Chapter 05

RETAINING WALLS (RW)
GENERAL NOTES

Specifications: MDOT SHA Standard Specifications for Construction and Materials


Concrete Design: LRFD, $f'_c = 3.0$ ksi.

Reinforcing Steel Design: $f_y = 60.0$ ksi.

Concrete: All structure concrete shall be Mix No. 3 (3500 psi) except as noted below under reinforcing steel.

Reinforcing Steel: Reinforcing steel shall conform to A 615, Grade 60. All splices, not shown, shall be lapped as per Bar Lap Charts. Minimum cover for any bar shall be 2” unless otherwise noted, with the exception of bars at the bottom and sides of all footings which shall have 3” minimum cover.

If the front face of a retaining wall less than 10 feet from the edge of paved surfaces, epoxy coated reinforcement shall be used in the front face of the stem and Mix No. 6 (4500 psi) concrete shall be used for the stem.

ONLY GRADE 60 CAN BE USED.

Design Parameters: Earth pressure calculated based on Coulomb Theory.

Angle of Internal Friction:
33 degrees for excellent soil
30 degrees for good and poor soils (and all walls on pile footings)

For Wall Types E and F, passive earth pressure from top of footing to bottom of shear key was utilized in the design. In these cases, the top of footing shall have a minimum of 30” cover.

Safe bearing pressures are factored resistances.
Notes:
1. An "Excellent Soil Condition" is that foundation material that can support a safe bearing pressure of 5 ksf and has an angle of friction of 33°.
2. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
3. Contractor has option of lapping main stem reinforcement with rear dowel reinforcement as shown; or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
4. These walls are valid if traffic is present on the level area adjacent to the wall.

<table>
<thead>
<tr>
<th>Wall Type</th>
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<th>A</th>
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<th>Rear Dowel Bar</th>
<th>Main Stem Bar</th>
<th>Top Foot, Bar</th>
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</thead>
<tbody>
<tr>
<td>A-I</td>
<td>6'-0&quot;</td>
<td>1'-0&quot;</td>
<td>9'</td>
<td>2'-0&quot;</td>
<td>3'-9&quot;</td>
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<td>2'-2&quot;</td>
<td>#5 @ 1'-0&quot;</td>
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<td>#5 @ 1'-0&quot;</td>
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<tr>
<td>A-II</td>
<td>8'-0&quot;</td>
<td>1'-0&quot;</td>
<td>9'</td>
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<td>5'-0&quot;</td>
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<td>A-III</td>
<td>10'-0&quot;</td>
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<td>*#6 @ 1'-0&quot;</td>
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<td>14'-0&quot;</td>
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Proposed Finished Groundline.

Top Main Stem Reinforcement

Dowel bar **

Top Footing Bar *#4 @ 1'-0" Typ.

Main Stem Bar

Foot. Bar

Dowel Bar

Rear Dowel Bar

Front Dowel bar

** (Typ.)

(See note 2 below)

For Drainage System, See RW(0.01)-80-100 or BR-S80(0.01)-80-101

Scale: ½" = 1'-0"

TYPICAL SECTION
Notes:

1. A "Good Soil Condition" is that foundation material that can support a safe bearing pressure of 4 ksf and has an angle of friction of 30 degrees.

2. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.

3. Contractor has option of lapping main stem reinforcement with rear dowel reinforcement as shown; or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.

4. These walls are valid if traffic is present on the level area adjacent to the wall.
Notes:
1. A "Poor Soil Condition" is that foundation material that can support a safe bearing pressure of 3 ksf and has an angle of friction of 30°.
2. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
3. Contractor has option of tapping main stem reinforcement with rear dowel reinforcement as shown; or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
4. These walls are valid if traffic is present on the level area adjacent to the wall.

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<td>9&quot;</td>
<td>2'-6&quot;</td>
<td>4'-3&quot;</td>
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<tr>
<td>C-II</td>
<td>8'-0&quot;</td>
<td>1'-0&quot;</td>
<td>9&quot;</td>
<td>3'-6&quot;</td>
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<tr>
<td>C-III</td>
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</tbody>
</table>

** Proposed Finished Groundline.**

** Proposed Finished Groundline.**

For Drainage System, See RW-301 or SUB-DR-203

** Main Stem Bar**

** Top Main Stem Reinforcement**

** Top Dowel Bar**

** Rear Dowel Bar**

** Top Footing Bar**

** Proposed Finished Groundline.**

Notes:
1. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
2. Contractor has option of tapping main stem reinforcement with rear dowel reinforcement as shown; or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
**DETAIL A**

Scale: None (See note 2 below)

Notes:
1. An "Excellent Soil Condition" is that foundation material that can support a safe bearing pressure of 5 ksf and has an angle of friction of 33°.
2. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
3. Contractor has option of lapping main stem reinforcement with rear dowel reinforcement as shown, or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
4. These walls are valid if the sloping backfill levels off and traffic is present on the level area.

### TYPICAL SECTION

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<td>6'-0&quot;</td>
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<td>10'-0&quot;</td>
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Notes:
1. An "Excellent Soil Condition" is that foundation material that can support a safe bearing pressure of 5 ksf and has an angle of friction of 33°.
2. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
3. Contractor has option of lapping main stem reinforcement with rear dowel reinforcement as shown, or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
4. These walls are valid if the sloping backfill levels off and traffic is present on the level area.
A "Good Soil Condition" is that foundation material that can support a safe bearing pressure of 4 ksf and has an angle of friction of 30°.

If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.

Contractor has option of lapping main stem reinforcement with rear dowel reinforcement as shown or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.

These walls are valid if the sloping backfill levels off and traffic is present on the level area.

Notes:
1. Where specific footing concrete and stem concrete items are included in the Proposal for a particular wall, these shall be the pay limits. Where no specific items have been set up in the Proposal, the cost of wall shall be included in the main structure Contract price, i.e.; box culvert, where wings are included in box culvert item; retaining wall, where no separate pay items are established, etc.

Pour against undisturbed material

For Drainage System, See RW-301 or SUB-DR-203

Wall Type | H | A | B | C | D | E | F | G | Straight Rear Dowel Bar | Hooked Rear Dowel Bar | Main Stem Bar | Top Foot Bar |
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
E-I | 6'-0" | 1'-0" | 1'-9" | 4'-6" | 7'-3" | 1'-0" | 2'-2" | 1'-0" | 5 @ 2'-0" | 4 @ 2'-0" | 5 @ 1'-0" | 5 @ 6" |
E-II | 8'-0" | 1'-0" | 1'-9" | 4'-9" | 7'-6" | 1'-0" | 2'-2" | 1'-0" | 5 @ 2'-0" | 4 @ 2'-0" | 5 @ 1'-0" | 5 @ 6" |
E-III | 10'-0" | 1'-0" | 1'-9" | 5'-6" | 8'-3" | 1'-0" | 2'-7" | 2'-0" | 6 @ 1'-0" | 6 @ 1'-0" | 6 @ 1'-0" | 6 @ 6" |
E-IV | 12'-0" | 1'-3" | 2'-0" | 7'-3" | 10'-6" | 1'-6" | 3'-6" | 2'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 6" |
E-V | 14'-0" | 1'-6" | 2'-6" | 7'-6" | 11'-6" | 1'-9" | 3'-0" | 3'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 6" |
E-VI | 16'-0" | 1'-9" | 3'-0" | 8'-6" | 13'-3" | 2'-0" | 4'-7" | 3'-0" | 8 @ 1'-0" | 8 @ 1'-0" | 8 @ 1'-0" | 8 @ 6" |
E-VII | 18'-0" | 2'-3" | 3'-6" | 10'-3" | 16'-0" | 2'-3" | 5'-9" | 3'-0" | 9 @ 1'-0" | 9 @ 1'-0" | 9 @ 1'-0" | 9 @ 6" |
E-VIII | 20'-0" | 2'-9" | 4'-3" | 12'-0" | 19'-0" | 2'-6" | 5'-9" | 3'-0" | 9 @ 1'-0" | 9 @ 1'-0" | 9 @ 1'-0" | 9 @ 6" |

** Where specific footing concrete and stem concrete items are included in the Proposal for a particular wall, these shall be the pay limits. Where no specific items have been set up in the Proposal, the cost of wall shall be included in the main structure Contract price, i.e.; box culvert, where wings are included in box culvert item; retaining wall, where no separate pay items are established, etc.

Pour against undisturbed material

For Drainage System, See RW-301 or SUB-DR-203

Wall Type | H | A | B | C | D | E | F | G | Straight Rear Dowel Bar | Hooked Rear Dowel Bar | Main Stem Bar | Top Foot Bar |
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
E-I | 6'-0" | 1'-0" | 1'-9" | 4'-6" | 7'-3" | 1'-0" | 2'-2" | 1'-0" | 5 @ 2'-0" | 4 @ 2'-0" | 5 @ 1'-0" | 5 @ 6" |
E-II | 8'-0" | 1'-0" | 1'-9" | 4'-9" | 7'-6" | 1'-0" | 2'-2" | 1'-0" | 5 @ 2'-0" | 4 @ 2'-0" | 5 @ 1'-0" | 5 @ 6" |
E-III | 10'-0" | 1'-0" | 1'-9" | 5'-6" | 8'-3" | 1'-0" | 2'-7" | 2'-0" | 6 @ 1'-0" | 6 @ 1'-0" | 6 @ 1'-0" | 6 @ 6" |
E-IV | 12'-0" | 1'-3" | 2'-0" | 7'-3" | 10'-6" | 1'-6" | 3'-6" | 2'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 6" |
E-V | 14'-0" | 1'-6" | 2'-6" | 7'-6" | 11'-6" | 1'-9" | 3'-0" | 3'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 1'-0" | 7 @ 6" |
E-VI | 16'-0" | 1'-9" | 3'-0" | 8'-6" | 13'-3" | 2'-0" | 4'-7" | 3'-0" | 8 @ 1'-0" | 8 @ 1'-0" | 8 @ 1'-0" | 8 @ 6" |
E-VII | 18'-0" | 2'-3" | 3'-6" | 10'-3" | 16'-0" | 2'-3" | 5'-9" | 3'-0" | 9 @ 1'-0" | 9 @ 1'-0" | 9 @ 1'-0" | 9 @ 6" |
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**Notes:**

1. "Poor Soil Condition" is that foundation material that can support a safe bearing pressure of 3 ksf and has an angle of friction of 30°.
2. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
3. Contractor has option of tapping main stem reinforcement with rear dowel reinforcement as shown; or by extending the rear dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.

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<td>5 @ 2'-0&quot; c/c</td>
<td>5 @ 1'-6&quot; c/c</td>
<td>5 @ 1'-6&quot; c/c</td>
</tr>
<tr>
<td>F-III</td>
<td>10'-0&quot;</td>
<td>1'-9&quot;</td>
<td>5'-6&quot;</td>
<td>8'-3&quot;</td>
<td>1'-0&quot;</td>
<td>2'-7&quot;</td>
<td>2'-0&quot;</td>
<td>6&quot; @ 1'-0&quot; c/c</td>
<td>6 @ 1'-0&quot; c/c</td>
<td>6 @ 1'-0&quot; c/c</td>
<td>6 @ 1'-0&quot; c/c</td>
<td></td>
</tr>
<tr>
<td>F-IV</td>
<td>12'-0&quot;</td>
<td>1'-3&quot;</td>
<td>2'-0&quot;</td>
<td>7'-3&quot;</td>
<td>10'-6&quot;</td>
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<td>7 @ 1'-0&quot; c/c</td>
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<td>7 @ 1'-0&quot; c/c</td>
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<td>3'-0&quot;</td>
<td>7'-6&quot;</td>
<td>12'-0&quot;</td>
<td>1'-9&quot;</td>
<td>3'-6&quot;</td>
<td>3'0&quot;</td>
<td>7 @ 1'-0&quot; c/c</td>
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<td>7 @ 1'-0&quot; c/c</td>
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<tr>
<td>F-VI</td>
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<td>3'-0&quot;</td>
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<td>4'-7&quot;</td>
<td>3'-0&quot;</td>
<td>8 @ 1'-0&quot; c/c</td>
<td>8 @ 1'-0&quot; c/c</td>
<td>8 @ 1'-0&quot; c/c</td>
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<td>4'-0&quot;</td>
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<td>8 @ 1'-0&quot; c/c</td>
<td>8 @ 1'-0&quot; c/c</td>
<td>8 @ 1'-0&quot; c/c</td>
</tr>
<tr>
<td>F-VIII</td>
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<td>5'-0&quot;</td>
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<td>9 @ 1'-0&quot; c/c</td>
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</tr>
<tr>
<td>F-IX</td>
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<td>6'-3&quot;</td>
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<td>3'-0&quot;</td>
<td>9 @ 1'-0&quot; c/c</td>
<td>9 @ 1'-0&quot; c/c</td>
<td>9 @ 1'-0&quot; c/c</td>
<td>9 @ 1'-0&quot; c/c</td>
</tr>
</tbody>
</table>

4. These walls are valid if the sloping backfill levels off and traffic is present on the level area.
**DETAIL A**

Scale: None

(See note no. 1 Sheet 2)

*Where specific footing concrete and stem concrete items are included in the Proposal for a particular wall, these shall be the pay limits. Where no specific items have been set up in the Proposal, the cost of wall shall be included in the main structure Contract price, i.e., box culvert, (where wings are included in box culvert item), retaining wall, (where no separate pay items are established, etc.)

**TOP Footing and Two Foot Surcharge**

**FOR PILE RETAINING WALLS**

**Rear face plumb, to be dampproofed from top of footing up to finished groundline.**

**Scale:** ½" = 1'-0"

* 4 @ 1'-6" c/c for wall types G-I thru G-IV
* 4 @ 1'-0" c/c for wall types G-V and G-VI
* 5 @ 1'-0" c/c for wall types G-VII and G-VIII

**Proposed Finished Groundline.**

**Footing and Two Foot Surcharge**

**For Drainage System, See RW-301 or SUB-DR-203**

**Typical Section**

Scale: ½" = 1'-0"
Notes:
1. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
2. Contractor has option of lapping stem reinforcement with toe reinforcement and/or dowels as shown; or by extending the toe and/or dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
3. H piles shown for Illustration purpose only.
4. For pile type, see Pile Layout on pertinent Contract Drawing.
5. Pile spacings are maximum. For actual pile spacing, see Pile Layout on pertinent contract drawing.
6. These walls are valid if traffic is present on the level area adjacent to the wall.
7. Capacities include resistance factors (LRFD only).

<table>
<thead>
<tr>
<th>Wall Type</th>
<th>H</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Rear Dowel Bar</th>
<th>Main Stem Bar</th>
<th>Top Footing Bar</th>
<th>Bottom Footing Bar</th>
<th>F</th>
<th>J</th>
<th>K</th>
<th>J</th>
<th>K</th>
<th>J</th>
<th>K</th>
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<td>G-I</td>
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<tr>
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<td>0'-9&quot;</td>
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**TYPICAL PILE PLAN**

**PILE CAPACITY - DESIGN LOAD**

<table>
<thead>
<tr>
<th>Pile Capacity</th>
<th>25 TONS</th>
<th>40 TONS</th>
<th>55 TONS</th>
<th>70 TONS</th>
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<td>55 TONS</td>
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<tr>
<td>70 TONS</td>
<td>5'-0&quot;</td>
<td>10'-0&quot;</td>
<td>5'-0&quot;</td>
<td>10'-0&quot;</td>
</tr>
</tbody>
</table>
**Detail A**

Scale: None

(See note no. 1 Sheet 2)

*Where specific footing concrete and stem concrete items are included in the Proposal for a particular wall, these shall be the pay limits.*

Where no specific items have been set up in the Proposal, the cost of wall shall be included in the main structure contract price, i.e., box culvert, where wings are included in box culvert item; retaining wall, where no separate pay items are established, etc.

**Footing and Sloping Groundline**

**Type H Retaining Wall Section (for Pile Footing and Sloping Groundline)**

**Proposed Finished Groundline.**

Least Wall Type thickness for a particular total length of wall.

- Proposed Finished Groundline.

Dowel bar ** *(Typ.)*

- Top Main Stem Reinforcement

2-6's to follow slope of wall.

Rear face plumb to be dampproofed from top of footing up to finished groundline.

- **4 @ 1'-6" c/c for wall types H-I thru H-III**
- **5 @ 1'-0" c/c for wall types H-IV and H-V**
- **5 @ 1'-0" c/c for wall types H-VI and H-VII**

**Typical Section**

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

- 3" @ 3'-0" (Typ.
- 3-6's @ 4" c/c Each way over piles
- *5 @ 1'-0" Typ.
- *5 @ 1'-0" Typ.
- Footing Concrete
- Stem Concrete
- Rear Dowel Bar
- Top Footing Bar
- Bottom Footing Bar (Respace Bottom Footing Bars to Clear Piles)

**For Drainage System, See RW-301 or SUB-DR-203**

11/13/2007
Notes:
1. If in the length of a wall the type of wall changes and provides for a different thickness of stem, then "Detail A" shall be used for all walls of greater than the least wall thickness.
2. Contractor has option of lapping stem reinforcement with toe reinforcement and/or dowels as shown; or by extending the toe and/or dowel reinforcement with no splicing. However, no additional compensation to Contractor will be allowed for whichever alternative is selected.
3. These walls are valid if the sloping backfill levels off and traffic is present on the level area.
4. H piles shown for illustration purpose only.
   For pile type, see Pile Layout on pertinent Contract Drawing.
5. Pile spacings are maximum. For actual pile spacing, see Pile Layout on pertinent Contract Drawing.
6. Capacities include resistance factors (LRFD only).
This system shall be used for all box culvert wing walls and other wing walls that are both less than 30' long and less than 15' high (height of wall from bottom of footing to top of highest section). One drain shall be placed at the top of wall for all walls less than 15' long. For walls between 15' and 30' long, two drains shall be placed, one at each third point.

**SYSTEM I**
Scale: None

1. Exact elevation of drain to be determined by Engineer in field.
2. Porous backfill (refer to Section 469).
3. Use this detail for bridges with wing walls that are not parallel to the highway. For bridges with wing walls parallel to the highway see Detail No. SUB-DR-203, sheet 5 of 5 for details.

**SYSTEM II**
Scale: None

If wall has concrete flume at rear face cast to underside of flume

- Porous Backfill
- 2 cu. ft. Porous Backfill at each drain
- 2-#5 @ 1'-6'' c/c
- *5 threads Rebar Dowel Coupler at 1'-6'' c/c.

This system shall be used for all retaining walls, all box culvert wing walls (not in System I).

**RETAINING WALL AND WING WALL DRAINAGE SYSTEMS**

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

APPROVAL
DIRECTOR OFFICE OF STRUCTURES
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DATE 01/22/2001
VERSION
1.0

DETAIL NO. RW-301 SHEET ___ OF ___
Notes:
1. Joint locations shall be as shown on contract drawing. If no locations are given concrete retaining walls shall have contraction joints a maximum of every 30'-0"; and expansion joints, with 1" sponge type material (see 911.02), a maximum of every 90'-0".
2. Stop key 9" below top of wall.
3. Reinforcing steel shall not pass through contraction or expansion joint.
4. For battered walls, with stems greater than 12 feet height, key dimensions noted thus *, shall be based on wall thickness at mid height.
5. All keys are nominal size.
6. Only place contraction and expansion joints in stems (no joint in footer).
Additional #5 bars as shown.

For footings under 2'-0'' thick:

Additional #5 bars.

Maximum vertical spacing is 1'-0'' for additional bars.

If bottom mat is called for, bend upper layer of bottom mat and extend upward as shown.

Additional #5 bars bent thus 5'-0'' shall also be provided perpendicular to these bars for the 5'-0'' length.

Slope as steep as ground will allow.

1'-0'' for additional bars.

TYPICAL SECTION
Scale: 3/16'' = 1'-0''

KEY SIZES

<table>
<thead>
<tr>
<th>T</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>1'-0'' to 1'-5''</td>
<td>2'' x 4''</td>
</tr>
<tr>
<td>1'-6'' to 1'-11''</td>
<td>3'' x 6''</td>
</tr>
<tr>
<td>2'-0'' to 2'-5''</td>
<td>4'' x 8''</td>
</tr>
<tr>
<td>2'-6'' to 3'-0''</td>
<td>5'' x 10''</td>
</tr>
</tbody>
</table>

Notes:
1. All keys are nominal size.
Notes:
1. Steel H piles shown. Other pile types similar.
2. See Plan of Footing for orientation of piles.

**KEY SIZES**

<table>
<thead>
<tr>
<th>T</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot; to 2'-5&quot;</td>
<td>4&quot; x 8&quot;</td>
</tr>
<tr>
<td>2'-6&quot; to 3'-0&quot;</td>
<td>5&quot; x 10&quot;</td>
</tr>
</tbody>
</table>

**TYPICAL SECTION**

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

* To center line of pile and to end of lower footer.

Optional construction joint with key (Typ.) or construction joint (one joint with key required). For key size see chart.
Note:
1. Increase the size of each of the first three normal main vertical reinforcing steel bars, on each side of the wall opening. New bar size shall be such that each increase in bar area shall at least equal the total area of the main reinforcing steel that has been cut.
2. When pipe size is over 3'-0", sufficient horizontal bars shall be added over and below opening to transfer load to adjacent full sections of wall.
3. In no case shall concrete cover be less than 2".

Normal Vertical Main Reinforcing Steel for Wall.

5 bars, each face (Typical).

Adjust adjacent vertical & horizontal steel pattern so that nearest bars to opening are placed at minimum distances. (This also applies to front face of wall).

Utility and/or Pipe Opening

6"

2" min, cl. (Typ.)

Normal Horizontal Reinforcing Steel.

These bars to have area increased.

ELEVATION
Scale: None

RETAINING WALLS
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

REINFORCEMENT ADJUSTMENT
AT UTILITY AND/OR PIPE OPENING IN WALL

DETAIL NO. RW-501
SHEET 1 OF 1

FOR OFFICE USE ONLY

07/02/1993

1.0