DIVISION 400 - APPROVED
MATERIAL LIST AND STANDARD
DETAILS
Section 403 - STANDARD DETAILS
# TABLE OF CONTENTS
DIVISION 400, Section 403 - STANDARD DETAILS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>DETAIL NOS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Table</td>
<td>403-1</td>
</tr>
<tr>
<td>I. Concrete Reaction Blocks, Valve Anchor Blocks, Beams, Jackets (B)</td>
<td></td>
</tr>
<tr>
<td>A. Reinforced Concrete Jacket</td>
<td>B1</td>
</tr>
<tr>
<td>B. Thrust Blocks</td>
<td>B2 - B13</td>
</tr>
<tr>
<td>C. Valve Anchor Blocks</td>
<td>B14 - B15</td>
</tr>
<tr>
<td>D. Concrete Thrust Beam</td>
<td>B16 - B23</td>
</tr>
<tr>
<td>II. Chain Link Fence and Gate (F)</td>
<td></td>
</tr>
<tr>
<td>A. Chain Link Fence</td>
<td>F1 - F3</td>
</tr>
<tr>
<td>B. Gate Security Details</td>
<td>F4 - F5</td>
</tr>
<tr>
<td>III. Fire Hydrants and Appurtenances (FH)</td>
<td></td>
</tr>
<tr>
<td>A. 2 ½ “Standpipe</td>
<td>FH1</td>
</tr>
<tr>
<td>B. Connection Layouts</td>
<td>FH2 - FH8</td>
</tr>
<tr>
<td>C. Slab, Guard Post, and Curb Guard</td>
<td>FH9 - FH11</td>
</tr>
<tr>
<td>D. Markers</td>
<td>FH12 - FH13</td>
</tr>
<tr>
<td>IV. Service Laterals (L)</td>
<td></td>
</tr>
<tr>
<td>A. Kauai</td>
<td>L1 - L6</td>
</tr>
<tr>
<td>B. Hawaii</td>
<td>L7 - L11</td>
</tr>
<tr>
<td>C. Oahu</td>
<td>L12 - L22</td>
</tr>
<tr>
<td>D. Maui</td>
<td>L23 - L38</td>
</tr>
<tr>
<td>V. Meter Boxes, and 3-Inch and Larger Meters (M)</td>
<td></td>
</tr>
<tr>
<td>A. Box Installation and Miscellaneous Details</td>
<td>M1 - M15</td>
</tr>
<tr>
<td>B. Compound, Detector Check, Turbine and FM Meters</td>
<td>M16 - M43</td>
</tr>
</tbody>
</table>
VI. Manholes (MH)

A. Type ‘A’ Manhole for Bevel Geared Gate Valve .......... MH1 - MH5
B. Type ‘A’ Manhole for Butterfly Valves ................. MH6 - MH11
C. Miscellaneous Details ...................................... MH12 - MH17
D. Type ‘B’ Manhole ........................................ MH18
E. Type ‘C’ Manhole ........................................ MH19
F. Type ‘D’ Manhole for 2” Air Release Valves .......... MH20 - MH21
G. Type ‘E’ Tapping Tee Manhole ......................... MH22 - MH24
H. Oversized Top Slab Detail ............................... MH25

VII. Trench Details, and Concrete Cylinder Pipe and Appurtenances (P)

A. Pipe Miscellaneous and Tap-In Tee Details .......... P1 - P8
B. Excavation Payment Limits at Connection .......... P9
C. Trench Details ............................................. P10 - P13

VIII. Valves and Appurtenances (V)

A. Air Relief Valves .......................................... V1 - V7
B. Backflow Preventers ..................................... V8 - V9
C. Automatic Pressure Relief .............................. V10
D. Valve Box Installation and Miscellaneous Details .... V11 - V17
E. Valve Marker and Nut Extension ....................... V18 - V19
F. Cleanouts ................................................. V20 - V22
G. ARV Installation in Type ‘F’ Manhole ............... V23
## APPLICATION TABLE

<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Contents</th>
<th>Applicable To</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>CONCRETE THRUST BLOCKS, VALVE ANCHOR BLOCKS, BEAMS, AND JACKETS (B)</strong></td>
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<tr>
<td>B1</td>
<td>Reinforced Concrete Jacket Typical Detail</td>
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<td>B2</td>
<td>Horizontal Reaction Block for Water Mains</td>
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<tr>
<td>B3</td>
<td>Horizontal Thrust Block Minimum Bearing Areas</td>
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<tr>
<td>B4</td>
<td>Horizontal Thrust Block Minimum Bearing Areas</td>
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<tr>
<td>B5</td>
<td>Horizontal Thrust Block Minimum Bearing Areas</td>
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<td>B6</td>
<td>Top Vertical Thrust Block Schedule</td>
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<td>B7</td>
<td>Typical Thrust Block at Vertical Bends</td>
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<tr>
<td>B8</td>
<td>Typical Thrust Block w/ Straps for Connections at Vertical Bend</td>
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<tr>
<td>B9</td>
<td>Typical Thrust Block with Structural Strut for Connections</td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>B10</td>
<td>Typical Thrust Block 6 to 22 1/2 Degree Conc. Cyl. Bend for 16&quot; to 42&quot; Connections Only</td>
<td></td>
</tr>
<tr>
<td>B11</td>
<td>Typical Thrust Block 22 1/2 to 45 Degree Conc. Cyl. Bend for 16&quot; to 42&quot; Connections Only</td>
<td></td>
</tr>
<tr>
<td>B12</td>
<td>Typical Thrust Block 45 to 67 1/2 Degree Conc. Cyl. Bend for 16&quot; to 42&quot; Connections Only</td>
<td></td>
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<tr>
<td>B13</td>
<td>Typical Thrust Block Conc. Cyl. Tee Connection (16&quot; to 42&quot;)</td>
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<tr>
<td>B14</td>
<td>Gate Valve Anchor Block Non-Metallic Pipes</td>
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<tr>
<td>B15</td>
<td>Gate Valve Anchor Block Schedule</td>
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<tr>
<td>B16</td>
<td>Concrete Thrust Beam Typical Detail</td>
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<tr>
<td>B17</td>
<td>Concrete Thrust Beam Schedule</td>
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<tr>
<td>B18</td>
<td>Concrete Thrust Beam Schedule</td>
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<tr>
<td>B19</td>
<td>Concrete Thrust Beam for Reducer - Typical Detail</td>
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<tr>
<td>B20</td>
<td>Concrete Thrust Beam for Reducer - Schedule</td>
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<td>Detail No.</td>
<td>Contents</td>
<td>Kauai</td>
</tr>
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<td>B21</td>
<td>Concrete Thrust Beam for Reducer - Schedule</td>
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</tr>
<tr>
<td>B22</td>
<td>Concrete Thrust Beam for Offset - Typical Detail</td>
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</tr>
<tr>
<td>B23</td>
<td>Concrete Thrust Beam for Offset - Schedule</td>
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</tbody>
</table>

**CHAIN LINK FENCE AND GATE (F)**

<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Contents</th>
<th>Kauai</th>
<th>Hawaii</th>
<th>Oahu</th>
<th>Maui</th>
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**FIRE HYDRANTS AND APPURTENANCES (FH)**

<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Contents</th>
<th>Kauai</th>
<th>Hawaii</th>
<th>Oahu</th>
<th>Maui</th>
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</thead>
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<td>Hydrant Connection with Elbow</td>
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<td>Hydrant Connection with Elbow</td>
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<td>FH8</td>
<td>Hydrant Connection Notes</td>
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<td>Hydrant Conc. Slab &amp; Reflector Post</td>
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<td>FH10</td>
<td>Hydrant Concrete Slab and Guard Posts</td>
<td>0</td>
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<td>FH11</td>
<td>Hydrant Curb Guard</td>
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<td>FH12</td>
<td>Hydrant Marker Location for Streets</td>
<td>0</td>
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</tr>
<tr>
<td>FH13</td>
<td>Hydrant Marker Location for Highways</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

**SERVICE LATERALS (L)**

<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Contents</th>
<th>Kauai</th>
<th>Hawaii</th>
<th>Oahu</th>
<th>Maui</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Single Service Lateral Plan, Profile &amp; Material List</td>
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<td>Double Service Lateral Plan, Profile &amp; Material List</td>
<td>0</td>
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<tr>
<td>Detail No.</td>
<td>Contents</td>
<td>Applicable To</td>
<td></td>
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<td>Kauai</td>
<td>Hawaii</td>
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<td>Maui</td>
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<tr>
<td>L3</td>
<td>Fabricated Branch Pipe and Linesetter Detail</td>
<td>0</td>
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<td>One Inch Meter Profile &amp; Material List</td>
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<td>L5</td>
<td>1 1/2&quot; Inch Meter Profile &amp; Material List</td>
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<td>L6</td>
<td>Two-Inch Meter Profile &amp; Material List</td>
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<td>Copper Service Lateral for Multiple Meters</td>
<td>0</td>
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<tr>
<td>L8</td>
<td>Service Laterals and Connections</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L9</td>
<td>Copper Service Lateral for 5/8&quot; &amp; 1&quot; Meters</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L10</td>
<td>Service Lateral / Connection Material Schedule</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L11</td>
<td>Stabilization of 5/8-Inch Meter Easements</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L12</td>
<td>Service Laterals and Connections Standard Sizing Arrangements</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L13</td>
<td>Copper Service Lateral for Connection Type &quot;X&quot; Meter Box 5/8&quot;, 3/4&quot;, &amp; 1&quot; Meters</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>L14</td>
<td>Copper Service Lateral for Connection Type &quot;X&quot; Meter Box 5/8&quot;, 3/4&quot;, &amp; 1&quot; Meters</td>
<td>0</td>
<td></td>
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<tr>
<td>L15</td>
<td>Copper Service Lateral for Connection Type III Meter Box 1 1/2&quot; and 2&quot; Meters</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L16</td>
<td>Copper Service Lateral for Connection (Multiple Service)</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L17</td>
<td>Special Lateral and Connection Fitting Schedule</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L18</td>
<td>Material List for Copper Laterals</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L19</td>
<td>End Of Line Connection</td>
<td>0</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>L20</td>
<td>Typical Detail for Installation of Ball Stop After Meter</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L21</td>
<td>New Lateral Installation Schematic Detail</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L22</td>
<td>Lateral Reconnection Schematic Detail</td>
<td>0</td>
<td></td>
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<tr>
<td>L23</td>
<td>Service Laterals and Connections Standard Sizing Arrangements</td>
<td>0</td>
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<tr>
<td>L24</td>
<td>Typical Service Lateral</td>
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<td></td>
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<td>L25</td>
<td>Single Service Lateral (Type “A”, 5/8&quot; &amp; 3/4&quot; Meters)</td>
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<td>Single Service Lateral (Type “A”, 5/8&quot; &amp; 3/4&quot; Meters)</td>
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<td>Double Service Lateral (Type “A-1”, 5/8&quot; &amp; 3/4&quot; Meters)</td>
<td>0</td>
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</tr>
</tbody>
</table>
## DIVISION 400, SECTION 403 - STANDARD DETAILS

<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Contents</th>
<th>Kauai</th>
<th>Hawaii</th>
<th>Oahu</th>
<th>Maui</th>
</tr>
</thead>
<tbody>
<tr>
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### METER BOXES, AND 3-INCH AND LARGER METERS (M)

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| M2          | Cast Iron Cover for Type “B” Meter Box         | 0 | 0 | 0 | 0 |
| M3          | Meter Box &amp; Cover Type “X”                    | 0 | 0 | 0 | 0 |
| M4          | Meter Box Type III for 1 1/2” &amp; 2” Meters      | 0 | 0 | 0 | 0 |
| M5          | Meter Box Type III for 1 1/2” &amp; 2” Meters      | 0 | 0 | 0 | 0 |
| M6          | Meter Box Frame &amp; Cover Cast Iron, Type III    | 0 | 0 | 0 | 0 |
| M7          | Meter Box Frame &amp; Cover Cast Iron Type IV for 3” &amp; 4” Meters | 0 | 0 | 0 | 0 |
| M8          | Meter Box Cover Cast Iron, Type IV             | 0 | 0 | 0 | 0 |
| M9          | Meter Box Frame &amp; Cover Cast Iron Type V for 6” &amp; 8” Meters | 0 | 0 | 0 | 0 |
| M10         | Meter Box Cover Cast Iron, Type V              | 0 | 0 | 0 | 0 |
| M11         | Metal Manhole Cover (Non-Traffic Loading)      | 0 | 0 | 0 | 0 |
| M12         | 1 1/2” &amp; 2” Meter Manhole Standard Non-Traffic | 0 | 0 | 0 | 0 |
| M13         | Standard 1”, 1 1/2”, &amp; 2” Meter and Box Installation | 0 | 0 | 0 | 0 |</p>
<table>
<thead>
<tr>
<th>Detail No.</th>
<th>Contents</th>
<th>Applicable To</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>M14</td>
<td>Standard Meter Box Covers</td>
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</tr>
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<td>Reading Cover Detail</td>
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</tr>
<tr>
<td>M16</td>
<td>Compound Meter and Box Installation</td>
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</tr>
<tr>
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### TRENCH DETAILS, AND CONCRETE CYLINDER PIPE AND APPURtenANCES (P)

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DIVISION 400, SECTION 403 - STANDARD DETAILS
NOTE:
1. WHEREVER CONSTRUCTION JOINTS ARE REQUIRED, DWS APPROVED 6" RUBBER OR NEOPRENE WATERSTOPS OR CONCRETE BONDING AGENT APPROVED BY THE MANAGER SHALL BE INSTALLED.
2. NO CONCRETE JACKETING OF PVC PIPE OR EXISTING AC PIPE WILL BE ALLOWED.
3. CONCRETE SHALL BE DWS 2500 EXCEPT UNDER RESERVOIR FLOOR SLABS WHERE IT SHALL BE DWS 3500.
4. REINFORCING DESIGN APPLICABLE FOR STRAIGHT PIPE JACKETED SEGMENT. FOR SIPHON OR OFFSET, SUBMIT SHOP DRAWINGS.
5. PRECAST JACKETED WATERLINE SEGMENT SHALL BE DESIGNED AND STAMPED BY A LICENSED STRUCTURAL ENGINEER AND APPROVED BY MANAGER.

BELT FUSH WITH FACE OF JACKET (SLIP JOINT)
NOTE:
REFER TO DETAILS B3, B4 & B5 FOR THE SIZE OF REACTION BLOCKS. REACTION BLOCKS SHALL BEAR AGAINST UNDISTURBED SOIL. CONCRETE SHALL BE DWS 2500.
## Minimum Bearing Areas (Sq. Ft.) for Horizontal Thrust Blocks

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**Type of Soil Condition**

A. Soft Clay; Fine Loose Sand

B. Sand & Clay; Mixed or In Layers; Fine Confined Sand

C. Hard Dry Clay

D. Coarse Sand

E. Gravel

F. Soft Rock

G. Hardpan

**Lateral Bearing Pressure**

- 500 LBS. PER SQ. FT.
- 1000 LBS. PER SQ. FT.
- 1500 LBS. PER SQ. FT.
- 2000 LBS. PER SQ. FT.
- 3000 LBS. PER SQ. FT.
- 4000 LBS. PER SQ. FT.
- 5000 LBS. PER SQ. FT.

**Note:**

1. Actual field conditions and soil type shall be verified in the field. The schedule, dimensions and details as shown are provided as a guide only. The contractor or engineer who prepared the plans shall confirm the final design and details to the manager for review and approval after field verification and prior to installation. For Oahu only, the department will furnish the final design and details for projects awarded by the manager.

2. For Kauai and Maui, see plate B2 for additional notes.
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**TYPE OF SOIL CONDITION**

A. SOFT CLAY; FINE LOOSE SAND..........................500 LBS. PER SQ. FT.
B. SAND & CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND..................1000 LBS. PER SQ. FT.
C. HARD DRY CLAY........................................1500 LBS. PER SQ. FT.
D. COARSE SAND.............................................2000 LBS. PER SQ. FT.
E. GRAVEL....................................................3000 LBS. PER SQ. FT.
F. SOFT ROCK................................................4000 LBS. PER SQ. FT.
G. HARDPAN....................................................5000 LBS. PER SQ. FT.

**NOTE:**

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. FOR KAUA'I AND MAUI, SEE PLATE B2 FOR ADDITIONAL NOTES.
## Minimum Bearing Areas (Sq. Ft.) for Horizontal Thrust Blocks

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Bend Angle (°)</th>
<th>Pressure 250 PSI</th>
<th>Pressure 200 PSI</th>
<th>Pressure 150 PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
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<td>0°</td>
<td>353.5</td>
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</tr>
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<td>167.0</td>
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<tr>
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<td>46.0</td>
<td>34.5</td>
</tr>
<tr>
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<td>69.5</td>
<td>35.0</td>
<td>23.5</td>
<td>17.5</td>
</tr>
<tr>
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<td>90.5</td>
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<td>136.0</td>
<td>68.0</td>
<td>45.5</td>
<td>34.0</td>
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</table>

**Type of Soil Condition**

- A. SOFT CLAY; FINE LOOSE SAND
- B. SAND & CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND
- C. HARD DRY CLAY
- D. COARSE SAND
- E. GRAVEL
- F. SOFT ROCK
- G. HARDPAN

**Lateral Bearing Pressure**

- 500 LBS. PER SQ. FT.
- 1000 LBS. PER SQ. FT.
- 1500 LBS. PER SQ. FT.
- 2000 LBS. PER SQ. FT.
- 3000 LBS. PER SQ. FT.
- 4000 LBS. PER SQ. FT.
- 5000 LBS. PER SQ. FT.

**Note:**

1. Actual field conditions and soil type shall be verified in the field. The schedule, dimensions and details as shown are provided as a guide only. The contractor or engineer who prepared the plans shall submit the final design and details to the manager for review and approval after field verification and prior to installation. For Oahu only, the department will furnish the final design and details for projects awarded by the manager.

2. For Kauai and Maui, see Plate B2 for additional notes.
## TOP VERTICAL THRUST BLOCK SCHEDULE

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>BEND</th>
<th>PRESSURE 250 PSI</th>
<th>PRESSURE 200 PSI</th>
<th>PRESSURE 150 PSI</th>
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<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>3'-9&quot;</td>
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<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>2'-6&quot;</td>
<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>1/8</td>
<td>5'-0&quot;</td>
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<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>3'-6&quot;</td>
<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<tr>
<td>1/16</td>
<td>2'-6&quot;</td>
<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
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<td>A: 4'-0&quot; B: 3'-7&quot; C: 1'-5&quot; D: 2'-6&quot;</td>
</tr>
</tbody>
</table>

### NOTE:

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2. Dimensions in schedule refer to B7.

3. Schedule is not applicable to blocks fully or partly submerged in water.

4. Safety factor 1.5 based on pipe location minimum 2' below ground.
CLEARANCE REQUIRED TO PROVIDE SUFFICIENT WORKING SPACE FOR REMOVAL OF MECHANICAL JOINT BOLTS.

HANGERS ∩

"X" BARS

#4 @ 12" OC, EW

A/2 A/2

A

ELEVATION

#4 @ 8" O.C.

HANGERS ∩

SLOPE

"X" BARS

#4 @ 12" OC, EW

D

NOTES:
1. DWS 2500 CONCRETE.
2. MIN. 2" COVER OVER ALL REINFORCEMENT.
3. SEE B6 FOR SCHEDULE.
4. AWWA C153 FITTINGS NOT ACCEPTABLE FOR THIS APPLICATION (EXCEPT HAWAII)
5. UNLESS OTHERWISE NOTED, ALL REINFORCING BARS SHALL BE ASTM A615, GRADE 60
NOTE:

1. Typical detail of reaction block with straps. Detail of actual block to be used shall be furnished during construction by the contractor/engineer.

2. Anchor bolts shall be placed perpendicular to the bend of the strap.

3. AWWA C153 fittings not acceptable for this application (except Hawaii)
NOTE:
ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.
Notes:
1. All welds shall conform to AWS standards.
2. PL shall be uncoated ready to receive thrust struts and appurtenances.
3. Deliver at request.
4. Number of struts to be used may vary according to the working pressure.

Typical Thrust Block
6° to 22 1/2° Concrete Cylinder Bend
For 18” to 42” Connections Only
Scale: NTS

KAUA'I
OAHU
MAUI

2002
REVISION

TYPICAL THRUST BLOCK
6° TO 22 1/2° CONCRETE CYLINDER BEND
FOR 18" TO 42" CONNECTIONS ONLY
SCALE: NTS

STANDARD DETAILS
B10
CONC. BLK. TO BE DESIGNED TO MEET FIELD REQUIREMENTS.

EXISTING PIPE

CONCRETE TO BE Poured AFTER CONNECTION COMPLETED

1/2" PL SIZE TO BE DESIGNED TO MEET FIELD REQUIREMENTS (1/2"x12"x12" MIN.)

UNDISTURBED GROUND
2"x1/4" WEB T & B AS SHOWN

STRUCTURAL W SHAPE SIZE AND LENGTH SHALL BE DESIGNED TO MEET FIELD REQUIREMENTS.

1/2" PL SHALL CONFORM TO ASTM A-36, TO BE INSTALLED BY PIPE MANUFACTURER

CONCRETE BLOCK TO BE DESIGNED TO MEET FIELD REQUIREMENTS

CONCRETE TO BE Poured AFTER CONNECTION COMPLETED

1/2" THRUST BLOCK PL TO BE INSTALLED BY PIPE MANUFACTURER

TRENCH LINE

BASE PL SHALL BE DESIGNED TO MEET FIELD REQ.

UNDISTURBED GROUND

CONC. TO BE POURED AFTER CONNECTION COMPLETED

NOTES:
1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

KAUA'I
OAHU
MAUI

TYPICAL THRUST BLOCK
22 1/2° TO 45° CONCRETE CYLINDER BEND FOR 16" TO 42" CONNECTIONS ONLY
SCALE: NTS

STANDARD DETAILS

B11

2002
REVISION
CONC. BLK. TO BE DESIGNED TO MEET FIELD REQUIREMENTS.

2"x1/4" WEB T & B AS SHOWN

EXISTING PIPE

1/2" PL SIZE TO BE DESIGNED TO MEET FIELD REQUIREMENTS (1/2"x12"x12" MIN.)

UNDISTURBED GROUND
BASE PL SHALL BE DESIGNED TO MEET FIELD REQUIREMENTS.

STRUCTURAL W SHAPE SIZE AND LENGTH SHALL BE DESIGNED TO MEET FIELD REQUIREMENTS.

CONCRETE TO BE Poured AFTER CONNECTION COMPLETED

TRENCH LINE

NOTE:

1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.

TYPICAL THRUST BLOCK
45° TO 67 1/2° CONCRETE CYLINDER BEND FOR 16" TO 42" CONNECTIONS ONLY
CALE: NTS

KAUAI OAHU MAUI

STANDARD DETAILS B12

2002 REVISION
NOTES:
1. ALL WELDS SHALL CONFORM TO AWS STANDARDS.
2. PL SHALL BE UNCOATED READY TO RECEIVE THRUST STRUTS AND APPURTENANCES.
3. DELIVER AT REQUEST.
4. NUMBER OF STRUTS TO BE USED MAY VARY ACCORDING TO THE WORKING PRESSURE.
NOTES:
1. APPLY BOND BREAKER BETWEEN GATE VALVE AND CONCRETE.
2. ALL ANCHOR MATERIALS SHALL BE HOT DIPPED GALVANIZED STEEL, AND COATED WITH ASPHALTIC MATERIAL AFTER INSTALLATION.
3. 3" CLEARANCE FOR ALL REINFORCING STEEL.
4. FOR MANHOLES, ANCHOR BLOCKS CAN BE MADE AS PART OF FLOOR SLAB. SUBMIT STRUCTURAL DESIGN FOR MANAGER'S APPROVAL.
5. (ADDITIONAL FOR MAUI) A SEGMENT OF AC PIPE SHALL BE REMOVED AND THE VALVE INSTALLED WITH D.I.P. NIPPLES.
6. ANCHOR BLOCK DESIGNED FOR VERTICAL LOAD ONLY. FOR BLOCK SCHEDULE, SEE DETAIL B15.
7. STANDPIPE SHALL BE PVC C-900.

TYPICAL DETAIL

ANCHOR BOLTS

ANCHOR BLOCK

#5 AT 12" E.W., E.F.

ANCHOR BLOCKS

NON-METALLIC PIPES

SCALE: NTS

GATE VALVE ANCHOR BLOCK

OAHU
MAUI

STANDARD
DETAILS

B14

FINISH GRADE

15" (MAX)

6" MAX

#8 GAGE COPPER WIRE STRAPPED TO STANDPIPE W/ NON-METALLIC THIES
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<th>PIPE SIZE (in)</th>
<th>WIDTH, W (in)</th>
<th>HEIGHT, H (in)</th>
<th>LENGTH OF ANCHOR BLOCK, L (in)</th>
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**TYPE OF SOIL CONDITION**

- A. SOFT CLAY: FINE LOOSE SAND ...........................................500 LBS. PER SQ. FT.
- B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND ........1000 LBS. PER SQ FT.
- C. HARD DRY CLAY ................................................................1500 LBS. PER SQ. FT.
- D. COARSE SAND ....................................................................2000 LBS. PER SQ FT.
- E. GRAVEL ...........................................................................3000 LBS. PER SQ FT.
- F. SOFT ROCK ........................................................................4000 LBS. PER SQ FT.
- G. HARDPAN ...........................................................................5000 LBS. PER SQ. FT.

**NOTE:**

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE
CONCRETE THRUST BEAM
TYPICAL DETAIL
SCALE: NTS

SEE TABLE ON PLATES B17 AND B18 FOR
DIMENSION. FOR TRENCH WIDTH REFER TO
TABLE 300-1 IN DIVISION 300 OF THE
WATER SYSTEM STANDARDS.

FOR MAUI: SEE TABLE ON PLATES B20
AND B21 WHEN BEAM IS REQUIRED FOR
RESTRAINT OF A REDUCER.

KAUAI
OAHU
MAUI
HAWAII

REVISION
2002

STANDARD
DETAILS
B16
### WATER PRESSURE 250 PSI
#### TYPE OF SOIL CONDITION

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### WATER PRESSURE 200 PSI
#### TYPE OF SOIL CONDITION

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**NOTE:**

REFER TO DETAIL B18 FOR ADDITIONAL INFORMATION
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### TYPE OF SOIL CONDITION

A. **SOFT CLAY: FINE LOOSE SAND...** .......................................................... 500 LBS. PER SQ. FT.
B. **SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND...** .......... 1000 LBS. PER SQ. FT.
C. **HARD DRY CLAY...** .............................................................................. 1500 LBS. PER SQ. FT.
D. **COARSE SAND...** .................................................................................. 2000 LBS. PER SQ. FT.
E. **GRAVEL...** ......................................................................................... 3000 LBS. PER SQ. FT.
F. **SOFT ROCK** .......................................................................................... 4000 LBS. PER SQ. FT.
G. **HARDPAN...** ....................................................................................... 5000 LBS. PER SQ. FT.

### NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE.
CONCRETE THRUST BEAM
FOR REDUCER - TYPICAL DETAIL
SCALE: NTS

SEE TABLE ON PLATES B20 AND B21 FOR DIMENSION. FOR TRENCH WIDTH REFER TO TABLE 300-1 IN DIVISION 300 OF THE WATER SYSTEM STANDARDS.
### Water Pressure 250 PSI Type of Soil Condition

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**NOTE:**

Refer to Plate B21 for additional information.
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### TYPE OF SOIL CONDITION

A. SOFT CLAY: FINE LOOSE SAND..............................500 LBS. PER SQ. FT.
B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND...........1000 LBS. PER SQ. FT.
C. HARD DRY CLAY..................................................1500 LBS. PER SQ. FT.
D. COARSE SAND....................................................2000 LBS. PER SQ. FT.
E. GRAVEL...........................................................3000 LBS. PER SQ. FT.
F. SOFT ROCK.......................................................4000 LBS. PER SQ. FT.
G. HARDPAN.........................................................5000 LBS. PER SQ. FT.

### NOTE:

1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE BEFORE USING TABLES ABOVE.
CONCRETE THRUST BEAM
FOR OFFSET - TYPICAL DETAIL

SEE PLATE B23 FOR TABLE. FOR TRENCH WIDTH REFER TO TABLE 300-1 IN WATER DIVISION 300 OF THE SYSTEM STANDARDS.
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<tbody>
<tr>
<td>A. SOFT CLAY: FINE LOOSE SAND</td>
<td>500 LBS. PER SQ. FT.</td>
</tr>
<tr>
<td>B. SAND AND CLAY; MIXED OR IN LAYERS; FINE CONFINED SAND</td>
<td>1000 LBS. PER SQ. FT.</td>
</tr>
<tr>
<td>C. HARD DRY CLAY</td>
<td>1500 LBS. PER SQ. FT.</td>
</tr>
<tr>
<td>D. COARSE SAND</td>
<td>2000 LBS. PER SQ. FT.</td>
</tr>
<tr>
<td>E. GRAVEL</td>
<td>3000 LBS. PER SQ. FT.</td>
</tr>
<tr>
<td>F. SOFT ROCK</td>
<td>4000 LBS. PER SQ. FT.</td>
</tr>
<tr>
<td>G. HARDPAN</td>
<td>5000 LBS. PER SQ. FT.</td>
</tr>
</tbody>
</table>

NOTE:
1. ACTUAL FIELD CONDITIONS AND SOIL TYPE SHALL BE VERIFIED IN THE FIELD. THE SCHEDULE, DIMENSIONS AND DETAILS AS SHOWN ARE PROVIDED AS A GUIDE ONLY. THE CONTRACTOR OR ENGINEER WHO PREPARED THE PLANS SHALL SUBMIT THE FINAL DESIGN AND DETAILS TO THE MANAGER FOR REVIEW AND APPROVAL AFTER FIELD VERIFICATION AND PRIOR TO INSTALLATION. FOR OAHU ONLY, THE DEPARTMENT WILL FURNISH THE FINAL DESIGN AND DETAILS FOR PROJECTS AWARDED BY THE MANAGER.

2. ENGINEER SHALL EVALUATE SOIL CONDITIONS AND VERIFY THAT THE ALLOWABLE PRESSURE PROVIDED IS APPLICABLE.
DRIVE GATE DETAIL
N.T.S.

NOTES:
1. FOR SIZES OF POSTS & RAILS, SEE TABLE 300-14 OF WATER SYSTEM STANDARDS.
2. DEPARTMENT SHALL FURNISH PADLOCKS.
3. ALL MATERIALS SHALL BE HOT-DIPPED GALVANIZED UNLESS SPECIFIED OTHERWISE.
4. CONTRACTOR TO FURNISH PADLOCKS (KAUAI ONLY)
2-6" LONG CHAINS WELDED TO GATE FRAME (STD. 3/8" PROOF COIL CHAIN)

2-1.315" O.D. PIPE, 3'-6" LONG WITH ORNAMENTAL CAP ON TOP

2-1.660" O.D. PIPE SLEEVE, 1 1/2" LONG WELDED TO GATE FRAME

2-1/2" DIA STEEL BARS WELDED TO GATE FRAME

2-3/4" DIA STEEL BARS 4" LONG WELDED 3'-6" LONG PIPE

TENSION BAR

STEEL STRAP

GATE FRAME

2" NO. 9 GAUGE CHAIN LINK MESH

STEEL PLATE CATCH (SEE DETAIL BELOW)

**NOTES:**

1 PROVIDE 2 GATE STOPS, SIMILAR IN CONSTRUCTION AS GATE CATCH FOR DRIVE GATES WHEN FULLY OPEN.

2 ALL MATERIALS SHALL BE HOT-DIPPED GALVANIZED UNLESS SPECIFIED OTHERWISE.
SECURITY SWITCH DETAIL FOR INSWINGING DOUBLE LEAF CHAIN LINK FENCE
(OPPOSITE HAND FOR OUTSWINGING)
N.T.S.

WEATHERPROOF CAST METAL J-BOX
MAGNETIC CONTACT, WIDE GAP, WEATHERPROOF,
SENTROL MODEL 2507A SERIES, WITH STAINLESS STEEL ARMORED CABLE, MTD ON PLATE

1/2" CONDUIT RUN ON INSIDE OF GATE. WELD STRAPS TO CONDUIT AND FRAME
1/2" LIQUIDTITE FLEX

CHAIN LINK FENCE
GALVANIZED METAL PLATE
STAINLESS STEEL ARMORED CABLE
CGB WITH TAPERED NEOPRENE BUSHING AND CABLE CLAMP
CHAIN LINK GATE
CONC. FTG.

1/2"C. RUN ON INSIDE OF GATE, WELD STRAPS TO CONDUIT & FRAME
WEATHERPROOF CAST METAL J-BOX
1" CONDUIT WITH 2 #14 TO CONTROL BUILDING

SEE OTHER PLATES FOR DETAILS NOT SHOWN.
PLAN

WEATHERPROOF MAGNETIC CONTACT
SEE AF4

GALVANIZED METAL PLATE WELDED TO GATE FRAME

BOLT TO FRAME (TYP.)

GATE

1/2"C, RUN ON INSIDE OF GATE, WELD STRAPS TO CONDUIT & FRAME

1/2" LIQUIDTITE FLEX

1/2"C DOWN, STRAP TO FRAME

5"x6"x1/4" MOUNTING PLATES

4"x3"x1/4" PL.

WELD

4"x2 1/2"x1/4" PL.

2" O.D. GATE FRAME

1/4" CARRIAGE BOLT

5"x6 1/2"x1/4" PL.

PLAN

1/4" CARRIAGE BOLT

2" O.D. GATE FRAME

1/2"

4"

7"

SECTION "A"

SWITCH ASSEMBLY DESCRIPTION

1. SPACER—SENTROL #1913 OR EQUAL
2. MAGNETIC SWITCH—SENTROL #2507 AH BIASED MAGNETIC SWITCH OR APPROVED EQUAL
LIST OF MATERIALS

A  ANGLE FIRE HYDRANT VALVE, 2 1/2" IPT x 2 1/2" NATIONAL STANDARD FIRE HOSE COUPLING SCREW THREADS "JONES J-334" W/ CAP & CHAIN OR EQUAL

B  2 1/2" GALV. STEEL PIPE, SCHEDULE 40 (CUT TO FIT)

C  2 1/2" GALV. STEEL 90° ELBOW

D  TEE

E  CONCRETE REACTION BLOCK

F  2 1/2" GATE VALVE, S.E.

G  CAST IRON VALVE BOX AND COVER

H  TERRA - TAPE "D"

J  2 1/2" BUSHING (S. x T.)

K  2 1/2" PVC MALE ADAPTER

L  2 1/2" PVC NIPPLE, SCHEDULE 40

M  2 1/2" BRASS NIPPLE (12" LONG)

N  6" x 2'-0" DIA. OR 2'-0" x 2'-0" SQ. SETTLEMENT SLAB

NOTE:
ALL STANDPIPES SHALL BE CLEANED AFTER INSTALLATION AND PAINTED W/ TWO COATS OF PAINT. PAINT SHALL BE DUPONT "DOLOX" HIGH VISIBILITY YELLOW OR KEM LUSTRE ENAMEL LIGHT YELLOW (NO. F-65Y12).

SCALE: NTS

KAUAI

2 1/2" STANDPIPE DETAIL

STANDARD DETAILS

2002

REVISION

FH1
NOTES:
1. GASKETS FOR FLANGED JOINTS SHALL BE 1/8" DUCK–INSERTED RUBBER PACKING CARLOCK NO. 19.
2. BOLTS SHALL BE BREAK–OFF TYPE, 5/8" DIA. X 3" LONG MACHINE BOLTS WITH CUT THREADS, AMERICAN STANDARD HEAVY HEXAGON HEADS, STAINLESS STEEL OR SILICON BRONZE.
3. NUTS SHALL BE AMERICAN STANDARD HEAVY COLD PUNCHED HEXAGON NUTS, STAINLESS STEEL OR SILICON BRONZE. (DOES NOT APPLY TO BREAK AWAY BOLTS)
4. CONCRETE SHALL BE DWS 2500.
5. FOR AREAS WITHOUT SIDEWALKS A CONCRETE CURB OR 4" D.I. PIPE SHALL BE INSTALLED IF CALLED FOR IN THE PLANS AND AS SHOWN IN THESE DETAILS.
6. REFER TO DETAIL FH3 FOR ADDITIONAL DETAILS.

+ IF SPACE IS AVAILABLE, TAPPING VALVE/ TAPPING SLEEVE ASSEMBLY MAY BE USED WHEN APPROVED BY MANAGER.
* FOR AREAS WITH ROLLED CURB THE FIRE HYDRANT CENTERLINE SHALL BE 24" FROM THE EDGE OF THE ROLLED CURB.
STANDARD HYDRANT EXTENSIONS ARE AVAILABLE IN THE FOLLOWING LENGTHS: 6 TO 30 INCHES LONG IN INCREMENTS OF 6 INCHES.

* SEE NOTES ON PLATE FH8

**HYDRANT CONNECTION**

**KAUAI**

**OAHU**

**2002**

**REVISION**

**FH4**
NOTES:
1. MINIMUM DIRECT DISTANCE FROM FIRE HYDRANT TO GATE VALVE SHALL BE 8'-0".
2. CONCRETE SHALL BE DWS 2500.
3. FLANGED OUTLET FOR THE TEE IS OPTIONAL FOR OAHU; MANDATORY FOR KAUAI.
4. REFER TO PLATE FH4 FOR DIMENSIONS OF 4" CONCRETE SLAB AROUND FIRE HYDRANT.
5. TAPPING SLEEVE WITH VALVE MAY BE USED. (SEE NOTE ON PLATE FH8)
6. LUBRICATE HYDRANT NOZZLE THREADS WITH NON-TOXIC GREASE.
7. INSTALL FH MARKERS (SEE PLATES FH12 AND FH13)
8. THE 4-1/2" NOZZLE SHOULD FACE PERPENDICULAR TO THE CURB/ROAD.
HYDRANT EXTENSIONS ARE AVAILABLE IN STANDARD LENGTHS OF 6, 12, 18, 24, AND 30 INCHES.

STANDARD LENGTHS FOR HYDRANT ELBOWS

<table>
<thead>
<tr>
<th>Size</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>30&quot;</td>
<td>36</td>
</tr>
<tr>
<td>36</td>
<td>42</td>
</tr>
<tr>
<td>42</td>
<td>48</td>
</tr>
</tbody>
</table>

SIDEWALK

STD. HYDRANT EXTENSION AND/OR SLOTTED FLANGED RISER WHERE NECESSARY

6" D.I. PIPE CLASS 52

FLAT ROCK OR BRICK SUPPORT

EXTEND SLAB TO SIDEWALK OR TO 21" WHERE NO SIDEWALK.

REFER TO STANDARD DETAIL FH8 FOR NOTES.
REFER TO STANDARD DETAIL FH8 FOR NOTES.
REFER TO STANDARD DETAIL FH6 FOR ADDITIONAL INFORMATION FOR FIRE HYDRANT INSTALLATION.
NOTE:
1. GASKETS FOR FLANGED JOINTS SHALL BE 1/8” DUCK–INSERTED RUBBER PACKING GARLOCK NO. 19.
2. BOLTS SHALL BE BREAK–OFF TYPE, 5/8” DIA. x 3” LONG MACHINE BOLTS WITH CUT THREADS, AMERICAN STANDARD COARSE HEXAGON HEADS, STAINLESS STEEL OR SILICON BRONZE. INSTALL BOLT WITH THREADS FACING DOWN.
3. NUTS SHALL BE AMERICAN STANDARD HEAVY COLD PUNCHED HEXAGON NUTS, STAINLESS STEEL OR SILICON BRONZE.
4. CONCRETE SHALL BE DWS 2500.
5. REFER TO PLATE FH11 FOR FIRE HYDRANT INSTALLATION WITH CURB GUARD. (OAHU & KAUA'I ONLY). FOR MAUI, REFER TO PLATE FH9 WHERE NO STREET CURBING.
6. FLANGED OUTLET FOR THE TEE IS OPTIONAL FOR OAHU; MANDATORY FOR KAUA'I AND MAUI.
7. TAPPING SLEEVE WITH TAPPING VALVE ASSEMBLY MAY BE USED FOR CONNECTION TO EXIST MAIN.
8. LUBRICATE HYDRANT NOZZLE THREADS WITH NON–TOXIC GREASE.
9. PROVIDE SLOTTED FLANGED RISER FOR HYDRANT AS NEEDED TO ALIGN 4–1/2” NOZZLE PERPENDICULAR TO CURB. (FOR MAUI ONLY)
10. INSTALL HYDRANT MARKERS. (SEE PLATES FH12 AND FH13)
ELEVATION

(REFLECTOR POST DETAIL
FOR MARKING HYDRANTS
WITHOUT STREET CURBING)

6" THICK CONC. SLAB
GROUND LINE

42" SQ. x 6" THICK CONC. SLAB WITH WWF REINF

FIRE HYDRANT

PROPERTY LINE

1'-0"
2'-0" MIN.

3'-0"
3'-0"

PLAN

RM-3 (4"x12") REFLECTOR UNIT
(YELLOW) 2-EA. POST

GALV. FLG. CHANNEL
1/8"x3/16" ROLLED SECTION POST W/
A MIN. WEIGHT OF
2 LBS. PER FT.

SLOPE 1/4" PER FOOT TO ROADWAY
CONCRETE SLAB

4'-0"

22°±2°

1'-4"

HYDRANT CONCRETE SLAB
& REFLECTOR POST
SCALE: NTS

2002
REVISION

MAUI

HYDRANT CONCRETE SLAB
& REFLECTOR POST
STANDARD DETAILS

FH9
4"x4"x4" THICK CONC. SLAB

6" FIRE HYDRANT

4" HIGH STAND PIPE

CONCRETE CAP

PAINTED RED (FOR HAWAII ONLY)

4" D.I. PIPE FILLED W/ DWS 2500 CONCRETE, PAINTED OSHA APPROVED SAFETY YELLOW (TO BE USED FOR HYDRANT GUARDS AS SHOWN AND FOR MARKING VALVE LOCATIONS.)

FINISH GRADE

4"x4"x4" CONC. SLAB REINF. #4 AT 12" O.C. BOTHWAYS OR 6x6x10/10 WWF. SLOPE CONC. SLAB 1/4" PER FOOT AWAY FROM HYDRANT

SCALE: NTS

OAHU HAWAII

HYDRANT CONCRETE SLAB AND GUARD POSTS

2002

REVISION

FH10

STANDARD DETAILS
1. CONCRETE SHALL BE DWS 2500.
2. SLOPE SLAB 1/4" PER FOOT AWAY FROM HYDRANT.

4" THICK CONC. SLAB
REINF WITH #4 AT 12" O.C., E.W.
GROUND LINE

CONC. BLOCK

PROPERTY LINE

SLOPE 1/4" PER FOOT AWAY FROM CURB (HAWAII)

CONCRETE CURB GUARD

1'-0" (KAUAI & OAHU)
6" (HAWAII)

DETAIL OF CURB GUARD AT HYDRANT WHERE REQUIRED
HYDRANT MARKER LOCATION

FIGURE 1
TWO LANE STREET

FIGURE 2
DIVIDED STREET

FIGURE 3
MULTI-LANE STREET W/TURN LANE

FIGURE 4
TWO LANE STREET @ INTERSECTION

FIGURE 5
FOUR LANE STREET W/TURN LANE @ INTERSECTION
## SCHEDULE OF FITTINGS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>SINGLE SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BRONZE SERVICE SADDLE W/ 1&quot; CC TAP FOR C-900 PVC PIPE &amp; D.I. PIPE</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>1&quot; CC x 1&quot; MPT BALL CORPORATION</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>PACK JOINT COUPLINGS (FORD C14-44 OR APPROVED EQUAL)</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>1&quot; COPPER TUBE, TYPE &quot;K&quot; SOFT</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>1&quot; 90° COPPER ELBOW, S x S</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>1&quot; COPPER MALE ADAPTER, SXT</td>
<td>1</td>
</tr>
<tr>
<td>G</td>
<td>ANGLE BALL VALVE, 1&quot; FEMALE IPT INLET x 3/4&quot; METER COUPLING NUT OUTLET</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(FORD BA13-342W OR APPROVED EQUAL)</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>METER SPACER, SUPPLIED BY DEPT. OF WATER &amp; INSTALLED BY CONTRACTOR</td>
<td>1</td>
</tr>
<tr>
<td>I</td>
<td>BALL VALVE W/ HANDLE, 3/4&quot; METER COUPLING NUT INLET x 1&quot;</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>FEMALE IPT OUTLET (FORD B13-342 W/ HT-34 HANDLE OR APPROVED EQUAL)</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>LINESETTER, 1&quot; COPPER TUBE, TYPE &quot;K&quot; SOFT, 12&quot; LONG (SEE STD. DET. L3)</td>
<td>1</td>
</tr>
<tr>
<td>K</td>
<td>1&quot; PLASTIC THREAD PROTECTOR</td>
<td>1</td>
</tr>
<tr>
<td>L</td>
<td>TYPE &quot;B&quot; CONCRETE METER BOX W/ CAST IRON COVER</td>
<td>1</td>
</tr>
<tr>
<td>M</td>
<td>TEE W/ 1&quot; BUSHING (WHEN CONNECTING TO 3&quot; OR SMALLER PIPE)</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:**
INSTALL TYPE "X" CONC. METER BOX W/ CAST IRON COVER IN SIDEWALK OR PAVED AREAS. TOP OF METER BOX TO BE FLUSHED WITH FINISHED GRADE.

---

**GROUND LINE**

**WATER MAIN (3" OR SMALLER)**

**WATER MAIN (C-900 PVC OR DUCTILE IRON PIPE. 4" OR LARGER)**

**A (BRONZE SERVICE SADDLE W/1" CC TAP FOR C-900 PVC PIPE & DUCTILE IRON PIPE)**

**B (1" CCx1" MPT BALL CORP.)**

---

**SINGLE SERVICE LATERAL**

**PLAN, PROFILE & MATERIAL LIST**

**SCALE: NTS**

**KAUAI**

**STANDARD DETAILS** L1

**2002**

**REVISION**
# Schedule of Fittings

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>DOUBLE SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BRONZE SERVICE SADDLE W/ 1-1/2&quot; CC TAP FOR C-900 PVC PIPE AND DUCTILE IRON PIPE</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>1-1/2&quot; CC x 1-1/2&quot; MPT BALL CORPORATION</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>PACK JOINT COUPLING (FORD C14–66 OR APPROVED EQUAL)</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>1-1/2&quot; COPPER TUBE, TYPE &quot;K&quot; SOFT</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>1&quot; 90° COPPER ELBOW, S x S</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>1&quot; COPPER MALE ADAPTER, S x T</td>
<td>2</td>
</tr>
<tr>
<td>G</td>
<td>ANGLE BALL VALVE, 1&quot; FEMALE IPT INLET x 3/4&quot; METER COUPLING NUT OUTLET (FORD BA13–342W OR APPROVED EQUAL)</td>
<td>2</td>
</tr>
<tr>
<td>H</td>
<td>METER SPACER, SUPPLIED BY DEPT. OF WATER &amp; INSTALLED BY CONTRACTOR</td>
<td>2</td>
</tr>
<tr>
<td>I</td>
<td>BALL VALVE W/ HANDLE, 3/4&quot; METER COUPLING NUT INLET x 1&quot; FEMALE IPT OUTLET (FORD B13–342 W/ HT–34 HANDLE OR APPROVED EQUAL)</td>
<td>2</td>
</tr>
<tr>
<td>J</td>
<td>LINESETTER, 1&quot; COPPER TUBE, TYPE &quot;K&quot; SOFT, 12&quot; LONG (SEE STD. DET. L3)</td>
<td>2</td>
</tr>
<tr>
<td>K</td>
<td>1&quot; PLASTIC THREAD PROTECTOR</td>
<td>2</td>
</tr>
<tr>
<td>L</td>
<td>TYPE &quot;B&quot; CONCRETE METER BOX WITH CAST IRON COVER</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>1&quot; x 1&quot; x 1-1/2&quot; COPPER TEE, S x S x S</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>TEE W/ 1-1/2&quot; BUSHING (WHEN CONNECTING TO 3&quot; OR SMALLER PIPE)</td>
<td>1</td>
</tr>
</tbody>
</table>

---

**Plan**

**Profile**

**Note:**

INSTALL TYPE "X" CONCRETE METER BOX W/ CAST IRON COVER IN SIDEWALK OR PAVED AREAS. TOP OF METER BOX TO BE FLUSHED WITH FINISHED GRADE.

---

**Double Service Lateral**

**Plan, Profile & Material List**

**Standard Details** L2
# Schedule of Copper Fittings

<table>
<thead>
<tr>
<th>NO.</th>
<th>DESCRIPTION</th>
<th>SINGLE SERVICE</th>
<th>DOUBLE SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1&quot; Copper Tube, Type 'K'</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>1&quot; Copper Male Adapter</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>1&quot; x 90° Elbow (Cast Solder)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>1&quot; x 1&quot; x 1 1/2&quot; Tee, (Cast Solder)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>E</td>
<td>Angle Valve, 1&quot; Female Ipt, Inlet 3/4&quot; Meter Coupling Nut Outlet (Ford K13-342W OR APPROVED EQUAL)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

## Fabricated Branch Pipe Detail

![Fabricated Branch Pipe Detail](image)

## Linesetter Detail

![Linesetter Detail](image)

---

**Kauai**

**Fabricated Branch Pipe and Linesetter Detail**

**Scale:** NTS

**Revision:** L3
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SERVICE SADDLE (SIZE DEPENDS UPON MAIN)</td>
</tr>
<tr>
<td>B</td>
<td>BALL CORPORATION (FORD FB 400 OR APPROVED EQUAL)</td>
</tr>
<tr>
<td>C</td>
<td>PACK JOINT COUPLING (FORD C14-66 OR APPROVED EQUAL)</td>
</tr>
<tr>
<td>D</td>
<td>COPPER TUBE TYPE &quot;K&quot; SOFT</td>
</tr>
<tr>
<td>E</td>
<td>90° COPPER ELBOW</td>
</tr>
<tr>
<td>F</td>
<td>COPPER MALE ADAPTER</td>
</tr>
<tr>
<td>G</td>
<td>ANGLE BALL VALVE (FORD BA13-444W OR APPROVED EQUAL)</td>
</tr>
<tr>
<td>H</td>
<td>METER SPACER (TO BE SUPPLIED BY THE DEPT. OF WATER &amp; INSTALLED BY CONTRACTOR)</td>
</tr>
<tr>
<td>I</td>
<td>BALL VALVE (FORD B13-444W W/HT 34 OR APPROVED EQUAL)</td>
</tr>
<tr>
<td>J</td>
<td>COPPER MALE ADAPTER</td>
</tr>
<tr>
<td>K</td>
<td>TYPE &quot;X&quot; CONC. METER BOX W/ C.I. COVER</td>
</tr>
</tbody>
</table>

**SCHEDULE OF FITTINGS**

**PROFILE**

BRONZE SERVICE SADDLE W/ 1-1/2"CC TAP FOR USE ON C-900 PVC PIPE AND DUCTILE IRON PIPE.

**ONE INCH METER PROFILE & MATERIAL LIST**

| SCALE | NTS |

**STANDARD DETAILS**

L4
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<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>SIZE</th>
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<tbody>
<tr>
<td>A</td>
<td>SERVICE SADDLE (SIZE DEPENDS UPON MAIN)</td>
<td>2” CC TAP</td>
</tr>
<tr>
<td>B</td>
<td>BALL CORPORATION (FORD FB 400 OR APPROVED EQUAL)</td>
<td>2” CC X MPT</td>
</tr>
<tr>
<td>C</td>
<td>PACK JOINT COUPLING (FORD C14-77 OR APPROVED EQUAL)</td>
<td>2”</td>
</tr>
<tr>
<td>D</td>
<td>COPPER TUBE TYPE &quot;K&quot; SOFT</td>
<td>2”</td>
</tr>
<tr>
<td>E</td>
<td>90° COPPER ELBOW</td>
<td>2”</td>
</tr>
<tr>
<td>F</td>
<td>COPPER MALE ADAPTER</td>
<td>2” X 1 1/2”</td>
</tr>
<tr>
<td>G</td>
<td>ANGLE BALL VALVE (FORD BFA13–666W OR APPROVED EQUAL)</td>
<td>1 1/2”</td>
</tr>
<tr>
<td>H</td>
<td>METER SPACER (TO BE SUPPLIED BY THE DEPT OF WATER &amp; INSTALLED BY CONTRACTOR)</td>
<td>1 1/2”</td>
</tr>
<tr>
<td>I</td>
<td>BALL VALVE (FORD BF13–676W W/ HB67S OR APPROVED EQUAL)</td>
<td>1 1/2”</td>
</tr>
<tr>
<td>J</td>
<td>COPPER MALE ADAPTER</td>
<td>2”</td>
</tr>
<tr>
<td>K</td>
<td>TYPE &quot;X&quot; CONC. METER BOX W/ C.I. COVER</td>
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</tr>
</tbody>
</table>

**SCHEDULE OF FITTINGS**

**PROFILE**

Scale: NTS

Bronze Service Saddle W/ 2” CC Tap for Use on C-900 PVC Pipe and Ductile Iron Pipe
<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SERVICE SADDLE (SIZE DEPENDS UPON MAIN)</td>
<td>2” CC TAP</td>
</tr>
<tr>
<td>B</td>
<td>BALL CORPORATION (FORD FB 800 OR APPROVED EQUAL)</td>
<td>2” CC X 2 1/2” MPT</td>
</tr>
<tr>
<td>C</td>
<td>PACK JOINT COUPLING (FORD C14–88 OR APPROVED EQUAL)</td>
<td>2 1/2”</td>
</tr>
<tr>
<td>D</td>
<td>COPPER TUBE TYPE “K” SOFT</td>
<td>2 1/2”</td>
</tr>
<tr>
<td>E</td>
<td>90° COPPER ELBOW</td>
<td>2 1/2”</td>
</tr>
<tr>
<td>F</td>
<td>COPPER FLUSH BUSHING</td>
<td>2 1/2” C x 2&quot; FTG.</td>
</tr>
<tr>
<td>G</td>
<td>COPPER TUBE TYPE “K” SOFT</td>
<td>2”</td>
</tr>
<tr>
<td>H</td>
<td>COPPER MALE ADAPTER</td>
<td>2”</td>
</tr>
<tr>
<td>I</td>
<td>ANGLE BALL VALVE (FORD BFA13–777W OR APPROVED EQUAL)</td>
<td>2”</td>
</tr>
<tr>
<td>J</td>
<td>METER SPACER (TO BE SUPPLIED BY THE DEPT. OF WATER &amp; INSTALLED BY CONTRACTOR)</td>
<td>2”</td>
</tr>
<tr>
<td>K</td>
<td>BALL VALVE (FORD BF13–787W W/ HB 67S OR APPROVED EQUAL)</td>
<td>2”</td>
</tr>
<tr>
<td>L</td>
<td>COPPER MALE ADAPTER</td>
<td>2 1/2”</td>
</tr>
<tr>
<td>M</td>
<td>TYPE III METER BOX FRAME AND COVER</td>
<td>——</td>
</tr>
</tbody>
</table>

**SCHEDULE OF FITTINGS**

![Diagram of two-inch meter installation](attachment:diagram.png)

**PROFILE**

BRONZE SERVICE SADDLE W/ 2" CC TAP FOR USE C-900 PVC PIPE AND DUCTILE IRON PIPE

**TWO-INCH METER**

PROFILE & MATERIAL LIST

SCALE: NTS

KAUAI

STANDARD DETAILS

L6
NOTE:
REFER TO L10 FOR SCHEDULE OF COPPER FITTINGS.

METER BOX EXCEPTION – FOR 1 1/2" TYPE "B", 1 1/2" TYPE "C", AND 1 1/2" TYPE "D" SERVICE LATERALS, INSTALL TYPE "X" METER BOXES IN A.C. AND CONCRETE PAVED AREAS. INSTALL TYPE "B" METER BOXES IN UNPAVED AREAS. CURB STOP TO BE LOCATED BELOW PLANTING STRIP. FOR CONC. SIDEWALKS W/O PLANTING STRIP, CURB STOP SHALL BE LOCATED 12" ON CENTERLINE SIDE OF CURB FACE. FOR A.C. PAVED AND STABILIZED SHOULDERS, CURB STOP SHALL BE LOCATED NEXT TO COPPER TEE, MIN. 7".
NOTE:
The size combinations shown are those most commonly used, but this figure is not intended to limit the combinations which may be used. However, combinations other than those shown above may be installed only with the approval of the manager.
NOTE:
REFER TO L10 FOR SCHEDULE OF COPPER FITTINGS.
FOR MULTIPLE CONNECTION, SEE L8.
FOR ASPHALTIC CONCRETE PAVED AREAS, METER BOX SHALL BE LOCATED 4" FROM THE PROPERTY LINE.
FOR NON-SIDEWALK AREAS, METER BOX SHALL BE LOCATED 12" FROM PROPERTY LINE.
FOR SERVICE SADDLE REQUIREMENTS SEE TABLE 100-15 OF THE WATER SYSTEM STANDARDS.

METER BOX EXCEPTION – FOR 1" TYPE "A" SERVICE LATERALS,
INSTALL TYPE "X" METER BOX IN A.C. AND CONCRETE PAVED
AREAS. INSTALL TYPE "B" METER BOXES IN UNPAVED AREAS.
<table>
<thead>
<tr>
<th>TYPE</th>
<th>SIZE</th>
<th>QNT.</th>
<th>SIZE</th>
<th>QNT.</th>
<th>SIZE</th>
<th>QNT.</th>
<th>SIZE</th>
<th>QNT.</th>
<th>SIZE</th>
<th>QNT.</th>
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<th>QNT.</th>
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<tr>
<td></td>
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<td>2</td>
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<td>1</td>
<td>1-1/2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2-1/2</td>
<td>2X2</td>
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<td>2</td>
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<td>1</td>
<td>1-1/2</td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>1-1/2</td>
<td>1-1/2X1-1/2</td>
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<tr>
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<td>1-1/2X1-1/2</td>
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<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
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<td>2X2</td>
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<td>2</td>
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<tr>
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<td>1-1/2</td>
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<tr>
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<td>2</td>
<td>2</td>
<td>2-1/2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>1-1/2</td>
<td>1-1/2X1-1/2</td>
<td>1</td>
<td>1-1/2</td>
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<td>1</td>
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<td>1</td>
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<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1-1/2</td>
<td>1-1/2X1-1/2</td>
<td>1</td>
<td>1-1/2</td>
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<td>1</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>2-1/2</td>
<td>2X2</td>
<td>1</td>
<td>2-1/2</td>
<td>1</td>
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<td>2</td>
<td>2</td>
<td>2-1/2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>1-1/2</td>
<td>1-1/2X1-1/2</td>
<td>1</td>
<td>1-1/2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**ITEM NO.**

1 2 3 4 5 6 7 8 9

(a) BRONZE BALL CORP.  
INLET: AWWA TAPER  
OUTLET: PACK JOINT, "M.P.T. W/ADAPTOR (F.P.T. x PACK JOINT)" OR  
M.P.T. W/ BRASS UNION (F.P.T X C)  
(b) BRONZE BALL CURB STOP  
INLET-OUTLET: PACK JOINTS OR  
FPT W/ ADAPTOR (C X MPT)  
(*) 1" SERVICE CONNECTION  
INLET: (TO FIT 1" COPPER PIPE)  
OUTLET: METER COUPLING FOR  
5/8" x 3/4" METER  
(c) BRONZE BALL CURB STOP  
INLET: PACK JOINT  
OUTLET: METER COUPLING OR FPT W/BRASS BUSHING  
OR  
INLET: FPT W/ ADAPTOR (C X MPT)  
OUTLET: METER COUPLING  
(d) CUSTOMER VALVE: BALL VALVE WITH HAND LEVER  
INLET: METER COUPLING OR FLANGE, PACK JOINT, OR FPT.  
OUTLET: FPT OR PACK JOINT.
TYPE "B" SERVICE LATERAL

TYPE "C" SERVICE LATERAL

TYPE "A" SERVICE LATERAL

2" A.C. OVER 4" COMPACTED AGGREGATE BASE COURSE

PROPERTY LINE

ROAD SHOULDER

EDGE OF PAVEMENT

EASEMENT AREA IN FAVOR OF D.W.S

METER BOX

BOUNDARY PIN

3'-0" 10" 3'-0"

4'-0"

3'-0"

4'-0"

2'-0"

6"

3'-0"

2'-4"

6"

3'-0"

4'-0"

2'-4"

3'-0"

2'-0"

6"

4'-0"

3'-0"

6"

METER BOX

BOUNDARY PIN

2'-0"

METER BOX

2" A.C. OVER 4" COMPACTED AGGREGATE BASE COURSE

PROPERTY LINE

ROAD SHOULDER

EDGE OF PAVEMENT

EASEMENT AREA IN FAVOR OF D.W.S

METER BOX

METER BOX

TYPE "X" METER BOXES SHALL BE INSTALLED

STABILIZATION OF 5/8 INCH METER EASEMENTS

HAWAII

STANDARD DETAILS

SCALE: NTS

L11
SINGLE SERVICE LATERAL

SERVICE CONNECTION
SERVICE LATERAL
METER SIZE (TYP.) (5/8", 3/4")
A (1"")
C (1-1/2"")
D (2"")
E (2-1/2"")

DOUBLE SERVICE LATERAL

SERVICE CONNECTION
SERVICE LATERAL
METER SIZE (TYP.) (5/8", 3/4")
C-1 (1"")
D-1 (1-1/2"")
E-1 (2"")

THE PURPOSE OF THIS FIGURE IS TO SIMPLIFY THE DESIGNATION OF SERVICE LATERALS AND CONNECTIONS ON CONSTRUCTION PLANS. THE SIZE COMBINATIONS SHOWN HEREON ARE THOSE MOST COMMONLY USED, BUT THIS FIGURE IS NOT INTENDED TO LIMIT THE COMBINATIONS WHICH MAY BE USED.
NOTES:
1. SEE M3 FOR DETAILS OF TYPE "X" METER BOX.

2. IF THE CONSUMER'S SERVICE VALVE CANNOT BE
INSTALLED 3-5 FEET FROM THE PROPERTY LINE, THE
VALVE SHALL BE INSTALLED AS DIRECTED BY THE
MANAGER, OR INSTALL BALL CORP. WITHIN METER BOX
AFTER METER.

3. SEE PLATE M4:3 FOR METER INSTALLATION IN NON-SIDEWALK AREA.

<table>
<thead>
<tr>
<th>METER SIZE</th>
<th>SPLICE SIZE</th>
<th>SPLICE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8&quot;</td>
<td>1&quot; DIA.</td>
<td>7 1/2&quot;</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>1&quot; DIA.</td>
<td>9&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
<td>1 1/4&quot; DIA.</td>
<td>10 3/4&quot;</td>
</tr>
</tbody>
</table>

METER SPLICE DETAIL

SEE TABLE "A"
INSTALL 3/4" PVC SCHEDULE 80 CONDUIT WITH STRING UNDER THE METER BOXES, WHENEVER THE DISTANCE BETWEEN METER BOXES (2 TO 12 MULTIPLE METER BOXES) IS 4'-0" OR LESS (EDGE TO EDGE), CONDUIT SHALL EXTEND 2" WITHIN METER BOX, KEEP BOTH ENDS EXPOSED, PLUG OR TAPE TO PREVENT SOIL INTRUSION, AS REQUIRED. FOR INSTALLATION IN EXISTING SLAB, SAW CUT TRENCH, REPAIR CONCRETE WITH EPOXY MORTAR, LEVEL AND FINISH TO MATCH EXISTING.

NOTES:
1. REFER TO PLATES M3 TO M6 FOR DETAILS OF METER BOXES.
2. INSTALLATION INSTRUCTIONS FOR METER BOXES IN SIDEWALK AREA SHALL BE: TYPE "X"- L13
   TYPE III- L15
3. REFER TO PLATE L17 FOR SCHEDULE OF COPPER FITTINGS.
4. SEE PLATE 43 FOR METER INSTALLATION IN NON-SIDEWALK AREAS.
5. IF THE CONSUMER'S SERVICE VALVE CANNOT BE INSTALLED 3 TO 5 FEET FROM THE PROPERTY LINE, THE VALVE SHALL BE INSTALLED AS DIRECTED BY THE MANAGER.

<table>
<thead>
<tr>
<th>TYPE OF METER BOX</th>
<th>MIN. DIMENSION &quot;A&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE &quot;X&quot;</td>
<td>25&quot;</td>
</tr>
<tr>
<td>TYPE III</td>
<td>29&quot;</td>
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</tbody>
</table>

COPPER SERVICE LATERAL
FOR CONNECTION (MULTIPLE SERVICE)
SCALE: NTS

2002
REVISION

L16

OAHU
STANDARD DETAILS
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
<th>SINGLE SERVICE CONN.</th>
<th>CONNECTION FOR TWO SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BALL CORPORATION, BRONZE</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>GROUND JOINT UNION, COPPER TO N.P.T.I.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>ADAPTER, COPPER TO N.P.T.E.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>BALL STOP</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>FITTING ADAPTER, FITTING TO N.P.T.E</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>REDUCING TEE, COPPER TO COPPER TO COPPER</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>90° ELBOW, COPPER TO COPPER</td>
<td>–</td>
<td>2</td>
</tr>
</tbody>
</table>

NPTI= NATIONAL PIPE THREAD, INTERNAL
NPTE= NATIONAL PIPE THREAD, EXTERNAL
CTS= COPPER TUBING SIZE

SCHEDULE OF COPPER FITTINGS
# TABLE A (COPPER)

<table>
<thead>
<tr>
<th>METER CODE</th>
<th>SIZE (GPM)</th>
<th>LOW RANGE FOR METER SIZING (GPM)</th>
<th>LATERAL TYPE</th>
<th>LATERAL SIZE</th>
<th>SPLICE SIZE</th>
<th>SPLICE LENGTH</th>
<th>METER COUPL'G</th>
<th>BRASS REDUC.</th>
<th>SERVICE VALVE</th>
<th>BRASS PIPE</th>
<th>CAP</th>
<th>METER BOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>5/8&quot;</td>
<td>20</td>
<td>&quot;A&quot;</td>
<td>1&quot;</td>
<td>1&quot; DIA.</td>
<td>7 1/2&quot;</td>
<td>3/4&quot;</td>
<td>1&quot;x3/4&quot;</td>
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<td>1&quot;x10&quot;</td>
<td>1&quot;</td>
<td>TYPE X</td>
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<td>1&quot;x3/4&quot;</td>
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<td>&quot;C&quot;</td>
<td>1-1/2&quot;</td>
<td>1&quot; DIA.*</td>
<td>10 3/4&quot;</td>
<td>1&quot;</td>
<td>1 1/2&quot;x1&quot;</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot;x10&quot;</td>
<td>1 1/2&quot;</td>
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</tr>
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<td>&quot;D&quot;</td>
<td>2&quot;</td>
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<td>13&quot; R.E.</td>
<td>1 1/2 FL.</td>
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<td>1 1/2&quot;x10&quot;</td>
<td>1 1/2&quot;</td>
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<td>2-1/2&quot;</td>
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<td>17&quot; R.E.</td>
<td>2&quot; FL.</td>
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<td>2&quot;x10&quot;</td>
<td>2&quot;</td>
<td>TYPE III</td>
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</tbody>
</table>

* INCLUDES 2-1 1/4"x 1" BUSHINGS
* * INCLUDES 2-2"x2 1/2" BUSHINGS

## MAXIMUM METER SIZES FOR DOMESTIC SERVICE LATERALS

<table>
<thead>
<tr>
<th>LATERAL TYPE</th>
<th>MAXIMUM METER SIZE FOR SINGLE SERVICE LATERAL</th>
<th>MAXIMUM METER SIZES FOR COMMON SERVICE LATERAL</th>
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<td>NA</td>
</tr>
<tr>
<td>&quot;C&quot;</td>
<td>1&quot;</td>
<td>3/4&quot; &amp; 3/4&quot;</td>
</tr>
<tr>
<td>&quot;D&quot;</td>
<td>1-1/2&quot;</td>
<td>1&quot; &amp; 1&quot;</td>
</tr>
<tr>
<td>&quot;E&quot;</td>
<td>2&quot;</td>
<td>1-1/2&quot; &amp; 1&quot;</td>
</tr>
</tbody>
</table>
SERVICE LATERAL CONNECTION AT END OF LINE
TYPICAL DETAIL FOR INSTALLATION
OF BALL STOP AFTER METER
NOTES:

1. CONTRACTOR SHALL INSTALL A 3/4” PVC SCHEDULE 80 CONDUIT WITH STRING WHENEVER THE DISTANCE BETWEEN METER BOXES (2 TO 12 MULTIPLE METER BOXES) IS 4’-0” OR LESS (EDGE TO EDGE). CONDUIT SHALL EXTEND 2” WITHIN METER BOX, KEEP BOTH ENDS EXPOSED, PLUG OR TAPE TO PREVENT SOIL INTRUSION, AS REQUIRED. SAW CUT TRENCH AS REQUIRED AND REPAIR TO MATCH EXISTING CONDITIONS. FOR CONCRETE SLAB, REPAIR TRENCH WITH EPoxy MORTAR, LEVEL AND FINISH TO MATCH EXISTING.

2. INSTALL ELBOWS AND PIPE EXTENSIONS BEFORE METERS TO PROVIDE 18-INCH MINIMUM COVER FOR SERVICE LATERALS, AS REQUIRED.
The purpose of this figure is to simplify the designation of service laterals and connections on construction plans. The size combinations shown hereon are those most commonly used, but this figure is not intended to limit the combinations which may be used.
INSTALL METER BOX IN 4" CONCRETE PAD ADJACENT TO PROPERTY LINE AND SIDEWALK (SEE NOTE BELOW).  

NOTE: REPLACE RD. BOX AND REPLACE 3/4" CRUSHED STONE WITH 1"-3/4" CRUSHED STONE. 

FINISH GRADE 

PROPERTY LINE 

WATER MAIN 

BALL VALVE WITH HANDLE 

DUAL CHECK VALVE 

WATER METER BOX 

SIDWALK 

CURBING 

GUTTER 

PAVEMENT 

4" THK. CONCRETE PAD 

SIDEWALK 

CURBING 

CONCRETE GUTTER 

PAVEMENT 

WATER MAIN 

SECTION 

PLAN 

MAUI 

TYPICAL SERVICE LATERAL 

SCALE: NTS 

STANDARD DETAILS 

L24
<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</th>
<th>①</th>
<th>②</th>
<th>③</th>
<th>④</th>
<th>⑤</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CORP. STOP</td>
<td>COPPER ADAPTER</td>
<td>COPPER SERVICE TUBING</td>
<td>BRONZE BALL VALVE</td>
<td>BRASS NIPPLE</td>
<td>BRASS FITTING</td>
</tr>
<tr>
<td>A</td>
<td>5/8&quot; x 3/4&quot;</td>
<td>1&quot; AWWA THREAD x FEMALE I.P.T. FB 1600-4</td>
<td>1&quot; MALE I.P.T. x COPPER</td>
<td>1&quot;</td>
<td>1&quot; FEMALE I.P.T. B 11-444</td>
<td>1&quot; x 4&quot;</td>
<td>N/A</td>
</tr>
<tr>
<td>A</td>
<td>3/4&quot; x 3/4&quot;</td>
<td>1&quot; AWWA THREAD x FEMALE I.P.T. FB 1600-4</td>
<td>1&quot; MALE I.P.T. x COPPER</td>
<td>1&quot;</td>
<td>1&quot; FEMALE I.P.T. B 11-444</td>
<td>1&quot; x 4&quot;</td>
<td>1&quot; x 45° ELBOW W/ CLOSE NIPPLE OR 45° STREET ELBOW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAST IRON METER BOX</td>
<td>COPPER ADAPTER</td>
<td>COPPER SERVICE TUBING</td>
<td>BRONZE BALL VALVE</td>
<td>PLASTIC VALVE BOX</td>
<td>DIELECTRIC COUPLING</td>
</tr>
</tbody>
</table>

**NOTES**

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL.

2. SEE L25 FOR PLAN VIEW

3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 36" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.

4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.
### DOUBLE SERVICE LATERAL (TYPE *A*.*, 5/8*.*, & 3/4*.*, METERS)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>1 1/2&quot; AWWA THREAD x FEMALE I.P.T. FB 1600-6</td>
<td>1 1/2&quot; MALE I.P.T. x COPPER</td>
<td>COPPER SERVICE TUBING</td>
<td>SIZES AS NOTED ON L27</td>
<td>1 1/2&quot; FEMALE I.P.T. B 11-666</td>
<td>1 1/2&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>1&quot; x 1 1/2&quot; C x C x C</td>
</tr>
<tr>
<td>A-1</td>
<td>3/4&quot; x 3/4&quot;</td>
<td>1 1/2&quot; MALE I.P.T. x COPPER</td>
<td>COPPER STOP CORP.</td>
<td>COPPER ADAPTER</td>
<td>BRONZE BALL VALVE</td>
<td>COPPER ADAPTER</td>
<td>COPPER TEE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>5/8&quot; x 3/4&quot;</td>
<td>1&quot; C x C</td>
<td>COPPER ADAPTER</td>
<td>COPPER 90° ELLS</td>
<td>CAST IRON METER BOX</td>
<td>COPPER ADAPTER</td>
<td>BRONZE BALL VALVE</td>
<td>PLASTIC VALVE BOX</td>
</tr>
<tr>
<td>A-1</td>
<td>1&quot; C x C (ROTATED 45°)</td>
<td>1&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>COPPER ADAPTER</td>
<td>COPPER STOP CORP.</td>
<td>1&quot; FEMALE I.P.T. INLET LYSIS 111-243-TP</td>
<td>3/4&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>3/4&quot; FEMALE I.P.T. B 11-333 HB-345</td>
<td></td>
</tr>
<tr>
<td>A-1</td>
<td>1&quot; C x C (ROTATED 45°)</td>
<td>1&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>COPPER ADAPTER</td>
<td>COPPER STOP CORP.</td>
<td>1&quot; FEMALE I.P.T. INLET LYSIS 211-314-TP (METER SHUTOFF AND DUAL CHECK VALVE INCLUDED)</td>
<td>3/4&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>3/4&quot; FEMALE I.P.T. B 11-333 HB-345</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL. FOR CONDITION OTHER THAN STANDARD CONDITION SHOWN, ENGINEER SHALL SUBMIT MODIFIED DETAIL FOR APPROVAL.
2. SEE L27 FOR PLAN VIEW.
3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 60" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.
4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.

DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.
<table>
<thead>
<tr>
<th>Type</th>
<th>Meter Size</th>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maui</td>
<td>B 1&quot;</td>
<td>1 1/2&quot; AWWA Thread x Female I.P.T. FB 1600-6</td>
<td>1 1/2&quot; Male I.P.T. x Copper</td>
<td>Sizes As Noted On L29</td>
<td>1 1/2&quot; Female I.P.T. x 1 1/2&quot; Male I.P.T. B11-666</td>
<td>1&quot; Inlet-Outlet Female I.P.T. (Meter Shutoff Included) YLB 111-444-TP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Meter Size</th>
<th>Column 8</th>
<th>Column 9</th>
<th>Column 10</th>
<th>Column 11</th>
<th>Column 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Service Lateral (Type B, 1&quot; Meter)</td>
<td>B 1&quot;</td>
<td>1&quot; In-Line Spring HS 11-444</td>
<td>1&quot; Male I.P.T. x Copper</td>
<td>1&quot; Female I.P.T. B11-444 HB-345</td>
<td>10&quot; AMETEK 10-181-014 W/ Green Cover 10-181-015</td>
<td>1&quot; Brass With Close nipple</td>
</tr>
</tbody>
</table>

## Notes
1. All fittings and materials shall be as listed by brand name or approved equal.
2. For condition other than standard condition shown, engineer shall submit modified detail for approval.
3. See L29 for plan view.
4. Where there is no sidewalk, the 4\" concrete pad shall measure 42\" front-to-back and 36\" along the property line, with top elevation 2\" above the graded shoulder.
5. Replace plastic valve box with cast iron frame & cover if subject to traffic.

DENOTES FORD METER BOX
MANUFACTURING CO. NUMBER.
<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CORP. STOP</td>
<td>COPPER ADAPTER</td>
<td>COPPER SERVICE TUBING</td>
<td>BRONZE BALL VALVE</td>
<td>COPPER ADAPTER</td>
<td>COPPER TEE</td>
<td>COPPER 90° ELLS</td>
</tr>
<tr>
<td>B-1</td>
<td>1&quot;</td>
<td>1 1/2&quot; AWWA THREAD x FEMALE I.P.T. FB 1600-6</td>
<td>1 1/2&quot; MALE I.P.T. x COPPER</td>
<td>SIZES AS NOTED ON L31</td>
<td>1 1/2&quot; FEMALE I.P.T. B 11-666</td>
<td>1 1/2&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>1&quot; x 1/2&quot; C x C x C</td>
<td>1&quot; C x C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</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></td>
<td></td>
<td>COPPER ADAPTER</td>
<td>CAST IRON METER BOX</td>
<td>BRASS NIPPLE</td>
<td>BRASS CHECK VALVE</td>
<td>COPPER ADAPTER</td>
<td>BRONZE BALL VALVE</td>
<td>PLASTIC VALVE BOX</td>
<td>DIELECTRIC COUPLING</td>
</tr>
<tr>
<td>B-1</td>
<td>1&quot;</td>
<td>1&quot; MALE I.P.T. x COPPER (SPIGOT)</td>
<td>INLET-OUTLET 1&quot; FEMALE I.P.T. (METER SHUT-OFF INCLUDED) YLB 111-444-TP</td>
<td>1&quot; x 4&quot;</td>
<td>1&quot; IN-LINE SPRING HS 11-444</td>
<td>1&quot; MALE I.P.T. x COPPER</td>
<td>1&quot; FEMALE I.P.T B 11-444 HB-34S</td>
<td>10&quot; AMETEK 10-181-014 W/ GREEN COVER 10-181-015</td>
<td>1&quot; BRASS WITH CLOSE NIPPLE</td>
</tr>
</tbody>
</table>

NOTES

1. ALL FITTINGS AND MATERIALS SHALL BE AS LISTED BY BRAND NAME OR APPROVED EQUAL. FOR CONDITION OTHER THAN STANDARD CONDITION SHOWN, ENGINEER SHALL SUBMIT MODIFIED DETAIL FOR APPROVAL.

2. SEE L31 FOR PLAN VIEW

3. WHERE THERE IS NO SIDEWALK, THE 4" CONCRETE PAD SHALL MEASURE 42" FRONT-TO-BACK AND 60" ALONG THE PROPERTY LINE, WITH TOP ELEVATION 2" ABOVE THE GRADED SHOULDER.

4. REPLACE PLASTIC VALVE BOX WITH CAST IRON FRAME & COVER IF SUBJECT TO TRAFFIC.

DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.
NOTE: SEE L34 FOR MATERIALS AND NOTES
<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</th>
<th>①</th>
<th>②</th>
<th>③</th>
<th>④</th>
<th>⑤</th>
<th>⑥</th>
<th>⑦</th>
<th>⑧</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1 1/2&quot;</td>
<td>AWWA THREAD x FEMALE I.P.T. FB 1600-7</td>
<td>2&quot; MALE I.P.T. x COPPER</td>
<td>2&quot;</td>
<td>1 1/2&quot; FEMALE I.P.T. B 11-777</td>
<td>1 1/2&quot; x 48&quot;</td>
<td>1 1/2&quot; x 2 1/2&quot;</td>
<td>5/8&quot; x 2 1/2&quot;</td>
<td>TYPE 304</td>
</tr>
<tr>
<td>C</td>
<td>1 1/2&quot;</td>
<td>1 1/2&quot; x 13&quot; FLG. x FLG. ONE END PLUGGED</td>
<td>1 1/2&quot; x 6&quot;</td>
<td>1 1/2&quot; x 14&quot;</td>
<td>1 1/2&quot; IN-LINE SPRING SB 11-666</td>
<td>1 1/2&quot; FEMALE I.P.T. B 11-666</td>
<td>10&quot; AMETEK 10-181-014</td>
<td>1 1/2&quot; BRASS WITH ADAPTER AND CLOSE NIPPLE</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. ALL FITTINGS AND MATERIALS LISTED BY BRAND NAMES OR APPROVED EQUAL.
2. SEE PLATE M23 FOR TRANSPODER BRACKET INSTALLATION.
3. SEE L33 FOR PLAN VIEW.

DENOTES FORD METER BOX MANUFACTURING CO. NUMBER.
### Maui

<table>
<thead>
<tr>
<th>Type</th>
<th>Meter Size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td>1 1/2&quot;</td>
<td>2&quot; AWWA Thread x Female I.P.T. FB 1600-7</td>
<td>2&quot; Male I.P.T. x Copper</td>
<td>Sizes as noted on L35</td>
<td>2&quot; Female I.P.T. x C (Spigot)</td>
<td>1 1/2&quot; x 1 1/2&quot; C x C</td>
<td>1 1/2&quot; C x C</td>
<td>1 1/2&quot; Male I.P.T. x Copper</td>
<td></td>
</tr>
</tbody>
</table>

### Double Service Lateral (Type C-1, 1 1/2" Meter)

<table>
<thead>
<tr>
<th>9</th>
<th>10</th>
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<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter Valve</td>
<td>Stainless Stl Bolts/Nuts</td>
<td>Meter Idler</td>
<td>Meter Coupling</td>
<td>Brass Nipple</td>
<td>Brass Check Valve</td>
<td>Brass Nipple</td>
<td>Bronze Ball Valve</td>
<td>Plastic Valve Box</td>
<td>Dielectric Coupling</td>
</tr>
<tr>
<td>1 1/2&quot; Female I.P.T. x Flange BF 13-666</td>
<td>5/8&quot; x 2 1/2&quot; Type 304</td>
<td>1 1/2&quot; x 13&quot; Flg. x Flg. One End Plugged</td>
<td>1 1/2&quot; Flg. x Lok-Pak</td>
<td>1 1/2&quot; x 6&quot;</td>
<td>1 1/2&quot; IN-LINE SPRING HS 11-666</td>
<td>1 1/2&quot; x 14&quot;</td>
<td>1 1/2&quot; Female I.P.T. B 11-666 HB-675</td>
<td>10&quot; AMETEK 10-181-014 W/GREEN COVER 10-181-015</td>
<td>1 1/2&quot; Brass with Adapter and Close Nipple</td>
</tr>
</tbody>
</table>

### Notes:

All fittings and materials listed by brand names or approved equal.

See Plate M23 for transponder bracket installation.

See L35 for plan view.

☑ Denotes Ford meter box manufacturing co. number.
<table>
<thead>
<tr>
<th>TYPE</th>
<th>METER SIZE</th>
<th>①</th>
<th>②</th>
<th>③</th>
<th>④</th>
<th>⑤</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>2&quot;</td>
<td>STOP CORP.</td>
<td>BRASS NIPPLE</td>
<td>BRASS REDUCING COUPLING</td>
<td>COPPER ADAPTER</td>
<td>COPPER SERVICE TUBING</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2&quot; AWWA THREAD x FEMALE I.P.T. FB 1600-7</td>
<td>2&quot; x 4&quot;</td>
<td>2 1/2&quot; x 2&quot; C 11-87</td>
<td>2 1/2&quot; (OR 2&quot;) MALE I.P.T. x COPPER</td>
<td>2 1/2&quot; (OR 2&quot;)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>⑥</th>
<th>⑦</th>
<th>⑧</th>
<th>⑨</th>
<th>⑩</th>
<th>⑪</th>
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</thead>
<tbody>
<tr>
<td>BRONZE BALL VALVE</td>
<td>BRASS NIPPLE</td>
<td>VALVE METER</td>
<td>STAINLESS STL. BOLTS/NUTS</td>
<td>METER IDLER</td>
<td>METER COUPLING</td>
</tr>
<tr>
<td>2&quot; FEMALE I.P.T. B 11-777 (OR LENGTH TO FIT)</td>
<td>2&quot; x 48&quot;</td>
<td>2&quot; FEMALE I.P.T. x FLANGE BF 13-777</td>
<td>5/8&quot; x 3&quot; TYPE 304</td>
<td>2&quot; x 17&quot; FLG. x FLG. ONE END PLUGGED</td>
<td>2&quot; FLG. x LOK PAK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>⑫</th>
<th>⑬</th>
<th>⑭</th>
<th>⑮</th>
<th>⑯</th>
<th>⑰</th>
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</thead>
<tbody>
<tr>
<td>BRASS NIPPLE</td>
<td>BRASS CHECK VALVE</td>
<td>BRASS NIPPLE</td>
<td>BRONZE BALL VALVE</td>
<td>PLASTIC VALVE BOX</td>
<td>DIELECTRIC COUPLING</td>
</tr>
<tr>
<td>2&quot; x 6&quot;</td>
<td>2&quot; IN-LINE SPRING HS 11-777</td>
<td>2&quot; x 14&quot;</td>
<td>2&quot; FEMALE I.P.T. B 11-777 HB-67 S</td>
<td>10&quot; AMETEK 10-181-014 W/ GREEN COVER 10-181-015</td>
<td>2&quot; BRASS WITH ADAPTER AND CLOSE NIPPLE</td>
</tr>
</tbody>
</table>

NOTES:
1. ALL FITTINGS AND MATERIALS LISTED BY BRAND NAMES OR APPROVED EQUAL.

2. SEE PLATE M23 FOR TRANSPOUNDER BRACKET INSTALLATION.

* IF LENGTH OF SERVICE LATERAL IS LESS THAN 15 FEET, DELETE ITEMS ② AND ③ AND USE 2" SIZE FOR ITEMS ④ AND ⑤.
SEE L37 FOR PLAN VIEW
CONCRETE BOX

NOTES:

1. ACCOMMODATES 5/8" OR 3/4" METERS. (KAUAI AND HAWAII ONLY) AND 2" AND 2-1/2" PROPERTY VALVES (FOR OAHU)
2. ACCOMMODATES 2" & 2-1/2" VALVES.
3. SEE PLATE M2 FOR C.I. COVER DETAILS.
4. FOR OAHU AND HAWAII, FIBER REINFORCED CONC. IS ALLOWED.
5. INSTALL 6" WIDE X 4" THICK CONCRETE COLLAR WITH WIRE MESH IN NON-CONCRETE/SIDEWALK AREA WHERE APPLICABLE.

SECTION "B"

SECTION "A"
NOTE:
METAL THICKNESS DIMENSIONS ARE NET.
USE 1/2" HIGH VERTICAL LETTERS.
METER COVER SHALL BE GRAY CAST IRON,
FREE OF BLISTER, BLOWHOLES, WARPAGE
AND COLD SHUTS.

CHECKERED PATTERN

WATER SUPPLY

WATER METER

SCALE: NTS

KAUAI
OAHU
HAWAII

CAST IRON COVER
FOR TYPE "B" METER BOX

STANDARD DETAILS

M2

2001
REVISION
NOTES:
1. THICKNESS DIMENSIONS ARE NET. ADD 1/8" FOR RAISED SURFACE. RAISED SURFACE USE 3/4" HIGH LETTERS.
2. TYPE "X" METER BOX FOR 5/8", 3/4", & 1" METERS.
3. FOR "HAWAII" TYPE "X" METER BOX IS FOR 1" METER AND FOR 5/8" METERS INSTALLED IN A.C. OR CONCRETE PAVED AREA.
4. FOR OAHU AND HAWAII, FIBER REINFORCED CONCRETE IS ALLOWED.
5. SEE PLATE M24 FOR READING HOLE COVER DETAIL.
6. INSTALL 6" WIDE X 4" THICK CONC COLLAR IN NON-CONCRETE/SIDEWALK AREAS WHERE APPLICABLE.

CONCRETE BOX
WT. = 107 LBS.

METER BOX & COVER
TYPE "X"
SCALE: NTS

KAUAI
OAHU
HAWAII

STANDARD DETAILS
M3

2002
REVISION
NOTE:
1. INSTALL 12" WIDE x 4" THICK CONCRETE COLLAR (REINFORCING AS SHOWN) IN NON-CONCRETE/SIDEWALK AREAS
2. DWS 3500 CONCRETE, 1500 PSI CMU AND GRADE 60 REINFORCEMENT STEELS
3. DESIGN IS BASED ON: 250 PSF LIVE LOAD, 0 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE AND WATER TABLE BELOW BOTTOM OF METER BOX PER ASSHTO LRFD BRIDGE SPECIFICATION (1998). NON TRAFFIC TYPE
4. ALL CELLS SHALL BE GROUTED SOLID WITH 2500 PSI GROUT, TYPE W MORTAR

* FOR 1½" AND 2" METERS ON OAHU, 2" METERS ON KAUAI
NOTE:
1. INSTALL 12" WIDE x 4" THICK CONCRETE COLLAR (REINFORCING AS SHOWN) IN NON-CONCRETE/SIDWALK AREAS
2. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL
3. DESIGN IS BASED ON: 250 PSF LIVE LOAD. 0 FEET SURCHARGE: 60 PCF/FT AT REST PRESSURE AND WATER TABLE BELOW BOTTOM OF METER BOX PER ASSHTO LRFD BRIDGE SPECIFICATION (1998) NON TRAFFIC TYPE

* FOR 1½" AND 2" METERS ON OAHU, 2" METERS ON KAUAI
NOTE:
THICKNESS DIMENSIONS ARE NET. ADD 1/8" FOR RAISED SURFACE.
PLAN VIEW OF CAST IRON FRAME FOR 24"x42"x3/4" PLATE

PLAN VIEW OF 24"x42"x3/4" CAST IRON PLATE

SEE PLATE M24 FOR READING HOLE COVER AND DETAILS OF RAISED SURFACE.

KAUAI
OAHU

METER BOX FRAME & COVER
CAST IRON, TYPE IV FOR 3" & 4" METERS
SCALE: NTS

STANDARD DETAILS
M7
BOTTOM VIEW OF 24"x42"x3/4" CAST IRON PLATE

SECTION "A-A"
(SEE M7)

SECTION "E-E"

SECTION "D-D"
(SEE M7)

KAUA'I
OAHU

METER BOX COVER
CAST IRON, TYPE IV
SCALE: NTS

STANDARD DETAILS

2002
REVISION

M8
PLAN VIEW OF CAST IRON FRAME FOR 36"x52"x3/4" PLATE

CHECKERED PATTERN OF RAISED SURFACE TO MATCH WITH PATTERN OF PLATE. (SEE M24)

PLAN VIEW OF 36"x52"x3/4" CAST IRON PLATE

WATER SUPPLY

1" HIGH LETTERS

3/4" HIGH LETTERS

READING HOLES

WATER METER

SEE DETAILS OF RAISED SURFACES PLATE M24

SEE M24 FOR READING HOLE COVER DETAILS.
PLAN OF STAINLESS (316) STEEL MANHOLE COVER

SECTION "F-F"

SECTION "D-D"

NOTES:
1. COAT CONTACT POINT OF DISSIMILAR METALS W/ CHEVRON INDUSTRIAL MEMBRANE (ELASTOMERIC MEMBRANE) OR EQUAL.
2. ALL MILD STEEL SHALL BE HOT-DIPPED GALVANIZED.

* ALTERNATE = PROVIDE DESIGN WITH ANODIZED ALUMINUM COVER.
** USE HEX HEAD FOR DETECTOR CHECK MANHOLES.
PLAN

ELEVATION

<table>
<thead>
<tr>
<th>METER SIZES</th>
<th>L/1</th>
<th>E</th>
<th>F</th>
<th>W/1</th>
<th>G</th>
<th>H</th>
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<td>28</td>
<td>20</td>
<td>27</td>
<td>21</td>
<td>6</td>
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</tbody>
</table>

NOTE:
REFER TO PLATE L10 FOR SCHEDULE OF COPPER FITTINGS. FOR SERVICE SADDLE REQUIREMENT, SEE SECTION 100, SECTION 104.02, OF THE WATER SYSTEM STANDARDS. FOR 1-1/2" AND 2" METERS, INSTALL FORD "LOK-PAK" METER COUPLING AND NECESSARY ADAPTERS.

HAWAII

STANDARD 1", 1 1/2", & 2" METER AND BOX INSTALLATION

SCALE: NTS

M13
## Standard Meter Covers

### Hawaii

#### Standard Details

**Scale:** NTS

**Revision:** 2002

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>L</th>
<th>W</th>
<th>L/3</th>
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<td>48</td>
<td>24</td>
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</table>

**Note:** All irons and plates shall be hot dipped galvanized after fabrication.

### 1 1/2" Meter Box Cover

#### Section "X-X"

- 3/4"x1" Flat Bar Cont.
- Conc. Apron
- Finish Grade
- 3/8" USS Multi-Grip Plate
- 1/4"x2"x2" L Clips, 6" Long
- 1/4"x2"x2" Frame
- 3/8" Anchor Rod at 1/2 Span and Corners
- 4" Hollow Tile Wall

### 2" Meter Box Cover

#### Section "Y-Y"

- 3/8"x1 1/2"x1 1/2" /

**Cover Plate Details for 1" Meter Shall Be Similar to Shown Below Except 2-16"x16"x3/8" Plates Required**

### Diagrams

- 1 1/2" Meter Box Cover
- 2" Meter Box Cover
READING COVER FOR:

COMPOUND METER BOX COVER SEE PLATES M16 & M17
MFM-MCT METER BOX COVER SEE PLATES M21 & M22 DETECTOR
CHECK METER BOX COVER SEE PLATES M18 & M20
**PLAN**

* If tapping sleeve and tapping valve used, COPPER LATERAL shall be tapped to water main.
  + If meter unit is installed on the opposite side of the road, as the waterline, an additional gate valve and valve box is required between the box and the 90° bend. Center of valve shall be 2'-6" from edge of box. Also relocate copper lateral, just upstream of valve (between valve & 90° bend).

**ELEVATION**

<table>
<thead>
<tr>
<th>2002</th>
<th>COMPOUND METER AND BOX</th>
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<tr>
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<td>DETAILS</td>
</tr>
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<td>M16</td>
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</table>
FOR 3”, 4”, & 6” COMPOUND METERS

SECTION ”Y–Y”

CONCRETE CAP AND FRAME DETAILS

SECTION ”X–X”

NOTES:
1. ALL ANGLES, CHANNELS, AND COVER PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
2. FOR DIMENSIONS, SEE TABLE ABOVE.
3. FOR METER INSTALLATIONS LARGER THAN 6”, SUBMIT DRAWINGS TO MANAGER FOR APPROVAL.
4. SEE M15 FOR READING COVER DETAIL.

DIMENSION TABLE
METER SIZE (IN INCHES)

<table>
<thead>
<tr>
<th></th>
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<td>29</td>
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</tr>
<tr>
<td>E</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>F</td>
<td>4 x 3</td>
<td>6 x 4</td>
<td>8 x 6</td>
</tr>
<tr>
<td>G</td>
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<tr>
<td>H</td>
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<td>I</td>
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<tr>
<td>J</td>
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</tr>
<tr>
<td>Ø</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

* = MIN.

3/8” USS MULTI-GRIFF STEEL PLATE

C3x5 FRAME

L2”x1-1/2”x1/4”
3/8” RODS AND CORNERS
AT 1/4 SPAN

L2 1/2”x1 1/2”x1/4”
2-#4 CONT.

3/8” USS MULTI-GRIFF STEEL PLATE

FILLET WELD BOTH EDGES TO PLATE
BUTT WELD (1/8” SPACE)
AND GRIND JOINT FLUSH

C3x5 ALL AROUND

6”x8” CONC. CAP
#4 AT 16” O.C.

6”x8” HOLLOWTILE, FILL EVERY CELL W/ CONC.
**DETECTOR CHECK COVER**

**DETAILS**

**SCHEDULES**

<table>
<thead>
<tr>
<th>DETECTOR CHECK AND DC VALVE TABLE (IN INCHES)</th>
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<tr>
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</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
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<td>K</td>
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<tr>
<td>L (MIN.)</td>
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<td>ø</td>
</tr>
</tbody>
</table>

**FRAME AND COVER DETAILS**

1. ALL ANGLES, CHANNELS, AND COVER PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
DETECTOR CHECK METER DETAIL

DETAIL OF WORK TO BE DONE BY CONTRACTOR IN ORDER TO RAISE AND CENTER BY-PASS METER

NOTES:
1. ITEMS UNDERLINED TO BE FURNISHED BY CONTRACTOR
2. ALL ITEMS TO BE RED BRASS OR BRONZE.
3. ALL WORK TO BE DONE BY THE CONTRACTOR.
4. (*) THESE ITEMS ARE PART OF DETECTOR CHECK ASSEMBLY.
5. DASHED LINE INDICATES BY-PASS METER LOCATION AS FURNISHED BY MANUFACTURER.
6. BY-PASS PIPING ASSEMBLY SHALL BE CONFIGURED TO CENTER THE BY-PASS METER UNDER THE READING COVERS.
**FOR DIMENSIONS, SEE TABLE, M18**

NOTEs:
1. TAPPING SLEEVE AND TAPPING VALVE MAY BE USED WITH THE APPROVAL OF THE MANAGER.
2. FOR 3" DC METER INSTALLATIONS A 3" X 4" F.E. REDUCER SHALL BE INSTALLED AT BOTH ENDS OF DC METER.
NOTES:
1. READING COVERS SHALL BE LOCATED DIRECTLY OVER THE METER REGISTERS. LOCATIONS WILL VARY W/ THE TYPE OF METER TO BE INSTALLED.
2. SEE M15 FOR READING COVER DETAILS.
3. ALL ANGLES, CHANNELS, & COVER PLATES SHALL BE HOT DIPPED GALV. AFTER FABRICATION.
4. FOR 2-1/2" COPPER BYPASS LINES, INSTALL 2" BALL CORP. WITH APPROPRIATE 2"x2-1/2" FITTINGS.

DIMENSION TABLE

<table>
<thead>
<tr>
<th>METER SIZE (IN INCHES)</th>
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<tr>
<td>0</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>12</td>
</tr>
</tbody>
</table>
CHECKERED TO MATCH METER BOX COVER

3/8" Ø HOLES

1/2"

9/16"

1/8"

DETAILS OF RAISED SURFACE

CAST IRON READING-HOLE COVER
COMBINATION OF SINGLE COMPOUND AND SINGLE DETECTOR CHECK METERS

NOTE:
1. REFER TO M19, M30 AND M31 FOR DETECTOR CHECK METER INSTALLATION DETAILS.
2. REFER TO M27 – M29 FOR COMPOUND METER INSTALLATION DETAILS.
3. INSTALL ADDITIONAL FLANGED SPOOLS, AS REQUIRED.
METER BOX DETAIL
FOR COMPOUND, DC AND TURBINE METERS
SCALE: NTS

NOTES:
1. REFER TO THE FOLLOWING DETAILS FOR BOX DIMENSIONS:
   M27-M29 FOR COMPOUND METERS, M19, M30 & M31 FOR DC
   METERS, M32 & M33 FOR TURBINE METERS.
2. CONCRETE SHALL BE DWS 3500.
3. REINFORCING STEEL SHALL BE ASTM A615
   GRADE 60.
4. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0
   SURCHARGE; 60 PCF/FT AT REST PRESSURE;
   AND WATER TABLE BELOW BOTTOM SLAB, PER
   AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS
   (1998). NON-TRAFFIC TYPE.
5. FOR CMU WALL:
   INSTALL 8” CMU W/ #5 @ 16” E.W. CENTERED. SEE
   MH12 FOR ADDITIONAL DETAIL.

PLAN

DETAIL "A"

SEEN DETAIL "A"

METER BOX
COVER
FRAME

POCKET
FOR
FRAME

3/4”
CHAMFER

1 1/2”
CLR (TYP.)

GROUT (EPoxy
MORTAR)

(2) #4 TOP

#4 AT 12” AT
METER BOX
COVER, TYP

4-#4 TYP ALL
AROUND

30# ROOFING PAPER
BOND BREAKER

ADD 1-#4 BAR

PRECAST,
CAST-IN-PLACE
WALL

#5 AT 10” EW

4” DIA. DRAIN HOLES
(2 REQ’D)

#4 AT 12”
E.W.

3” CLR

1’-6”

8”

"A" OR "B"

TYPICAL SECTION

OAHU

STANDARD
DETAILS

M26

2002
REVISION
NOTE:
1. SEE TABLE ON M28 FOR DIMENSIONS BASED ON METER SIZE.
2. TAPPING SLEEVE/TAPPING VALVE ASSEMBLY MAY BE USED.
3. ALL PIPING SHALL BE DUCTILE IRON PIPE UNLESS OTHERWISE NOTED.
4. MIN. DISTANCE OF TAP FOR BY-PASS TO TEE SHALL BE 36" CENTER TO CENTER.
5. OUTLET GATE VALVE MUST REMAIN
6. BACKFLOW PREVENTION ASSEMBLY TYPE TO BE DETERMINE BY BWS, IF REQUIRED.
NOTES:
1. SEE M7, M8, M9 AND M10 FOR METER BOX FRAME AND COVER DETAILS. SEE M26 FOR METER BOX DETAIL.
2. THE PROJECT SHALL PAY THE APPLICABLE WATER SYSTEM FACILITIES CHARGE AND FOR THE METER WHICH WILL BE FURNISHED BY BWS AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
3. LOCATE BY-PASS BALL STOPS IN METER BOX WITH ENOUGH SPACE BETWEEN METER AND WALL FOR TEMPORARY BY-PASS STANDPIPE TO BE HOOKED UP.
4. ELIMINATE 4” DRAINHOLES FOR WATERPROOFED MANHOLES.
5. CONTRACTOR SHALL NOTIFY CUSTOMER SERVICE DIVISION IN WRITING AFTER THE PLAN IS APPROVED, NO LATER THAN 120 DAYS, PRIOR TO WITHDRAWING METER FROM THE BWS STOREYARD. SUCH NOTICE SHALL INDICATE NUMBER, SIZE, AND TYPE OF METER AND APPROXIMATE MONTH AND YEAR METER IS ANTICIPATED TO BE DRAWN OUT. IF THE APPROVED PLAN IS ALLOWED TO LAPSE, THE 120-DAY NOTICE WILL BE VOIDED.
6. ALL METERS SHALL BE INSTALLED IN THE CONCRETE OR DIRT SIDEWALK AREA WITH CONCRETE SLAB (SEE PLATE M43).

<table>
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<th>METER CODE</th>
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<td>2' - 3&quot;</td>
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<tr>
<td>12 H</td>
<td>3' - 6&quot;</td>
</tr>
<tr>
<td>15 F</td>
<td>4' - 6&quot;</td>
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FLOW RATE (GPM)

<table>
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<th>6&quot;</th>
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<tbody>
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<td>7' - 2&quot;</td>
<td>7' - 5&quot;</td>
<td>7' - 11&quot;</td>
</tr>
<tr>
<td>B</td>
<td>4' - 0&quot;</td>
<td>4' - 6&quot;</td>
<td>4' - 6&quot;</td>
</tr>
<tr>
<td>C</td>
<td>1' - 8 1/2&quot;</td>
<td>1' - 9 1/2&quot;</td>
<td>1' - 10 3/4&quot;</td>
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<tr>
<td>D</td>
<td>2' - 0&quot;</td>
<td>2' - 3&quot;</td>
<td>2' - 3&quot;</td>
</tr>
<tr>
<td>E</td>
<td>3' - 6&quot;</td>
<td>3' - 6&quot;</td>
<td>3' - 0&quot;</td>
</tr>
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<td>F</td>
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<td>3' - 1&quot;</td>
<td>3' - 6&quot;</td>
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<tr>
<td>J</td>
<td>1' - 6 1/4&quot;</td>
<td>1' - 8 1/2&quot;</td>
<td>1' - 11 1/2&quot;</td>
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<td>2' - 6 3/4&quot;</td>
<td>2' - 11 1/2&quot;</td>
<td>3' - 4 1/2&quot;</td>
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<td>L</td>
<td>24” X 42”</td>
<td>24” X 42”</td>
<td>36” X 52”</td>
</tr>
<tr>
<td>M</td>
<td>15 1/4”</td>
<td>15 1/4”</td>
<td>15”</td>
</tr>
<tr>
<td>N</td>
<td>1”</td>
<td>7/8”</td>
<td>1/2”</td>
</tr>
<tr>
<td>Ø</td>
<td>4”</td>
<td>4” OR 6”</td>
<td>6” OR 8”</td>
</tr>
</tbody>
</table>
SECTION "X-X"

SEE DETAIL "A" AT M26
L = C.I. FRAME & COVER
N
M

1" OPENING AROUND PIPE TO BE PACKED W/ 1" CLOSED CELL NEOPRENE STRIP.

FOR METERS IN DIRT AREAS INSTALL 4" THK. X 12" WIDE CONC. SLAB ALL AROUND.

CONC.
C.I. FL. 90° ELBOW
C.I. FL. 90° RED. ELBOW
DIA. DRAINHOLES
TEMPORARY BLIND SPlice, SEE DETAIL BELOW
CONC. FLOOR SLAB REINF. W/#4@12" EW

ELBOW, CU. TO N.P.T.I. BRASS PIPE, CUT TO FIT BALL STOP (SEE NOTE 3)
INSERT FLANGED FILLER PIECE WHEN REQUIRED

REDUCING COMPANION FLANGE

F

SEE M28 FOR NOTES AND TABLE

DETAIL OF TEMPORARY BLIND SPlice

DRILL 1/4" AIR HOLE
GALV. PIPE CUT AND THREAD BOTH ENDS
WELD ROUND PLATE AT END OF PIPE AND SEAL
MATERIALS FOR TESTING AS REQUIRED:
1 - BLIND FLANGE WITH CLEANOUT OR,
1 - BLIND SPLICE

8" CMU W/ #5 AT 16"
EW CENTERED SEE MH12
FOR ADDITIONAL DETAILS.
FOR BOTTOM AND TOP
SLAB REFER TO M26

PROPERTY LINE
FLANGE 1/4 BEND WITH
CONC. BLOCK

FE X B PIPE,
24" LONG
FLANGED COUPLING
ADAPTER

GATE VALVE & VALVE BOX
24" MIN.

SLEEVE
MIN. 24" NIPPLE
AS REQUIRED

PLAN VIEW

CENTER LINE OF
WATER MAIN
CONC. BLOCK WITH
STRUCTURAL STRUTS

MATERIALS FOR TESTING AS REQUIRED:
1 - SLEEVE
1 - CAP WITH CLEANOUT
8 L.F. CONNECTING PIPE

NOTES:
1. ALL METERS SHALL BE INSTALLED IN THE CONCRETE OR DIRT SIDEWALK AREA WITH CONCRETE SLAB (SEE PLATE M43).
2. CONTRACTOR SHALL NOTIFY CUSTOMER SERVICE DIVISION IN WRITING AFTER PLAN IS APPROVED, NO LATER THAN 120
   DAYS, PRIOR TO WITHDRAWING METER THE FROM THE BWS STOREYARD. SUCH NOTICE SHALL INDICATE NUMBER, SIZE,
   AND TYPE OF METER AND APPROXIMATE MONTH AND YEAR METER IS ANTICIPATED TO BE DRAWN OUT. IF THE
   APPROVED PLAN IS ALLOWED TO LAPSE, THE 120-DAY NOTICE WILL BE VOIDED.
3. THE PROJECT SHALL PAY THE APPLICABLE ONE-TIME SERVICE CHARGE AND FOR THE METER WHICH WILL BE FURNISHED
   BY BWS AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
4. TAPPING SLEEVE/ TAPPING VALVE ASSEMBLY MAY BE USED.
5. FOR DETAILS, SECTIONS AND TABLE SEE PLATES M19 AND M31.
6. CONCRETE SHALL BE DWS 3500.
7. REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.
8. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER
   TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON-TRAFFIC TYPE.
9. SEE DETAIL M26 FOR METER BOX DETAIL.
SECTION "Y-Y"

SECTION "X-X"

<table>
<thead>
<tr>
<th>METER</th>
<th>A SIZE</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E (MIN.)</th>
<th>F (MIN.)</th>
<th>G (MIN.)</th>
<th>H</th>
<th>CI F &amp; C</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;x5/8&quot;</td>
<td>5'-9 1/2&quot;</td>
<td>4'-1&quot;</td>
<td>1'-8 1/2&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-2 1/2&quot;</td>
<td>3'-4 1/2&quot;</td>
<td>1'-0&quot;</td>
<td>24&quot;</td>
<td>42&quot;</td>
<td>15 3/4&quot;</td>
</tr>
<tr>
<td>6&quot;x5/8&quot;</td>
<td>6'-6&quot;</td>
<td>4'-8 1/2&quot;</td>
<td>1'-9 1/2&quot;</td>
<td>2'-3&quot;</td>
<td>2'-3&quot;</td>
<td>2'-6 1/2&quot;</td>
<td>3'-9 1/2&quot;</td>
<td>1'-0&quot;</td>
<td>36&quot;</td>
<td>52&quot;</td>
<td>15 3/4&quot;</td>
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<td>8&quot;x5/8&quot;</td>
<td>7'-1 1/4&quot;</td>
<td>5'-1 1/2&quot;</td>
<td>1'-10 3/4&quot;</td>
<td>2'-8&quot;</td>
<td>2'-9&quot;</td>
<td>3'-1 1/2&quot;</td>
<td>4'-6&quot;</td>
<td>1'-6&quot;</td>
<td>36&quot;</td>
<td>52&quot;</td>
<td>23&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. MAX. DEPTH FOR "E", "F", & "G" SHALL BE 1'-0" MORE THAN SHOWN IN TABLE.
NOTES:
1. SEE M7, M8, M9 AND M10 FOR METER BOX FRAME AND COVER DETAILS. SEE DETAIL M26 FOR METER BOX DETAIL.
2. THE PROJECT SHALL PAY THE APPLICABLE WATER SYSTEM FACILITIES CHARGE AND FOR THE METER WHICH WILL BE FURNISHED BY BWS AND INSTALLED BY THE CONTRACTOR WHEN THE LATERAL IS INSTALLED.
3. LOCATE BY-PASS BALL STOP IN METER BOX WITH ENOUGH SPACE BETWEEN METER AND WALL FOR TEMPORARY BY-PASS STANDPIPE TO BE HOOKED UP.
4. ELIMINATE 4” DRAINHOLES FOR WATERPROOFED MANHOLES.
5. CENTER DIAL UNDER READING COVER.
6. CONTRACTOR SHALL NOTIFY CUSTOMER SERVICE DIVISION IN WRITING AFTER THE PLAN IS APPROVED, NO LATER THAN 120 DAYS, PRIOR TO WITHDRAWING METER FROM THE BWS STOREYARD. SUCH NOTICE SHALL INDICATE NUMBER, SIZE, AND TYPE OF METER AND APPROXIMATE MONTH AND YEAR METER IS ANTICIPATED TO BE DRAWN OUT. IF THE APPROVED PLAN IS ALLOWED TO LAPSE, THE 120-DAY NOTICE WILL BE VOIDED.
7. ALL METERS SHALL BE INSTALLED IN THE CONCRETE OR DIRT SIDEWALK AREA WITH CONCRETE SLAB. (SEE PLATE M43)
8. CONCRETE SHALL BE DWS 3500.
9. REINFORCING STEEL SHALL BE ASTM A615 GRADE 60.
10. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON-TRAFFIC TYPE.
11. SPECIAL INSPECTION SHALL BE PROVIDED DURING CONSTRUCTION FOR CMU WALL.
12. STRUCTURAL STEEL SHAPES SHALL BE ASTM A-36. HOT DIP GALVANIZED AFTER FABRICATION.

<table>
<thead>
<tr>
<th>TURBINE METERS</th>
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<tbody>
<tr>
<td>3”</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
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<td>D</td>
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<tr>
<td>E</td>
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<tr>
<td>K</td>
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<tr>
<td>L</td>
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<tr>
<td>Ø</td>
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</tbody>
</table>
NOTES FOR CMU WALL MANHOLE

1. BWS 3500 CONCRETE, 1500 PSI CMU AND GRADE 60 REINFORCING STEEL
2. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB; PER AASHTO LRFD BRIDGE DESIGN SPECIFICATION (1998) NON–TRAFFIC TYPE.
3. ALL CELLS SHALL BE GROUTED SOLID WITH 2500 PSI GROUT. TYPE M MORTAR
4. SPECIAL INSPECTION SHALL BE PROVIDED DURING CONSTRUCTION FOR CMU WALL.

SECTION "A1–A1"

NOTE:
COMBINED DOMESTIC AND FIRE FLOW REQUIREMENT = NOT TO EXCEED 3,500 GPM

CMU WALLS
NOTE:
1. Combine main bypass tap with 8-inch lateral if tapping transmission main or if long lateral runs across a wide street, a larger size lateral maybe required.
2. Backflow prevention assembly type to be determined by BWS, if required.
3. Outlet gate valve must remain.

#4 at 12" OC both ways put vert. bars at middle of walls.

Direction of normal flow:

Concrete collar required in dirt areas.

Existing water main.

8" tapping sleeve with tapping gate valve & box.

NOTE:
May omit one valve on by-pass line when connecting to new main.

Plan view of galv. steel frame and removable support.

Precast/Cast in place walls.

For sections see M38, M39 and M40.
NOTES FOR PRECAST/CAST-IN-PLACE WALL MANHOLE

1. BWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL

2. DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATION (1998): NON-TRAFFIC TYPE.

NOTE:
REFER TO M39 TO M42 FOR DETAILS.

COMBINED DOMESTIC AND FIRE FLOW REQUIREMENT = NOT TO EXCEED 3,500 GPM
NOTES:
1. CONTRACTOR TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
2. LOCATION OF READING LID SHALL BE VERIFIED BY CONTRACTOR.

PLAN – FM METER COVER
NOT TO SCALE

DETAIL "D"
REMOVABLE SUPPORT
NOT TO SCALE

SECTION “F–F”
NOT TO SCALE
SECTION OF DETAIL A

3/8" CHECKERED PLATE READING LID

1/4" SMOOTH PLATE RING CUT DIA, 6 7/8" I.D., 8 7/8" O.D.

1/2"x1/2"x3/4" LONG STEEL STOPS TYPICAL TWO PLACES

1/8"x3/4" F.B. LUGS WELDED TO COVERS

5/8" DIA. (2 HOLES)

ROTATE FOR REMOVAL

PROVIDE (2) SLOTS 1"x9/16" 180° IN SEATING RING

DETAIL A PLAN

3/4"

1 1/2"

1/2"

1/8"

3/8" CHECKERED PLATE

1"x3/8" TRIM BAR (MITER AT CORNERS)

2 1/2"x2 1/2"x3/8" FRAME ANGLE

(18) DRILL AND COUNTERSINK CHECKERED PLATE, DRILL AND TAP ANGLE FOR 3/8" S.S. FLAT HEAD MACHINE SCREWS.

DETAIL E

3/8" DIA x4" LONG NAIL STUD (12 REQ'D. AT 24" O.C.) / (14 REQUIRED AS INDICATED)

3/8" CHECKERED PLATE

1"x3/8" TRIM BAR

1/4"<TYP.

2 1/2"x2 1/2"x3/8" FRAME ANGLE

(18) DRILL AND COUNTERSINK CHECKERED PLATE, DRILL AND TAP ANGLE FOR 3/8" S.S. FLAT HEAD MACHINE SCREWS.

SECTION "C-C"

3/8"x2" FLAT BAR

CLIP-SEE PLATE M41

(8) 1/2" EXPANSION ANCHORS WITH GALVANIZED HEX-HEAD BOLTS. (WELD BOLTS TO ANGLE AFTER INSTALLATION)

3/8"x1 3/4" FLAT BAR FILLER, 4 3/4" LONG
WATER METER BOX DETAIL FOR NON-SIDEWALK AREAS

1. AVOID PLACEMENT OF METERS IN SWALE AREAS OR LOW POINTS.

2. METER/CONC. SLAB DETAIL MAY BE ROTATED 90° TO FIT IN TIGHT AREAS. INSTALL FL X BELL PIECE WITH CONCRETE BEAM, AS REQUIRED.

3. RETAINING WALL REQUIRED IF EXISTING OR FINISH GROUND HAS SLOPE GREATER THAN 1/4" PER FOOT.

4. PROVIDE 4" THICK BY 12" WIDE (MIN.) WITH 1-3/4" REBAR, CONCRETE SLAB AROUND METER BOX FOR 3" AND LARGER METERS.

5. PROVIDE GUARD POSTS WHEREVER POSSIBLE 2 FEET MINIMUM CLEAR FROM METER BOX.
2" CLR (TYP.) BETWEEN MANHOLE COVER AND REBARS

#4 ○ T. & B. TYP.
2nd MH FOR VALVES 16" AND LARGER

A

(4) #4 x 3'0" DIAG. T. & B.

#6 BARS AT 10" O.C.

(4) #4 x 3'0" DIAG. T. & B.

EYE BOLT

NOTE:
LOCATION OF EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE

6" CAST IRON FRAME & COVER (CENTERED ABOVE THE CENTERLINE OF THE OPERATING NUT ±1-INCH)

PLAN OF TOP SLAB (BOTTOM REINFORCEMENT)

1½" CLR.

#4 AT 12" O.C.

30# ROOFING PAPER BOND BREAKER

1¾" CLR.

#6 AT 10" O.C.

#6 AT 6" O.C.

2" TYP.

10"

REFER TO MH2 FOR WALL DETAILS

SECTION A-A

CAST-IN-PLACE TOP SLAB

SEE PLATE MH3 FOR NOTES & TABLE

KAUAI
OAHU

TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE

SCALE: NTS

2002
REVISION

MH1

STANDARD DETAILS
SEE MH15 FOR DETAIL

11"

FLOW

PROVIDE PIPE COLLAR FOR FL VALVE

4" MIN CLR TYP.

18"

#5 AT 11" O.C. E.F.

16"

DISMANTLING JOINT

LAP 2'-6" TYP.

15" DIA SUMP

6" (MIN.) FOR FL. VALVE

PLAN - SECTION

L

6" C.L. FRAME AND COVER

12"

LIFT PORT AT ALL CORNERS

MORTAR

TOP SLAB SEE PLATE MH1

SECTION A-A

30# ROOFING PAPER BOND BREAKER

2" CLR.

TYP.

#5 AT 11"

O.C. E.F.

2-#5 AT 11", LAP 2'-6" TYP.

2-#4 BOT

ROCK FOR MANHOLES ABOVE WATERTABLE (SEE PLATE MH15 FOR WATERPROOFED SUMP)

2" CLR. FOR REBARS IN WALLS

FOR M.H.'s FLOOR LOCATED BELOW WATERTABLE, PROVIDE APPROVED WATERPROOFING OR MEMBRANE

1-1/2" & 2"

CRUSHED ROCK

WATER TABLE

ADD (2) #6 AT TOP

#6 AT 7" O.C. E.F.

6 x 6" x 1/4"

WASHER & NUT

TOP RUNG-INSTALL 3"

CLR. OF TOP SLAB

(SEE PLATE MH14)

18"

REAR

STD. 1-1/8" DIA EYE BOLT 6" LONG

CONC. PEDESTAL WITH #4 AT 6" O.C. E.W. AND E.F. ADDED

18" SQ.

APPROVED SEALANT AT JOINT, TYP.

#5 BEND 1'-6" TYP. WITH 3" CLR.

#6 AT 11" O.C.

#4 AT 12" O.C. E.W.

SEE PLATE MH3 FOR NOTES AND TABLE

SECTION B-B

CAST-IN-PLACE WALL

KAUAI

OAHU

TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE

SCALE: NTS

STANDARD DETAILS

MH2

2002

REVISION
NOTES FOR CAST-IN-PLACE AND PRECAST WALL MH FOR BGGV’s:

1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.

2. REFER TO PLATES MH12, MH13, MH14, MH15, MH16, MH17 AND V3 FOR ADDITIONAL DETAILS.

3. REFER TO SECTION 302.16 AND TABLE 300–5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.

4. DESIGN IS BASED ON: HS–20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). ENGINEER TO MODIFY DESIGN IF WATER TABLE IS MORE THAN 4 FEET ABOVE BOTTOM SLAB.

5. STRUCTURAL BASE COURSE FOR MANHOLE BOTTOM SLAB NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.

6. PAINT ALL METALS:
   A. MANHOLE FRAME AND COVER SHALL BE PAINTED WITH ASPHALTUM.
   B. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.

7. PROVIDE HOISTING SYSTEM FOR TRANSPORTATION AND INSTALLATION OF PRECAST WALL AND SLAB MEMBERS.

8. SPECIAL DESIGN FOR ROAD GRADES >5% IS REQUIRED.

9. FOR OAHU, INSTALL FLXFL DISMANTLING JOINT ON ONE SIDE OF FLANGED END VALVES.

10. FOR FLANGED END VALVES, INSTALL FE x B ADAPTERS (LENGTH TO SUIT), DISMANTLING JOINT AND CAPPING COLLARS.

11. FOR OAHU ONLY, PLASTIC RUNGS MAY BE USED. SEE MH16.

<table>
<thead>
<tr>
<th>VALVE SIZE (IN.)</th>
<th>L</th>
<th>HT. (MIN.)</th>
<th>HT. (MAX.)</th>
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<td>12</td>
<td>6’-8”</td>
<td>6’-0”</td>
<td>12’-0”</td>
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<td>16</td>
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</tr>
<tr>
<td>30</td>
<td>11’-4”*</td>
<td>6’-6”</td>
<td>12’-0”</td>
</tr>
<tr>
<td>36</td>
<td>12’-8”*</td>
<td>7’-0”</td>
<td>12’-0”</td>
</tr>
<tr>
<td>42</td>
<td>14’-8”*</td>
<td>7’-6”</td>
<td>12’-0”</td>
</tr>
</tbody>
</table>

* SEE MH25 FOR OVERSIZED TOP SLAB DETAIL

KAUA\OI\AHU  TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, CAST-IN-PLACE AND PRECAST WALL NOTES

SCALE: NTS  STANDARD DETAILS

MH3
2" CLR (TYP.) BETWEEN MANHOLE COVER AND REBARS

NOTE:
LOCATION OF EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE

6" CAST IRON FRAME & COVER
(CENTERED ABOVE THE CENTERLINE OF THE OPERATING NUT ±1-INCH)

PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

SECTION A-A

PRECAST TOP SLAB

SEE PLATE MH3 FOR NOTES & TABLE

KAUAI
OAHU

TYPE "A" MANHOLE (TRAFFIC) FOR BEVEL GEARED GATE VALVES, PRECAST

SCALE: NTS

STANDARD DETAILS MH4

2002
REVISION
PLAN-SECTION

SECTION A-A
CAST-IN-PLACE WALL

SEE PLATE MH7 FOR NOTES AND TABLE

2002
REVISION

KAUAI
OAHU
MAUI

TYPE "A" MANHOLE (TRAFFIC)
FOR BUTTERFLY VALVES, CAST-IN-PLACE
SCALE: NTS

STANDARD
DETAILS

MH6
CAST-IN-PLACE TOP SLAB

PLAN OF TOP SLAB
(BOTTOM REINFORCEMENT)

24" MANHOLE FRAME
AND COVER

#4 T. & B.
2-#6 BARS
#6 BARS AT 6" O.C.
#6 BARS AT 10" O.C.
(4)#4 x 3'-0"
DIAG. T. & B.
6" C.I. FRAME & COVER (CENTERED
ABOVE THE CENTERLINE
OF THE OPERATING
NUT ± 1 INCH)

2nd MH FOR VALVES
18" AND LARGER

2" CLR TYP DISTANCE
FOR REBAR AND EDGE
OF MH OPENING

NOTE:
LOCATION OF EYE BOLT TO BE
VERIFIED WITH SIZE OF VALVE

NOTES: FOR CAST-IN-PLACE WALL MH
1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2 REFER TO SECTION 302.16 AND TABLE 300-5 OF THE
WATER SYSTEM STANDARD FOR THE REQUIRED BALL
CORP. SIZES FOR VALVES.
3 REFER TO PLATES MH13, MH14, MH15, MH17,
AND V3 FOR ADDITIONAL DETAILS.
4 FOR OAHU AND KAUA'I, PLASTIC RUNGS MAY BE USED.
REFER TO PLATE MH16.
5 FOR MAUI ONLY, IN NON-TRAFFIC LOADING AREAS. SEE PLATE
M23 FOR COVER DETAILS AND MANHOLE MODIFICATIONS.
6 DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE;
AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO
7 STRUCTURAL BASE COURSE FOR MANHOLE BOTTOM SLAB NOT SHOWN
AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.
8 PAINT ALL METALS:
A. SEE PAINTING SECTION IN STANDARDS FOR
PAINT TYPE, SURFACE PREPARATION, ETC.
B. MANHOLE FRAME AND COVER,
SHALL BE PAINTED WITH ASPHALTUM.
9 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED
10 FOR FLANGED END VALVES, INSTALL FE X B ADAPTERS (LENGTH
TO SUIT), FE X FE DISMANTLING JOINT ON ONE SIDE OF VALVE,
AND CAPPING COLLARS.

KUAI
OAHU
MAUI

TYPE "A" MANHOLE (TRAFFIC)
FOR BUTTERFLY VALVES, CAST-IN-PLACE
SCALE: NTS

SIZE VALVE  L     HT (MIN)    HT (MAX)
12" & 16"    5'-4"    6'-0"    12'-4"
18" & 20"    6'-0"    6'-0"    12'-0"
24"          6'-8"    6'-0"    12'-0"
30"          7'-4"    6'-0"    12'-0"
36"          8'-0"    6'-0"    12'-0"
42"          8'-8"    6'-0"    12'-0"

MH7
PLAN—SECTION

SECTION A-A

PRECAST WALL

SEE PLATE MH9 FOR
NOTES AND TABLE

SEE PLATE MH12 FOR WATERPROOFED SUMP

** 14" FOR WATERPROOF CONDITION

KAUAI
OAHU
MAUI

TYPE "A" MANHOLE (TRAFFIC)
FOR BUTTERFLY VALVES, PRECAST

SCALE: NTS

STANDARD DETAILS

MH8

REVISION

2002
NOTES: FOR PRECAST CONCRETE WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2 REFER TO SECTION 302.16 AND TABLE 300–5 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.
3 REFER TO PLATES MH12, MH13, MH14, MH15, MH17 AND V3 FOR ADDITIONAL DETAILS.
4 FOR OAHU AND KAUAI, PLASTIC RUNGS MAY BE USED. REFER TO PLATE MH16.
5 FOR MAUI ONLY, IN NON–TRAFFIC LOADING AREAS, SEE PLATE M23 FOR COVER DETAILS AND MANHOLE MODIFICATIONS.
6 DESIGN IS BASED ON: HS–20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).
7 STRUCTURAL BASE COURSE FOR MANHOLE NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.
8 PAINT ALL METALS:
  A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
  B. MANHOLE FRAME AND COVER, SHALL BE PAINTED WITH ASPHALTUM.
9 PROVIDE HOSTING SYSTEM FOR TRANSPORTATION AND INSTALLATION OF PRECAST WALL MEMBERS.
10 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED
11 FOR FLANGED END VALVES, INSTALL FE x B ADAPTERS (LENGTH TO SUIT), FE x FE DISMANTLING JOINT ON ONE SIDE OF VALVE, AND CAPPING COLLARS.
NOTES: FOR CMU WALL MH

1 DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2 REFER TO SECTION 302.16 AND TABLE 300-5 OF THE WATER SYSTEM
   STANDARD FOR THE REQUIRED BALL CORP. SIZES FOR VALVES.
3 REFER TO PLATES MH12, MH13, MH14, MH15, MH17 AND V3 FOR ADDITIONAL DETAILS.
4 IN NON-TRAFFIC AREAS, METAL MH COVERS MAY BE USED. SEE PLATE M23.
5 DESIGN IS BASED ON: 250 PSF LIVE LOAD; 0 SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND WATER TABLE
   BELOW BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998). NON-TRAFFIC TYPE.
6 ALL CELLS SHALL BE GROUTED SOLID WITH 2500 PSI GROUT. TYPE M MORTAR.
7 STRUCTURAL BASE COURSE FOR MANHOLE BOTTOM SLAB NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY
   DESIGN ENGINEER.
8 PAINT ALL METALS:
   A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
   B. MANHOLE FRAME AND COVER SHALL BE PAINTED WITH ASPHALTUM.
9 SPECIAL DESIGN FOR ROAD GRADES > 5% IS REQUIRED
10 CMU WALL NOT ALLOWED BELOW WATERTABLE (WT)
11 FOR FLANGED END VALVES INSTALL FE X B ADAPTERS (LENGTH
   TO SUIT), FE X FE DISMANTLING JOINT ON ONE SIDE OF VALVE, AND CAPPING COLLARS.

<table>
<thead>
<tr>
<th>SIZE VALVE</th>
<th>L</th>
<th>HT</th>
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<tbody>
<tr>
<td>12&quot; &amp; 16&quot;</td>
<td>5'-4&quot;</td>
<td>6'-0&quot;</td>
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<td>18&quot; &amp; 20&quot;</td>
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<td>&gt;24&quot;</td>
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</table>
LONGITUDINAL SECTION THRU LINTEL

NOTE:
CONCRETE SHALL BE DWS 3500

SECTION THRU LINTEL (A–A)

CLOSED PRECAST SUMP
FOR HIGH WATER TABLE CONDITION

KAUAI
MAUI
OAHU

MANHOLE DETAIL OF LINTEL AND FILLER
TYPICAL DETAIL
SCALE: NTS

2002
REVISION

STANDARD DETAILS
MH12
PIPECOLLARDETAILS

ELEVATION

WALLPIPEOPENING
ADDEDREBARSDETAIL

NOTE: INSTALL ON BOTH ENDS OF MH IF FLOW CAN GO BOTH WAYS.
2" DIAMETER PIPE CHASE
THREADED TO RECEIVE 2" CAP. FLOOD COAT CAP & PIPE (EXPOSED SURFACE) WITH GILSMOSTIC OR APPROVED EQUAL.

TOP SLAB

LIFT PORT DETAIL

STANDARD 24" MANHOLE & 6" FRAME & COVER.
SET COVER FLUSH WITH GROUND, SHIM WITH GROUT OR BRICK AS REQUIRED. MANAGER'S APPROVAL IS REQUIRED IF TOP OF MH FRAME & COVER IS SET GREATER THAN 22" FROM THE TOP MH RUNG.

FINISH GRADE

PAVING OR WIDE CONC. COLLAR
(COLLAR REQUIRED FOR MAUI)

GROUT AS REQUIRED

2" CLEAR

(2) #4 BEND SLAB REINFORCEMENT
1st RUNG LOCATED 3" BELOW TOP SLAB

24" MANHOLE & 6" VALVEBOX SETTING DETAIL

MONOLITHIC POUR

8" 15" 8"
DIA.
3-#4 E.W.

INSTALL SEALED SUMP IN LIEU OF OPEN HOLE WITH CRUSHED ROCK WHEN BOTTOM SLAB IS LOCATED BELOW ESTIMATED WATER TABLE

CAST-IN-PLACE SUMP DETAIL

PRECAST WALL

APPROVED SEALANT AT JOINT

LEVELING MORTAR

PRECAST/C.I.P. WALL

TYP. CONN DETAIL

DOUBLE LAYER
TYP HORIZ REINFORCEMENT

SINGLE LAYER
TYP HORIZ REINFORCEMENT

CONSTRUCTION JOINT AT BOTH SLAB AND WALL

* NOTE:
UNLESS OTHERWISE NOTED ON PLANS

KAUAI
OAHU
MAUI

MANHOLE
MISCELLANEOUS DETAILS
SCALE: NTS

STANDARD DETAILS

MH15
ELEVATION

PLAN

NOTES:
1. ALL FABRICATION DIMENSIONS INDICATED ARE MINIMUM.
2. SEE PLATE MH14 FOR MANHOLE LOCATION OVER RUNG CENTERLINE.
3. STEP TO BE INSTALLED DURING CONSTRUCTION OF THE WALL. NO INSTALLATION INTO EXISTING WALL.

SECTION A-A

SIDE ELEVATION

POLYPROPYLENE PLASTIC RUNG

SCALE: NTS

KAUAI OAHU

STD. DETAILS

MH16

2002

REVISION
NOTE:

ALL CASTINGS SHALL BE MADE ACCURATELY TO THE DIMENSIONS SHOWN. SEAT AND COVER SHALL BE MACHINED, NOT GROUND TO SECURE FLAT AND TRUE SURFACES. THE COVER SHALL NOT RATTLE IN ANY POSITION.

SEE TABLE 200–10 FOR MIN WEIGHTS.
NOTES FOR PRECAST MH

1. CONCRETE SHALL BE DWS 3500; REINFORCING STEEL SHALL BE GRADE 60

2. REFER TO MH14 FOR DETAILS OF RUNG

3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE AND TABLE 200-9 OF THE WATER SYSTEM STANDARD FOR THE REQ'D BALL CORP SIZES

4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES

5. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998)

6. INSTALL BALL CORP W/ APPROVED SERVICE SADDLE ON PVC PIPES (FOR OAHU ONLY)

TYPE "B" MANHOLE

24" MANHOLE FRAME & COVER SEE MH19

TRANSITION REINF. SAME AS CONE

PRECAST RISER REINF 3x6-4/7 GA. WWF As= 0.16 IN²/FT E.F.

VERT. REINFORCING #5 AT 7" FOR FILLER SEE MH19

#4 HOOPS E.F. (LAP 1-6" OR WELD)

VALVE BALL CORP

#4 HOOP

6" DRAIN HOLES

SECTION "A-A"

CONC. REINF. #1 GA (.2830) A-615 WIRE SPIRALLY WOUND AT 8", ON #3 AT 12" O.C. VERT. REINF.

PRECAST TRANSITION

CONC. REINF. (SAME AS ABOVE)

JOINT DETAIL SEE MH21

#5 AT 11" O.C. EACH WAY (TOP)

#4 AT 12" O.C. EACH WAY (BOT)

PRECAST BASE

24" DIAM. DRAIN HOLE

4-#4 AT 12" O.C. EACH WAY (BOT)

BASE PLAN

#5 @ 11" O.C. EACH WAY (TOP)

#4 HOOP BAR (BOT)

SEALANT AT JOINT, TYP.

CRUSHED ROCK 12" SQ, 12" DEEP AT EA DRAIN HOLE
PRE-CAST TYPE C MANHOLE

SECTION A-A

NOTES FOR PRE-CAST MANHOLE

1. CONCRETE SHALL BE DWS 3500.
2. REFER TO MH14 FOR DETAILS OF RUNG.
3. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES AND TABLE 200-9 OF THE WATER STANDARD FOR THE REQUIRED BALL CORP SIZES.
4. OMIT DRAIN HOLES AND CRUSHED ROCK FOR WATERPROOFED MANHOLES.
5. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHHO LRFD BRIDGE DESIGN SPECIFICATIONS (1998)
6. INSTALL BALL CORP W/ APPROVED SERVICE SADDLE ON PVC PIPES (FOR OAHU ONLY)

2" THK. (MIN.) NEOPRENE AROUND UPPER HALF OF BARREL (RUBATEX R-431-N OR APPROVED EQUAL)

PRE-CAST MANHOLE BASE PLAN

FILLER DETAIL

WATER MAIN

MORTAR SPACE

T&G JOINT DETAIL

24" M.H. FRAME & COVER, SEE DETAILS ON MH19

PAVING OR 12" WIDE CONC. COLLAR A-615 WIRE SPIRALLY WOUND AT 8" ON #3 AT 12'' O.C. VERT.

CAST SLOT IN M.H. FOR WATER MAIN

RISER REINF. 4"x8"xNO. 4/NO. 8 GA. WELDED WIRE FABRIC AS=0.12 IN^2 /FT./V.FT.

CRUSHED ROCK 12" SQ., 12" DEEP AT EA. DRAIN HOLE

2" MAX

PRE-CAST BASE

12" MAX

PRE-CAST MANHOLE

BASE PLAN

2" THK. (MIN.) NEOPRENE AROUND UPPER HALF OF BARREL (RUBATEX R-431-N OR APPROVED EQUAL)

MORTAR SLOT IN FIELD (TYP.)

SEALANT AT JOINT TYP.

BALL CORP.

4'-0" I.D.

6"  

MATERIAL 4 AT 12" B.W.

6" DIA DRAIN HOLES (OMIT FOR WATERPROOFED MANHOLES)

K AU AI

OAHU

MAUI

TYPE "C" MANHOLE
GENERAL ARRANGEMENT, PRECAST WALL
SCALE NTS

STANDARD DETAILS

MH19

2002
REVISION
NOTES FOR CAST-IN-PLACE AND PRECAST WALL MH:
1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO MH12, MH14, MH15, MH17 AND MH18 FOR ADDITIONAL DETAILS.
3. REFER TO SECTION 205.08 BALL CORPS FOR VALVES AND TABLE 200-9 OF THE WATER SYSTEM STANDARDS FOR THE REQUIRED BALL CORP. SIZES.
4. PLASTIC RUNGS MAY BE USED. REFER TO MH18 (EXCEPT MAUI).
5. FOR PRECAST WALL MANHOLE, BOTTOM HALF OF MANHOLE MAY BE PRECASTED IF BOTTOM SLAB ELEVATION IS +2’ ABOVE ESTIMATED WATER TABLE.
6. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 4 FEET OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).
7. PAINT ALL METALS:
   A. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
   B. MANHOLE FRAME AND COVER, VALVE SHALL BE PAINTED WITH ASPHALTUM.
8. PROVIDE HOISTING SYSTEM FOR TRANSPORTATION AND INSTALLATION OF PRECAST WALL.
9. FOR MAUI, IN NON-TRAFFIC AREAS, METAL MH COVERS MAY BE USED. REFER TO M23.
24" MH FRAME AND COVER—REFER TO MH15 FOR SETTING DETAIL

NOTE:
FOR PRECAST BOX, EXTEND VERTICAL BARS INTO BOTTOM SLAB AND BEND.

SECTION

NOTE: SEE PLATE MH20 FOR TOP SLAB DETAIL & NOTES
* LATERAL CENTERED FOR SINGLE ARV

PLAN—SECTION

TYPE "D" MANHOLE FOR 2" AIR RELIEF VALVES
CAST-IN-PLACE AND PRECAST WALLS
SCALE: NTS

KAUAI
OAHU
MAUI

STANDARD DETAILS
MH21

2002
REVISION
NOTE:
LOCATION OF THE EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE.

CAULK WITH POLYSULFIDE CAULKING

SECTION "B-B"

NOTES: FOR CAST-IN-PLACE WALL MH
1. DWS 3500 CONCRETE AND GRADE 60 REINFORCING STEEL.
2. REFER TO SECTION 205.08 BALL CORPS. FOR VALVES ABD TABLE 200-9 OF THE WATER SYSTEM STANDARD FOR THE REQUIRED BALL CORP. SIZES.
3. REFER TO MH12, MH13, MH14, MH15 AND MH17 FOR ADDITIONAL DETAILS.
4. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF AT REST PRESSURE; AND 4 FEET MAX OF WATER ABOVE BOTTOM SLAB, PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998).
5. STRUCTURAL BASE FOR MANHOLE NOT SHOWN AND SHALL BE PROVIDED AS REQUIRED BY DESIGN ENGINEER.
6. PAINT ALL METALS:
   A. MANHOLE FRAME AND COVER, VALVE SHALL BE PAINTED WITH ASPHALTUM.
   B. SEE PAINTING SECTION IN STANDARDS FOR PAINT TYPE, SURFACE PREPARATION, ETC.
7. SEE PLATES MH23 AND MH24 FOR SECTIONS.
NOTE: SEE TABLE BELOW FOR DIMENSIONS

TAPPING TEE MANHOLE DIMENSION

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>MATERIAL</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; - 12&quot;</td>
<td>CI AND DI</td>
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<td>0&quot;</td>
<td>5'</td>
<td>0&quot;</td>
<td>1'</td>
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<tr>
<td>16&quot; - 20&quot;</td>
<td>CI AND DI</td>
<td>3'</td>
<td>0&quot;</td>
<td>5'</td>
<td>6&quot;</td>
<td>1'</td>
</tr>
<tr>
<td>24&quot; - 42&quot;</td>
<td>CI AND DI</td>
<td>3'</td>
<td>6&quot;</td>
<td>6'</td>
<td>0&quot;</td>
<td>1'</td>
</tr>
</tbody>
</table>

NOTES:
1. DIMENSIONS SHALL BE VERIFIED IN FIELD
2. SEE PLATE MH24 FOR SECTION
3. TAPPING VALVE SHALL BE OPENED ONLY AFTER THRUST BLOCK IS POURED AND CURED IN PLACE. FOR THRUST BLOCK WITH STRUCTURAL STEEL STRUTS, IF NEEDED FOR LARGER Sized PIPES, THE MANHOLE WALL SHALL BE BUILT AROUND THE BLOCK OR STRUCTURAL STRUTS.
SECTION A–A

SEE PLATE MH22 FOR TOP SLAB REINF.
SEE PLATE MH23 FOR TOP WALL REINF.
PLAN OF OVERSIZED TOP SLAB
(BOTTOM REINFORCEMENT)

NOTE:
1. LOCATION OF THE EYE BOLT TO BE VERIFIED WITH SIZE OF VALVE. REFER TO MH1, MH2, MH3, MH4 AND MH5 FOR DETAILS.
2. PROVIDE LIFT PORTS FOR SLAB AT FOUR CORNERS MINIMUM 2" AWAY FROM THE WALL.
3. PROVIDE TWO SECTIONS OF SLAB WHEN TOTAL WEIGHT OF THE SINGLE PIECE OF SLAB EXCEEDS 10 KIPS.
4. SEE PLATE MH1 FOR DETAILS NOT SHOWN.
2. **PIECE ELBOW**
6' TO 22-1/2' INCLUSIVE

3. **PIECE ELBOW**
OVER 22-1/2' TO 45' INCLUSIVE

4. **PIECE ELBOW**
OVER 45' TO 67-1/2' INCLUSIVE

5. **PIECE ELBOW**
OVER 67-1/2' TO 90' INCLUSIVE

**TEE**

**CROSS**

**REDUCER**
SEE PLATE P2 FOR DIMENSIONS

**LATERAL**
30' MINIMUM - 75' MAXIMUM
### STANDARD FITTING DIMENSIONS

**FOR PLATE P1**

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>TEE CROSS (30° TO 75°)</th>
<th>LATERAL</th>
<th>ELBOWS (CENTER TO END)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RUN OUTLET</td>
<td>RUN OUTLET</td>
<td>2 PIECE (UP TO 22 1/2°)</td>
</tr>
<tr>
<td></td>
<td>J + J</td>
<td>J + J</td>
<td>M</td>
</tr>
<tr>
<td>16&quot;</td>
<td>34&quot;</td>
<td>17&quot;</td>
<td>34&quot;</td>
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<tr>
<td>42&quot;</td>
<td>72&quot;</td>
<td>36&quot;</td>
<td>72&quot;</td>
</tr>
</tbody>
</table>

### DIMENSIONS FOR ECCENTRIC REDUCER REDUCING LENGTH

| 36" X 30" ECCENTRIC REDUCER | LENGTH 66" |
| 30" X 24" ECCENTRIC REDUCER | LENGTH 66" |
| 24" X 20" ECCENTRIC REDUCER | LENGTH 26" |
| 20" X 16" ECCENTRIC REDUCER | LENGTH 26" |
| 42" X 36" ECCENTRIC REDUCER | LENGTH 66" |
| 42" X 30" ECCENTRIC REDUCER | LENGTH 66" |

### NOTE:

All dimensions shown are laying lengths.

All fittings and specials shall be fabricated independent from pipe sections and in accordance with the dimensions shown.

All fittings and specials shall be all bell unless otherwise noted.

All tees, wyes, crosses and reducers 16-inch in diameter and larger shall be reinforced with steel ribs or steel crotch plates welded continuously to the cylinder or by other methods to withstand the longitudinal crushing effect caused by the test pressure as called for in the plans.

---

**KAUA'I  OAHU  MAUI**

**CONCRETE CYLINDER PIPE**

**NOTES AND TABLES**

**SCALE: NTS**

**STANDARD DETAILS**

**P2**
PLATE THICKNESS SHALL BE AS SHOWN IN SPECIFICATIONS FOR CONCRETE CYLINDER PIPE.

NOTE: FOR PIPE SIZES 24 AND LARGER 2 HANDHOLES REQUIRED

NOTE: FLANGE CLASS SHALL BE AS SPECIFIED IN THE PLANS.
MECHANICAL JOINT

NOTE:
ADAPTER SHALL BE SUBMITTED FOR APPROVAL PRIOR TO INSTALLATION.

DUCTILE IRON PIPE ADAPTER

BELL TO FIT D.I. PIPE

JOINT MAY BE:
PUSH-ON JOINT
MECH. JOINT

C.I. PIPE

MECHANICAL JOINT
(SEE DETAIL ABOVE)

NOTE:
FOR NOTES, SEE P6

TYPICAL CAST IRON PIPE CONNECTION
TO CONCRETE CYLINDER PIPE

CONCRETE CYLINDER PIPE

STANDARD BELL RING

CONCRETE CYLINDER TEE

STANDARD BELL RING

CONCRETE CYLINDER PIPE
NOTES:
1. BOLTS – 1/2" STICKING OUT BEYOND TIGHTENED NUT IS ACCEPTABLE.
2. ADD STEP DOWN (SIMILAR TO A BELL END) OR STOP TO PREVENT INSIDE MORTAR FROM CRACKING WHEN PIPE IS PUSHED IN TOO FAR DURING INSTALLATION.
3. INTERIOR JOINT TO BE FILLED WITH MORTAR GROUT.
4. BOLTS AND NUTS FOR FOLLOWING RING TO BE TYPE 316 STAINLESS STEEL.
5. ONLY C.I. FITTING EPOXY COATING (NSF APPROVED) SHALL BE FACTORY-INSTALLED DURING THE MANUFACTURING OF THE ADAPTER.
6. APPLY BITUMAST COATING TO ALL EXPOSED STEEL, BOLTS, NUTS, FOLLOWING RING AFTER INSTALLATION.
7. INSTALL DOUBLE POLYETHYLENE WRAP (16 MILS MINIMUM) AND 15 LB. ROOFING FELT OVER POLY-WRAP TO PREVENT DAMAGE/PUNCTURES TO POLY-WRAP DURING BACKFILL WORK ON DUCTLINE IRON PIPE ADAPTER.

NOTE:
SEE PLATE P5 FOR DETAIL OF EXIST DUCTILE IRON AND CONCRETE CYLINDER PIPE CONNECTION.
CONCRETE CYLINDER PIPE
TAP-IN TEE DETAILS
SCALE: NTS

CIRC. ROD REINF. - CUT AND BEND BEFORE TAP-IN TEE INSTALLATION. TO BE REPLACED AND TACK WELDED ON ANCHORED SADDLE PLATE.

1" MUELLER THREAD HALF COUPLING

GUSSET PL.
1/4"
1/4"

REINF. SADDLE PL.

CONC. CYLINDER PIPE

FRONT VIEW

DISPLACED WIRE OR ROD REINFORCEMENT CUT AND BEND BEFORE TAP-IN TEE INSTALLATION: TO BE REPLACED AND TACK WELDED ON ANCHORED SADDLE PLATE.

STEEL SHEET CYLINDER

INTERIOR CEMENT MORTAR LINING

1" MUELLER THREAD HALF COUPLING

SECTION X-X

EXTERIOR CEMENT MORTAR COATING

CIRC. ROD REINF.

3/8 V

Z

E 1/4

Y

CONC. CYLINDER PIPE (MAIN)

TEE BRANCH

REINFORCING SADDLE PLATE

GUSSET PLATES

TO BE CEMENT MORTARED AFTER TAP-IN TEE IS INSTALLED
<table>
<thead>
<tr>
<th>DIMENSIONS (INCH)</th>
<th>TEE BRANCH</th>
</tr>
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<tbody>
<tr>
<td>NOMINAL BRANCH SIZE (DIA.)</td>
<td>4</td>
</tr>
<tr>
<td>A ACTUAL BRANCH DIAMETER (I.D.)</td>
<td>4.25</td>
</tr>
<tr>
<td>B LENGTH OF TEE BRANCH</td>
<td>6.00</td>
</tr>
<tr>
<td>C MIN. THICKNESS OF TEE NIPPLE</td>
<td>0.237</td>
</tr>
<tr>
<td>D DIAMETER OF MACHINED FLANGE</td>
<td>9.125</td>
</tr>
<tr>
<td>E FLANGED THICKNESS</td>
<td>0.94</td>
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<tr>
<td>F FLANGE OFFSET DIAMETER</td>
<td>4.724</td>
</tr>
<tr>
<td>G DEPTH OF FLANGE OFFSET</td>
<td>.375</td>
</tr>
<tr>
<td>H BOLT CIRCLE DIAMETER</td>
<td>7.50</td>
</tr>
<tr>
<td>J (AMOUNT) &amp; DIA. OF BOLT HOLES</td>
<td>(8)0.750</td>
</tr>
<tr>
<td>K THICKNESS OF REINF. SADDLE PLATE</td>
<td>0.250</td>
</tr>
<tr>
<td>O DEGREES BETWEEN BOLT CENTER</td>
<td>45°</td>
</tr>
</tbody>
</table>

* FOR 16" AND LARGER BRANCH THE CONTRACTOR SHALL SUBMIT 8 SETS OF SHOP DRAWINGS FOR APPROVAL BY THE WATER DEPARTMENT.

FABRICATION NOTES:
1. ALL TAP-IN TEE COMPONENTS SHALL BE MADE FROM NEW AND SOUND MATERIALS AS SPECIFIED.
2. STEEL PRODUCTS FOR COMPONENTS SHALL BE HOT ROLLED M-1020 OR BETTER.
3. WELDING ELECTRODES SHALL MEET ASTM A-223, AWS A-5.1 SPECIFICATIONS.
4. THE TOP TWO BOLT HOLES ON THE FLANGE SHALL BE EQUIDISTANT FROM THE PLUMB CENTER LINE.
5. THE BUTT END ON THE BRANCH AND THE ARCH ON THE REINFORCING SADDLE PLATE SHALL CONFORM TO THE O.D. OF THE STEEL SHEET CYLINDER SO THAT A TIGHT AND CLOSE FIT JOINT WILL BE ATTAINED ON THE STEEL SHEET CYLINDER. DIAMETER OF BRANCH HOLE ON THE SADDLE PLATE IS 0.50" LARGER THAN THE O.D. OF THE BRANCH.
6. THREE 0.375" THICK GUSSET PLATES SHALL BE PROVIDED AND INSTALLED IN THE FIELD.

INSTALLATION PROCEDURE
1. REMOVE SUFFICIENT EXTERIOR MORTAR COATING FROM CONCRETE CYLINDER PIPE TO CONTAIN REINFORCING SADDLE PLATE.
2. POSITION AND MARK OUT EXACT OUTLINE OF REINFORCING SADDLE PLATE ON EXPOSED STEEL SHEET CYLINDER.
3. TACK WELD CIRCUMFERENTIAL WIRE OR ROD REINFORCEMENT ONTO STEEL SHEET CYLINDER – 1" AWAY FROM PERIMETER OF SADDLE PLATE.
4. CUT AND BEND REINFORCING WIRES OR RODS AWAY FROM THE WORK AREA.
5. POSITION AND DRAW REINFORCED SADDLE PLATE TIGHTLY AGAINST THE STEEL SHEET CYLINDER BEFORE WELDING THE SADDLE PLATE ON THE CYLINDER, AS INDICATED BY "γ".
6. TEE BRANCH INSTALLATION:
   A. POSITION THE PRESHAPED END OF THE TEE BRANCH ON THE STEEL SHEET CYLINDER THROUGH THE BRANCH HOLE ON THE SADDLE PLATE.
   B. WELD THE BRANCH TO THE STEEL SHEET CYLINDER BEFORE JOINING AND TYING THE BRANCH TO THE SADDLE PLATE, AS INDICATED BY "Z" ON SECTION X–X.
   C. FIT AND INSTALL THE GUSSET PLATES, AS ABOVE.
   D. TEST WELDED JOINTS ON NEW INSTALLATION FOR LEAKS.
   E. BEND AND REPLACE THE DISPLACED CIRCUMFERENTIAL WIRE OR ROD REINFORCEMENT OVER THE SADDLE PLATE AND TACK WELD THE WIRES OR RODS TO THE PLATE.
   F. APPLY A HEAVY COAT OF CEMENT MORTAR ON EXPOSED METAL SURFACE, AS SHOWN BY DOTTED LINES ON SECTION X–X.
### TABLE "A"

<table>
<thead>
<tr>
<th>PIPE DIAMETER</th>
<th>MATERIAL</th>
<th>FITTING</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
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<tbody>
<tr>
<td>4&quot;–12&quot;</td>
<td>AC</td>
<td>COUPLING</td>
<td>3'-0&quot;</td>
<td>5'-0&quot;</td>
<td>1'-0&quot;</td>
<td>1'-6&quot;</td>
<td>1'-6&quot;</td>
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<tr>
<td></td>
<td>CI &amp; DI</td>
<td>SLEEVE OR BEND</td>
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<tr>
<td></td>
<td>CI &amp; DI</td>
<td>TAPPING TEE</td>
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<td>CC</td>
<td>BUTT STRAP</td>
<td>3'-0&quot;</td>
<td>5'-6&quot;</td>
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<td></td>
<td>CI &amp; DI</td>
<td>TEE</td>
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<td>1'-6&quot;</td>
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<td>3'-0&quot;</td>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**

1. LIMIT OF PAYMENT FOR EXCAVATION SHALL BE AS SHOWN ON TABLE "A" ABOVE.
2. FOR BGGV, DIMENSIONS SHALL BE DETERMINED IN THE FIELD.
3. REACTION BLOCKS AS REQUIRED. NOT SHOWN FOR CLARITY.
NOTE:

1. 12" of cushion material for pipes 16" or larger. 6" cushion material for pipes 12" or smaller at locations where invert is above 4-foot elevation.

2. 12" of cushion material for all pipe sizes at locations where the invert is at or below the 4-foot elevation.
NOTE FOR PVC WATER MAIN

1. A MIN OF 3 FEET OF COVER SHALL BE MAINTAINED AT ALL TIMES.

2. BACKFILL MATERIAL SHALL BE SAND ONLY; WATER JETTED TO WITHIN 12" OF FINISHED GRADE.

3. NO DIRECT TAPS SHALL BE PERMITTED. ALL TAPS SHALL BE WITH THE USE OF BRONZE, DOUBLE STRAP SERVICE SADDLES.

4. ALL OTHER CONDITIONS FOR PIPELINE INSTALLATIONS REMAIN AS SPECIFIED.

5. ONLY C.I. FITTINGS SHALL BE USED FOR ALL BENDS, REDUCERS, ETC. WITH PVC ENDS OR MJ ENDS.
NOTE FOR PVC WATER MAIN

1. A MIN OF 3 FEET OF COVER SHALL BE MAINTAINED AT ALL TIMES.

2. BACKFILL MATERIAL SHALL BE SAND ONLY; WATER JETTED TO WITHIN 12" OF FINISHED GRADE.

3. NO DIRECT TAPS SHALL BE PERMITTED. ALL TAPS SHALL BE WITH THE USE OF BRONZE, DOUBLE STRAP SERVICE SADDLES.

4. ALL OTHER CONDITIONS FOR PIPELINE INSTALLATIONS REMAIN AS SPECIFIED.

5. ONLY C.I. FITTINGS SHALL BE USED FOR ALL BENDS, REDUCERS, ETC. WITH PVC ENDS OR MJ ENDS.
NOTES:
A. ELIMINATE CURB STOP AND COUPLING WHERE PIPE BURY (TOP OF PIPE TO FINISH GRADE) IS LESS THAN 30 INCHES. CONNECT UNION TO BALL CORP. AND ADJUST OVERALL HEIGHT ACCORDINGLY W/ BRASS NIPPLE (CUT TO FIT).
B. FOR INSTALLATIONS WITHIN PAVED AREAS, SEE DETAIL AT RIGHT.

MANHOLE INSTALLATION
WITHIN PAVED AREAS
24" STANDARD MANHOLE FRAME AND COVER CENTERED ON MH COVER
4-#4 DIAGONAL BAR
4'-0" X 4'-0" SQUARE CONCRETE SLAB

20" I.D. STANDPIPE-D.I.,C.I., OR PVC C-905 PIPE
90° ELBOW, BRONZE
VERTICAL CHECK VALVE (SEE NOTE 4)
3/4" ELBOW (BRONZE)
3/4" X 2" NIPPLE (BRASS)
3-WAY 3/4" STOPCOCK, 3 PORT
3/4" BRASS PIPE CUT TO FIT
BRICK

3/4" BRASS COUPLING

3/4" BALL CORP.

16" AND SMALLER WATER MAINS

STANDARD CONNECTION FOR
3/4" AIR RELIEF VALVE AT VALVE BOX

NOT TO SCALE

NOTE:
1. SEE V4 FOR INSTALLATION IN MANHOLES.
2. CONCRETE SHALL BE DWS 2500. REINFORCING STEEL SHALL BE GRADE 60.
3. DESIGN IS BASED ON: HS-20 LOADING; 5 FEET SURCHARGE; 60 PCF/FT AT REST PRESSURE; AND 2 FEET OF WATER ABOVE BOTTOM OF STANDPIPE PER AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (1998)
4. VERTICAL CHECK VALVE IS REQUIRED WHEN AIR VALVE IS IMMERSED IN WATER.
5. PROVIDE S.S. FABRIC SCREEN COVER FOR OUTLET PIPE.
NOTE:
ALL CASTINGS SHALL BE MADE ACCURATELY TO THE
DIMENSIONS SHOWN. SEAT AND COVER SHALL BE
MACHINED, NOT GROUND TO SECURE FLAT AND TRUE
SURFACES. THE COVER SHALL NOT RATTLE IN ANY
POSITION.

PLAN OF COVER

SECTION

1/8" RAISED LETTERS
7/8" HOLE

9" DIAMETER
3/4"
7-1/2" DIAMETER
3/4"
1/8"
7-1/4" DIAMETER
1/8"

2"

4"

1/4"
5" DIA.
1/4"
5-1/2" DIA.
1/4"
6" DIAMETER
3/4"

14" DIAMETER

6" & 8 1/2"
HEIGHT AVAILABLE

KAUAI
OAHU
MAUI

VALVE FRAME & COVER
CAST IRON, 6" SIZE
SCALE: NTS

STANDARD DETAILS
V3

2002
REVISION
STANDARD CONNECTION FOR AIR RELIEF VALVE

NOTE:
1. FOR 2" AIR RELIEF VALVE, SIZE OF BALL CORP., UNION, VERTICAL CHECK VALVE AND NIPPLE SHALL BE 2".
2. PROVIDE TYPE "F" MANHOLE V23 FOR BURIED INSTALLATION. (MAUI ONLY)
3. INSTALL PRECAST TYPE B OR TYPE C MANHOLE FOR VALVES (OAHU ONLY)
4. FOR COMBINATION AIR VALVE, IMMERSED INSTALLATION NOT PERMITTED.
LIST OF MATERIALS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NO. REQ. FOR 1 ARV</th>
<th>NO. REQ. FOR 2 ARVS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2” BALL CORPORATION</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2” UNION, BRONZE</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2” 90° ELBOW, BRONZE</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2” BRASS PIPE, CUT TO FIT</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2” STREET ELBOW</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>2</td>
<td>2” BALL STOP</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>4</td>
<td>BRICK SUPPORT</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2</td>
<td>2” DIA. X 4” NIPPLE, BRASS</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>2</td>
<td>2” AIR RELIEF VALVE</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>8</td>
<td>2” DIA. X 4” NIPPLE, BRASS</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>2</td>
<td>STREET ELBOW TO FIT IPT **</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>1</td>
<td>2” X 2” TEE, BRASS</td>
</tr>
<tr>
<td>*13</td>
<td>1</td>
<td>2</td>
<td>3-WAY STOP</td>
</tr>
</tbody>
</table>

* FOR MAUI ONLY

NOTE:
1. DESIGN ENGINEER TO VERIFY ALL DIMENSIONS/ELEVATIONS AND MAKE NECESSARY ADJUSTMENTS TO MAINTAIN A 0 TO POSITIVE SLOPE OF LATERAL GOING TO THE ARV, AND PROVIDE ALL REQ'D CLEARANCES INSIDE THE MANHOLE.
2. INSTALL MANHOLE AT GRADE HIGHER THAN FINISH GRADE ALONG MAIN.

OFFSET AIR RELIEF VALVE FOR 20" OR LARGER MAINS
SCALE: NTS

KAUAI
OAHU
MAUI

STANDARD DETAILS

2002
REVISION

V5
NOTE:
1. AN ATMOSPHERIC VACUUM BREAKER SHALL BE INSTALLED ON THE DISCHARGE SIDE OF THE LAST CIRCUIT CONTROL VALVE.
2. NO CHEMICAL ADDITION, EITHER BY INJECTION OR SIPHONING, WILL BE PERMITTED.
3. FOR USE ONLY ON THOSE CIRCUITS, WITH UNDERGROUND SPRAY, SHRUBBERY SPRAY, BUBBLE HEADS, OR OTHER SIMILARLY CONSTRUCTED IRRIGATION HEADS.
4. NOT FOR USE ON CIRCUITS WITH QUICK COUPLING VALVES OR SUBSURFACE IRRIGATION SYSTEMS.
NOTES:

1. PRESSURE VACUUM BREAKER SHALL BE INSTALLED AT THE BEGINNING OF EACH CIRCUIT.
2. INJECTION OR SIPHONING OF CHEMICALS AND OTHER TOXIC OR OBJECTIONABLE SUBSTANCES INTO THE IRRIGATION SYSTEM WILL NOT BE PERMITTED.
3. FOR USE ON CIRCUITS WITH QUICK COUPLING VALVES, SUBSURFACE IRRIGATION SYSTEMS, OR SWIMMING POOLS.
NOTE:
1. MAY BE USED AS AN ALTERNATIVE FOR THE REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION DEVICE.
2. NO CONNECTIONS OR TEES BETWEEN METER AND TANK IS ALLOWED.
3. THE AIR GAP SHALL BE LOCATED ON PRIVATE PROPERTY AS CLOSE TO THE METER AS PHYSICALLY POSSIBLE.
NOTES:

1. ANY CONNECTIONS OR TEES BETWEEN METER AND BACKFLOW PREVENTION ASSEMBLY MUST HAVE WRITTEN APPROVAL BY THE MANAGER.

2. A RP OR DC BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED
   WHENEVER THE MANAGER DEEMS NECESSARY TO PREVENT POTENTIAL CONTAMINATION TO
   THE PUBLIC WATER SYSTEM. THE TYPE OF BACKFLOW PREVENTION ASSEMBLY SHALL BE
   DETERMINED BY THE MANAGER.

3. AT NO TIME SHALL THE BOTTOM OF THE BACKFLOW PREVENTION ASSEMBLY BE LESS THAN
   12" ABOVE GROUND, FLOOR, OR FLOOD LEVEL NOR MORE THAN 48" ABOVE
   AFOREMENTIONED GRADES.

4. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AFTER THE WATER METER
   PRIOR TO ANY TEES AND BRANCHES.

5. WHENEVER BACKFLOW PREVENTION ASSEMBLY IS LOCATED 5' OR MORE FROM THE WATER
   METER, INSTALL CONCRETE JACKET BETWEEN WATER METER AND BACKFLOW PREVENTION
   ASSEMBLY TO AVOID POTENTIAL CROSS CONNECTION.

6. THE BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED PRIOR TO ISSUANCE OF WATER
   METER OR ACTIVATION OF WATER SERVICE.

7. REFER TO DIVISION 100, SECTION 107.1 FOR ADDITIONAL REQUIREMENTS AND TYPE OF
   BACKFLOW PREVENTER NEEDED.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>MATERIALS LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>TYPE &quot;X&quot; METER BOX W/ CAST IRON COVER</td>
</tr>
<tr>
<td>B</td>
<td>1&quot; PRESSURE AIR RELIEF VALVE</td>
</tr>
<tr>
<td>C</td>
<td>1&quot; COPPER (TYPE &quot;K&quot;, SOFT)</td>
</tr>
<tr>
<td>D</td>
<td>1&quot; COPPER MALE ADAPTER</td>
</tr>
<tr>
<td>E</td>
<td>ANGLE BALL VALVE (FORD BAIL-344W OR APPROVED EQUAL)</td>
</tr>
<tr>
<td>F</td>
<td>2&quot; X 4&quot; X 8&quot; BRICK SADDLE</td>
</tr>
<tr>
<td>G</td>
<td>PACK JOINT COUPLING (FORD C14-44 OR APPROVED EQUAL)</td>
</tr>
<tr>
<td>H</td>
<td>1&quot; CC X 1&quot; MPT BALL CORPORATION</td>
</tr>
<tr>
<td>J</td>
<td>BRONZE SERVICE SADDLE W/ 1&quot; CC TAP FOR USE ON C-900 PVC PIPE AND DUCTILE IRON PIPE OR PVC TEE W/ 1&quot; PVC BUSING FOR USE ON 3&quot; AND 4&quot; PVC PIPE. SMITH-BLAIR TYPE 342 PLASTIC SERVICE SADDLE W/ 1&quot; CC TAP FOR 3&quot; AND 4&quot; PVC PIPE.</td>
</tr>
<tr>
<td>K</td>
<td>ELBOWS AND SCREEN</td>
</tr>
</tbody>
</table>

![Diagram of Automatic Pressure Relief Valve](image)
GENERAL NOTES:
1. PAVEMENT AREA: 2'–0" DIA. OR 2'–0" X 2'–0" SQUARE X 4" THICK CONC. SETTLEMENT SLAB.
2. NON-PAVEMENT AREA: 3'–0" DIA. OR 3'–0" X 3'–0" SQUARE X 4" THICK CONC. SETTLEMENT SLAB.
3. COVER TO BE DROP LID COVER.

CAST IRON VALVE BOX DETAILS

STANDARD DETAILS

KAUAI

SCALE: NTS

V11
36" Dia x 8" Conc. Collar in roadway 48"x48"x8" slab w/ W.W.F. reinforcement in non-road area

Standard Drop 5-1/4" lid, marked "Water"

Tyler Pipe Series 6855, or approved equal

Two-piece valve box, height to suit

1 1/2" / 2 1/4"
Valve Box Riser

Extension Piece
60-A

Notes:
1. Valve box assembly to be cast iron.
2. Model numbers refer to Tyler Pipe catalog.
3. Maximum 4' depth to valve operator nut.
NOTE:
1. ACCOMMODATES 1" & 1-1/2" VALVES.
2. FOR 2" & 2-1/2" VALVES, USE TYPE "B" METER BOX.
3. FOR OAHU AND HAWAII, FIBER REINFORCED CONCRETE IS ALLOWED.
4. FOR VALVES INSTALLED IN ROADWAYS, INSTALL VALVE BOXES, SEE DETAIL V14 (FOR OAHU)
NOTE:

1. THE LIMIT OF PIPE CUSHION BACKFILL AROUND THE VALVE SHALL BE THE TRENCH WIDTH X 4 FEET ON EACH SIDE OF VALVE AND FILL TO 8" BELOW FINISH GRADE.

2. IF VALVE OPERATOR NUT IS DEEPER THAN 5', TYPE B OR C MANHOLE SHALL BE USED. (EXCEPT HAWAII)

3. FOR DIRECT BURIED BEVEL GEARED GATE OR BUTTERFLY VALVES REFER TO V15 (EXCEPT HAWAII)

4. CONCRETE SHALL BE DWS 2500.

5. INSTALL PRECAST WATERPROOFED TYPE B OR C MANHOLE FOR VALVES SUBMERGED IN WATER (EXCEPT HAWAII)

6. PAVEMENT FOR PIPE CUSHION BACKFILL SHALL BE INCIDENTAL TO VALVE INSTALLATION (FOR HAWAII)
NOTE:
1. THE LIMIT OF PIPE CUSHION BACKFILL AROUND THE VALVE SHALL BE THE TRENCH WIDTH x 4 FEET ON EACH SIDE OF VALVE AND FILL TO 8" BELOW FINISH GRADE.
2. CONCRETE SHALL BE DWS 2500.
3. TWO VALVE BOXES REQUIRED PER BEVEL GEARED GATE VALVE WITH BY-PASS VALVE. APPLICABLE FOR DIRECT-BURIED BGVXS IN PAVED ROADWAYS AS APPROVED BY MANAGER. (OAHU ONLY)
NOTE:
ALL CASTINGS SHALL BE MADE ACCURATELY TO THE DIMENSIONS SHOWN. SEAT AND COVER SHALL BE MACHINED, NOT GROUND TO SECURE FLAT AND TRUE SURFACES. THE COVER SHALL NOT RATTLE IN ANY POSITION.

SEE TABLE 200-9 FOR MINIMUM WEIGHT REQUIREMENTS
SECTION

TAG SHALL BE SCREWED TO THE COVER WITH TWO (2), 1/4"Øx1 5/16" LONG BRASS ROUND HEAD MACHINE SCREWS. THE CONTRACTOR SHALL TAP THE COVERS TO RECEIVE THE SCREWS.

NOTES:
1. THE CONTRACTOR SHALL VERIFY VALVE DATA WITH THE VALVE MANUFACTURER PRIOR TO STAMPING I.D. TAG.
2. I.D. TAG SHALL BE INSTALLED ON UNDERSIDE OF ALL NEW MANHOLE OR VALVE BOX COVER.
3. PAYMENT FOR THE FURNISHING AND INSTALLATION OF I.D. TAGS WILL NOT BE MADE DIRECTLY BUT SHALL BE INCLUDED IN THE UNIT PRICE BIDS FOR VALVES.

VALVE TYPE ABBREVIATIONS
GATE VALVE  GV
BEVEL GEARED GATE  BGGV
BUTTERFLY VALVE  BV

IDENTIFICATION TAG FOR MANHOLE OR VALVE BOX COVER
SCALE: NTS

OAHU HAWAII

STANDARD DETAILS
V17
DETAIL OF VALVE MARKER

PAINT TOP RED FOR ALL AIR VALVES
PAINT YELLOW FOR ALL VALVES
2" GALV. PIPE FILLED WITH DWS 2500 CONC.
DWS 2500 CONC.

1'-0"
3'-0"
NOTE:
1. FURNISH AND INSTALL VALVE EXTENSION TO 18" FROM TOP OF VALVE BOX COVER.
2. VALVE EXTENSION SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
3. FOR VALVE OPERATORS DEEPER THAN 3.5' TO FINISH GRADE.
**SCHEDULE OF CLEANOUTS**

<table>
<thead>
<tr>
<th>MAIN SIZE</th>
<th>CLEANOUT SIZE</th>
<th>MANHOLE ENCLOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; &amp; SMALLER</td>
<td>2&quot;</td>
<td>TYPE &quot;F&quot;</td>
</tr>
<tr>
<td>8&quot; &amp; 12&quot;</td>
<td>2 1/2&quot;</td>
<td>TYPE &quot;F&quot;</td>
</tr>
<tr>
<td>LARGER THAN 12&quot;</td>
<td>FURNISH SPECIAL DESIGN FOR DISCHARGE NOZZLE OR HYDRANT ASSEMBLY</td>
<td></td>
</tr>
</tbody>
</table>

**CLEANOUT**

- **24" STD. MANHOLE FRAME AND COVER**
- **BALL STOP OR GATE VALVE**
- **BRASS NIPPLE, LENGTH=3"**
- **REFER TO V23 FOR TYPE "F" M.H. DETAILS**
- **CONCRETE REACTION BLOCK**
- **UNDISTURBED BEARING**
- **18" MIN LG. NIPPLE FILLED W/ DIRT BEFORE PLACING REACTION BLOCK**

**MAUI**

**CLEANOUT**

**STANDARD DETAILS**

**SCALE: NTS**

**V21**
TYPICAL DETAIL OF CLEANOUT

<table>
<thead>
<tr>
<th>SCHEDULE OF CLEANOUTS</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE SIZE</td>
<td>CLEANOUT SIZE</td>
</tr>
<tr>
<td>8&quot; &amp; SMALLER</td>
<td>2 1/2&quot;</td>
</tr>
<tr>
<td>12&quot; TO 20&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>24&quot; &amp; LARGER</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. CLEANOUT SHALL INCLUDE THE CAP, PLUG, AND ALL APPURTENANCES AS SHOWN.
2. FOR OAHU ONLY: FOR PIPES 8" & SMALLER:
   a) ALL TEMPORARY PIPES SHALL BE OF GALVANIZED MATERIALS.
   b) FOR PERMANENT CLEANOUT INSTALLATION, ONLY BRASS OR COPPER FITTINGS SHALL BE USED.
3. FOR KAUAI ONLY: ALL CLEANOUTS INSTALLATION SHALL BE BRASS OR COPPER PIPE FITTINGS.