# SECTION 10 - SILT CONTROL

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## SECTION 40- PORTAL CLOSURES & HIGHWALLS

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<td>STEEL BEAM GUARDRAIL</td>
<td>AML 50-20-8A</td>
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<td>GUARDRAIL COMPONENTS</td>
<td>AML 50-20-8B</td>
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<td>GUARDRAIL POST- STEEL</td>
<td>AML 50-20-8C</td>
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<td>GUARDRAIL POST- TIMBER</td>
<td>AML 50-20-8D</td>
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<td>AML 50-20-9</td>
<td>10-2013</td>
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<td>PIPE DIVERSION</td>
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<tr>
<td>SANDBAG/STONE DIVERSION</td>
<td>AML 60-10-2</td>
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<tr>
<td>FABRIC-BASED CHANNEL DIVERSION</td>
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<td>ECB BANK PROTECTION</td>
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<td>BRUSH MATTRESS BANK TREATMENT</td>
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<td>FASCINE BANK TREATMENT</td>
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<td>AML 60-20-4</td>
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<td>DORMANT POST PLANTINGS- WILLOW POST</td>
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<td>BANK SHAPING</td>
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<td>REINFORCED EARTH BANK TREATMENT</td>
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<td>REINFORCED EARTH BANK INSTRUCTIONS</td>
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<td>3-STAGE CHANNEL</td>
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<td>STEP POOL- PART A</td>
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<td>STEP POOL- PART B</td>
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<td>LOG VANE</td>
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<tr>
<td>ROCK VANE</td>
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<td>J-HOOK VANE</td>
<td>AML 60-40-3</td>
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<td>STREAM DEFLECTOR</td>
<td>AML 60-40-4</td>
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<td>STREAM DEFLECTOR- ALTERNATIVE CONFIGURATIONS</td>
<td>AML 60-40-5</td>
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<td>CROSS VANE</td>
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<td>&quot;W&quot; WEIR</td>
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### SECTION 70- MISCELLANEOUS

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<td>SLOPE OR EMBANKMENT FOUNDATION BENCHES</td>
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<td>BENCHES</td>
<td>AML 70-10-3</td>
<td>7-2017</td>
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<td>COVER MATERIAL PLACEMENT</td>
<td>AML 70-10-4</td>
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<td>ECB SLOPE INSTALLATION</td>
<td>AML 70-10-5</td>
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<td>GATE VALVE AND HOUSING</td>
<td>AML 70-20-1</td>
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<td>FLUME- TIMBER</td>
<td>AML 70-20-2</td>
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<td>SPREADER BAR BAFFLE</td>
<td>AML 70-20-3</td>
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<tr>
<td>GABION BASKET ASSEMBLY</td>
<td>AML 70-30-1</td>
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*Updated 6-2021*
EVERY 100’ AND AT ENDS SET ON BALES PERPENDICULAR GOING UPSLOPE TO PREVENT WATER FLOWING ALONG THE CHECK.

2” X 2” WOODEN STAKES DRIVEN 1’ MIN INTO SOLID GROUND

3’ LONG BALES

0.5’ MIN. OVERLAP

SHEET FLOW ON SLOPE

FLOW

DITCH

STRINGS NOT TO TOUCH GROUND
SILT BARRIER- FENCE (AML 10-10-2)

1. SEE AML SILT CONTROL TECHNICAL SPECIFICATION FOR MORE INFORMATION.
2. POST MAY BE WOODEN OR METAL T-SECTION.
3. POST SHALL BE SET 1'-4" DEEP
4. EVERY 100' AND AT ENDS TURN FENCE UPHILL FOR MIN. 3' INTO "J" HOOK. THEN TIE THE END OF A NEW SECTION OF FENCE INTO THE ORIGINAL FENCE OVERLAPPING THE HOOK BY 2'.
5. SILT FENCE SHALL BE REMOVED PRIOR TO THE COMPLETION OF THE PROJECT.
NOTES

1. INLET PROTECTION IS SUITABLE FOR USE IN BOTH PAVED AND UNPAVED AREAS.
2. THE HEIGHT REQUIREMENT IS WAIVED IN CASES WHERE IT WILL CREATE AN UNACCEPTABLE PONDING
   SITUATION.
3. INTERWEAVE BAG ENDS TO FILL GAPS BETWEEN BAGS.
4. CONSTRUCT 18” X 3” BAGS OF NON-WOVEN FILTER FABRIC. DOUBLE STITCH BAG SEAMS WITH 1 LB
   POLYESTER THREAD. ATTACH 1 TIE STRING TO EACH BAG. BAG OPENING SHALL BE ON THE 18”
   SIDE.
5. FILL BAGS WITH NO. 57 STONE BETWEEN ½ TO ¾ FULL (50-60 LBS)
6. DO NOT USE IN BLUE LINE STREAMS.

SILT CHECK- GEOTEXTILE BAGS (AML 10-20-1)
SILT CHECK - ROCK (AML 10-20-2)

THESE CHECKS ARE TEMPORARY!

NOTES

1. MIDDLE OF SILT CHECK SHALL BE A MINIMUM OF 1′−0" LOWER THAN SIDES SO FLOW WILL NOT BYPASS CHECK OR ERODE BANKS.
2. UPSTREAM FACE OF ROCK SHALL BE A FOUR INCH MIN. LAYER OF NO. 2 STONE OVER A CLASS II/III CORE. LINE UPSTREAM FACE WITH WOVEN FILTER FABRIC UP TO BOTTOM OF THE V AND COVER FABRIC WITH STONE TO HOLD IN PLACE (SEE DETAIL "A").
3. "L" = "H"/SLOPE OF DITCH.
4. SPACE SILT CHECKS AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
5. DO NOT PLACE CHECKS IN BLUE LINE STREAMS.
THE SIZE, SHAPE, AND LOCATION OF TRAPS MAY BE ADJUSTED FROM THAT SHOWN IN THE DRAWINGS, AS DIRECTED BY THE ENGINEER.

USE BAFFLES OR TURBIDITY CURTAINS TO ACHIEVE THE 3:1 FLOW LENGTH TO WIDTH RATIO WHEN NECESSARY (INCIDENTAL).

SILT TRAPS SHALL BE CLEANED WHEN THEY ARE APPROXIMATELY 50% FILLED WITH SEDIMENT. SILT TRAPS MAY REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE SEEDED AND MULCHED AND APPROVED BY THE ENGINEER. ENGINEER MAY ELECT TO CONVERT TO PERMANENT TRAP, SEE 10–30–3).
THE SIZE, SHAPE, AND LOCATION OF TRAPS MAY BE ADJUSTED FROM THAT SHOWN IN THE DRAWINGS, AS DIRECTED BY THE ENGINEER. USE BAFFLES OR TURBIDITY CURTAINS TO ACHIEVE THE 3:1 FLOW LENGTH TO WIDTH RATIO WHEN NECESSARY (INCIDENTAL).

SILT TRAPS SHALL BE CLEANED WHEN THEY ARE APPROXIMATELY 50% FILLED WITH SEDIMENT. SILT TRAPS MAY REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE SEEDED AND MULCHED AND APPROVED BY THE ENGINEER. ENGINEER MAY ELECT TO CONVERT TO PERMANENT TRAP, SEE 10–30–3).

SILT TRAP- TYPE B TEMPORARY (AML 10-30-2)
SILT TRAP- TYPE A & B PERMANENT (AML 10-30-3)

THESE ROCK LINED TRAPS MAY ALSO BE USED DURING CONSTRUCTION AS ENERGY DISSIPATERS.

THE SIZE, SHAPE, AND LOCATION OF TRAPS MAY BE ADJUSTED FROM THAT SHOWN IN THE DRAWINGS, AS DIRECTED BY THE ENGINEER. WHEN POSSIBLE MAINTAIN 3:1 LENGTH:WIDTH RATIO.

CLEAN OUT WHEN THEY ARE APPROXIMATELY 50% FILLED WITH SEDIMENT.
RIPRAP PROTECTION

SPILLWAY SET 2’ MAX ABOVE BOTTOM OF CHANNEL

FLOW

BIAXIAL OR TRI-AXIAL GEO-GRID BASE (NOT SHOWN)

DIMENSIONS SHOWN ARE TYPICAL BUT MAY VARY FROM SITE TO SITE.

3’ MIN. BURIED INTO GROUND

SPILLWAY SET 2’ MAX ABOVE BOTTOM OF CHANNEL

BURIED BELOW BOTTOM OF CHANNEL

GROUNDLINE MUST EXTEND ABOVE AND BEYOND WEIR TO PREVENT BYPASSING

9’

9’

18’

21’

GABION WEIR (AML 10-40-1)
CALCULATE ECB AT RATE OF 2 SY/LF.
BED SLOPE OF DIVERSION CHANNEL SHOULD BE BETWEEN 3% - 5% GRADE.
BED SLOPE ALONG DIVERSION IS 3–5%.

PROPOSED GRADELINE OR EXISTING GROUNDLINE

KEY INTO SOIL

2:1 SLOPES OR FLATTER

EROSION CONTROL BLANKET (ECB TYPE A)

E.C.B. 1 S.Y./FT.

USE WITH AML 21–10–5
ROCK ANCHORS SHALL BE PLACED AT ALL TRANVERSE SEAMS AND MAX 100’ INTERVALS.

<table>
<thead>
<tr>
<th>TOP WIDTH</th>
<th>ECB SY/LF</th>
</tr>
</thead>
<tbody>
<tr>
<td>4’</td>
<td>1</td>
</tr>
<tr>
<td>10’</td>
<td>1.25</td>
</tr>
<tr>
<td>20’</td>
<td>1.5</td>
</tr>
</tbody>
</table>

EROSION CONTROL BLANKET (ECB TYPE A OR C)

EKY DITCHES USE TYPE A OR C
WKY DITCHES USE ONLY TYPE C

USE WITH AML 21-10-5, 21-70-1

ECB DITCH- SWALE (AML 21-10-3)
NOTE: SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.
TYPE B ECB
CHANNEL INSTALLATION

SEAM PROFILE

SEAM CROSS SECTION

ANCHOR PROFILE

CRITICAL POINT SECURING

STEP 1 - SITE PREPARATION
PREPARE SITE TO DESIGN PROFILE AND GRADE. REMOVE DEBRIS, ROCKS, CLODS, ETC. GROUND SURFACE SHOULD BE SMOOTH PRIOR TO INSTALLATION TO ENSURE BLANKET REMAINS IN CONTACT WITH SLOPE.

STEP 2 - SEEDING
SEEDING OF SITE SHOULD BE CONDUCTED TO DESIGN REQUIREMENTS OR TO FOLLOW LOCAL OR STATE SEEDING REQUIREMENTS AS NECESSARY.

STEP 3 - STAPLE SELECTION
SECURE BLANKET USING STEEL STAPLES OR WOODEN STAKES. INSTALLATION IN ROCKY, SANDY OR OTHER LOOSE SOIL MAY REQUIRE LONGER STAPLES.

STEP 4 - EXCAVATE ANCHOR TRENCH AND SECURE BLANKET

STEP 5 - SECURE BODY OF BLANKET
ROLL BLANKET DOWN SLOPE FROM ANCHOR TRENCH. STAPLE BODY OF BLANKET FOLLOWING THE PATTERN. LEAVE END OF BLANKET UNSTAPLED TO ALLOW FOR OVERLAP. PLACE DOWNSTREAM BLANKET UNDERNEATH UPSTREAM BLANKET TO FORM SHINGLE PATTERN. MORE STAPLES MAY BE REQUIRED TO ENSURE BLANKET IS SUFFICIENTLY SECURED TO RESIST MOWERS AND FOOT TRAFFIC AND TO ENSURE BLANKET IS IN CONTACT WITH SOIL SURFACE OVER THE ENTIRE AREA OF BLANKET. FURTHER, CRITICAL POINTS REQUIRE ADDITIONAL STAPLES.

STEP 6 - CONTINUE ALONG SLOPE - COMPLETE INSTALLATION
OVERLAP ADJACENT BLANKETS AND REPEAT STEP 5. SECURE TOE OF SLOPE USING STAPLING PATTERN SHOWN IN FIGURE E. SECURE EDGES OF INSTALLATION BY STAPLING AT 1.0' INTERVALS ALONG THE TERMINAL EDGE.

EXACT STAPLE SPACING MAY DIFFER BETWEEN MANUFACTURER AND THIS DETAIL.
1. Excavate ditch to depth where water runs over rock on sides into ditch.
2. Ditches <10% are underlain with geo-grid unless on bedrock.
3. Ditches over acidic material will have 2' earthen base and may have 3” limestone base.
4. Ditches >4’ depth should have side slopes on 3:1 covered with ECB instead of rock.

**Anchor into soil**

**3’-4’ Width**

ECB Type A

Place ECB prior to channel lining

Bi-axial geo-grid do not use on >10% slopes.

**Based on 2’ depth**

<table>
<thead>
<tr>
<th>&quot;A&quot; Flat Bottom Width (LF)</th>
<th>&quot;B&quot; (LF)</th>
<th>&quot;C&quot; (LF)</th>
<th>Class II/III (Ton/LF)</th>
<th>Geo-Grid (SQ YD/LF)</th>
<th>ECB (SQ YD/LF)</th>
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<tbody>
<tr>
<td>2</td>
<td>2.6</td>
<td>10</td>
<td>0.76</td>
<td>1.55</td>
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<tr>
<td>4</td>
<td>4.6</td>
<td>12</td>
<td>0.90</td>
<td>1.75</td>
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**Use with AML 21-20-3**

**Class II Ditch- Flat Bottom (AML 21-20-1)**
1. Excavate ditch to depth where water runs over rock on sides into ditch.
2. Ditches <10% are underlain with geo-grid unless on bedrock.
3. Ditches over acidic material will have 2’ earthen base and may have 3” limestone base.
4. Ditches >4’ depth should have side slopes on 3:1 covered with ECB instead of rock.

<table>
<thead>
<tr>
<th>BASED ON 2’ DEPTH</th>
<th>&quot;A&quot; FLAT BOTTOM SIZE (LF)</th>
<th>&quot;B&quot; (LF)</th>
<th>&quot;C&quot; (LF)</th>
<th>C + EARTH BASE (LF)*</th>
<th>CLASS II/III (TON/LF)</th>
<th>GEO-GRID (SQ YD/LF)</th>
<th>ECB (SQ YD/LF)</th>
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<tbody>
<tr>
<td>4</td>
<td>4.9</td>
<td>10</td>
<td>15.9</td>
<td>1.65</td>
<td>2.40</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6.9</td>
<td>12</td>
<td>19.9</td>
<td>1.88</td>
<td>2.60</td>
<td>1</td>
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<tr>
<td>8</td>
<td>8.9</td>
<td>14</td>
<td>23.9</td>
<td>2.10</td>
<td>2.80</td>
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* This is for ditches with earthen cover over acidic underlying materials.

CLASS III DITCH- FLAT BOTTOM (AML 21-20-2)
INLET AND OUTLET DITCH TREATMENT (AML 21-20-3)

**W** = WIDTH OF BOTTOM OF DITCH

**D** = DEPTH OF CHANNEL LINING (CLASS II/III OR GABION)

FLOW LINE

SECTION A–A

CONCRETE ANCHOR (DRAWINGS STATE IF REQUIRED)

SECTION B–B

ISOMETRIC VIEW

INLET

OUTLET
CONCRETE BLOCK- TIED MAT (AML 21-30-1)

CONSTRUCTION NOTES:
1. GRADE CHANNEL SO THAT WATER IS CONTAINED AND FLOWS DOWN THE CENTER.
2. THE SUBGRADE SHALL BE SMOOTH, UNYIELDING, AND FREE OF ALL PROTRUSIONS AND/OR DEBRIS.
3. APPLY SEED PRIOR TO INSTALLATION.
4. ENGINEER MAY ELECT TO ADD ADDITIONAL "U" SHAPED REBAR ANCHORS SET MIN. 2' DEEP (INCIDENTAL).
5. ENGINEER MAY REQUIRE INTERMEDIATE CONCRETE/GROUT ANCHORS 2' WIDE X 1.5' DEEP WIDTH OF DITCH. ASSUME INCIDENTAL UNLESS STATED OTHERWISE IN BID ITEM DESCRIPTION. AN ALTERNATIVE IS TO BURY THE LEADING EDGE 18" VERTICALLY INTO COMPACTED DGA.
6. OVERLAP IS REQUIRED FOR SLOPES >10%.
7. NOT RECOMMENDED FOR SLOPES STEEP THAN 2:1.
- GEO-GRID SHALL ONLY BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10% AND NOT ON BEDROCK.
- INSTALL GABION ANCHORS (21-70-3) ON SLOPES >10%.

GABION = 0.22 CY/LF
GEO-GRID = 1.1 SY/LF

1' X 3' X LENGTH
2 BASKETS REQUIRED

BI-AXIAL GEO-GRID DO NOT USE ON >10% SLOPES.

FILL THIS AREA WITH ROCK
JOIN BASKETS AND LACE SECURELY DEFORMING BASKETS SLIGHTLY AS REQUIRED. OVERLAP LID OF ONE BASKET AS REQUIRED TO LACE SECURELY

USE WITH AML 70-30-1

GABION DITCH- "V" (AML 21-40-1)
- GEO-GRID SHALL ONLY BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10% AND NOT ON BEDROCK.
- INSTALL GABION ANCHORS (21-70-3) ON SLOPES >10%.

**Quantities**

**Gabions**
- 3' Wide = 0.35 CY/LF
- 6' Wide = 0.48 CY/LF
- 9' Wide = 0.61 CY/LF

**Geo-Grid**
- 1.00 SY/LF

**Use with** AML 21-70-3 & 70-30-1

GABION DITCH- TRAPEZOIDAL 3',6',9' WIDTH (AML 21-40-2)
- GEO-GRID SHALL ONLY BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10% AND NOT ON BEDROCK.
- INSTALL GABION ANCHORS (21-70-3) ON ALL SLOPES >10%.
- PLACE FILTER FABRIC BETWEEN ROCK AND SOIL CONTACT ON SIDES.
- USE CONCRETE HEADWALL WHEN GABION DITCHES TIE INTO A PIPE. BASE OF HEADWALL EXTENDS 1' BELOW BASE OF GABION.

**Quantities**

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Gabion</td>
<td>1.00 CY/LF</td>
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<tr>
<td>Geo-Grid</td>
<td>1.11 SY/LF</td>
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<tr>
<td>Class II Backfill</td>
<td>0.84 TON/LF</td>
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<tr>
<td>ECB (Type A)</td>
<td>1.00 SY/LF</td>
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<tr>
<td>Filter Fabric</td>
<td>1.5 SY/LF</td>
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USE WITH AML 21-70-3 & 70-30-1

GABION DITCH- RECTANGULAR 4' FLAT BOTTOM EVEN SIDE HEIGHTS (AML 21-40-3)
- Geo-grid shall only be placed under all ditches with channels flatter than 10% and not on bedrock.
- Install gabion anchors (21-70-3) on all slopes >10%.
- Place filter fabric between rock and soil contact on sides.
- Use concrete headwall when gabion ditches tie into a pipe. Base of headwall extends 1' below base of gabion.

**Quantities**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Gabion</td>
<td>1.33 CY/LF</td>
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<tr>
<td>Geo-grid</td>
<td>1.1 SY/LF</td>
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<tr>
<td>Class II Backfill</td>
<td>1.11 TON/LF</td>
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<tr>
<td>ECB</td>
<td>1.00 SY/LF</td>
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<tr>
<td>Filter Fabric</td>
<td>Varies</td>
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Use with AML 21-70-3 & 70-30-1
- GEO-GRID SHALL ONLY BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10% AND NOT ON BEDROCK.
- INSTALL GABION ANCHORS (21-70-3) ON ALL SLOPES >10%.
- PLACE FILTER FABRIC BETWEEN ROCK AND SOIL CONTACT ON SIDES.
- USE CONCRETE HEADWALL WHEN GABION DITCHES TIE INTO A PIPE. BASE OF HEADWALL EXTENDS 1' BELOW BASE OF GABION.

![Diagram of Gabion Ditch](image)

<table>
<thead>
<tr>
<th>6' FB DITCH</th>
<th>8' FB DITCH</th>
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<tr>
<td>GABION</td>
<td>1.70 CY/LF</td>
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<tr>
<td>GEO-GRID</td>
<td>2.70 SY/LF</td>
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<tr>
<td>CLASS II BACKFILL</td>
<td>1.80 TON/LF</td>
</tr>
<tr>
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<td>1.00 SY/LF</td>
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<tr>
<td>FILTER FABRIC</td>
<td>2.5 SY/LF</td>
</tr>
<tr>
<td>GABION</td>
<td>1.80 CY/LF</td>
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<tr>
<td>GEO-GRID</td>
<td>3.50 SY/LF</td>
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<td>1.00 SY/LF</td>
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<tr>
<td>FILTER FABRIC</td>
<td>2.5 SY/LF</td>
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USE WITH AML 21-70-3 & 70-30-1

GABION DITCH- RECTANGULAR 6' & 8' FLAT BOTTOM (AML 21-40-5)
CONCRETE DITCH- SWALE (AML 21-50-1)

NOTES:
1. ESTIMATE 0.032 CYD CLASS "A" CONCRETE PER LF OF DITCH AND 0.060 CYD CLASS "A" CONCRETE PER ANCHOR BASED ON MINIMUM DIMENSIONS SHOWN. ALL CONCRETE HAS FIBER REINFORCEMENT.
2. IF THE CONTRACTOR ELECTS TO USE A CONSTRUCTION JOINT IN THE POURING OF THE PAVED DITCH, IT SHALL BE CONSTRUCTED AS SHOWN.
3. ANY LENGTH OF LONGITUDINAL REINFORCEMENT STEEL WILL BE PERMITTED PROVIDED A 1"-0" LAP IS USED IN THE SPLICE. ADEQUATE TIES AT THE SPLICE SHALL BE REQUIRED.

END ANCHOR

INTERMEDIATE
ANCHOR

SECTION A-A

NO. 4 TIE BARS SPACED 6" O.C.

NO. 4 BARS SPACED 1"-0"
O.C. LONGITUDINALLY AND TRANSVERSELY THROUGHOUT THE SECTION. (IN ADDITION TO ANCHOR STEEL).

SECTION B-B

TIE BAR SECTIONAL VIEW

SECTION C-C

APPARENT STEEL QUANTITIES FOR MINIMUM SECTION SHOWN

<table>
<thead>
<tr>
<th></th>
<th>END ANCHOR (EACH)</th>
<th>8.90 LBS.</th>
<th>CONSTRUCTION JOINTS (EACH)</th>
<th>6.68 LBS.</th>
<th>INTERMEDIATE ANCHORS (EACH)</th>
<th>8.90 LBS.</th>
<th>BARS PER SQ. YD. OF DITCH</th>
<th>12.47 LBS.</th>
</tr>
</thead>
</table>

KYCNAL 10-2013
CONCRETE DITCH- TRAPEZOIDAL (AML 21-50-2)

NOTES:
1. ESTIMATE 0.080 CYD CLASS A CONCRETE PER LINEAR FOOT OF DITCH AND 0.398 CYD CONCRETE PER ANCHOR BASED ON MINIMUM DIMENSIONS SHOWN ON THIS DRAWING.
2. THE SECTION SHOWN WITHIN THE MINIMUM DIMENSION IS ESTIMATED AT 0.72 SQ. YD. PER LF.
3. ANY LENGTH OF LONGITUDINAL REINFORCING STEEL WILL BE PERMITTED PROVIDED SUFFICIENT SPLICE IS USED (SEE "STEEL" SECTION OF AML TECHNICAL SPECIFICATIONS).
4. USE CLASS A (3,500 PSI) CONCRETE WITH FIBER REINFORCEMENT.
CONSTRUCTION JOINTS SHALL BE PLACED A MINIMUM OF 10’ & A MAXIMUM OF 20’. SEE "STEEL" SECTION OF AML TECHNICAL SPECIFICATION FOR BAR SPLICES & EMBEDMENT INFORMATION. INSERT WEEP HOLES AT CONSTRUCTION JOINTS.

ALL STEEL REINFORCEMENT SHALL BE 60 KSI. ALL CONCRETE IS 4,000 PSI WITH FIBER REINFORCEMENT. SECURITY ANCHORS ARE INCIDENTAL. DON'T WELD GRATES CLOSED. ALL REBAR SHALL HAVE 2” MIN CLEARANCE.

INSTALL SIDEWALLS COMPLETELY BELOW GROUNDLINE. UNITS MAY BE PRE-CAST WITH ENGINEER'S PRIOR APPROVAL.

VEHICLE GRATE IS EQUIVALENT OF JR HOE "STANDARD" OR NEENAH R-499- TYPE A. ALL GRATES USE EMBEDDED FRAME RAIL TO SECURE GRATE TO THE TRENCH.

NON-VEHICULAR GRATE IS 1” X 3/16” BEARING BAR SIZE PLAIN BLACK PAINTED, WELDED STEEL BAR GRATING.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>&quot;U&quot; DIMENSION</th>
<th>&quot;U&quot; BAR SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0’ – 3’</td>
<td>6”</td>
<td>#4 REBAR</td>
</tr>
<tr>
<td>3.1’ – 6’</td>
<td>10”</td>
<td>#5 REBAR</td>
</tr>
</tbody>
</table>

"U" SHAPE BARS SET 18” CENTERS SEE CHART FOR SIZE

FLOWABLE FILL

CREATE NOTCH TO ALLOW FOR GRATE AND ANCHOR RAIL.

4” WEEP HOLE (NOT NEEDED UNDER DRIVEWAYS)

10” THICK ANCHOR AT INLET, OUTLET AND EVERY 50’ ALONG CHANNEL

NO. 4 BARS SET IN ANCHORS TIED TO THE "U" BAR RUNNING FROM THE DITCH TOP TO ANCHOR BOTTOM (W/ 2” CLEARANCES FROM EDGES)

USE WITH AML 24-50-1

CONCRETE DITCH- RECTANGULAR w/ GRATE (AML 21-50-3)
CONCRETE DITCH - RECTANGULAR NO GRATE (AML 21-50-4)

CONSTRUCTION JOINTS SHALL BE PLACED A MINIMUM OF 10' & A MAXIMUM OF 20'. SEE "STEEL" SECTION OF AML TECHNICAL SPECIFICATION FOR BAR SPLICES & EMBEDMENT INFORMATION. INSERT WEEP HOLES AT CONSTRUCTION JOINTS.

ALL STEEL REINFORCEMENT SHALL BE 60 KSI. ALL CONCRETE IS 4,000 PSI WITH FIBER REINFORCEMENT. SEE "STEEL" SECTION OF AML TECHNICAL SPECIFICATION FOR BAR SPLICES & EMBEDMENT INFORMATION. ALL REBAR SHALL HAVE 2" MIN CLEARANCE.

INSTALL SIDEWALLS COMPLETELY BELOW GROUNDLINE.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>&quot;T&quot; DIMENSION</th>
<th>&quot;U&quot; BAR SIZE</th>
</tr>
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<tbody>
<tr>
<td>0' - 3'</td>
<td>6&quot;</td>
<td>#4 REBAR</td>
</tr>
<tr>
<td>3.1' - 6'</td>
<td>10&quot;</td>
<td>#5 REBAR</td>
</tr>
</tbody>
</table>

10" THICK ANCHOR AT INLET, OUTLET AND EVERY 50' ALONG CHANNEL

NO. 4 BARS SET IN ANCHORS TIED TO THE "U" BAR RUNNING FROM THE DITCH TOP TO ANCHOR BOTTOM (W/ 2" CLEARANCES FROM EDGES)

"U" SHAPE BARS SET 18" CENTERS SEE CHART FOR SIZE

NO. 2 BACKFILL (NOT FULLY SHOWN)

HORIZONTAL #5 REBAR 12" CC (MAX)

3/4" CHAMFER

4" WEEP HOLE

3/4" CHAMFER
USE OF HOE RAM MAY BE REQUIRED ON ROCK DITCHES. ENGINEER MAY SPECIFY DIFFERENT DIMENSIONS DURING CONSTRUCTION.
NOTES:
1. SPACING OF ANCHORS SHALL BE AT ALL TRANSVERSE SEAMS AND 100’ MAX INTERVALS.
2. TWO HAYBALES SHALL BE PLACED ON EACH SIDE AT ALL ANCHOR LOCATIONS
3. SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.
NOTES:

1. SPACING OF ANCHORS SHALL BE AT ALL TRANSVERSE SEAMS AND 100' MAX INTERVALS UNLESS STATED OTHERWISE ON THE DESIGN PLANS OR SPECIAL CONDITIONS.

2. SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.

CLASS II AGGREGATE RISES NO MORE THAN ½ DITCH DEPTH

0.25 TON / ANCHOR (2' F.B.)
0.50 TON / ANCHOR (4' F.B.)

ECB ANCHOR- FB DITCH SEAMS (AML 21-70-2)
**GABION DITCH ANCHORS - (AML 21-70-3)**

- **Excavation Limits**
- **6' Typical**
- **Ditch Width**
- **Compacted Fill**
- **ECB (Type A)**
- **3' x 3' Baskets**

**Notes:**
- Medium weight non-woven filter fabric
- 18" thick gabion mat as directed by engineer
- 1' thick base mattress anchor size varies
- Join baskets and overlap lid of one basket, lace securely, deforming baskets where necessary.

**Gabion Anchors:**
Gabion anchors may be used in all types of gabion ditches and in rock ditches as directed by the engineer.
**PLACED EDGES**
MIN 1’ INTO
NATURAL GROUND

**HOOKS/BOLTS FOR HANDLING**

**PLACE EDGES MIN. 1’**
INTO NATURAL GROUND

**VARIES WITH**
DITCH DEPTH

**VARIES, AT LEAST 75% OF FB DITCH WIDTH**

**USE 3,500 PSI CONCRETE WITH FIBER**
REINFORCEMENT AND NO. 4 BARS SET ON
12” CENTERS IN MIDDLE W/ 2” CLEARANCE
FROM EDGES

**6” ABOVE FLOWLINE OF DITCH**

**DITCH DEPTH**

**BURIED 2’ BELOW DITCH BASE**

**TOP DITCH WIDTH + 2’ ON EACH SIDE**

---

**NOTE:** WHEN USED IN GABION DITCHES PUT HOOKS/BOLTS ON DOWNSTREAM FACE IN ORDER TO ATTACH GABIONS (MINIMUM OF 4 HOOKS/BOLTS).

PLACE EDGES INTO NATURAL GROUND OR PAST EDGES OF GABION BASKETS. INSERT REBAR INTO SIDES AND CAST ADDITIONAL CONCRETE ON EDGES TO EXTEND IF NECESSARY TO FIT PRECAST PIECES INTO NATURAL GROUND.
FOLLOW CROSS-SECTIONS WHEN AVAILABLE

CLASS III BACKFILL

BASE SLOPED ON 2–3\% DOWN ANGLE TO BACK

NO STEEPER THAN 1:1 ROCK CUT
1.5:1 SOIL CUT

MEDIUM WEIGHT NON-WOVEN FILTER FABRIC ON SOIL-ROCK INTERFACE

12–15'
FOLLOW CROSS-SECTIONS WHEN AVAILABLE

EXISTING GROUNDLINE

FINISHED GRADE LINE

2' COMPACTED EARTHEN BACKFILL ENGINEER MAY REQUEST ROCK TO SURFACE INSTEAD OF EARTH CAP

10:1

VARIES

CLASS II

MEDIUM WEIGHT NON-WOVEN FILTER FABRIC BETWEEN AGGREGATE AND SOIL INTERFACE

INTERPOLATED ROCKLINE

8" DUAL WALL HDPE PIPE MAY BE INCLUDED

KEY INTO SOLID ROCK

SHEAR KEY (AML 22-10-2)
FOLLOW CROSS-SECTIONS WHEN AVAILABLE

CLASS III BACKFILL

NO STEEPER THAN 1:1 ROCK CUT
1.5:1 SOIL CUT

FINISHED GRADELINE

VARIES

CLASS II BACKFILL

MEDIUM WEIGHT NON-WOVEN FILTER FABRIC BETWEEN AGGREGATE AND SOIL INTERFACE

8" DUAL WALL HDPE PIPE MAY BE INCLUDED

KEY INTO SOLID ROCK

INTERPOLATED ROCKLINE

COMBINATION ROCK TOE BUTTRESS & SHEAR KEY (AML 22-10-3)
ROCK CORE DRAIN (AML 22-20-1)

<table>
<thead>
<tr>
<th>SIDE SLOPE</th>
<th>CLASS II/III</th>
<th>FILTER FABRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>3.1 TON/LF</td>
<td>4.7 SY/LF</td>
</tr>
<tr>
<td>2:1</td>
<td>4.0 TON/LF</td>
<td>7.2 CY/LF</td>
</tr>
</tbody>
</table>
NOTES:

1. EXCAVATION SHALL BE CONSIDERED INCIDENTAL FOR SUBDRAINS INSTALLED TO 3 FT DEEP. FOR SUBDRAINS DEEPER THAN 3 FT, EXCAVATION SHALL BE INCLUDED FOR PAYMENT AS EARTHWORK.
2. USE SOCK PIPE FOR ALL DEPTHS.
3. WHEN SWITCHING FROM PERFORATED TO NON–PERFORATED PIPE USE A SUBDRAIN COLLAR (AML 21–30–2)
4. SET PIPE ON MINIMUM OF 1% GRADE. RAISE THE PIPE IF NECESSARY TO MAINTAIN GRADE. THE ROCK CORE OF THE SUBDRAIN IS STILL TIED INTO BEDROCK.
5. THE CONSTRUCTION DRAWINGS, NOTES, SPECIAL CONDITIONS MAY REQUIRE A LARGE DIAMETER PIPE THAN SHOWN, THE LARGER PIPE IS STILL INCIDENTAL TO THE SUBDRAIN.

---

[Diagram of subdrain with dimensions and materials listed in the text above.]
SUBDRAIN COLLARS JOIN PERFORATED AND NON-PERFORATED PIPE.

CLASS A CONCRETE W/ FIBER REINFORCEMENT

FLOWLINE

SUBDRAIN COLLAR (AML 22-30-2)
SEE ECB DITCH DETAIL
SEE SUBDRAIN DETAIL

SEE AML 22-30-1

SEE THE DITCH AND SUBDRAIN DETAILS FOR SPECIFIC INFORMATION. SEPARATE BID ITEMS.

COMBINATION ECB DITCH-DRAIN (AML 22-30-3)
SEE AML 21-20-1 OR 2

NO FILTER FABRIC BETWEEN DITCH AND SUBDRAIN

SEE ROCK DITCH DETAIL

SEE SUBDRAIN DETAIL

SEE AML 22-30-1

NO GEO-GRID OR FILTER FABRIC ALONG INTERFACE

ROCK

SEE THE DITCH OR SUBDRAIN DETAIL FOR SPECIFIC INFORMATION. SEPARATE BID ITEMS.

COMBINATION ROCK DITCH-DRAIN (AML 22-30-4)
COMBINATION CONCRETE BLOCK- TIED MAT & DRAIN (AML 22-30-5)

SEE THE DITCH AND SUBDRAIN DETAILS FOR SPECIFIC INFORMATION.

SEPARATE BID ITEMS.
CONCRETE HEADWALLS- CIRCULAR STANDARD & "ELL" (AML 23-10-1)

NOTES

1. THE "H" DIMENSION AND/OR ANGLE OF INTERSECTION BETWEEN THE WALLS MAY BE VARIED ON CONSTRUCTION.
2. VOLUME BASED ON VALUES OF 18" ON EARTH AND 12" ON ROCK.
3. FINISH BY FLOATING
4. CIRCULAR PIPE INCLUDES SLIGHTLY ELLIPTICAL CONCRETE PIPE WITH CIRCULAR REINFORCEMENT.
5. ALL HEADWALLS USE 3,500 PSI CONCRETE WITH FIBER REINFORCEMENT.
6. HEADWALLS FOR 48" DIA. AND LARGER PIPES INCLUDE NO. 4 REBAR SET ON 12" CENTERS VERTICALLY AND HORIZONTALLY WITH MIN. 2" CLEARANCE FROM EDGES.
7. USE 9" FOR PIPES <48" DIA., USE 12" FOR 48" AND LARGER DIA. PIPES

USE WITH AML 23-10-3, 23-10-11

CONCRETE HEADWALLS- CIRCULAR STANDARD & "ELL" (AML 23-10-1)
1. THE DIMENSION AND/OR ANGEL OF INTERSECTION BETWEEN THE WALLS MAY BE VARIED ON CONSTRUCTION.
2. VOLUME BASED ON VALUES OF 18" ON EARTH, 12" ON ROCK.
3. FINISH BY FLOATING CONCRETE
4. ALL CONCRETE IS 3,500 PSI W/ FIBER REINFORCEMENT.

CONCRETE HEADWALLS- ELLIPTICAL STANDARD & "ELL" (AML 23-10-2)
# Dimensions and Quantities for Circular Pipes

<table>
<thead>
<tr>
<th>HEADWALL TYPE</th>
<th>PIPE DIA</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>CUBIC YARDS CONCRETE PER HEADWALL</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>EARTH</td>
</tr>
<tr>
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<td>6'-9&quot;</td>
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<td>14'-6&quot;</td>
<td>6.72</td>
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# Dimensions and Quantities for Non-Circular Pipes

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<thead>
<tr>
<th>TYPE</th>
<th>CIRCULAR EQUI. DIA.</th>
<th>RCP ELLIPTICAL</th>
<th>CMP ARCH</th>
<th>SIZE OF PIPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>CUBIC YARDS CONCRETE PER HEADWALL</th>
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<tbody>
<tr>
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<td>EARTH</td>
</tr>
<tr>
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<td>1'-3&quot;</td>
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<td>4'-6&quot;</td>
<td>2'-11&quot;</td>
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<tr>
<td></td>
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<td>30&quot; X 19&quot;</td>
<td>28&quot; X 20&quot;</td>
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<td>1'-3&quot;</td>
<td>4'-10&quot;</td>
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CONCRETE HEADWALLS- U-TYPE (AML 23-10-4)

DIMENSIONS AND QUANTITIES

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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>CU. YD. CONC. FOR 1 HEADWALL</th>
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</tr>
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<td>1'</td>
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<td>6'</td>
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<td>2'</td>
<td>0&quot;</td>
<td>4'</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

NOTES

1. VOLUME DISPLACED BY BARREL OF PIPE NEED TO BE COMPUTED USING INSIDE DIAMETER OF PIPE.
2. ALL CONCRETE IS 3,500 PSI W/ FIBER REINFORCEMENT.
CONCRETE HEADWALLS- 12"-27" SLOPED & PARALLEL (AML 23-10-5)

- NOTES -

REINFORCING STEEL: GRADE 60, EVENLY SPACED
CONCRETE: 3,500 PSI

1. 12 - NO. 4 X 1'-0" DOWEL BARS.
2. 2 - NO. 4 X (R DIMENSION MINUS 4").
3. SLOPES SHALL BE WARPED TO FIT HEADWALL WHEN PIPE IS SKEWED AND/OR NORMAL SLOPE VARIES FROM 4:1.
4. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL SHALL REMAIN VERTICAL.
5. DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY SLIGHTLY FOR METAL PIPE.

PLAN VIEW

SECTION A-A

OBLIQUE VIEW

PLAN VIEW OF STRUCTURE LOCATIONS

<table>
<thead>
<tr>
<th>DIA. OF PIPE</th>
<th>SHAPE</th>
<th>DIMENSIONS</th>
<th>CLASS</th>
<th>REINF. STEEL</th>
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<td></td>
<td>H</td>
<td>R</td>
<td>L</td>
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<td>O</td>
<td>2'-8&quot;</td>
<td>2'-8&quot;</td>
<td>7'-4&quot;</td>
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<td>15&quot;</td>
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<td>2'-10&quot;</td>
<td>3'-0&quot;</td>
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<tr>
<td></td>
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<td>3'-3&quot;</td>
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<tr>
<td>18&quot;</td>
<td>O</td>
<td>3'-1&quot;</td>
<td>3'-3&quot;</td>
<td>9'-6&quot;</td>
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<td>O</td>
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<td>3'-9&quot;</td>
<td>8'-3&quot;</td>
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<td></td>
<td>O</td>
<td>3'-5&quot;</td>
<td>3'-7&quot;</td>
<td>10'-7&quot;</td>
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CONCRETE HEADWALLS- 12"-27" SLOPED & FLARED (AML 23-10-6)

### PIPE

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<tr>
<th>DA. OR SHAPE</th>
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<th>CLASS</th>
<th>REINF. STEEL</th>
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<td>1.50</td>
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### NOTES

1. DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY INSIGNIFICANTLY FOR CORRUGATED METAL PIPE.
2. REINFORCING STEEL 60 KSI, EVENLY SPACED; CONCRETE 3,500 PSI
3. 5 – NO. 4 x 1'-0" DOWEL BARS.
4. 2 – NO. 4 x (E DIMENSION MINUS 4').
5. SLOPES SHALL BE WRAPPED TO FIT HEADWALL WHEN PIPE IS SKewed AND/OR NORMAL SLOPE VARIES FROM 2:1.
6. VOLUME DISPLACED BY PIPE COMPUTED USING INSIDE DIAMETER OF PIPE.
7. WING ANGLES AND/OR DIMENSIONS MAY BE ALTERED DURING CONSTRUCTION TO ACCOMMODATE FLOW OF WATER.
8. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL SHALL REMAIN VERTICAL.
9. HEADWALLS ARE FOR CIRCULAR, ARCH, AND HORIZONTAL ELLIPTICAL 12" - 27" EQUIVALENT PIPE SIZES.

USE WITH AML 23-10-11
CONCRETE HEADWALLS - ≥30" SLOPED & FLARED (AML 23-10-7)

1. Dimensions from face of concrete to steel shall be 2" clear distance.
2. Encircled letters (.) indicate steel bar locations.
3. Bars (b), (c), (a), (p), (m), (v) are spaced 1'-0" O.C. All other bars shall be evenly spaced.
4. Bars (b) and (v) are placed in order of increasing lengths, beginning at the end of each wing.
5. Bars (c) are placed in order of increasing lengths, beginning at the top of each wing.
6. Apron between wings shall be sloped in direction of flow equal to slope of pipe. Front face of headwall and ends of wings shall remain vertical.
7. Concrete - 3,500 psi; Steel - 60 ksi.

USE WITH AML 23-10-8, 9, 11
### CIRCULAR & NON-CIRCULAR HEADWALL DIMENSIONS

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>DIAMETER OF PIPE</th>
<th>DIMENSION</th>
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<tr>
<td>A</td>
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<td>4'-11&quot;</td>
</tr>
<tr>
<td>B</td>
<td>1'-3&quot;</td>
<td>1'-6&quot;</td>
</tr>
<tr>
<td>C</td>
<td>3'-6&quot;</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>E</td>
<td>3'-1&quot;</td>
<td>3'-8&quot;</td>
</tr>
<tr>
<td>F</td>
<td>4'-4&quot;</td>
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<td>H</td>
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<td>J</td>
<td>3'-9&quot;</td>
<td>4'-4&quot;</td>
</tr>
<tr>
<td>M</td>
<td>0'-5&quot;</td>
<td></td>
</tr>
<tr>
<td>T</td>
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<td>0'-4.0&quot;</td>
</tr>
<tr>
<td>V</td>
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<td>W</td>
<td>0'-8&quot;</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>Y</td>
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<td></td>
</tr>
<tr>
<td>Z</td>
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</tr>
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</table>

**Cement:**

- 3.36 for 30" Headwalls
- 4.3 for 36" Headwalls
- 6.53 for 48" Headwalls
- 9.22 for 60" Headwalls

**Steel:**

- 281 lbs for 30" Headwalls
- 363 lbs for 36" Headwalls
- 496 lbs for 48" Headwalls
- 687 lbs for 60" Headwalls

**NOTES:**

1. NO. = NUMBER OF BARS IN ONE HEADWALL.
2. DIMENSIONS ARE 0. TO 0. OF BARS.
3. ALL BARS ARE STRAIGHT EXCEPT THOSE SHOWN BELOW.

---

**Use with AML 23-10-7**
### CONCRETE HEADWALLS - ≥30" SLOPED & FLARED REINFORCEMENT (AML 23-10-9)

#### REINFORCEMENT FOR CIRCULAR PIPES

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</tr>
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<td>4</td>
<td>3</td>
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</tr>
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<td>4</td>
<td>2</td>
<td>3'-10&quot;</td>
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<td>H</td>
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</tr>
<tr>
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<td>4</td>
<td>6</td>
<td>4'-2&quot;</td>
</tr>
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<td>4</td>
<td>2</td>
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</tr>
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#### REINFORCEMENT FOR CIRCULAR PIPES - 60"

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#### REINFORCEMENT FOR NON-CIRCULAR PIPES

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</tr>
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<td>2</td>
<td>7'-5&quot;</td>
</tr>
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<td>F</td>
<td>4</td>
<td>3</td>
<td>1'-3&quot;</td>
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</tr>
<tr>
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<td>4</td>
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<tr>
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<td>3'-5&quot;</td>
</tr>
<tr>
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</tr>
<tr>
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<td>4</td>
<td>2</td>
<td>5'-7&quot;</td>
</tr>
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<td>C4</td>
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</tr>
<tr>
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#### REINFORCEMENT FOR NON-CIRCULAR PIPES - 36"

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<td>C3</td>
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<td>9'-6&quot;</td>
</tr>
<tr>
<td>F</td>
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<td>7</td>
<td>1'-3&quot;</td>
</tr>
<tr>
<td>G1</td>
<td>4</td>
<td>1</td>
<td>5'-4&quot;</td>
</tr>
<tr>
<td>G2</td>
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<td>5'-7&quot;</td>
</tr>
<tr>
<td>R</td>
<td>4</td>
<td>6</td>
<td>0'-10&quot;</td>
</tr>
<tr>
<td>V1</td>
<td>5</td>
<td>4</td>
<td>3'-5&quot;</td>
</tr>
<tr>
<td>V2</td>
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</tr>
<tr>
<td>V3</td>
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#### USE WITH AML 23-10-7

KY DML 12-2014
GENERAL NOTES:
1. ALL CONCRETE IS 3,500 PSI (MIN.) WITH FIBER REINFORCEMENT.
2. STEEL REINFORCEMENT IS 60 KSI STRENGTH
3. MINIMUM 2” CLEAR DISTANCE OVER REINFORCING STEEL
4. ¾” CHAMFER ON ALL EXPOSED SURFACES

<table>
<thead>
<tr>
<th>PIPE DIA.</th>
<th>NO. OF DISSIPATORS</th>
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</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>1</td>
</tr>
<tr>
<td>15&quot;</td>
<td>3</td>
</tr>
<tr>
<td>18&quot;</td>
<td>5</td>
</tr>
<tr>
<td>24&quot;+</td>
<td>5</td>
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</table>

PLAN VIEW

FRONT VIEW

SECTION A-A

CULVERT HEADWALL- DISSIPATERS (AML 23-10-10)
CONCRETE HEADWALLS- 18"-24" MULTIPLE BARREL (AML 23-20-1)

DOUBLE PIPE ELEVATION VIEW

TRIPLE PIPE ELEVATION VIEW

DIMENSIONS AND QUANTITIES

<table>
<thead>
<tr>
<th>TYPE</th>
<th>PIPE DIA.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>CUBIC YARDS CONCRETE PER 2 HEADWALLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD DOUBLE</td>
<td>18&quot;</td>
<td>1'-9&quot;</td>
<td>1'-3&quot;</td>
<td>4'-6&quot;</td>
<td>3'-0&quot;</td>
<td>10'-5&quot;</td>
<td>10 3/4&quot;</td>
<td>3'-9&quot;</td>
<td>4.18</td>
</tr>
<tr>
<td></td>
<td>24&quot;</td>
<td>1'-10&quot;</td>
<td>1'-4&quot;</td>
<td>5'-0&quot;</td>
<td>3'-6&quot;</td>
<td>12'-6&quot;</td>
<td>10 3/4&quot;</td>
<td>4'-6&quot;</td>
<td>5.65</td>
</tr>
<tr>
<td>STANDARD TRIPLE</td>
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<td>1'-9&quot;</td>
<td>1'-3&quot;</td>
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<td>3'-0&quot;</td>
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<td>10 3/4&quot;</td>
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<tr>
<td></td>
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<td>16'-0&quot;</td>
<td>10 3/4&quot;</td>
<td>4'-6&quot;</td>
<td>6.68</td>
</tr>
</tbody>
</table>

NOTES:

1. USE 3,500 PSI CONCRETE WITH FIBER REINFORCEMENT.

2. VOLUME DISPLACED BY BARREL OF PIPE HAS BEEN COMPUTED USING INSIDE DIAMETER OF PIPE. NO DEDUCTION HAS BEEN MADE FOR BEVELED EDGES.

3. WHEN HEADWALLS ARE LOCATED AT THE EDGE OF SHOULDERS, THE TOP OF THE HEADWALLS SHALL BE PARALLEL TO THE EDGE OF THE SHOULDER.

4. CAST IN PLACE UNLESS APPROVED OTHERWISE BY THE ENGINEER.

SECTION A-A

USE WITH AML 23-10-11
1. Encircled letters (C) indicate steel bar locations.
2. Bars C, G, H, are spaced 1'-0" O.C. All other bars shall be evenly spaced.
3. Bars C are placed in order of increasing lengths, beginning at the end of each wing.
4. Bars C are placed in order of increasing lengths, beginning at the top of each wing.
5. Headwalls located at edge of shoulder shall be parallel to centerline of the road.
6. Apron between wings shall be sloped in direction of flow equal to slope of pipe. Front face of headwall and ends of wings shall remain vertical.
7. Dimensions from face of concrete to steel shall be 2" clear distance.
8. Cast in place unless approved otherwise by the engineer.
9. Concrete = 3,500 psi; steel = 80 ksi

Concrete Headwall - 30"-48" Double Barrel (AML 23-20-2)
CONCRETE HEADWALLS- 30"-48" TRIPLE BARREL (AML 23-20-3)

USES WITH AML 23-20-4 & 23-20-5

NOTES:
1. ENCIRCLED LETTERS, ○, INDICATE STEEL BAR LOCATIONS.
2. BARS ○○○ ARE SPACED 1'-0" O.C. ALL OTHER BARS SHALL BE EVENLY SPACED.
3. BARS ○○○ ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE END OF EACH WING.
4. BARS ○○○ ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE TOP OF EACH WING.
5. HEADWALLS LOCATED AT EDGE OF SHOULDER SHALL BE PARALLEL TO CENTERLINE OF THE ROAD.
6. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL AND ENDS OF WINGS SHALL REMAIN VERTICAL.
7. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR DISTANCE.
8. CAST IN PLACE UNLESS APPROVED OTHERWISE BY THE ENGINEER.
9. CONCRETE—3,500 PSI, STEEL 60ksi
## Dimensions for Multiple Pipe Headwalls

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>DOUBLE</th>
<th></th>
<th></th>
<th></th>
<th>TRIPLE</th>
<th></th>
<th></th>
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<th>DIMENSION</th>
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<tbody>
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<td>48&quot;</td>
<td>30&quot;</td>
<td>36&quot;</td>
<td>48&quot;</td>
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<td>5'-6&quot;</td>
</tr>
<tr>
<td>A</td>
<td>3'-9&quot;</td>
<td>4'-4&quot;</td>
<td>5'-6&quot;</td>
<td>3'-9&quot;</td>
<td>4'-4&quot;</td>
<td>5'-6&quot;</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
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<td>1'-6&quot;</td>
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<td>B</td>
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<td>1'-6&quot;</td>
</tr>
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<td>4'-0&quot;</td>
<td>5'-1&quot;</td>
<td>C</td>
<td>7'-2&quot;</td>
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<td>5'-0&quot;</td>
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<td>5'-0&quot;</td>
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<td>13'-0&quot;</td>
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<td>18'-0&quot;</td>
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<td>H</td>
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<td>FOR 2 HEADWALLS</td>
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</table>

Dimensions and quantities are based on concrete pipe and will vary slightly for corrugated metal pipe.

**NOTES:**

1. Dimensions are 0. to 0. of bar
2. All bars are straight except those shown below

**Bent Bar Shapes**

- **K**
- **E**
- **F**
- **H**

**Use with AML 23-20-2 & AML 23-20-3**

**Concrete Headwall - Multiple Pipe Dimensions (AML 23-20-4)**
# Concrete Headwalls - Multiple Pipe Reinforcement

## Reinforcement for Double Barrel

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<td>2'4&quot;</td>
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<tr>
<td>C2</td>
<td>4</td>
<td>2</td>
<td>4'2&quot;</td>
<td></td>
</tr>
<tr>
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<tr>
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<td>4</td>
<td>6</td>
<td>5'1&quot;</td>
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## Reinforcement for Triple Barrel

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<td>2'4&quot;</td>
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</tr>
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<td>3'5&quot;</td>
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<tr>
<td>N</td>
<td>4</td>
<td>6</td>
<td>4'2&quot;</td>
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<tr>
<td>Q</td>
<td>4</td>
<td>2</td>
<td>11'1&quot;</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>4</td>
<td>12</td>
<td>0'8&quot;</td>
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</tr>
<tr>
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<td>5</td>
<td>4</td>
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<td>1'10&quot;</td>
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<tr>
<td>V2</td>
<td>5</td>
<td>4</td>
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## Reinforcement for Single Barrel

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<tr>
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<tr>
<td>C1</td>
<td>4</td>
<td>2</td>
<td>2'4&quot;</td>
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<td>4</td>
<td>2</td>
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<tr>
<td>E1</td>
<td>5</td>
<td>2</td>
<td>10'6&quot;</td>
<td>7'6&quot;</td>
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<tr>
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<tr>
<td>F</td>
<td>4</td>
<td>8</td>
<td>1'3&quot;</td>
<td>0'4&quot;</td>
</tr>
<tr>
<td>G1</td>
<td>4</td>
<td>2</td>
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<td></td>
</tr>
<tr>
<td>G2</td>
<td>4</td>
<td>3</td>
<td>10'0&quot;</td>
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<tr>
<td>H</td>
<td>4</td>
<td>6</td>
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<td>3'5&quot;</td>
</tr>
<tr>
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<td>6</td>
<td>4'2&quot;</td>
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<td>5</td>
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<td>2'10&quot;</td>
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</table>

*Use with AML 23-20-2 & AML 23-20-3

Concrete Headwalls - Multiple Pipe Reinforcement (AML 23-20-5)
END ANCHOR FOR 30'' - 72'' PIPE (AML 23-20-6)
CMP JOINTS (AML 23-40-1)

CONTINUOUS CORRUGATION AROUND BAND
BAR AND STRAP CONNECTOR

HUGGER JOINT

2.66" 2"

ROLLED END OF PIPE

JOINT CROSS SECTION
O-RING GASKETS MAY BE PROVIDED FOR SPECIAL APPLICATIONS

10.5"

6" BAND BOLD GALVANIZED, 1/2" DIA
SPOT OR ARC WELD STRAP TO BAND
GALVANIZED FORGED STEEL BAR
HUGGER BAND
BAR AND STRAP CONNECTOR

SPOT WELD LOCK IN PLACE
## INTERMEDIATE AND END CULVERT ANCHOR (AML 23-40-2)

### Intermediate Anchor for Pipe (3,500 PSI Concrete)

<table>
<thead>
<tr>
<th>% Grade</th>
<th>12&quot;</th>
<th>15&quot;</th>
<th>18&quot;</th>
<th>24&quot;</th>
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<th>36&quot;</th>
<th>45&quot;</th>
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<td>10</td>
<td>0.72</td>
<td>0.91</td>
<td>1.13</td>
<td>1.66</td>
<td>2.38</td>
<td>3.24</td>
<td>4.33</td>
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<td>4.78</td>
<td>6.34</td>
<td>10.38</td>
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### DMD

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<tr>
<th>L</th>
<th>2-4&quot;</th>
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<th>2-9&quot;</th>
<th>3-8&quot;</th>
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<th>5-10&quot;</th>
<th>7-0&quot;</th>
<th>8-2&quot;</th>
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</thead>
<tbody>
<tr>
<td>H</td>
<td>1-6&quot;</td>
<td>1-6&quot;</td>
<td>2-0&quot;</td>
<td>2-0&quot;</td>
<td>2-0&quot;</td>
<td>2-0&quot;</td>
<td>2-0&quot;</td>
<td>2-0&quot;</td>
<td>2-0&quot;</td>
</tr>
</tbody>
</table>

### Volume (CUDS)

| On Earth | 0.13 | 0.15 | 0.16 | 0.16 | 0.20 | 0.24 | 0.26 | 0.28 | 0.31 |
| On Rock  | 0.09 | 0.10 | 0.10 | 0.10 | 0.13 | 0.17 | 0.20 | 0.23 | 0.26 |

**NOTES:**
1. Circular pipe includes slightly elliptical concrete pipe with circular reinforcement.
2. Volume displaced by barrel of pipe has been computed using inside diameter dimensions of pipe.
3. For grade breaks in pipe, use average grade to calculate volumes.

---

**END ANCHOR FOR PIPE OUTLET**

**INTERMEDIATE ANCHOR**
1. 85% COMPACTED DGA IN LAYERS 6” OR LESS TO WIDTH AND ELEVATION AS SHOWN W/ MECHANICAL TAMPERS OR COMPACTORS.
2. 95% COMPACTED DGA IN LAYERS 6” OR LESS W/ MECHANICAL TAMPERS OR COMPACTORS.
3. UNCOMPACTED DGA TO WIDTH AND ELEVATION SHOWN.
4. FLOWABLE FILL SHALL BE USED ON ALL PAVED ROADS. HDPE PIPE MUST BE ANCHORED WITH GUY WIRE ANCHORS AND STRAPS OR EQUIVALENT PRIOR TO PLACING FLOWABLE FILL.
1. UNCOMPACTED DENSE GRADE AGGREGATE (DGA) TO WIDTH AND ELEVATION SHOWN
2. 95% COMPACTED DGA IN LAYERS 6” OR LESS TO WIDTH AND ELEVATION AS SHOWN W/ MECHANICAL TAMPER OR COMPACTORS
3. 85% COMPACTED DGA IN LAYERS 6” OR LESS TO WIDTH AND ELEVATION AS SHOWN W/ MECHANICAL TAMPER OR COMPACTORS
4. ANCHORED HDPE & RHDPE WITH GUY WIRE ANCHORS AND STRAPS OR EQUIVALENT IF FLOWABLE FILL IS USED INSTEAD OF DGA. ANCHOR PRIOR TO PLACING FLOWABLE FILL.
5. USE FLOWABLE FILL ON ALL PAVED ROADS WITH REINFORCED CONCRETE PIPE (SEE DETAIL 50-10-4).
PIPE TYPES:

CMP: CORRUGATED STEEL PIPE WITH HELICAL LOCK SEAM OR HELICAL WELDED SEAM (KYTC DEPT OF HIGHWAY'S "CSPHS")

PVC: POLYVINYL CHLORIDE

HDPE: HIGH DENSITY POLYETHYLENE PIPE (SMOOTH INTERIOR, CORRUGATED OUTER WALL)

RCP: CIRCULAR REINFORCED CONCRETE PIPE

FF: FLOWABLE FILL REQUIRED

CMP ARCH: CORRUGATED STEEL PIPE ARCH (ANNULAR CORR).

RCHEP: REINFORCED CONCRETE HORIZONTAL ELLIPTICAL PIPE (NON-CIRCULAR)

NOTES:

1. GAGES FOR CORRUGATED STEEL PIPE ITEMS SHOWN ARE BASED ON ALUMINUM-COATED TYPE 2 STEEL AS PER AASHTO M-274. ALUMINUM COATED TYPE 2 STEEL IS ONLY PERMITTED IN pH RANGES OF 5-9.

2. MAXIMUM COVER HEIGHT MEASURED FROM TOP OF PIPE TO SUBGRADE ELEVATION SHALL GOVERN GAGE OF PIPE TO BE USED FOR ENTIRE LENGTH OF PIPE INSTALLATION.

3. ALL CIRCULAR STRUCTURAL PLATE SHALL BE 5% VERTICALLY ELONGATED.

4. FILL DEPTHS OVER 60' ARE TO BE SPECIALLY DESIGNED.

5. $2\frac{3}{4}'' \times \frac{3}{8}''$ CMP MEANS $2\frac{3}{4}''$ SPACING CENTERS OF CORRUGATIONS AND $\frac{3}{8}''$ MIN DEPTH OF CORRUGATION.
<table>
<thead>
<tr>
<th>Pipe Dia.</th>
<th>Pipe Type</th>
<th>CIRCULAR PIPE COVER HEIGHT IN FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot; &amp; 15&quot;</td>
<td>PVC SMOOTH WALL (SOLID WALL)</td>
<td>FF SPECIAL DESIGN</td>
</tr>
<tr>
<td>18&quot;</td>
<td>PVC RIBBED (PROFILE WALL)</td>
<td>FF SPECIAL DESIGN</td>
</tr>
<tr>
<td>24&quot;</td>
<td>PVC RIBBED (PROFILE WALL)</td>
<td>FF SPECIAL DESIGN</td>
</tr>
<tr>
<td>30&quot;</td>
<td>PVC RIBBED (PROFILE WALL)</td>
<td>FF SPECIAL DESIGN</td>
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<td>PVC RIBBED (PROFILE WALL)</td>
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<td>48&quot;</td>
<td>PVC RIBBED (PROFILE WALL)</td>
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</tr>
<tr>
<td>60&quot;</td>
<td>PVC SMOOTH INTERIOR</td>
<td>FF SPECIAL DESIGN</td>
</tr>
<tr>
<td>72&quot;</td>
<td>PVC SMOOTH INTERIOR</td>
<td>FF SPECIAL DESIGN</td>
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CIRCULAR PIPE COVER DEPTHS (AML 23-50-5)
## NON-CIRCULAR PIPE COVER DEPTHS & EQUIVALENT CIRCULAR PIPE DIAMETERS

### NON-CIRCULAR PIPE COVER HEIGHT IN FEET

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<th>EQUI. PIPE DIA.</th>
<th>Pipe Type</th>
<th>2-5</th>
<th>6</th>
<th>7</th>
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<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>15&quot;</td>
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<td>16 GA.</td>
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<tr>
<td>18&quot;</td>
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<td>24&quot;</td>
<td>2 2/3&quot; X 1/2&quot; CSPA</td>
<td>CLASS III</td>
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<td>2 2/3&quot; X 1/2&quot; CSPA</td>
<td>CLASS III</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>36&quot;</td>
<td>2 2/3&quot; X 1/2&quot; CSPA</td>
<td>CLASS III</td>
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<td></td>
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<td></td>
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<tr>
<td>42&quot;</td>
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<td>14 GA.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48&quot;</td>
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<tr>
<td>72&quot;</td>
<td>3&quot; X 1&quot; CSPA</td>
<td>14 GA.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>5&quot; X 1&quot; CSPA</td>
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<td></td>
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</table>

### EQUIVALENT CIRCULAR PIPE DIAMETER

<table>
<thead>
<tr>
<th>EQUIVALENT CIRCULAR PIPE DIAMETER</th>
<th>2 2/3&quot; X 1/2&quot; CMP ARCH</th>
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<td>15</td>
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<tr>
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<tr>
<td>2 2/3&quot; X 1/2&quot; CSPA</td>
<td>57</td>
<td>38</td>
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</tbody>
</table>

**SEE AML 23-50-4 FOR CHART KEY & NOTES**
1. DEBRIS RAILS SHOULD BE 1.25" RECTANGULAR STEEL SECTIONS SET ON 6" CENTERS.

2. SET CENTER CROSS BRACE AT ELEVATION AT LEAST \( \frac{1}{2} \) PIPE DIA. ABOVE CULVERT INVERT.

3. USE CROSS BARS ONLY ON PIPES >36" UNLESS STATED OTHERWISE ON THE DRAWINGS OR IN THE SPECIAL CONDITIONS OR WHEN DIRECTED BY ENGINEER IN WRITING.

CULVERT DEBRIS BARRIER (AML 23-60-1)
"BW" SPACING AND "H" ARE SPECIFIED ON DRAWINGS OR SPECIAL CONDITIONS.

BARRIER SCREEN MATERIALS WILL BE SPECIFIED ON THE DRAWINGS. IF NOT STATED ASSUME #8 REBAR. ALL JOINTS ARE WELDED.

THESE DEVICES SHOULD BE SET UPSTREAM OF THE CULVERT A MINIMUM DISTANCE OF 1.5 TIMES THE PIPE DIAMETER.

IN-STREAM CULVERT DEBRIS BARRIER (AML 23-60-2)
DROP BOX - INLET TYPE 1 (AML 24-10-1)

NOTES
1. 1'-5 1/4" FOR 15" PIPE
2. 1'-6 1/2" FOR 18" PIPE
2. 1'-6" MINIMUM COVER BELOW SUBGRADE.

APPROX. CONCRETE QUANTITIES

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>MIN. HEIGHT</th>
<th>CU. YDS.</th>
<th>CONC.</th>
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<tr>
<td>15&quot;</td>
<td>3'-4&quot;</td>
<td>0.90</td>
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<tr>
<td>18&quot;</td>
<td>3'-6&quot;</td>
<td>0.77</td>
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APPROXIMATE WEIGHTS

<table>
<thead>
<tr>
<th>FRAME</th>
<th>365 LBS.</th>
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<tbody>
<tr>
<td>GRATE</td>
<td>185 LBS.</td>
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</table>

NO DEDUCTIONS HAVE BEEN MADE FOR PIPE.
CONCRETE SHALL HAVE 28-DAY STRENGTH OF 4,000 PSI MIN.
1. 6:1 slopes are with reference to ditch grade.
2. When a box inlet is placed in a sag, omit the earth dike and longitudinal slope of the grate and provide a concrete apron on each side of the inlet.
3. Rate of increase or decrease 0.36 cyd per foot in height.
4. Deduct approximately 0.1 cyd of concrete per pipe.
5. Compact this volume with dga base (incidental).
6. Grate type will be specified on the drawings and/or special conditions. If none is stated then assume type 1 grate is required.

DROP BOX- INLET TYPE 2 (AML 24-10-2)
CONSTRUCTION REQUIREMENTS:
1. 6:1 SLOPES ARE WITH REFERENCE TO DITCH GRADE.
2. WHEN A BOX INLET IS PLACED IN A SAG, OMIT THE EARTH DIKE AND LONGITUDINAL SLOPE OF THE GRADE AND PROVIDE A CONCRETE APRON ON EACH SIDE OF THE INLET.
3. RATE OF INCREASE OR DECREASE 0.41 CYD PER FOOT IN HEIGHT.
4. DEDUCT APPROXIMATELY 0.2 CYD OF CONCRETE PER 30" PIPE AND 0.3 CYD OF CONCRETE PER 36" PIPE.
5. COMPACT THIS VOLUME WITH DGA BASE (INCIDENTAL).
6. GRADE TYPE WILL BE SPECIFIED ON THE DRAWINGS AND/OR SPECIAL CONDITIONS. IF NONE IS STATED THEN ASSUME TYPE 1 GRADE IS REQUIRED.

USE WITH AML 24-10-4, 24-50-1

DROP BOX- INLET TYPE 3 (AML 24-10-3)
DROP BOX - GRATES FOR INLET TYPE 2 & 3 (AML 24-10-4)
NOTES:

USE A SOLID GRATE TO CONVERT INTO A JUNCTION BOX STRUCTURE.

GRATE MUST BE INSTALLED PRIOR TO BRINGING BACKFILL TO WITHIN 2’ OF PIPE SURFACE TO PREVENT PIPE DEFLECTION.
NOTES:
1. THE MAXIMUM DEPTH OF BOX FROM FINAL GRADE TO FLOW LINE OF PIPE SHALL BE 8'-0". ANY BOX DEEPER THAN 8'-0" SHALL BE SPECIFICALLY DESIGNED.
2. BASED ON "H" AS EQUAL TO "D + T + 1'-0"
3. Q = CUBIC YARDS OF CONCRETE PER FOOT INCREASE OR DECREASE WHEN "H" VARIES FROM "D + T + 1'-0".
4. NO DEDUCTIONS HAVE BEEN MADE FOR PIPE, SEE REFERENCE CHART FOR QUANTITIES TO DEDUCT.
5. THE DIMENSIONS AND QUANTITIES HAVE BEEN CALCULATED FROM CIRCULAR RCP. WHEN NON-CIRCULAR PIPE IS USED THE BOX SHALL BE DETERMINED BY CONTROLLING DIMENSIONS OF THE PIPE.
6. FOR THIS APPLICATION THE "X" DIMENSION IS ASSUMED TO BE EQUAL TO OR GREATER THAN THE "Y" DIMENSION.
7. CONCRETE- 4,000 PSI; STEEL- 60 KSI

USE WITH AML 24-20-3 & 24-50-1

JUNCTION BOX - FRAME AND ACCESSIBLE LID (AML 24-20-1)
NOTES:

1. \( H = D + T + 1' - 0'' \) FOR THE LARGEST PIPE INVOLVED.

2. STEEL REINFORCEMENT SHALL BE #4 BARS PLACED ON 6'' CENTERS.

3. THE MAXIMUM DEPTH OF BOX FROM FINAL GRADE TO FLOW LINE OF PIPE SHALL BE 6'-0''. ANY BOX DEEPER THAN THIS SHALL BE SPECIFICALLY DESIGNED.

4. SEE AML 23-20-3 FOR DIMENSIONS AND QUANTITIES.

5. FOR THIS APPLICATION THE "X" DIMENSION IS ASSUMED TO BE EQUAL TO OR GREATER THAN THE "Y" DIMENSION.

6. THE TOP SHALL BE PRECAST.

7. CONCRETE - 4,000 PSI; STEEL - 60 KSI

JUNCTION BOX- CONCRETE TOP (AML 24-20-2)
## Junction Box Dimensions (AML 24-20-3)

### Dimensions and Estimate of Quantities

<table>
<thead>
<tr>
<th>Inlet Size</th>
<th>Pipe Q</th>
<th>Concrete</th>
<th>Reinforced Steel</th>
</tr>
</thead>
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<td>No. X Y</td>
<td>Max. Dia H</td>
<td>Cubic Yards</td>
<td>LB</td>
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<td>3 3'</td>
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</tr>
</tbody>
</table>

### Notes:
1. Based on H as equal to D+T+1'-0".
2. Q = Cubic Yards of Concrete per Foot Increase or Decrease When "H" Varies from D+T+1'-0".
3. No deductions have been made from pipe, see reference chart for quantities to deduct.
4. The dimensions and quantities have been calculated for circular RCP. When non-circular pipe is used the box size shall be determined by the controlling dimensions of the pipe.

### Reference Chart

<table>
<thead>
<tr>
<th>Dia. of Pipe</th>
<th>JUNCTION BOX ON &quot;X&quot; SIDE</th>
<th>JUNCTION BOX ON &quot;Y&quot; SIDE</th>
<th>Concrete to Deduct for Each Pipe</th>
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<tr>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>0.1 Yards</td>
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<td>2'-6&quot;</td>
<td>2'-6&quot;</td>
<td>0.2 Yards</td>
</tr>
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<td>3'-0&quot;</td>
<td>3'-0&quot;</td>
<td>0.3 Yards</td>
</tr>
<tr>
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<td>3'-6&quot;</td>
<td>3'-6&quot;</td>
<td>0.5 Yards</td>
</tr>
<tr>
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<td>4'-0&quot;</td>
<td>4'-0&quot;</td>
<td>1.0 Yards</td>
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</table>

**Use with AML 24-20-1 & 2**
NOTES

1. 12", 15", or 18" diameter pipe outlet (see pipe sections for size and type).
2. Spring box inlet type "B" may be used when fill over top is less than 10'-0".
3. Steel reinforcement placed 6' on centers.
4. "t" is concrete pipe wall thickness or metal pipe corrugation depth.

STEEL REINFORCEMENT FOR CONCRETE COVER

<table>
<thead>
<tr>
<th>NO. 3 STEEL BARS</th>
<th>QTY.</th>
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<th>TOTAL</th>
<th>LBS.</th>
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<td>A</td>
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<td>1'-0&quot;</td>
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<td>13</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>2'-5&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>3'-0&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>3'-2&quot;</td>
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CLASS "A" CONCRETE

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<th>PIPE (CU. YD.)</th>
<th>CONCRETE</th>
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<td>12&quot;</td>
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<td>15&quot;</td>
<td>0.94</td>
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<td>18&quot;</td>
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</table>

SPRING BOX- INLET TYPE B (AML 24-30-2)
MANHOLE TYPE A (AML 24-40-1)

NOTES

1. THE RISER SECTION MAY BE PRECAST CONCRETE PIPE OR CAST-IN-PLACE CONCRETE. A CONCENTRIC CAST-IN-PLACE CONE OR PRECAST CONCRETE CONE MAY BE PERMITTED, PROVIDED HEIGHT LIMITATIONS WOULD PERMIT.
2. THE MAXIMUM SIZE OF INTERCEPTED PIPE SHALL BE 27".
3. COVER OVER HIGHEST PIPE SHALL BE 2'.
4. CAST-IN-PLACE CONCRETE MANHOLES SHALL HAVE 8" THICK WALLS.
5. SEE AML 24-40-2 FOR STEP DETAILS.
6. CONCRETE= 4,000 PSI; STEEL= 60 KSI.

PLAN VIEW

GRADE RING, CLASS "A" CONC., PRECAST CONC., OR BRICK

OUTSIDE DIA. OF MANHOLE PLUS 8"
SECTION A-A

ISOMETRIC OF BASE

DETAIL "A"
DIMENSIONS AND STEEL PATTERN
NOTES

1. STEPS SHALL BE ASPHALT COATED CAST IRON OR POLYPROPYLENE PLASTIC COATED STEEL ROD OR OF A TYPE AND SIZE APPROVED BY THE ENGINEER.

2. STEPS SHALL BE SPACED APPROXIMATELY 18" TO 16" O.C. VERTICALLY SO AS TO FORM A CONTINUOUS LADDER.

3. STEPS SHALL BE REQUIRED IN MANHOLES WHEN THE STRUCTURE IS 4 FEET AND GREATER IN DEPTH (MEASURE FROM FLOW LINE OF LOWEST PIPE TO TOP OF STRUCTURE).

4. THE TREADS OF ALL STEPS SHALL HAVE ANTI-SKID PROPERTIES FOR HAND AND FOOT GRIPS.

MANHOLE:
USE TYPE 1 OR TYPE 3 STEPS FOR MANHOLE PIPE CHAMBER AND STEP TYPE 2 OR TYPE 4 FOR MANHOLE TOWER.
TYPICAL ILLUSTRATIONS FOR CASTINGS

1. CHAIN SHACKLE, OR COLD SHUT OF AN APPROVED TYPE.
2. 3/16" PROOF COIL CHAIN OF SUFFICIENT LENGTH TO ALLOW REMOVAL AND DISPLACEMENT OF GRATE OR LID.
3. 3/8" x 6" EYE BOLT, NUT, AND WASHER.
4. 3/8" HEX HEAD CAP SCREW (GRADE 2), NUT AND WASHERS. LENGTH DETERMINED BY THICKNESS OF FRAME OR GRATE.
5. 7/16" DIA. HOLE FOR CAP SCREW. BATTER THREADS ON CAP SCREW TO PREVENT REMOVAL OF NUT.
6. 3/8" EYE BOLT (LENGTH DETERMINED BY THE FRAME DIMENSION).
7. ALL EYE BOLTS SHALL HAVE A CONTINUOUS OR SOLID EYE.
8. ALL HARDWARE SHALL BE GALVANIZED AND OF COMMERCIAL QUALITY AND SHALL BE APPROVED BY THE ENGINEER.
9. THE COST OF THE COMPLETE SECURITY DEVICE, INSTALLED, SHALL NOT BE INCIDENTAL TO THE COST OF THE STRUCTURE.
10. THE DESIGNS SHOWN ARE ACCEPTABLE, HOWEVER THEY ARE SUBJECT TO CHANGE IF APPROVED IN WRITING BY THE ENGINEER.

TYPICAL ILLUSTRATIONS FOR STRUCTURAL STEEL UNITS

SECURITY DEVICES FOR FRAMES, GRATES & LIDS (AML 24-50-1)
WELDED WIRE REINFORCED SOIL WALL (AML 30-10-1)

NOTES:
1. FIELD CONDITIONS WILL DICTATE FINAL BACKSLOPE, BUT SHOULD NOT BE MORE THAN 1:2 CUT AND REMAIN STABLE DURING CONSTRUCTION.
2. ALL SOIL RECEIVES 95% PROCTER COMPACTION.
TYPICAL WELDED WIRE FACING UNITS

NOTES:

1. FACING TO CONSIST OF PREFABRICATED WWF 4” x 4” (0.225” Ø x 0.225” Ø) FORMS.

2. ALL FORMS AND STRUTS WILL BE FABRICATED WITH BLACK WIRE.

3. OVERALL LENGTH OF WIRE FORMS IS 10’-0”. EFFECTIVE CONSTRUCTED WIDTH IS 9’-8” WITH 4” OVER LAPPING AT ENDS.
1. Remove loose material from highwall prior to wall construction.
2. Construct base on a concrete footer unless directed otherwise by engineer.
3. See design drawings if chain-link fence (not shown) is required.
4. If design height is to exceed 8' then wall must be specially designed.

**NON-REINFORCED BLOCK WALL - TYPE I (AML 30-20-1)**

**DESIGN BACKFILL WIDTH**

**ORIGINAL GROUND**

**TYPE I MODULAR BLOCK**

**CLASS II BACKFILL STARTING NO LOWER THAN TWO TOP TIVERS.**

**MEDIUM WEIGHT NON-WOVEN FILTER FABRIC**

**UNI-AXIAL GEOGRID TIED TO BLOCK PINS AND HIGHWALL EVERY 3 COURSES OR AS MANUFACTURER RECOMMENDS**

**#57 BACKFILL**

**8" HDPE DOUBLE DUAL WALL SMOOTH INTERIOR PIPE WRAPPED IN LIGHT WEIGHT FILTER FABRIC OR SOCK PIPE**

**WALLS TERMINATE INTO HILLSIDE WINGED OR AT 90° ANGLE. USE CLASS "AA" CONCRETE W/ FIBER REINFORCEMENT.**

**GROUND**

**6" X 6" CONCRETE KEY**

**NO. 4 REBAR SET MIN. 2" FROM EDGES**

**DESIGN HEIGHT**
NON-REINFORCED BLOCK WALL- TYPE II (AML 30-20-2)
1. Corner blocks are 46" x 24" w/ 6" knobs. Base course has straight bottom.

2. See 30-20-2 for block size per row height.

3. Cut edge of 10" knobs on 41" blocks and 6" knob on corner block w/ chop saw to provide clearance for blocks in the next row.

4. Lap longitudinal bars in concrete footer at corners.
**STEEL PILES- TEMPORARY AND INDEPENDENT SUPPORT** (AML 30-30-1)

Holes must be large enough to accommodate pile and 2” minimum concrete on all sides.

---

**DEPTH TO ROCK** | **USE** | **TYPE** | **SPACING**
--- | --- | --- | ---
5’ - 19’ | TEMPORARY SUPPORT ONLY | 130 LBS/YD RAIL STEEL OR W8 X 40 | SINGLE ROW, 36” OC, 15” DIA. MIN

20’+ | INDEPENDENT PERMANENT STABILIZATION | W8 X 40 | DOUBLE ROW, 48” OC, 18” DIA. MIN, REINFORCED CONCRETE CAP

---

**NOTES:**

1. BEAMS SHALL BE ORIENTED WITH FLANGES PERPENDICULAR TO POSSIBLE SLIDE MOVEMENT.
2. BEAMS SHALL BE ENCASED WITH CONCRETE A MINIMUM 2” CONCRETE ON ALL SIDES FOR THE ENTIRE DEPTH OF THE HOLE.
3. BEAMS SHALL BE STRAIGHT AND STRUCTURALLY SOUND. ENGINEER MUST AUTHORIZE SPLICING. NO SPLICING SHALL BE ALLOWED IN RAILROAD RAILS.
4. THE ENGINEER MAY SPECIFY THE SIZE OR TYPE OF STEEL (INCLUDING USE OF RAILROAD STEEL RAILS) ON DRAWINGS, IN THE SPECIAL CONDITIONS, OR IN WRITING DURING CONSTRUCTION.

SEE AML 30-30-2 FOR CAP DETAILS
STEEL PILES WITH REINFORCED CONCRETE CAP (AML 30-30-2)
GABION RETAINING WALL (AML 30-40-1)

1. BURY ONLY 1/2 BASKET FOR WALLS SHORTER THAN 9 FT.
2. GABION WALLS MUST BE CONSTRUCTED IN A STAGGER PATTERN AS SHOWN. THIS MUST BE DONE FOR BOTH DIRECTIONS OF THE WALL.

CHAIN-LINK FENCE REQUIRED FOR WALLS 9' OR HIGHER

3' X 3' GABION BASKETS

SLOPE 1.5:1 MAX

CLASS II BACKFILL

USE MEDIUM WEIGHT NON-WOVEN FILTER FABRIC OVER SOIL, NOT OVER BEDROCK

CONSTRUCTION SLOPE

DEPENDING ON ROCK LINES ENCOUNTERED, THE SHADED BASKETS MAY BE OMITTED BY ENGINEER

NO. 57 STONE SURROUNDED BY LIGHT WEIGHT NON-WOVEN FILTER FABRIC (1' OVERLAP)

8" HDPE DUAL WALL PERFORATED PIPE WRAPPED IN LIGHT WEIGHT FILTER FABRIC OR SOCK PIPE

BIAXIAL GEO-GIRD

CLASS II LEVELING PAD AS NEEDED

STEEL PILES FOUNDATION (IF REQUIRED USE AML 30-30-1)

THE DRAWINGS MAY REQUIRE GABIONS WITH TAILS (NOT SHOWN). TAILS EXTEND HORIZONTALLY INTO THE BACKFILL AT LENGTH SPECIFIED ON DRAWINGS.

USE WITH AML 70-30-1

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<th>Height</th>
<th>Pattern</th>
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<td>12</td>
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<td>4-4-3-2-1</td>
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<tr>
<td>18</td>
<td>4-4-4-3-2-1</td>
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</table>
CONCRETE GRAVITY WALL (AML 30-50-1)

EMBEDMENT
1. MINIMUM EMBEDMENT VALUE FOR FIRM EARTH IS 2'-0".
2. CASE III REQUIRES AN EMBEDMENT OF 1/4 H FOR A WALL OVER 8'.
3. FOR FOOTER SET ON ROCK 1/2 FOOTER DEPTH WILL BE SET IN ROCK.

WALLS TERMINATE INTO HILLSIDE WINGED OR AT 90° ANGLE
INSTALL JOINTS AS REQUIRED BY TECHNICAL SPECIFICATIONS

BATTER
CASE I AND CASE II
H = 3'-0" TO LESS THAN 5'-0" (VERTICAL)
H = 5'-0" TO LESS THAN 10'-0" (12:1)
H = 10'-0" TO LESS THAN 12'-0" (6:1)

CASE III
H = 3'-0" TO LESS THAN 5'-0" (12:1)
H = 5'-0" TO LESS THAN 12'-0" (6:1)

USE WITH AML 30-50-2, 30-60-3
THE RETAINING WALL DEPICTED ON THIS DRAWING SHALL BE USED WHEN THE HEIGHT ("H" DIMENSION) OF THE WALL IS 12'--0" OR LESS PROVIDED THE FILL COMPLIES WITH THE FOLLOWING CONDITIONS:

CASE I: WALL BACKFILL SLOPES DOWN, IS LEVEL, OR SLOPES UP FROM WALL AT 20:1 OR FLATTER SLOPE ALLOWS FOR BACKFILL WHICH WOULD BE LEVEL EXCEPT FOR THE SLOPE REQUIRED TO FACILITATE PROPER DRAINAGE.

CASE II: BACKFILL SLOPES UP STEEPER THAN 20:1, BUT NOT STEEPER THAN 4:1.

CASE III: BACKFILL SLOPES UP STEEPER THAN 4:1, BUT NOT STEEPER THAN 2:1. WHEN "H" IS GREATER THAN 8' (6' FRONT FACE), INCREASE THE EMBEDMENT DEPTH TO 1/4 "H."

SPECIAL DESIGNS SHALL BE REQUIRED WHEN THE FOLLOWING CONDITIONS EXIST:

A. WALL HEIGHT IS GREATER THAN 12'0"
B. WALL IS SURCHARGED WITH DEAD LOAD FILL SLOPES STEEPER THAN 2:1
C. WALL IS SURCHARGED WITH A LIVE LOAD, WITHOUT THE LIMITS OF A 1:1 SLOPE EXTENDING FROM THE BASE OF THE WALL.

AREAS AND VOLUMES HAVE BEEN COMPUTED WITHOUT REDUCTION FOR BEVELED EDGES OR PIPE DRAINS. WHEN A RETAINING WALL VARIES IN HEIGHT, THE PRISMOIDAL FORMULA SHALL BE USED IN COMPUTING VOLUMES. THE FOOTER IS NOT INCLUDED IN THE TABULATED VOLUMES.

1. PLACE BI-AXIAL GEO-GRID UNDER THE BASE OF THE WALL UNLESS ON BEDROCK.
2. ALL CONCRETE SHALL BE 4,000 PSI CONCRETE WITH FIBER REINFORCEMENT
3. THE BASE OF THE FOOTER MUST BE SET AT 24" DEEP (MIN.) OR BELOW LOCAL FROSTLINE (WHICHEVER IS DEEPER)
4. RAISE THE MIDDLE PORTION OF THE SUBDRAIN ~2" TO PUT A SLIGHT GRADE ON PIPE

<table>
<thead>
<tr>
<th>WALL HEIGHT (EXCLUDING FOOTER)</th>
<th>WALL BASE (EXCLUDING FOOTER)</th>
<th>FOOTER CONCRETE</th>
<th>WALL CONCRETE</th>
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<tbody>
<tr>
<td>3'-0&quot;</td>
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<td>3'-9&quot;</td>
<td>0.21</td>
<td>0.71</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>4'-0&quot;</td>
<td>0.22</td>
<td>0.78</td>
</tr>
<tr>
<td>8'-6&quot;</td>
<td>4'-3&quot;</td>
<td>0.23</td>
<td>0.86</td>
</tr>
<tr>
<td>9'-0&quot;</td>
<td>4'-6&quot;</td>
<td>0.24</td>
<td>0.94</td>
</tr>
<tr>
<td>9'-6&quot;</td>
<td>4'-9&quot;</td>
<td>0.25</td>
<td>1.01</td>
</tr>
</tbody>
</table>

**USE WITH AML 30–50–1**
**REINFORCED CONCRETE WALL (HEIGHTS FROM 5' TO 20') (AML 30-60-1)**

**REINFORCEMENT REQUIREMENTS**

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;T&quot;</th>
<th>&quot;W&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-7&quot;</td>
<td>2.00</td>
<td>3.00</td>
<td>1.00</td>
<td>6.00</td>
</tr>
<tr>
<td>8'-10&quot;</td>
<td>2.25</td>
<td>3.50</td>
<td>1.25</td>
<td>7.00</td>
</tr>
<tr>
<td>11'-13&quot;</td>
<td>2.75</td>
<td>4.00</td>
<td>1.25</td>
<td>8.00</td>
</tr>
<tr>
<td>14'-16&quot;</td>
<td>3.50</td>
<td>5.00</td>
<td>1.50</td>
<td>10.00</td>
</tr>
<tr>
<td>17'-20&quot;</td>
<td>4.00</td>
<td>6.25</td>
<td>2.25</td>
<td>12.50</td>
</tr>
</tbody>
</table>

* B1 BAR IS TO BE ONE BAR SIZE SMALLER THAN "B" BAR
* F1 BAR IS TO BE ONE BAR SIZE SMALLER THAN "F" BAR

NUMBER OF H BARS TO USE IS EQUAL TO WALL HEIGHT X 2
NUMBER OF P BARS TO USE IS EQUAL TO "W" (FOOTING WIDTH) X 2

**BAR DIMENSIONS (FEET)**

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>B BAR</th>
<th>F BAR</th>
<th>H BAR</th>
<th>P BAR</th>
<th>T BAR</th>
<th>K BAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-7&quot;</td>
<td>L= 3.00', M= 2.75'</td>
<td>L= 2.75', N= 1.75'</td>
<td>L= 2.75', N= 0.50'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8'-10&quot;</td>
<td>L= 3.33', M= 3.25'</td>
<td>L= 2.75', N= 2.0'</td>
<td>L= 3.0', N= 0.75'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11'-13&quot;</td>
<td>L= 4.00', M= 3.75'</td>
<td>L= 3.50', N= 2.50'</td>
<td>L= 3.0', N= 0.75'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14'-16&quot;</td>
<td>L= 5.00', M= 4.75'</td>
<td>L= 3.75', N= 3.25'</td>
<td>L= 3.25', N= 1.00'</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17'-20&quot;</td>
<td>L= 7.25', M= 6.00'</td>
<td>L= 4.25', N= 3.75'</td>
<td>L= 4.0', N= 1.50'</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ALL REINFORCEMENT IS TO BE SPACED AT 12 INCH CENTERS**

**WALL DIMENSIONS (FEET)**

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>&quot;B&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;T&quot;</th>
<th>&quot;W&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-7&quot;</td>
<td>2.00</td>
<td>3.00</td>
<td>1.00</td>
<td>6.00</td>
</tr>
<tr>
<td>8'-10&quot;</td>
<td>2.25</td>
<td>3.50</td>
<td>1.25</td>
<td>7.00</td>
</tr>
<tr>
<td>11'-13&quot;</td>
<td>2.75</td>
<td>4.00</td>
<td>1.25</td>
<td>8.00</td>
</tr>
<tr>
<td>14'-16&quot;</td>
<td>3.50</td>
<td>5.00</td>
<td>1.50</td>
<td>10.00</td>
</tr>
<tr>
<td>17'-20&quot;</td>
<td>4.00</td>
<td>6.25</td>
<td>2.25</td>
<td>12.50</td>
</tr>
</tbody>
</table>

**REINFORCED CONCRETE WALL (HEIGHTS FROM 5' TO 20') (AML 30-60-1)**

**ALL SHEET DRAIN WILL BE ACROSS WALL (NOT SHOWN)**

**CLASS II BACKFILL W/ FILTER FABRIC**

**WEEP HOLE (SEE 30-60-3)**

**8" HDPE DUAL WALL PERFORATED SOCK PIPE, BED IN NO. 57 UNLESS CLASS II IS APPROVED BY ENGINEER**

**MEDIUM WEIGHT NON-WOVEN FILTER FABRIC BETWEEN SOIL/AGGREGATE CONTACT**

**KEY LOCATION (WHEN REQUIRED, SOIL FOUNDATIONS ONLY)**

**"K" BAR (ONLY WHEN KEY IS USED) SPACE WITH "B" BAR**

**KEY AND FOOTING SHALL BE SAME CONCRETE POUR**

**THE BASE OF THE FOOTER MUST BE SET MIN. 24" DEPTH.**

**WALLS TERMINATE INTO HILLSIDE WINGED OR AT 90° ANGLE.**

---

**KY D & M 7-2017**
### CONCRETE VOLUMES

<table>
<thead>
<tr>
<th>WALL HEIGHT</th>
<th>VOLUME (PER FOOT OF WALL LENGTH)</th>
<th>Key Volume (PER FOOT OF WALL LENGTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-7'</td>
<td>V= 0.23 + (.04 x H)</td>
<td>0.074 Cu. Yds.</td>
</tr>
<tr>
<td>8'-10'</td>
<td>V= 0.32 + (.05 x H)</td>
<td>0.093 Cu. Yds.</td>
</tr>
<tr>
<td>11'-13'</td>
<td>V= 0.37 + (.05 x H)</td>
<td>0.093 Cu. Yds.</td>
</tr>
<tr>
<td>14'-16'</td>
<td>V= 0.56 + (.06 x H)</td>
<td>0.111 Cu. Yds.</td>
</tr>
<tr>
<td>17'-20'</td>
<td>V= 1.04 + (.09 x H)</td>
<td>0.167 Cu. Yds.</td>
</tr>
</tbody>
</table>

V= Cu. Yds. PER FOOT OF WALL LENGTH
H= ACTUAL WALL HEIGHT USED FOR DESIGN

Example: 12' Wall Height, 100' Long, with Key
V= 0.37 + (.05 x 12) + 0.093 = 1.063
Total V= 1.063 x 100' = 106.3 Cu. Yds.

### REINFORCEMENT QUANTITIES

<table>
<thead>
<tr>
<th>WALL HEIGHT</th>
<th>FOOTING*</th>
<th>WALL**</th>
<th>ADD FOR &quot;K&quot; BAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'-7'</td>
<td>29.50</td>
<td>2.68</td>
<td>4.00</td>
</tr>
<tr>
<td>8'-10'</td>
<td>35.00</td>
<td>3.80</td>
<td>4.50</td>
</tr>
<tr>
<td>11'-13'</td>
<td>54.63</td>
<td>4.26</td>
<td>4.50</td>
</tr>
<tr>
<td>14'-16'</td>
<td>80.22</td>
<td>5.72</td>
<td>5.00</td>
</tr>
<tr>
<td>17'-20'</td>
<td>118.38</td>
<td>6.34</td>
<td>6.35</td>
</tr>
</tbody>
</table>

* PER FOOT OF WALL LENGTH
** PER FOOT OF WALL HEIGHT AND PER FOOT OF WALL LENGTH

Example: 12' Wall Height, 100' Long, with Key

\[(4.26 \times 12) + 54.63 + 3.85 \times 100 = 10,960 \text{ LBS. REINFORCEMENT} \]

### REINFORCEMENT QTY:

Example: 12’ Wall Height, 100’ Long, with Key

\[(4.26 \times 12) + 54.63 + 3.85 \times 100 = 10,960 \text{ LBS. REINFORCEMENT} \]

"K" BAR BECAUSE USING KEY

**USE WITH AML 30-60-1**
CONSTRUCTION JOINT DETAIL

2" X 4" KEYED JOINT

¾" V-GROOVE RUSTICATION
(TOP OF WALL AND DOWN VERTICAL FACE)

LONITUDINAL REINFORCEMENT
CONTINUES THROUGH THE JOINT

WEEP HOLE DETAIL

12" (TYP.)

TOP OF FINISHED GRADE

TOP OF FOOTING

8.0" (TYP.)

4" WEEP HOLE

EXPANSION JOINT DETAIL

2" X 4" KEYED JOINT

1" PREFORMED CORK
JOIN MATERIAL

LONITUDINAL REINFORCING
STEEL HAS 2" CLEARANCE
FROM JOINT

USE WITH AML 30–60–1

REINFORCED CONCRETE WALL- JOINTS & WEEP HOLES (AML 30–60–3)
"T" IS DETERMINED FROM WALL HEIGHT.

SEE "STEEL" SECTION OF TECHNICAL SPECIFICATIONS FOR OVERLAP/SPLICE LENGTHS
NOTE: ALL CONCRETE 4,000 PSI

PILE AND LAGGING WALL SHEET 1 (AML 30-70-1)

CONCRETE LAGGING PLACED BETWEEN SOLDIER PILES:
2" X 4" X 6" STACKED AS SHOWN IN PROFILE

FINISHED GRADE (2:1 MAX)

FRONT FACE

NO. 2 STONE BACKFILL

NO. 57 STONE

24" X 36" CONCRETE DIAPHRAGM/LEVELING PAD
(REINFORCEMENT NOT SHOWN)

LIFT 5

CLASS II BACKFILL 2' LIFTS

LIFT 4

LIFT 3

LIFT 2

LIFT 1

8" DUAL WALL PERFORATED SOCK PIPE

STEEL PILES ENCASED IN CONCRETE

SECTION - PILE AND LAGGING WALL

USE WITH AML 30-70-2

FLANGE PRESSURE DISTRIBUTION DETAIL

BOREHOLE

W SHAPE PILE (W14 X 99)

PLAN VIEW @ BEND

PRECAST CONCRETE LAGGING

FILL VOIDS WITH GROUT OR PRE-TREATED CONTINUOUS WOODEN WEDGE

PRECAST CONCRETE LAGGING KEY

INCLUDE CHAMFER

2" CLEAR DISTANCE

SECTION A-A

6"

3"

PRECAST CONCRETE LAGGING KEY

#5 BARS AT 8" CC
FRONT FACE ONLY

3/4" CHAMFER
(FRONT FACE)

6"

3"

PRECAST CONCRETE LAGGING KEY

#5 BARS AT 12" CC
FRONT FACE ONLY

6"

PRECAST CONCRETE LAGGING

NOTE:
SEE PROFILE SHEET AND CROSS SECTIONS OF THE
DESIGN DRAWINGS FOR SPECIFIC WALL HEIGHTS.

LIFT 1

LIFT 2

LIFT 3

LIFT 4

LIFT 5

2' CLEAR DISTANCE
**PILE AND LAGGING WALL- REBAR CAGE (AML 30-70-2A)**

### REINFORCED CAGE

NOTE:

THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO FORMING AND/OR POURING ANY PANELS SUCH THAT THE ENGINEER MAY HAVE A REPRESENTATIVE ON SITE PRIOR TO AND DURING THE POURING PROCESS.


FOR SPLICES SEE AML 30–70–3 AND "STEEL" SECTION OF TECHNICAL SPECIFICATIONS.

THE NO. 6 BARS TIE THE COLUMN AND FOOTER TOGETHER. SEE AML 30–30–2 FOR THE CONCRETE LEVELING PAD REINFORCEMENT DETAILS. STANDARD LEVELING PAD SIZE IS 2' H X 3' W.

### HOLE DIAMETER VS. NO. OF #6 BARS

<table>
<thead>
<tr>
<th>HOE DIA.</th>
<th>NO. OF #6 BARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot;</td>
<td>0</td>
</tr>
<tr>
<td>24&quot;</td>
<td>7</td>
</tr>
<tr>
<td>30&quot;</td>
<td>9</td>
</tr>
<tr>
<td>36&quot;</td>
<td>11</td>
</tr>
</tbody>
</table>

USE WITH AML 30-70-1
#6 VERTICAL BARS AND #4 HOOPS SET 12" CENTERS 2" CLEAR FROM CASING

PILE ENCASEMENT

CONCRETE LAGGING

4'

STEEL PILES

FILL SIDE

3' - 9"

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

#4 HOOPS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

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SOLDIER PILE

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#6 VERTICAL BARS

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STEEL PILES

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SOLDIER PILE

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1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

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1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

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SOLDIER PILE

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1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

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SOLDIER PILE

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1'-6"

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#6 VERTICAL BARS

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STEEL PILES

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#6 VERTICAL BARS

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#6 VERTICAL BARS

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STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTICAL BARS

ENCASEMENT

STEEL PILES

ELEVATION NTS

SOLDIER PILE

HEIGHT

1'-6"

2'

#6 VERTI
GENERAL NOTES

FIELD WELDS: ENSURE FIELD WELDING MATERIAL AND WORKMANSHIP FOR ALL PILINGS CONFORMS TO THE CURRENT JOINT SPECIFICATIONS ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE. SPLICE PILES AS INDICATED ABOVE ONLY WHEN DRIVEN BELOW CUT-OFF ELEVATION.

SPLICE PLATES: ENSURE ALL PILE SPlicing OPTIONS CONFORM TO ASTM A36, CURRENT SPECIFICATIONS. IN LIEU OF SPLICE OPTION "A" OR SPLICE OPTION "B", SPLICE PLATES MAY BE FLAME CUT FROM HP OR W SECTIONS. IF FLANGE SECTIONS ARE USED, THE PORTION CUT AT THE WEB MUST BE TURNED OUTSIDE IN ORDER TO OBTAIN A TIGHT FIT. GRIND THE EDGES SMOOTH PRIOR TO WELDING.

SPLICE OPTION "B": THE PILE SPlicer SHOWN IN THE DETAILS FOR SPLICE OPTION "B" MAY BE CHAMPION H-PILE SPlicer, MODEL HP 30000, OR AN APPROVED EQUAL. ENSURE THE SPlicer IS IN ACCORDANCE TO THE MANUFACTURER'S RECOMMENDATIONS AND SUBJECT TO THE ENGINEER'S APPROVAL.

NOTE: THIS DETAIL SHOWS HP 14X89 AS A TYPICAL SHAPE. CHECK DESIGN PLANS FOR ACTUAL SHAPE AND SIZE USED.
PILE & LAGGING WALL- REINFORCED CONCRETE CAP (AML 30-70-4)

H" = 2 FEET UNLESS NOTED OTHERWISE ON DRAWINGS OR SPECIAL CONDITIONS.

"W" = VARIES BASED ON PILE SIZE + 12"

6" MIN.

3/4" CHAMFER

#9 REBAR ON TOP & BOTTOM

#5 REBAR ON SIDE MIDDLE

#4 HOOPS ON 18" CENTERS

USE WITH AML 30-70-1 & 2
**REINFORCED CONCRETE PILES & CAP (AML 30-80-1)**

1. **#4 Spiral @ 12" O.C.**
2. **#9 Rebar on Top & Bottom**
3. **#5 Rebar on Side Middle**
4. **#4 Hoops on 18" Centers**

- **Concrete Pile**
- **#10 Bars Spaced Equally Around Pile**
- **High Density Plastic Spacer**
  - 3 sets of 3 along length of cage

**Assume Standard Hoops Unless Specified Otherwise on Design Plans or Special Conditions.**

**Standard "H" = 2 Feet Unless Noted Otherwise on Drawings or Special Conditions. \("W\) = Pile Dia. + 6" Overhang on Each Side.**

<table>
<thead>
<tr>
<th>Reinf. Concrete Cap</th>
<th>Concrete Pile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steel (lbs)</strong></td>
<td><strong>Concrete (cycd)</strong></td>
</tr>
<tr>
<td>w/ Spiral Hoops</td>
<td>w/ Standard Hoops</td>
</tr>
<tr>
<td><strong>24&quot; Pile</strong></td>
<td>33.19</td>
</tr>
<tr>
<td><strong>30&quot; Pile</strong></td>
<td>33.59</td>
</tr>
<tr>
<td><strong>36&quot; Pile</strong></td>
<td>34.09</td>
</tr>
</tbody>
</table>

**Per Linear Foot**
(2) NO. 4 REBAR WALERS
24” LONG VERTICAL EACH
SIDE OF NAIL

(2) NO. 4 REBAR WALERS
CONTINUOUS—HORIZONTAL

8” X 8” X 3/8” A36 STEEL PLATE

GALVANIZED TWISTED WIRE MESH

SOIL FACE

NO. 6 REBAR EPOXY COATED

GALVANIZED ROUND HOLLOW STEEL TUBING W/ NOMINAL 1-1/2” O.D. AND 0.12” WALL THICKNESS

3,000 PSI (MIN.) GROUT

4” DIA. DRILL HOLE

20’ EMBEDMENT (TYP)

SOIL NAILS- SHEET 1 (AML 30-90-1)
NOTE: INFORMATION TO BE DISPLAYED ON STEEL PLATE SHALL BE PROVIDED TO THE CONTRACTOR BY THE ENGINEER.

OBTAIN GPS COORDINATES AT NUT LOCATION (LATITUDE AND LONGITUDE ONLY)

0.75" THREADED ROD

WELD NUT TO ROD

0.25" STEEL INFORMATION PLATE

6" SQUARE 1/2" STEEL PLATE WELDED TO ROD

WELDED WIRE REINFORCEMENT

SIDE VIEW

0.25" STEEL INFORMATION PLATE

PLAN VIEW

CONCRETE MINE SHAFT MONUMENT (AML 40-10-1)
SUBSIDENCE AND MINE BACKFILL (AML 40-10-2)

- Obtain GPS coordinates at center for future locating.
- Pile extra rock in center to allow for settling.
- Existing groundline.
- Class II or III backfill.
- Remove debris prior to backfilling.
NOTE: IF FILLED WITH PEA GRAVEL INSTEAD OF FOAM, NO BOTTOM FORM WILL BE NEEDED. BRING GRAVEL TO SURFACE.

EARTHWORK/GRADEWORK IS INCIDENTAL TO THE CLOSURE.

EXISTING GROUNDLINE

VARIES

1" SOIL BACKFILL OVER FOAM

POLYURETHANE FOAM (PUF) PLUG OR PEA GRAVEL PNEUMATICALLY BACKSTOWED

5' FOR PUF

2" PVC DRAIN PIPE WITH SCREEN

BOTTOM FORM

VOID

MOUNTAIN BREAK BACKFILL (AML 40-10-3)
ALL LOOSE OR UNSUPPORTED ROOF ROCK ON HIGHWALL OR PORTAL FACE-UPS SHALL BE BACKFILLED FOR SUPPORT OR REMOVED.

CLASS II OR NATIVE SANDSTONE PUSHED INTO OPENING

FILTER FABRIC

CLASS II ROCK

COVER PIPE WITH NO. 2 STONE AND FILTER FABRIC. INSTALL PEST SCREEN OVER END OF PIPE

8" DUAL WALL SMOOTH INTERIOR HDPE (PERFORATED OR NON-PERFORATED AS DIRECTED BY ENGINEER) SLOPE TO DRAIN

FLOW

PROVIDE POSITIVE DRAINAGE TO EXISTING CONSTRUCTED DITCH. THE ENGINEER MAY ELECT TO INSTALL SUBDRAIN (NOT SHOWN, SEPARATE BID ITEM).

ALL ROCK, EXCAVATION, PIPE, SCREENS ARE INCIDENTAL TO EACH PORTAL CLOSURE.

IF PNEUMATICALLY BACKSTOWED GRAVEL, ROCK DITCHES, SUBDRAIN ARE USED THEY ARE SEPARATE BID ITEM.

ALL PIPE IS INCIDENTAL REGARDLESS OF LENGTH OR NUMBER OF SECTIONS REQUIRED.

SEE AML 40-20-11 FOR ADDITIONAL NOTES

STANDARD NON-WILDLIFE ACCESSIBLE CLOSURE (AML 40-20-1)
ALL LOOSE OR UNSUPPORTED ROOF ROCK ON HIGHWALL OR PORTAL FACE-UPS SHALL BE BACKFILLED FOR SUPPORT OR REMOVED.

PNEUMATIC BACKSTOW MATERIAL OR CLASS II ROCK

ALL PIPE IS INCIDENTAL REGARDLESS OF LENGTH OR NUMBER OF SECTIONS REQUIRED.

36” HDPE WITH WILDLIFE ACCESS GRATE. SEE SECTION “A–A”

PROVIDE POSITIVE DRAINAGE TO EXISTING NATURAL DRAINS OR CONSTRUCT DITCHES

NOTE:

#4 REBAR OR 1/2” ALL-THREAD

36” HDPE PIPE

SECURE REBAR OR ALL-THREAD ON EXTERIOR OF PIPE WITH WELDED WASHERS, LOCK NUTS, OR OTHER APPROVED METHODS. DO NOT SET BARS VERTICALLY.

6” +/- 1/4”

MAJOR INCIDENTALS: ALL ITEMS SHOWN.

SEE AML 40–20–11 FOR ADDITIONAL NOTES
GENERAL NOTES:

POLYURETHANE FOAM IS A SEPARATE BID ITEM. ALL OTHER MATERIALS, EQUIPMENT, AND LABOR ARE INCIDENTAL TO THE PORTAL CLOSURE BID ITEM.

POLYURETHANE FOAM NOTES:

1. REAR AND FRONT BARRIERS SHALL BE CONSTRUCTED FROM COMMON MATERIALS OR SHALL BE COMPRISED OF BAGGED FOAM PLACED IN LAYERS AND ALLOWED TO PARTIALLY HARDEN. THE ENGINEER MAY SUBSTITUTE CONSTRUCTED BULKHEADS WITH LOCAL OR COMMON MATERIALS.

2. THE VOID IN FRONT OF EACH SUCCESSIVE LAYER SHALL THEN BE FILLED WITH FOAM.

3. THE FOAM SEAL SHALL BE TIGHT ENOUGH TO SECURE THE ADIT, BUT IT DOES NOT HAVE TO BE AIR TIGHT.

4. THE ENGINEER WILL DETERMINE THE DEPTH OF FOAM REQUIRED IN THE FIELD.

5. THE FACE OF THE FINAL CLOSURE MUST BE COVERED WITH 2’ OF EARTH OR ROCK, OR 2” OF GROUT. THE GROUT MUST BE TIED TO THE FACE USING PINS SET IN THE FOAM AND A WIRE MESH OVER THE FOAM FACE.

6. ALL PIPE IS INCIDENTAL REGARDLESS OF LENGTH OR NUMBER OF SECTIONS REQUIRED.

SEE PLANS FOR WILDLIFE OR NON-WILDLIFE ACCESS DETAILS AND AML 40-20-1 OR 40-20-2 FOR PIPE NOTES

SEE AML 40-20-11 FOR ADDITIONAL DETAILS

STANDARD CLOSURES W/ POLYURETHANE FOAM (AML 40-20-3)
NOTES:

THE ENGINEER WILL DETERMINE THE EXACT HEIGHT OF THE GABION WALL IN THE FIELD.

THE ENGINEER WILL DETERMINE THE NEED FOR A SURFACE DITCH AND/OR SUBDRAIN.

THE SURFACE DITCH, SUBDRAIN, GABION WALL ARE SEPARATE BID ITEMS.

8" SOLID HDPE SMOOTH INTERIOR PIPE W/ PEST SCREEN OR 36" HDPE WILDLIFE ACCESS

12"–18" CLASS II LEVELING PAD (WHERE NECESSARY)

OPTIONAL COMBINATION DITCH AND SUBDRAIN (SEE AML 21–30–3 OR 4, SEPARATE BID ITEMS)

EXISTING GROUNDLINE

CLASS II/III BACKFILL

GABION RETAINING WALL (SEPARATE BID ITEM)

FRACTURED MINE ROOF

PIPE SIZE VARIES DEPENDING ON OPENING SIZE. 8" PERFORATED HDPE PIPE (SMOOTH INTERIOR) HAS END CAPPED.

ROOF FALLS AND TALUS

PORTAL CLOSURE W/ GABION RETAINING WALL (AML 40-20-4)
SECTION "A-A"

FILL TO ROOF LINE W/ MORTAR

SEE DETAIL A & B (AML 40-20-7)

CLASS II AS REQUIRED

4' MIN

1'

CONCRETE PAD

ANGLE IRON CAPPED W/ MORTAR

VARIES

SEE DETAIL "B" ON AML 40-20-7

SEE DETAIL "A" ON AML 40-20-7

SOLID CONCRETE BLOCK (8" X 8" X 16")

AS REQUIRED

10' MAX

2'

6" OC

GROUNDLINE

USE WITH AML 40-20-7 & 11

CLOSURE W/ EXTERIOR BARS IN CONCRETE BLOCK (AML 40-20-5)
CLOSURE W/ EXTERIOR BARS SET IN CONCRETE (AML 40-20-6)

METHOD 1
USE FOR STABLE HIGHWALLS

METHOD 2
USE FOR UNSTABLE HIGHWALLS

SEE DETAIL "B" ON AML 40-20-7
SEE DETAIL "A" ON AML 40-20-7

2' DEEP HOLES, FILLED WITH CONCRETE, SET REBAR 1' DEEP IN CONCRETE
CONCRETE FILLED HOLES AS DIRECTED BY THE ENGINEER
A CONTINUOUS CONCRETE FOOTER MAY BE USED AS IN AML 40-20-5

SEE AML 40-20-5, 40-20-6, & 40-20-11
NOTES:

1. ALL EXTERIOR EXPOSED SURFACES OF BLOCK, CONCRETE, REBAR, AND METAL DOORS SHALL BE PAINTED BLACK OR BROWN SO AS TO BLEND WITH SURROUNDINGS. ALL WELDS AND EXPOSED METAL SURFACES SHALL BE PAINTED WITH RUST INHIBITING PAINT.

2. THE EXTERIOR CAGE CLOSURE SHALL BE UTILIZED WHERE SOLID AND STABLE FACE-UPS ARE PRESENT WHICH WILL ENSURE THE LONGEVTY OF THE CLOSURE.

3. THE CAGE SHALL BE ANCHORED INTO SOLID STRATA WITH EXPANSION BOLTS, GUY WIRE ANCHORS OR EQUIVALENT. ALL BOLTS AND NUTS SHALL BE SPOT WELDED TO PREVENT REMOVAL.

4. DANGEROUS ROOF ROCK MAY BE PRESENT AT ALL PORTALS. NO PERSONNEL SHALL BE ALLOWED BENEATH ANY PORTAL WITHOUT PROPER STRUCTURAL ROOF SUPPORT. IN MOST CASES, PROPER SUPPORT CANNOT BE PROVIDED AND NO PERSONNEL SHALL ENTER INTO ANY PORTAL.

5. ALL OPENINGS SHALL BE A MAXIMUM OF 24" X 6".

DETAIL A

1/2" X 4" ANCHOR BOLT W/ LOCK WASHER
1' OC MIN FILLET WELD

STEEL ANGLE PLATE
1 1/2" X 1 1/2" X LENGTH

#6 REBAR
6" OC VERTICAL
24" OC HORIZONTAL

FILLET WELD
BOTH SIDES

DETAIL B

USE WITH AML 40-20-5 & 6, 40-20-11

CLOSURE EXTERIOR BARS DETAILS (AML 40-20-7)
CONCRETE BLOCK CLOSURE

Section "A-A"

- DO NOT RECESS INTO ROOF
- SOLID CONCRETE BLOCK
- 8" DIA. PERFORATED HDPE SOCK PIPE
- END CAP
- SLOPE TO DRAIN
- PEST SCREEN
- 6" EXCEPT IN SOLID ROCK

CONCRETE OR MORTAR TO COMPLETELY FILL OPENING

- (MIN) EACH SIDE RECESS BLOCK 6"
- RECESS BLOCK 6" IN FLOOR EXCEPT WHERE SOLID ROCK EXISTS
- SOLID CONCRETE BLOCK (8" X 8" X 16"

~ PIPE LOCATION

ALL ITEMS SHOWN ARE INCIDENTAL TO EACH CLOSURE

SEE AML 40-20-11 FOR ADDITIONAL NOTES
SECTION "A−A"

DO NOT RECESS INTO ROOF
SOLID CONCRETE BLOCK

* EXCEPT IN SOLID ROCK NOT REQUIRED.

SLOPE TO DRAIN

CONCRETE OR MORTAR TO COMPLETELY FILL OPENING

RECESS BLOCK 6” (MIN) EACH SIDE

RECESS BLOCK 6” IN FLOOR EXCEPT WHERE SOLID ROCK EXISTS

ALL ITEMS SHOWN ARE INCIDENTAL TO EACH CLOSURE.

SEE AML 40−20−11 FOR ADDITIONAL NOTES

CONCRETE BLOCK CLOSURE W/ HUMAN ACCESS (AML 40-20-9)
SUBDRAIN AND SURFACE DITCH ARE SEPARATE BID ITEMS.

CLASS II BACKFILL

2’ MIN.

EXCAVATE TALUS AND PROVIDE POSITIVE DRAINAGE

BENCH

VARIES

AUGER MINE OPENINGS

OPTIONAL COMBINATION DITCH AND SUBDRAIN (SEE AML 21-30-3 & 4)

SEE AML 40-20-11 FOR ADDITIONAL NOTES

AUGUR CLOSURE W/ CLASS II BACKFILL (AML 40-20-10)
PORTAL CLOSURE DESIGN & SAFETY REQUIREMENTS NOTES:

1. EXCAVATION EFFORTS SHALL BEGIN AT THE TOP MOST OF EACH DESIGNATED PORTAL CLOSURE AND PROCEED INCREMENTALLY DOWNWARD UNTIL ALL OF THE MATERIAL HAS BEEN REMOVED DOWN TO GRADE. AS EXCAVATION WORK PROCEEDS, THE CONTRACTOR SHALL BE WATCHFUL FOR THE PRESENCE OF MINE WATER. ANY MINE WATER DETECTED, SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER AND EXCAVATION WORK HALTED UNTIL APPROVAL HAS BEEN GRANTED BY THE ENGINEER TO PROCEED FURTHER.

2. DANGEROUS ROOF ROCK MAY BE PRESENT AT ALL PORTALS. NO PERSONNEL SHALL BE ALLOWED BENEATH ANY PORTAL WITHOUT PROPER STRUCTURAL ROOF SUPPORT. IN MOST CASES, PROPER SUPPORT CANNOT BE PROVIDED AND NO PERSONNEL SHALL ENTER INTO ANY PORTAL.

3. BLACK DAMP OR OTHER DANGEROUS VENTILATION / GAS CONDITIONS MAY BE PRESENT. THE CONTRACTOR MUST TAKE EVERY PRECAUTION AND UTILIZE QUALIFIED PERSONNEL TO ENSURE THE SAFETY OF HIS WORKERS AND THE PUBLIC.

4. ALL PORTALS BEING USED AS A WATER SOURCE SHALL BE MAINTAINED AS A WATER SOURCE BY GROUTING TO CREATE A RESERVOIR IN THE MINE. AN END CAP WITH APPROPRIATE FITTINGS SHALL BE PLACED OVER THE END OF THE HDPE. PROVISIONS FOR A SUPPLY LINE OUTLET SHALL BE MADE IN THE POURED CONCRETE BASE AT A LOCATION DETERMINED BY THE ENGINEER.

5. ALL COARSE AGGREGATE, CLASS II, OR PNEUMATICALLY BACKSTOWED AGGREGATE SHALL BE INCIDENTAL TO THE PORTAL CLOSURE. GROUT SHALL BE USED TO SURFACE SEAL ALL SURFACES AS REQUIRED BY THE ENGINEER AND SHALL BE INCIDENTAL TO THE PORTAL CLOSURE.

6. ALL EXTERIOR EXPOSED SURFACES OF BLOCK, CONCRETE, REBAR, AND METAL DOORS SHALL BE PAINTED BLACK OR BROWN SO AS TO BLEND WITH SURROUNDINGS. ALL WELDS AND EXPOSED METAL SURFACES SHALL BE PAINTED WITH RUST INHIBITING PAINT.

7. IF ROOF LINE IS UNSTABLE THEN CAP REBAR WITH APPROPRIATE LENGTH OF 2 1/2” x 2” x 3/8” STEEL ANGLE AND FILL TO ROOF LINE WITH MORTAR.

8. THE ACCESS DOOR IS TO BE USED WHERE THE MINE IS A WATER SOURCE OR AS DIRECTED BY THE ENGINEER. DOOR SIZE MAY DEPEND ON SIZE OF MINE OPENING.

9. 8” DIAMETER HDPE DUAL WALL PIPE SHALL BE USED UNLESS 12” IS REQUIRED BY THE ENGINEER. THE ENGINEER MAY REQUIRE A 12” PIPE IN WET PORTALS (INCIDENTAL).

10. A CONCRETE FOOTING SHALL BE CONSTRUCTED WHERE REQUIRED TO PROVIDE A SUITABLE LEVEL BASE FOR THE BLOCK WALL. CONCRETE SHALL BE 3,500 PSI.
HIGHWALL RESTORATION

EXISTING HIGHWALL SHALL BE THOROUGHLY CLEANED BY PRESSURE WASHING AS DIRECTED BY THE ENGINEER. REMOVE ALL LOOSE ROCK.

ROCKFALL NETTING (SECURELY FASTEN WITH ROOF BOLTS ON 8'x8' MAX. SPACING GRID)

INSTALL SHEET DRAIN UNDER ROCKFALL NETTING

#4 REBAR SET ON 3' X 3' SPACING

APPLY MINIMUM OF 4” SHOTCRETE

2” DIA WEEP HOLES 10’ C/C HORIZ/VERT

INSERT ROOF BOLTS INTO PRE-DRILLED 24” MIN. DEPTH AND GROUT IN PLACE

2” DIA WEEP HOLES 10’ ON CENTER UNLESS PLANS CALL FOR SPECIFIC PORTAL CLOSURE

CONSTRUCT DITCH IF WATER PRESENT (SEE DESIGN DRAWINGS FOR TYPE)
HIGHWALL RESTORATION FOR DANGEROUS OVERHANGS (AML 40-30-2)

- Rockfall netting (securely fasten with roof bolts on 8’x8’ max. spacing grid)
- Install sheet drain under rockfall netting
- #4 Rebar set on 3’ x 3’ spacing
- Apply minimum of 4” shotcrete
- 2” dia weepholes 10’ c/c horiz/vert
- Pneumatic backstow to fill void
- 2” dia weep holes 10’ on center unless plans call for specific portal closure
- Existing highwall shall be thoroughly cleaned by pressure washing as directed by the engineer. Remove all loose rock.
- Construct ditch if water present (see design drawings for type)
STABILIZED CONSTRUCTION ENTRANCE (AML 50-10-1)
CAST IN PLACE UNITS

LONGITUDINAL
NO. 4 REBAR

H/2

NO. 4 BAR 2'-3"
LONG AT 2'-6" O.C.

L = STANDARD LENGTHS OF THE INDEPENDENT UNITS ARE
2'-0", 4'-0", 6'-0", AND 8'-0".

1. NO. 5 BARS- 1'-6" MIN. LENGTH. FILL VOID WITH
COMMERCIAL GRADE BUTYL RUBBER CAULKING.
2. NO. 3 DEFORMED BARS (OR LARGER) 2 REQUIRED.
3. PRE-CAST UNIT WEIGHTS ARE APPROXIMATELY 38 LBS/LF.
4. LEAVE 6-8" SPACE BETWEEN SECTIONS WHEN INSTALLED
BETWEEN ROADWAY AND DITCH.

PRE-CAST UNITS

END VIEW

SECTIONAL ELEVATION

CURB BARRIERS (AML 50-10-2)
FLOWABLE FILL SHALL BE USED ON ALL PAVED ROADS.
CAP MIN. IS 6" TOTAL FOR ALL ROADS
- PRIVATE/COUNTY ROADS MUST HAVE MIN. 4" CONCRETE CAP OVER TOP OF PIPE
- STATE ROADS MUST HAVE MIN. 8" CONCRETE CAP OVER TOP OF PIPE.

3,500 PSI CONCRETE

FLOWABLE FILL

PIECE (SEE NOTE)

2' + PIPE DIA.

Hc

12"

Hc / 2

3" MIN DGA

PIECE NOTE:
RCP, PP (DUAL WALL POLYPROPYLENE), OR RHDPE (DUAL WALL STEEL REINFORCED HIGH DENSITY POLYETHYLENE) SHALL NOT BE USED UNDER PUBLIC ROADS

PROVIDE STEEL PLATING TO COVER TRENCH UNTIL PAVEMENT REPAIRED (INCIDENTAL TO PIPE INSTALLATION).
ACCESS GATE - 16' STEEL TUBE (AML 50-10-5)

NOTES:

USE HINGES, LATCH, CHAIN, AND LOCK AS RECOMMENDED BY THE GATE MANUFACTURER AND APPROVED BY THE ENGINEER (INCIDENTAL).

A MINIMAL AMOUNT OF FENCE SHALL BE REQUIRED ON EITHER SIDE OF THE GATE AS DIRECTED BY THE ENGINEER. FENCE AND ALL HARDWARE SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION OF THE GATE.
CONCRETE BLOCK- INTERLOCKING MAT (AML 50-10-6)

CHANNEL LINING OR EXISTING BASE

INTERLOCKING CONCRETE BLOCK

FLOW LINE

18" NO. 2 STONE BASE

BII-AXIAL GEO-GRID

2' X 2' X (BOTTOM WIDTH + 2') 3,500 PSI CONCRETE ANCHOR (UPSTREAM SIDE ONLY UNLESS NOTED OTHERWISE ON PLANS)

BLOCKS MUST HAVE INTERLOCKING PATTERN AND WEIGHT AT LEAST 10 LBS PER BLOCK

THE CONCRETE HEADER EXTENDS TO AT LEAST 2' BELOW THE TOP OF THE BLOCK.

ENGINEER MAY ELECT TO ADD CONCRETE FOOTER TO CROSSING DESIGN. USE SAME DIMENSION AS HEADER ANCHOR.

ENGINEER MUST PRE-APPROVE BLOCK MATERIAL PRIOR TO DELIVER TO SITE. ALL BLOCKS MUST INTERLOCK ON ALL SIDES.

3' NOMINAL TURNING RADIUS

6:1 OR FLATTER

FLOW LINE

18" NO. 2 STONE BASE

6:1 OR FLATTER

BURY TOP FLAP OF GEO-GRID 24-36" IN DGA

BI-AXIAL GEO-GRID
Guidelines for Low Water Crossing

1. The channel bottom to the top of the proposed crossing shall not be less than 24" in diameter or

2. The channel shall be a maximum full height of four and one-half (4½) feet measured from

3. The pipes shall not be more than one (1) foot spacing between the pipes measured

4. Between the outside edges of the pipes,

5. As many pipes as possible shall be placed within the stream banks,

6. All pipes shall be laid flush with the bottom of the stream channel,

7. The maximum cover over the top of the pipe shall not be greater than eighteen (18) in diameter.

Notes:

1. This is a conceptual drawing. The number and size of pipes and other details will very depending on specific site conditions.

2. The pipes and backfill must be contained within the stream channel as shown above. During construction of the approaches and access roadway across the roadway, unstable and replaced with unconsolidated materials unsuitable for roads may be excavated and replaced with the construction of the approaches and access roadway.

3. The finished surface of the roadway shall be outside of the roadbed, and (2) the finished surface of the completed road may be no more than three inches (3") above the pre-construction surface.

4. The disposal of excess unconsolidated materials must be outside of the roadbed, and (2) the finished surface of the completed road may be no more than three inches (3") above the pre-construction surface.

5. Rip rap, crushed stone, or other stable, road construction materials. This may only be done, however, with the following provisions: (t) the disposal of excess unconsolidated materials.

6. 4" From low point of original channel:

7. Not to Scale

8. Standard Drawing
TEMPORARY ACCESS BRIDGE (AML 50-10-8)

NOTES:
1. TYPES OF TEMPORARY BRIDGES OTHER THAN THE I-BEAM BRIDGE SHOWN HERE MUST BE APPROVED BY THE ENGINEER.
2. UNLESS OTHERWISE SPECIFIED THE STRUCTURE SHALL BE DESIGNED FOR AN H-10 LOADING.
3. REMOVE AT END OF CONTRACT.
CONSTRUCTION SPECIFICATIONS

1. USE MINIMUM WIDTH OF 10 FEET TO ALLOW FOR VEHICULAR PASSAGE.

2. PLACE HEAVY WEIGHT NONWOVEN GEOTEXTILE OVER THE EARTH MOUND PRIOR TO PLACING STONE.

3. PLACE 3" NO. 2 STONE OVER THE LENGTH AND WIDTH OF THE MOUNTABLE BERM.

4. MAINTAIN LINE, GRADE, AND CROSS SECTION. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN SPECIFIED DIMENSIONS. REMOVE ACCUMULATED SEDIMENT AND DEBRIS. MAINTAIN POSITIVE DRAINAGE.
DEBRIS AND OTHER MATERIALS SHALL NOT BE PERMITTED TO BUILD UP ON THE STRUCTURE. ALL MATERIALS SHALL BE IMMEDIATELY REMOVED AND TRANSPORTED TO A LOCATION AS DIRECTED BY THE ENGINEER. ALL SUCH WORK SHALL BE INCIDENTAL.

4" X 4" X 10' WOODEN STAKES DRIVEN 2' MIN. INTO SOLID GROUND AND SET IN CONCRETE ON SIDE OF STRUCTURE BEING PROTECTED

4' X 8' SECTIONS OF \( \frac{3}{8} \)" PLYWOOD ON OUTSLPPE SIDE AWAY FROM STRUCTURE TO BE PROTECTED

FOR PROJECTS ESTIMATED TO LAST LONGER THAN 2 MONTHS, BALES SHALL BE COVERED WITH BLACK OR WHITE PLASTIC.

(No Clear Plastic)

8' MIN.

2' MIN.

3,500 PSI CONCRETE

2 ROWS OF BALES ARE SHOWN. SOME PROJECTS MAY ONLY NEED 1 ROW OF BALES.

DEBRIS BARRIER WALL - BALE & PLYWOOD (AML 50-20-1)
STEEL PILES SET IN CONCRETE OR 6” SCHEDULE 80 STEEL PIPE SLOTTED BELOW GRADE TO PERMIT GROUT INFILTRATION

3 BOLTS PER PANEL

MAX 12” DIA HOLE FILLED WITH CONCRETE

4’ O.C. 4’ O.C.

10’ MIN.

FINISHED STEEL PANEL SIZE – 3.75’ X 10’

CORRUGATED 11 GAUGE GALVANIZED STEEL PANELS

MIN. 6” LAP

BACK (FILL SIDE)

GROUNDLINE

6” OVERLAP

5/8” HEX NUT

WASHER

5/8” HEX BOLT

OR FIELD WELD TO PIPE

WASHER

FRONT

SIDE VIEW

DEBRIS BARRIER WALL- PERMANENT (AML 50-20-2)
GUARDRAIL PANEL WALL - STEEL PILES (AML 50-20-3)

- EXISTING GROUND
- 10' (MAX)
- PILES SET 4' ON CENTER WITH GUARDRAIL PANELS
- CLASS II AND/OR NO. 2 STONE
- BACKFILL SIDE
- CONCRETE ENCASEMENT
- 4' O.C.
- STEEL PILE
- ASSUMED ROCKLINE
- PILES ENCASED IN CONCRETE
- 8' MAX
- EXISTING GROUNDLINE
- 10' MIN IN ROCK

SEE DRAWINGS AND SPECIAL CONDITIONS FOR STEEL PILE SIZE (E.G. W8 X 40) OR RAILROAD STEEL (E.G. 130 LBS/YD)
STEEL PANEL WALL (AML 50-20-4)

Class II and/or No. 2 Stone

Concrete Encasement

Steel Pile or Schedule 80 Pipe

Backfill Side

Steel Piles or Schedule 80 Pipe Set on 4' Centers w/ Steel Panels

Existing Groundline

8' Max

Existing Groundline

4' O.C.

Assumed Rockline

Piles Encased in Concrete

10' Min in Rock

10' (Max)

See drawings and special conditions for steel pile size (e.g. W8 x 40) or railroad steel (e.g. 130 lbs/yd)
CHAIN-LINK FENCE (AML 50-20-5)

NOTES:

- All posts shall be set in concrete to the dimensions indicated on this drawing.
- All fence fittings shall be galvanized steel, cast iron or other type as approved by the engineer. They shall be designed in a manner to exclude moisture from inside posts and rails.
- NPS = Nominal Pipe Size. ASTM F1083 and F1043 (Heavy Industrial Fencing) shall govern.
- Indiscriminate mixing of posts will not be permitted.
- Tension wire complying with ASTM A74 shall be substituted for the top rail, when the fence is to be installed in the path of an errant vehicle.

LEGEND / ALTERNATES:

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<tr>
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<tbody>
<tr>
<td>2 1/2&quot; NPS END POST</td>
<td>3 1/2&quot; X 3 1/2&quot; END POST</td>
</tr>
<tr>
<td>2&quot; NPS LINE POST</td>
<td>2 1/4&quot; E-COL. LINE POST</td>
</tr>
<tr>
<td>3/8&quot; DIA. TRUSS ROD AND TIGHTENER</td>
<td>3/8&quot; DIA. TRUSS ROD AND TIGHTENER</td>
</tr>
<tr>
<td>1 1/4&quot; NPS BRACE</td>
<td>NOT REQUIRED</td>
</tr>
<tr>
<td>1 1/4&quot; NPS TOP RAIL</td>
<td>1 1/4&quot; X 1 5/8&quot; TOP RAIL &amp; BRACE</td>
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<tr>
<td>FLAT TENSION BAR</td>
<td>NOT REQUIRED</td>
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<tr>
<td>BRACE Band and Tension Band</td>
<td>NOT REQUIRED</td>
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CAP OR FITTED OVER CLAMP

1 1/4" X 1 5/8" TOP RAIL & BRACE

TRUSS TIGHTENER

BRACE AND TRUSS CONNECTOR

1 1/4" X 1 5/8" BRACE
WOVEN - WIRE FENCE (AML 50-20-6)

MATERIALS:
- WOVEN-WIRE FABRIC SHALL BE EITHER ALUMINUM-COATED STEEL NO. 1047-6-9 OR ZINC-COATED STEEL NO. 1047-6-9.
- ALL FENCE FITTINGS SHALL COMPLY WITH ASTM F 626.
- NPS = NOMINAL PIPE SIZE – ASTM F1083 AND F1043 (HEAVY INDUSTRIAL FENCE) SHALL GOVERN.

1. STUDED "T" POST AT 1.33 LBS. PER FOOT OR
2. ROLL FORM POST AT 1.40 LBS. PER FOOT (SEE DETAIL)
   NOT REQUIRED FOR ROLL FORM POST.

ROLL FORM POST

PLAN VIEW OF CLIP

INSTALLED IN ROLL FORM POST

0.080"  1 5/8"  3/8"

PLAN VIEW OF ROLL FORM POST

ISOMETRIC EXPLODED VIEW
OF ROLL FORM POST AND CLIPS

CLIPS SHALL BE SPRING STEEL ALUMINUM - FINISHED

WELDED

ALTERNATE METHODS OF SECURING VERTICAL STAY WIRE TO THE HORIZONTAL WIRE OF THE FABRIC.

DETAIL "A"
1. SECTIONS WILL BE 10’ LONG UNLESS APPROVED BY ENGINEER.
2. 2’ DIA. LIFTING HOLE–2 REQUIRED FOR EACH SECTION FORMED WITH 2” PVC PIPE OR EQUAL.
3. ALL STEEL HAS 2” MIN. CLEAR DISTANCE FROM OUTSIDE FACE OF BARRIER.
4. LIFTING BARS SHALL BE REQUIRED TO PREVENT SPALLING OF CONCRETE AROUND HOLES.

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<th>ACCEPTABLE SIZES</th>
<th>TOP WIDTH</th>
<th>BASE WIDTH</th>
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<tbody>
<tr>
<td>TOP WIDTH</td>
<td>BASE WIDTH</td>
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</tr>
<tr>
<td>0’-9”</td>
<td>2’-2”</td>
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<td>1’-0”</td>
<td>2’-6”</td>
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<td>1’-2”</td>
<td>2’-8”</td>
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CONCRETE JERSEY BARRIER (AML 50-20-7)
GUARDRAIL POST- STEEL (AML 50-20-8C)

~ W8 X 9.0 STEEL POST ~

OFFSET BLOCK TYPE 4 (TIMBER) (FOR USE WITH STEEL POST ONLY)

REAR ELEVATION

SIDE VIEW ANCHOR PLATE

PLAN VIEW

SIDE VIEW

SECTION A-A

FRONT VIEW

NOTES

1. W8 X 8.5 IS AN ACCEPTABLE ALTERNATE.
PIPE DIVERSION (AML 60-10-1)

Plan View

Disturbed Area

Flow

Sandbag / Stone Barriers

Barrier Height = Bank Height "H"/2 + 1' for projects of duration <2 weeks; 2-year flood elevation for projects of longer duration

Longitudinal Section View

Impervious Sheeting (Incidental)

Design Flow Level

Barrier Height Defined by H Equation

Diversion Pipe

Top of Stream Bank

Disturbed Area
BARRIER HEIGHT = BANK HEIGHT \( \frac{H}{2} + 1' \) FOR PROJECTS OF DURATION <2 WEEKS; 2-YEAR FLOOD ELEVATION FOR PROJECTS OF LONGER DURATION.

PLAN VIEW

FLOW

MIN. OPENING 50% STREAM WIDTH

DISTURBED AREA

SANDBAG/STONE DIVERSION

SANDBAG/STONE DIVERSION (AML 60-10-2)
GENERAL NOTES
1. Coir able to withstand 10 fps water velocities and 4.46 psf shear stress. Fabric embedment 3.0 ft.
2. Prepare soil before installing rolled erosion control products (RECP), including any necessary application of lime, fertilizers, and seed.
3. Begin at top of the slope by anchoring RECP's in a 1' deep by 6' wide trench with approximately 12" extended beyond the upslope portion of the trench. Anchor the RECP with a row of stakes approximately 3' apart in bottom of the trench. Backfill and compact the trench. Apply seed to compacted soil and fold remaining 12" portion of RECP back over seed and compacted soil. Secure RECP over compacted soil with a row of stakes spaced approximately 12" apart across the width of the RECP. The edges of RECP's must be overlapped a minimum of 1'.
BRUSH MATTRESS BANK TREATMENT - (AML 60-20-2)

**GENERAL NOTES**

1. COCONUT EROSION CONTROL BLANKET SHALL BE ABLE TO WITHSTAND 10 FPS WATER VELOCITIES AND 4.46 PSF SHEAR STRESS. FABRIC EMBEDMENT 3.0 FT.

2. FASCINES WILL CONTAIN DORMANT LIVE WOODY MATERIAL 1/2 TO 2 INCHES IN DIAMETER FORMING BUNDLES THAT ARE 8" MINIMUM DIAMETER AND NOT LESS THAN 6 FEET IN LENGTH (L). THE PLANT MATERIAL SHOULD BE DORMANT, STRIPPED OF LEAVES AND IRRIGATED.

3. FASCINE BUNDLES SHALL BE TIED WITH UNTREATED TWINE EVERY 1 TO 2 FEET.

4. PLACE AND FIRMLY COMPACT SOIL OVER AND AROUND FASCINE LEAVING APPROXIMATELY 30% OF UPPER BRANCHES EXPOSED.

5. STAKES USED TO SECURE THE LIVE FASCINES SHOULD BE 2 FEET LONG, UNTREATED, 2X4 LUMBER, CUT DIAGONALLY. STAKES SHALL BE DRIVEN IN AT REQUIRED CONTOUR INTERVAL.

6. LOGS SHALL BE 1.5'x', 20' LONG WITH 4' ROOTWAD. EMBED BALLAST LOGS 13' MIN. INTO BANK. BALLAST LOG SHALL BE PLACED WITH A "TIGHT" CONNECTION TO RESTRAIN TOE LOG.
FASCINE BANK TREATMENT - (AML 60-20-3)

GENERAL NOTES

1. FASCINES WILL CONTAIN DORMANT LIVE WOODY MATERIAL 1/2 TO 2 INCHES IN DIAMETER FORMING BUNDLES THAT ARE 8" MINIMUM DIAMETER AND NOT LESS THAN 6 FEET IN LENGTH (L). THE PLANT MATERIAL SHOULD BE DORMANT, STRIPPED OF LEAVES AND IRRIGATED.

2. FASCINE BUNDLES SHALL BE TIED WITH UNTREATED TWINE EVERY 1 TO 2 FEET.

3. PLACE AND FIRMLY COMPACT SOIL OVER AND AROUND FASCINE LEAVING APPROXIMATELY 30% OF UPPER BRANCHES EXPOSED.

4. STRUCTURAL MEASURES SUCH AS REVETMENT OR DRAINAGE TO BE INSTALLED PRIOR TO FASCINES. SLOPE SHALL BE SHAPED AND GRADED TO SLOPE INDICATED ON DRAWING.

5. FASCINES TRENCH TO BE EXCAVATED BY HAND JUST ABOVE EACH ANCHOR STAKE, WORKING FROM THE BOTTOM OF THE SLOPE TO THE TOP. TRENCH DEPTH SHALL BE ONE-HALF THE FASCINE DIAMETER.

6. LOGS SHALL BE 1.5' x 2.0' LONG WITH 4' ROOTWAD. EMBED BALLAST LOGS 13' MIN. INTO BANK. BALLAST LOG SHALL BE PLACED WITH A "TIGHT" CONNECTION TO RESTRAIN TOE LOG.

7. COCONUT EROSION CONTROL BLANKET SHALL BE ABLE TO STAND 10 FPS WATER VELOCITIES AND 4.46 PSF SHEAR STRESS. FABRIC EMBEDMENT 3.0 FT.
DORMANT POST PLANTING - (AML 60-20-4)

PLAN VIEW

SECTION ④
WILLOW POST MUST BE AT LEAST ¾'' DIA. X 5' LONG

USE STINGER BAR ON A BACKHOE TO MAKE THE HOLE

FILL THE HOLE WITH DRY SAND OR SOIL AROUND THE TREE. LEAVE NO AIR SPACES AROUND THE CUTTING.

BASE OF CUTTING SHALL BE AT LEAST 12'' INTO THE SEASONAL LOW WATERTABLE
CONSTRUCTION NOTES:

1. ATTACH WITH WOODEN (DEAD STOUT STAKES) AT LEAST 18" IN LENGTH (2X4 CUT AT AN ANGLE) OR METAL PINS.
2. POSITION STAKES APPROXIMATELY 3' APART (3 PER SQ. YARD OF FABRIC), DOMINO PATTERN.
3. OVERLAP FABRIC AT LEAST 18" IN WATER FLOW DIRECTION.
4. OVERLAP EDGES AT LEAST 8", STAKING BOTH EDGES SECURELY.
5. CHECK SLOTS WITH FABRIC BURIED AT LEAST 6" DEEP SHOULD BE USED EVERY 25' IN WATERWAYS OR DITCHES.
6. THE FABRIC SHOULD BE BURIED IN ANCHOR TRENCHES AT LEAST 10" DEEP AT THE TOP AND BOTTOM ENDS OF AN INSTALLATION TO PREVENT UNDERCUTTING OF THE FABRIC.
7. PROVIDING ALL STAKES IS INCIDENTAL TO ECB.
GENERAL NOTES
1. MINIMUM LENGTH OF LIVE CUTTINGS SHALL BE 4' TO 6' WITH A DIAMETER OF 1/2" TO 2".
2. EMBOD LIVE CUTTINGS 4 FEET INTO REINFORCED EARTH.
3. INSTALLATION SHALL OCCUR WHILE VEGETATION IS DORMANT.
4. LOGS SHALL BE 1.5", 20' LONG WITH 4' ROOTWAD. EMBOD BALLAST LOGS 13' MIN. INTO BANK. BALLAST LOG SHALL BE PLACED WITH A "TIGHT" CONNECTION TO RESTRAIN TOE LOG.

FILL KEY TRENCH W/ TOPSOIL AND COMPACT
WOVEN COIR FABRIC
STAKE FABRIC TO BOTTOM OF KEY TRENCH, 1 STAKE PER 3 LF
STAKE

SECTION
REINFORCED EARTH BANK TREATMENT - (AML 60-20-7)

NOTES:
*NUMBER OF LIFTS MAY VARY
FILL: TOPSOIL, STONE, OR SPawning GRAVEL
FABRIC: NON-WOVEN COIR (INNER) AND WOVEN COIR (OUTER)
COCONUT EROSION CONTROL BLANKET SHALL BE ABLE TO WITHSTAND 10 FPS WATER VELOCITIES AND 4.46 PSF SHEAR STRESS. FABRIC EMBEDMENT 3.0 FT.

KEY TRENCH DETAIL

FABRIC WRAPPED SOIL LIFTS
SEE STAKING DETAIL
KEY TRENCH MIN. 1' DEEP

STAKING DETAIL
WOVEN (OUTER) COIR FABRIC
NON-WOVEN (NINDY) COIR FABRIC
NATIVE SEED MIX
FILL
GENERAL INSTRUCTIONS FOR CONSTRUCTING REINFORCED EARTH BANKS

1. BANKS MAY BE CONSTRUCTED IN EITHER AN UPSTREAM OR DOWNSTREAM DIRECTION, AS LONG AS THE FABRIC IS OVERLAPPED IN THE PROPER DIRECTION.

2. CHECK PLANS AND SPECIFICATIONS: EACH LIFT MAY HAVE A UNIQUE FILL COMPOSITION AND VARYING PLACEMENT OF ROOTED CUTTINGS.

3. PLACE A SERIES OF THREE OR MORE FORMS ON THE GROUND SO THAT THE FORMS FOLLOW THE PROPOSED STREAM BANK ALIGNMENT, BUT THE ENDS OF THE FORMS TIGHTLY TOGETHER.

4. UNROLL THE WOVEN COIR FABRIC PARALLEL TO THE LONG AXIS OF THE CHANNEL AND POSITON IT SO THAT 3.0 FEET EXTENDS FOR EMBEDMENT ON THE BANK SIDE OF THE FORMS (Fig. B), AND A MINIMUM 3 FEET EXTENDS LENGTHWISE BEYOND THE LAST FORM FOR OVERLAP. DRAPE THE REMAINDER OF THE FABRIC OVER THE TOP OF THE FORMS ON THE STREAM SIDE (Fig. B).

5. UNROLL THE NONWOVEN COIR FABRIC OVER THE TOP OF THE WOVEN COIR FABRIC (Fig. B) AND POSITION IT SO THAT AT LEAST 1 FOOT OF THE INNER FABRIC EXTENDS AS AN EMBEDMENT LENGTH ON THE BANK SIDE OF THE FORMS (Fig. C). DRAPE THE REMAINDER OF THE FABRIC OVER THE TOP OF THE FORMS ON THE STREAM SIDE AND ALIGN THE LONG EDGES OF THE COIR FABRICS. STRETCH AND PULL THE FABRIC LAYERS TO REMOVE WRINKLES.

6. APPLY NATIVE SEED MIX TO NONWOVEN COIR FABRIC ALONG VERTICAL EDGE OF LIFT (Fig. D). PLACE SPECIFIED FILL OVER THE FABRIC ON THE BANK SIDE OF THE FORMS. SLOPE THE FILL DOWNWARD TO THE BANK AND COMPACT TO 85–90 PERCENT STANDARD PROCTOR DENSITY (Fig. E).

7. APPLY NATIVE SEED MIX TO TOP OF FILL FROM THE FRONT OF THE LIFT TO 3 FT BACK FROM FRONT OF THE LIFT (Fig. F).

8. FOLD THE LOOSE ENDS OF THE TWO COIR FABRIC LAYERS BACK OVER THE COMPACTED FILL MATERIAL AND STRETCH TIGHTLY TO REMOVE WRINKLES (Fig. G). SECURE WITH WOODEN STAKES 1 PER 3 LF. ALONG THE BACK EDGE AND INTO UNDISTURBED SOIL.

9. REMOVE THE FORMS FROM THE FRONT OF THE COMPLETED LIFTS (Fig. F). LEAVE THE LAST FORM IN PLACE AT THE END OF THE NEWLY CONSTRUCTED LIFT (Fig. G). PLACE ROOTED CUTTINGS ON TOP OF THE FINISHED LAYER FOR THE NEXT LIFT (Fig. G). PLACE A SMALL AMOUNT OF TOPSOIL AROUND THE BURLAP SOCK OF THE ROOTED CUTTING. CAREFULLY RESET THE FORMS ON TOP OF THE FINISHED LAYER FOR THE NEXT LIFT (Fig. H) TO AVOID DAMAGING THE ROOTED CUTTING.

10. PROCEED WITH A NEW SERIES OF LIFTS BY EXTENDING A NEW ROW OF FORMS, BEGINNING AT THE END FORM THAT WAS LEFT IN PLACE, LAY OUT TWO NEW LAYERS OF FABRIC AS PREVIOUSLY DESCRIBED, MAKING SURE TO OVERLAP THE NEW FABRIC LAYERS WITH THE PREVIOUS LAYERS, STAGGER OVERLAPS, BETWEEN ADJACENT LIFTS BY A MINIMUM OF 15 FEET (Fig. G).

11. ON THE TOP LIFT, EXCAVATE A KEY TRENCH 1.5 FEET WIDE AND 1 FOOT DEEP ALONG THE EDGE OF THE WOVEN COIR FABRIC LAYER, PARALLEL TO THE FORMS. SECURE FABRIC IN THE KEY TRENCH WITH WOODEN STAKES, 3 FT O.C.

12. BACKFILL THE KEY TRENCH WITH TOPSOIL AND CONTINUE TO APPLY TOPSOIL TO SMOOTHLY MERGE WITH EXISTING CONTOURS. APPLY NATIVE SEED MIX TO KEY TRENCH AREA.

USE WITH AML 60–10–5

REINFORCED EARTH BANK INSTRUCTIONS - (AML 60-20-8)
NOTE:
L IS MEASURED PARALLEL TO THE BED SLOPE (TAN θ)
H IS MEASURED PERPENDICULAR TO THE HORIZONTAL
**PROFILE VIEW:**
*CASCADE & STEP POOL MORPHOLOGIES*

<table>
<thead>
<tr>
<th>Approximate Channel Slope:</th>
<th>Typical Pool Spacing:</th>
<th>Average Step Height</th>
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</thead>
<tbody>
<tr>
<td>&gt;0.065 Ft/ft</td>
<td>&lt;1 Channel Width</td>
<td>1 &lt; (H/L)_{AVE} /S&lt;2</td>
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S = Slope

<table>
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<tr>
<th>Approximate Channel Slope:</th>
<th>Typical Pool Spacing:</th>
<th>Average Step Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.030–0.065 Ft/ft</td>
<td>1–4 Channel Widths</td>
<td>1 &lt; (H/L)_{AVE} /S&lt;2</td>
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</tbody>
</table>
LOG VANE (AML 60-40-1)

PLAN VIEW: LOG VANE

BOULDER FOR ADDED STABILITY (IF NEEDED)

20°-30°

5’ TO 6’ MIN.

1/4 TO 1/3 STREAM WIDTH

SCOUR POOL

FLOW LINES

SUPPORT PILING

3’ ANCHOR RODS

SECTION VIEW: LOG VANE

END OF VANE SHOULD BE SECURED IN BANK AT BANKFULL HEIGHT

TIP OF VANE AT OR NEAR BED ELEVATION SUPPORT PILING

FLOW

BANKFULL

3% TO 7% SLOPE

FLOW

3’ ANCHOR RODS

P = POOL; B = BAR; E = BANK EROSION

— MAIN/SURFACE FLOW;

— OVER TOPPING FLOW

— NEAR BED FLOW;

CRITICAL NOTE: THIS FEATURE DIPS DOWN AS GOES UPSTREAM.
PLAN VIEW: ROCK VANE

BOULDERS FOR ADDED STABILITY

FLOW LINES

TYP 1/4 TO 3/4 STREAM WIDTH

SCOUR POOL

SECTION VIEW: ROCK VANE

END OF VANE SHOULD BE SECURED IN BANK AT BANKFULL HEIGHT

FLOW

NORMAL BASEFLOW LEVEL

TIP OF VANE AT OR NEAR BED INVERT

PROFILE VIEW: STRAIGHT VANE

BANKFULL

FLOW LINES

1 OR 2 TIERS OF FOOTER ROCK

3% TO 7% SLOPE

SCOUR POOL

CRITICAL NOTE: THIS FEATURE DIPS DOWN AS GOES UPSTREAM.

ROCK VANE (AML 60-40-2)
J-HOOK VANE (AML 60-40-3)

PLAN VIEW: J-HOOK VANE

1/3 - 1/2 ROCK DIA. GAPS
20'-30'
FLOW LINES
SCOUR HOLE
FOOTER ROCKS
ANCHOR VANE A MIN. OF 2 ROCKS DEEP INTO BANK
60% BANKFULL

SECTION VIEW: J-HOOK VANE

TOP LAYER OF ROCKS AT OR NEAR BED ELEVATION
1/3 TO 1/2 ROCK DIA. GAPS
BANKFULL

PROFILE VIEW OF VANE ARM

3% TO 7% SLOPE
BANKFULL
FLOW LINES
SCOUR POOL
1 OR 2 TIERS OF FOOTER ROCKS

PROFILE VIEW OF J-HOOK

FLOW LINES
SCOUR POOL
1 OR 2 TIERS OF FOOTER ROCKS
BANKFULL

CRITICAL NOTE: THIS FEATURE DIPS DOWN AS GOES UPSTREAM.
PLAN VIEW: LOG DEFLECTOR

LARGE BOULDERS TO PROTECT AGAINST SCOUR AT HIGH FLOWS

MAX $\frac{1}{2}$ STREAM WIDTH

30°-40°

5-6' MIN.

CONSTRUCTION NOTE:
A SINGLE LARGE LOG OR MULTIPLE SMALLER LOGS CAN BE USED FOR DEFLECTORS; SMALLER LOGS SHALL BE SECURELY ANCHORED TO EACH OTHER WITH METAL RODS

SECTION VIEW: LOG DEFLECTOR

NORMAL BASEFLOW LEVEL

LARGE STONE FOR ADDED STABILITY

SUPPORT PILING

PLAN VIEW: LOG FRAME DEFLECTOR

BRACE LOG

LARGE BOULDERS FOR BRACING

90°

MAX 1/2 STREAM WIDTH

ANCHOR ROD

FLOW

STREAM DEFLECTORS (AML 60-40-4)
LEGEND:

P = POOL; B = BAR; E = BANK EROSION

→→ MAIN/SURFACE FLOW; ----> OVER TOPPING FLOW

-----→ NEAR BED FLOW;

WING

STREAM DEFLECTORS- ALTERNATIVE CONFIGURATIONS (AML 60-40-5)

USE WITH AML 60-40-4

KY DAML 1-2013
PLAN VIEW: CROSS VANE

FLOW LINES

ANCHOR EACH WING OF VORTEX WEIR A MINIMUM OF 2 TO 3 ROCKS DEEP INTO BANK

1ST TIER OF FOOTER ROCKS

2ND TIER OF FOOTER ROCKS

SCOUR HOLE

SCOUR POOL

SECTION VIEW: CROSS VANE

BANKFULL WIDTH

AT OR NEAR STREAM INVERT

PROFILE VIEW OF CENTER OF CROSS VANE

FLOW LINES

SCOUR POOL

1 OR 2 TIERs OF FOOTER ROCKs

PROFILE: CROSS VANE ARM

BANKFULL

SLOPE

SCOUR POOL

BANKFULL

1 OR 2 TIERs OF FOOTER ROCKs

CRITICAL NOTE: THIS FEATURE DIPS DOWN AS GOES UPSTREAM.

CROSS VANE (AML 60-40-6)
PLAN VIEW: W—ROCK WEIR

- **RIP-RAP FOR BANK ARMORING**
- **FLOW LINES**
- **FOOTER ROCKS**
- **1/4 BANKFULL WIDTH**
- **1/2 BANKFULL WIDTH**
- **1/2 BANKFULL WIDTH**
- **1/2 BANKFULL WIDTH**

SECTION VIEW: W—ROCK WEIR

- **BANKFULL WIDTH**
- **1/2 BANKFULL WIDTH**
- **1/2 BANKFULL WIDTH**
- **1/2 BANKFULL DEPTH**

ANCHOR WINGS OF WEIR A MIN. OF 2–3 ROCKS DEEP INTO THE BANK

CRITICAL NOTE: THIS FEATURE DIPS DOWN AS GOES UPSTREAM.

APEX ROCKS AT OR NEAR BED ELEVATION TO PERMIT FISH PASSAGE DURING LOW FLOWS

"W" WEIR (AML 60-40-7)
1. THIS TREATMENT FOR EMBANKMENT FOUNDATION BENCHES AS INDICATED ON THIS SHEET SHALL BE ACCEPTED AS GUIDES, HOWEVER, ALL THE CONDITIONS THAT WILL BE ENCOUNTERED CANNOT BE SHOWN, THEREFORE, THE DESIGN ENGINEER AND/OR CONTRACTOR MUST GIVE CONSIDERABLE THOUGHT TO THE LOCATION AND DIMENSIONS OF THESE BENCHES.

2. DEFINITE DESIGN INFORMATION CANNOT BE ESTABLISHED AS TO SIZE OF THESE BENCHES, DUE TO IRREGULARITIES AND THE DIFFERENT RATES OF INCLINE OF THE EXISTING CROSS SECTION. HOWEVER, IT IS GENERALLY BELIEVED THAT A 6’ TO 12’ RISE AND A 20’ TO 35’ HORIZONTAL RUN ARE FAIRLY TYPICAL WITH A 15’ HORIZONTAL RUN BEING THE MINIMUM.

3. WHEN THE INCLINE OF THE CROSS SECTIONS IS 15% OR GREATER THESE EMBANKMENT FOUNDATION BENCHES SHALL BE CONSTRUCTED IN THE ORIGINAL SLOPE AS THE EMBANKMENT IS CONSTRUCTED IN COMPACTED LAYERS OR LIFTS.

4. WHEN EMBANKMENT FOUNDATION BENCHES ARE SHOWN ON THE CROSS SECTION, THE VOLUME SHALL BE INCIDENTAL.

5. NO QUANTITIES WILL BE ALLOWED FOR THE REFILLING OF THESE BENCHES, SINCE SUPPOSEDLY; THE MATERIAL THAT WAS EXCAVATED WILL BE PROCESSED AND PLACED BACK IN THESE BENCHES.
1. All final grade areas should have benches created with bench diversions to central drainage channels.

2. Line bench channels with type A ECB (erosion control blanket). Bench spacing and grades may be adjusted at the engineers direction in the field.
CONSTRUCT ECB SWALE DITCH ALONG BENCH 2 TO 3% LONGITUDINAL GRADE AND DRAIN TO A STABLE OUTLET.

BENCH SPACING = H

1 FT MIN.

6 FT MIN.

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>H (MAX.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:1</td>
<td>20 FT</td>
</tr>
<tr>
<td>3:1</td>
<td>30 FT</td>
</tr>
<tr>
<td>4:1</td>
<td>40 FT</td>
</tr>
</tbody>
</table>
NOTE: COVER MATERIAL SHALL BE PLACED AT 2.5’ MIN. DEPTH ONCE EARTHWORK–GRADEWORK AND LIME BARRIER HAS BEEN PLACED. SEE CONSTRUCTION NOTES, SPECIAL CONDITIONS, AND AML STANDARD TECHNICAL SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND REQUIREMENTS.

UNIFORMLY PLACED COVER MATERIAL
MINIMUM 2.5’ THICK, UNCOMPACTED

EXISTING GROUNDLINE

PROPOSED FINAL GRADELINE

PROPOSED EARTHWORK–GRADEWORK GRADELINE

REFUSE/SLURRY

UNIFORMLY PLACED LIME BARRIER
(SEE PLANS/SPECIFICATIONS FOR RATE OF APPLICATION)
**STEP 1 - SITE PREPARATION**
Prepare site to design profile and grade. Remove debris, rocks, clods, etc. Ground surface should be smooth prior to installation to ensure blanket remains in contact with slope.

**STEP 2 - SEEDING**
Seeding of site should be conducted to design requirements or to follow local or state seeding requirements as necessary.

**STEP 3 - STAPLE SELECTION**
Secure blanket with steel staples or wooden stakes.

**STEP 4 - EXCAVATE ANCHOR TRENCH AND SECURE BLANKET**
Excavate a trench along the top of the slope to secure the upstream end of the blanket. The trench should run along the length of the installation, be 6 in. wide and 6 in. deep min. Staple blanket along bottom of trench, fill with compacted soil, overlap blanket towards toe of slope and secure with row of staples.

**STEP 5 - SECURE BODY OF BLANKET**
Roll blanket down slope from anchor trench. Staple body of blanket. Leave end of blanket unstapled. Place downstream blanket underneath upstream blanket to form shingle pattern. Staple seam. Secure downstream blanket. More staples may be required to ensure blanket is sufficiently secured to resist mowers and foot traffic and to ensure blanket is in contact with soil surface over the entire area of blanket. Further, critical points require additional staples.

**STEP 6 - CONTINUE ALONG SLOPE - COMPLETE INSTALLATION**
Overlap adjacent blankets and repeat step 5. Secure toe of slope using stapling pattern shown in Figure E. Secure edges of installation by stapling at 1.0' intervals along the terminal edge. Actual stable spacing may differ between this detail and manufacturer details.
GATE VALVE AND HOUSING (AML 70-20-1)

- **Groundline**
- **Lockable Lid or Locking Bar**
- **Depth Varies**
- **Gate Valve Tool (min 1.5” φ Painted Steel Tubing) with Lateral Supports**
- **2” Square Nut Gate Valve**
- **Provide tool to reach valve or install shaft (1.5” φ min.) and wheel w/ lateral supports that can be reached**

Pre-fabricated valve enclosure or "Dog-Housed" corrugated polyethylene pipe.
FLUME- TIMBER (AML 70-20-2)

EARTHEN EMBANKMENT

4”X4” PRESSURE TREATED TIMBER

NO. 5 REBAR STAKED THROUGH 6”X6” TIMBERS

FLOW

CUTTHROAT FLUME WITH CONCRETE FILL

6”X6” PRESSURE TREATED TIMBERS NAILED OR SPIKED TOGETHER
SPREADER BAR BAFFLE (AML 70-20-3)

4' x 8' x 1/4" MARINE PLYWOOD SHEETING

FLOW

SET OUTSIDE SECTION 0.5'
ABOVE REST OF BAR

2" x 4" CROSS BEAM

4" x 4" PRESSURE TREATED
POST SET MIN 2' IN
CONCRETE

SHORELINE
ASSEMBLY

1. Lift the sides, ends, and diaphragms into vertical position. (Fig. A.)

2. Wire the corners of the panels and diaphragms to the front and back panels using the gage wire projecting from the corner of each panel.

3. Lace all vertical edges of end panels and diaphragms using manufacturer’s approved lacing wire. Lacing shall begin by securing the wire at the basket corner by looping and twisting, then proceeding along edges by looping the wire at approximately 5” intervals alternating between single and double loops, finally securing the wire by looping and twisting at the opposite corner (Fig. C).

4. All vertical edges shall be secured by lacing wire to another vertical edge when touching another basket.

INSTALLATION

1. The foundation surface on which the gabions are to be placed shall be relatively smooth and even.

2. Gabions shall be placed, where possible, front to front and back to back to expedite stone filling and lid lacing operations (Fig. B).

3. Adjacent gabions shall be laced along the perimeter of all contact surfaces including any underlying rows of gabions (Fig. B).

4. Gabions shall be filled in approximately 1” lifts, connecting wires shall be placed in outside cells at all exposed faces and firmly wired (Figs D and E).

5. Filled gabions shall be stretched tight during the lacing operation to limit shifting of the gabion stone after installation.

6. Alternative gabion unit fasteners may be used to secure the horizontal edges.

7. Adjacent rows of gabion units shall be placed such that the seams are offset.