>
</tr>
</thead>
<tbody>
<tr>
<td>48&quot; x 48&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 45&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 36&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 30&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 24&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 15&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 12&quot; Riser</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 24&quot; x 36&quot; Cone</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>48&quot; x 33&quot; x 22&quot; Cone</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>22&quot; x 4&quot; Grade Ring</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>22&quot; x 2 1/2&quot; Grade Ring</td>
<td>0.12</td>
<td></td>
</tr>
</tbody>
</table>

NOTES
1. Precast 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

2' - 0"

4' - 0"

5"

5"

2' - 8"

Eccentric Section

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

Scale: 1" = 1'-0"

COUNTY OF KAUA\N COUNTY OF MAUI COUNTY OF HAWAII

SEPTEMBER 1984

SCALE: 1" = 1'-0"
PLAN

SECTION

Scale: \( \frac{3}{4}'' = 1' - 0'' \)
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 SEPTEMBER 1984 SCALE: AS NOTED COUNTY OF KAUAI CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII
Type SA manhole frame and cover.

Mortar

Type SA rungs

Type SE rungs

1" cement plaster

Interior to be bagged or plastered smooth

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

8'

4' 0'

8'

10" 15"

4'

6'

12" a.c. bothways

(Maximum Height - 10.0 Feet)

Plain Manhole (Brick)

S-26

Standard Details

Brick Manhole

September 1984

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

County of Kauai
City & County of Honolulu
County of Maui
County of Hawaii
Type SA manhole frame and cover

1" Cement plaster

Type SA rungs

Brick

Type SE rungs

Interior to be bagged or plastered smooth

*4 Horizontal bars 12" o.c.

*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
FOR DROPS UNDER 5.0 FEET
(SHALLOW) DROP MANHOLE
(CAST-IN-PLACE)

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

NOTES:
Manhole wall to be of reinforced concrete to height 1' above normal ground water table.
Standard chimney frame and cover

4 - #4 vertical bars

#4 hoops 18" o.c.

8" pipe to be centered over drop pipe

4 - #4 vertical hoops

Payment line for drop manhole

Radius = 3'

#4 bent bars

Diameter of drop pipe shall be the same as influent pipe

1/4 Bend

NOTE:
2' minimum cover on reinforcing steel
See sheet No. S-30 for sections.

[Diagrams and specifications for chimney and manhole construction, including details on rungs, hoops, and payment distances.

FOR DROPS OVER 5.0 FEET
DROP MANHOLE (CAST-IN-PLACE)

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

DROP MANHOLE

STANDARD DETAILS

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

SEPTEMBER 1984
PLAN OF MANHOLE COVER

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

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

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

SECTION B-B

BOTTOM VIEW OF COVER
Scale: 1 1/2" = 1'-0"
PLAN OF MANHOLE FRAME
Scale: 1 1/2" = 1'-0"

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

Approx. weight 156 pounds

S-32
STANDARD DETAILS
MANHOLE FRAME - TYPE SA
SEPTEMBER 1984
SCALE: 1-1/2" = 1'-0"
COUNTY OF KAUAI
CITY & COUNTY OF HONOLULU
COUNTY OF MAUI
COUNTY OF HAWAII
PLAN
SPECIAL MANHOLE COVER

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

SECTION A-A

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

Approx. Weight 260 Pounds
PLAN
SPECIAL MANHOLE FRAME

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

Approx. Weight 480 Pounds

SECTION A-A

MANHOLE FRAME - TYPE SB

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

SEPTMBER 1984

S-35
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. 5-37

HALF PLAN—MANHOLE FRAME

SECTION—MANHOLE FRAME & COVER

DETAIL "A"

DETAIL "B"

PRESSURE MANHOLE FRAME & COVER

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

PRESSURE MANHOLE FRAME AND COVER - TYPE SC

NOT TO SCALE

STANDARD DETAILS

S-39

SEPTEMBER 1984
PLAN

SECTION A-A

TYPE SD FRAME
Scale: 1 1/2" = 1' - 0"

NOTE:
Type SA Cover is used with this frame.

Approx. weight 156 pounds
PLAN OF COVER

BOTTOM OF COVER

ELEVATION

SECTION

DROP MANHOLE
CHIMNEY CASTINGS

Scale: 1/2" = 1'-0"
1" dia. Wrought Iron or 3/4" Stainless Steel rod shaped as shown.

* Types 302, 304, or 316

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

SECTION "AA"

TYPE SC MANHOLE RUNG DETAILS
(STAINLESS STEEL)

Scale: 3" = 1'-0"
FOR FLAT SURFACES

FOR ROUND MANHOLES

PLAN

3/4" dia. Hex head S.S. bolt 6' long

S.S. Rung

FRONT ELEVATION

Drill 3/4" dia. hole through plastic lining and push bolt through for tight fit.

1/4" Rod welded to insert

Plastic with locking anchor

SIDE ELEVATION

NOTES:

1. All items exclusive of insert to be stainless steel Type 316, 304 or equat.

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 STANDARD DETAILS

MANHOLE RUNG DETAILS - TYPE SD

CITY & COUNTY OF HONOLULU COUNTY OF MAUI COUNTY OF HAWAII

SEPTEMBER 1984 SCALE: 3" = 1'-0"
TYPE SE MANHOLE RUNGS
CAST IRON OR DUCTILE IRON

C Scale: 3" = 1'-0"

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

MANHOLE RUNG DETAILS - TYPE SE

STANDARD DETAILS
S-45

SEPTEREMBER 1984
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.
CLASS A 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 ≤ 4
A

4 < C ≤ 17
B

17 < C ≤ 30
C

C > 30
Special Design

CLASS B BEDDING
NOT TO SCALE
Sewage Pump Stations & Treatment Plants

PART 4
NOTES

1. Fencing materials shall be of aluminum or galvanized steel as called for in the specifications.
2. Posts, bracing, 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 Catchers, 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.

FENCE DETAILS
OIL SEALS & RELATED PIPING

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.

Plug these pipes with lead solder

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.
## 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>¾&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, 8½&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>1&quot; gate valves, OIC, Bronze with ¾&quot; hose nipple</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Gate valve, screwed ends, Brass 1&quot;</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>Union, Brass 1&quot;</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>Pipe cap, Galv. Malleable Iron 6&quot;</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Pipe, 19&quot; long, Wrought Iron 6&quot;</td>
<td>2</td>
</tr>
<tr>
<td>13</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>14</td>
<td>Elbow, 90° 1&quot; brass with 1&quot; nipple</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>Pipe, 5&quot; long, brass 1&quot;</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>Cap, brass, 1&quot;</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>Aircock, Tee handle, brass ¼&quot; with male end bibb hose or 90° elbow</td>
<td>2</td>
</tr>
<tr>
<td>18</td>
<td>Pipe, 12&quot; long, brass 1&quot;</td>
<td>2</td>
</tr>
</tbody>
</table>
TEMPORARY CURB RETAINER

COVER PLATE

REMOVABLE POST & CHAIN DETAILS
ELEVATIONS

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

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

PLAN

SECTION A-A

REMOVABLE RAILING DETAILS
INTAKE PIPE THROUGH WALL DETAILS

Fill opening with concrete after pipe is in place.

TYPICAL WALL SLEEVE DETAILS

W = Wall width

GALV. IRON PIPE SLEEVE
TWO SIZES LARGER THAN PIPE DIAMETER.

LEAD CAULKING

JUTE

P-8  STANDARD DETAILS  TYPICAL WALL SLEEVE  COUNTY OF KAUAI
SEPTEMBER 1984  CITY & COUNTY OF HONOLULU
NOT TO SCALE
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
TYPICAL PUMP MOTOR DRIVE SHAFT GUARD

Dimensions to suit shaft arrangement

Bolt holes with nuts welded to back side

Coupling access door if necessary

Latch assembly

Holes for anchor bolts

Frame work and filler material (see general notes)

Floor level

7'-0" Min.

1'-0" Min.
**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)

**FRONT VIEW**

- 1/4" Min. steel plate

**SIDE VIEW**

- 1/2" Min. dia. bar
- 1/8" x 1/8" Min. flat bar

**TYPICAL PUMP COUPLING GUARD**

No Scale

---

P-12  | STANDARD DETAILS  | TYPICAL PUMP COUPLING GUARD  | CITY & COUNTY OF HONOLULU

SEPTEMBER 1984  | NOT TO SCALE
Frame work and filler material
(see general notes)

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
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 1/2 in. x 1 1/2 in. x 1/8 in. angle iron, metal pipe of 1 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>1/8</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>
</tbody>
</table>

Note: Materials to be steel. For additional requirements refer to project plans and specifications.
1½" Angle valve with chain & cap (iron pipe hose thread)

¾" H.B.

Top of tank

Galv. pipe strap at 5'-0" o.c. max.

1½" G.S. riser

Finish ground

Insulating coupling or adaptor as applicable

Supply line (size varies)

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 1½" gate valve shall be 90° apart.

1½" STAND PIPE DETAIL

No Scale

P-16 STANDARD DETAILS 1-1/2" STAND PIPE DETAIL CITY & COUNTY OF HONOLULU SEPTEMBER 1964 NOT TO SCALE
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.

EDGE OF PAVEMENT FINISH GROUND

CURB

2 1/4" SQUARE TUBE ANCHOR POST (SEE NOTE 2)

5/16" BOLTS (BOTHWAYS)

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.

COUNTY OF MAUI
COUNTY OF HAWAII

STREET NAME AND STOP SIGN DETAILS

NOT TO SCALE

SEPTEMBER 1984

T-1

STANDARD DETAILS
HEIGHT AND LATERAL LOCATION OF SIGNS
(TYPICAL INSTALLATIONS)
TYPICAL LOCATIONS FOR STOP SIGNS AND YIELD SIGNS
(TYPICAL INSTALLATIONS)

COUNTY OF KAUA'I
COUNTY OF MAUI
COUNTY OF HAWAII
TYPICAL LOCATIONS FOR STOP SIGNS
STANDARD DETAILS
T-3
NOT TO SCALE
SEPTEMBER 1984
AT INTERSECTION

MIDBLOCK

T-4 STANDARD DETAILS TYPICAL DETAIL FOR CROSSTICK AND STOP LINES COUNTY OF HAWAII

SEPTMBER 1984 NOT TO SCALE
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.
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

Reflector marker

TYPICAL SECTION

RM-1
WHITE

RM-2
YELLOW

RM-3
YELLOW

RM-1, 2, or 3

usable
shoulder

not less
than 2'0

MIN.

SECTION
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

RAISED PAVEMENT MARKERS

COUNTY OF KAUA'I
COUNTY OF MAUI
COUNTY OF HAWAII

RAISED PAVEMENT MARKERS

STANDARD DETAILS

T-7

NOT TO SCALE
SEPTMBER 1984
TWO-LANE PASSING PERMITTED AND PASSING PROHIBITED

TWO-LANE PASSING PROHIBITED ZONES

MULTI-LANE LANE LINES AND CENTER LINE

CHANNELIZING LINES OR SOLID LANE LINES

NOTE: Type H positioned with reflective surface facing No-Pass direction.

NOTE: Type H positioned with reflective surface facing oncoming traffic.
STRIPPING 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 STOPPING" 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

RAISED PAVEMENT MARKING

TWO - LANE PASSING PERMITTED

TWO - LANE PASSING PROHIBITED
FOR 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
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.

2" SQUARE TELESPAR TUBING
NO 20F12, OR APPROVED EQUAL
WITH 7/16" DIAMETER HOLES
SPACED 1" ON CENTER.

5/16" BOLTS
(BOTHWAYS)

EDGEOFPAVEMENT
CURB

2-7/4" SQUARE TUBE ANCHOR POST
(SEE NOTE 1)

NOTES:
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.

*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

1. Sign shall be 0.080" min. thickness alum. sheet (ASTM: B-209 alloy 6061-T6 as amended flatsheet).

2. Reflective sheets shall be scotchlite sheeting #3277 green for face and scotchlite #2270 silver for letters and numbers or equal.

STANDARD STREET NAME SIGN