Chapter 05

RETAINING WALLS (RW)

GENERAL NOTES

Specifications: MDOT SHA Standard Specifications for Construction and Materials

AASHTO LRFD Bridge Design Specifications, 5th edition, 2010.

Concrete Design: LRFD, f'c= 3.0 ksi.

Reinforcing Steel Design: fy = 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.

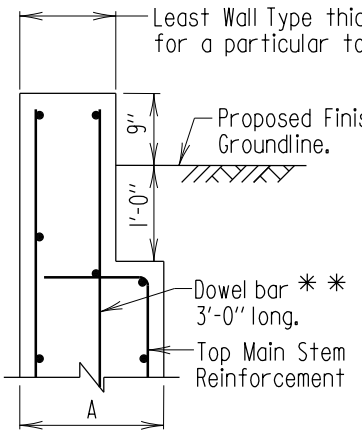
Angle of Internal Friction:
33 degrees for excellent soil
30 degrees for good and poor soils (and all walls on pile footings)

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.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES DATE: 03/21/2014	RETAINING WALL GENERAL NOTES
VERSION 1.0	DETAIL NO. RW-101 SHEET 1 OF 1

RETAINING WALLS

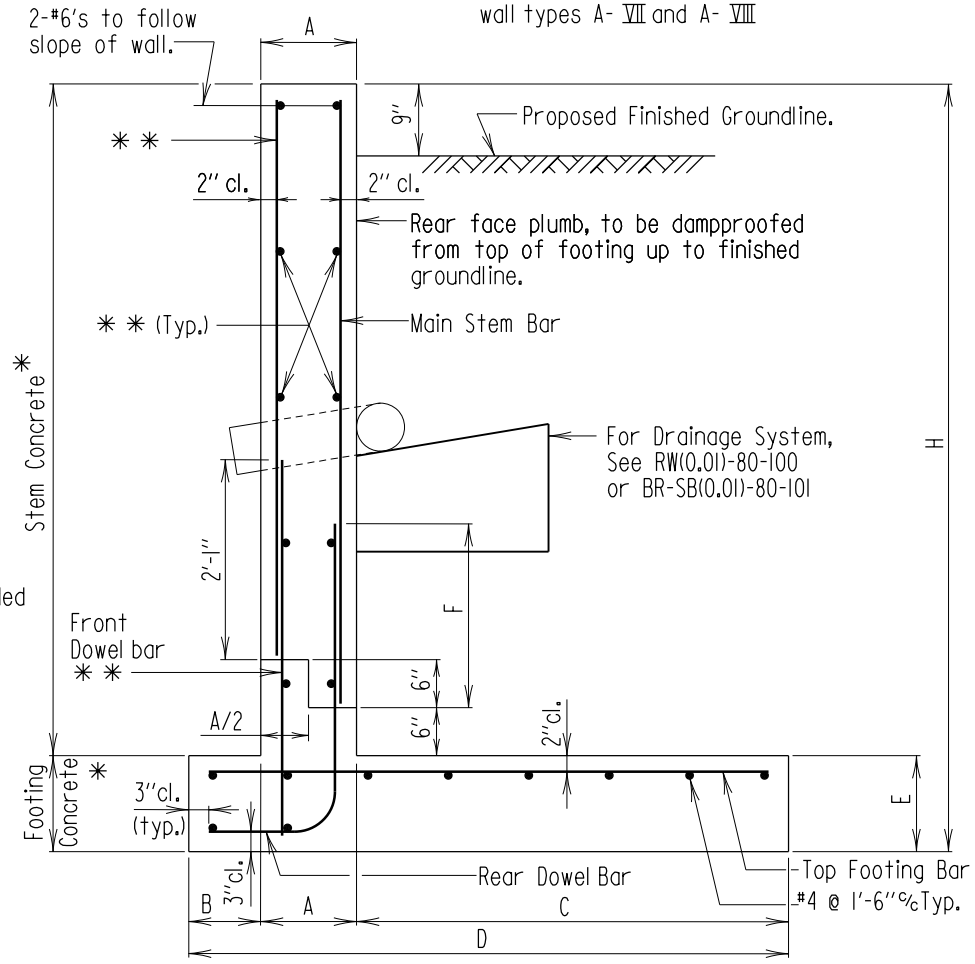


DETAIL A

Scale: None

(See note 2 below)

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



TYPICAL SECTION

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

* 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.

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

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.

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DATE: 12/04/2013

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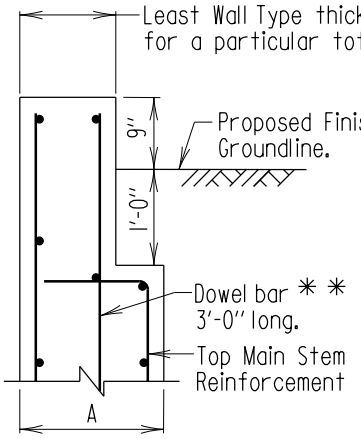
TYPE A RETAINING WALL SECTION (FOR EXCELLENT SOIL CONDITION AND TWO FOOT SURCHARGE)

DETAIL NO. RW-102

SHEET 1 OF 1

RETAINING WALLS

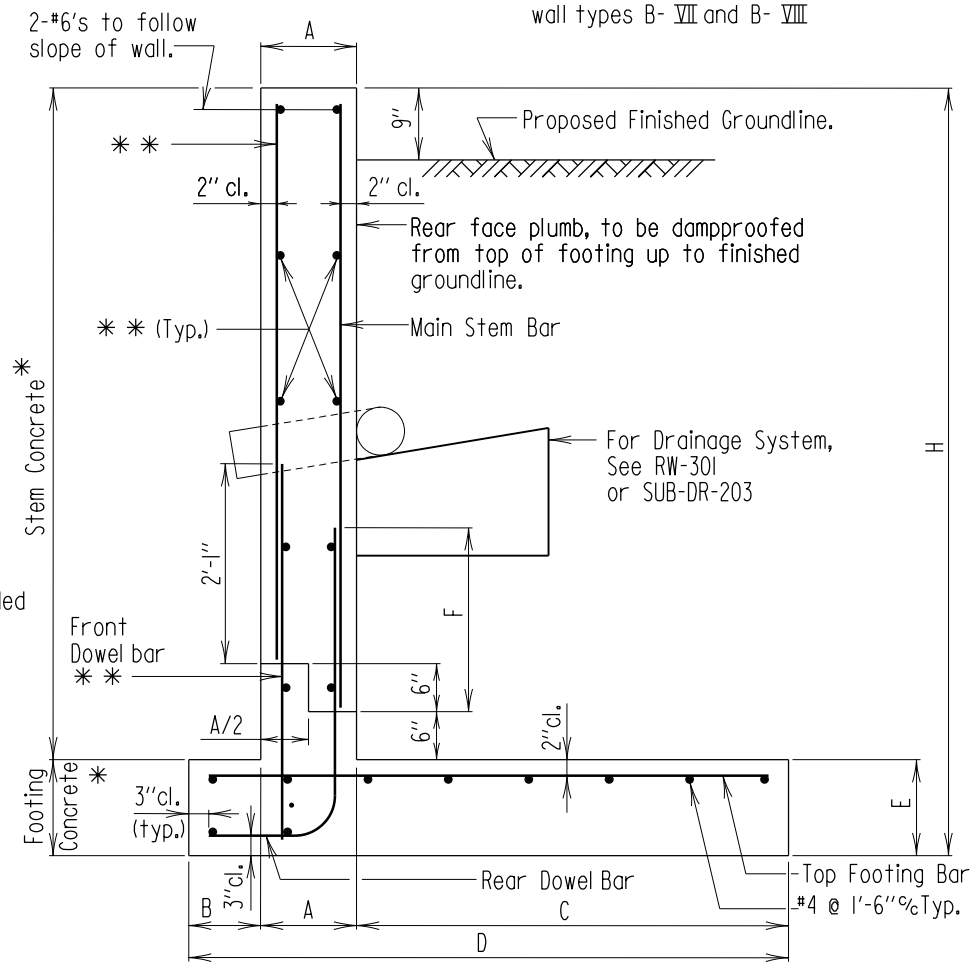


DETAIL A

Scale: None

(See note 2 below)

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



TYPICAL SECTION

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

* 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.

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

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°.
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.

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E.S. Freedman DIRECTOR
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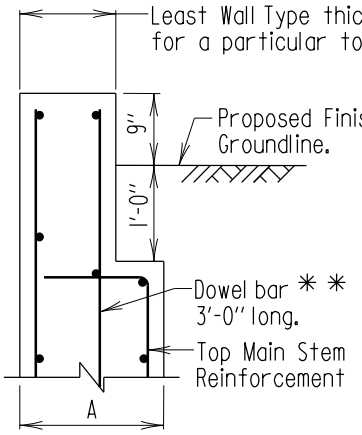
TYPE B RETAINING WALL SECTION (FOR GOOD SOIL CONDITION AND TWO FOOT SURCHARGE)

DETAIL NO. RW-103

SHEET 1 OF 1

RETAINING WALLS

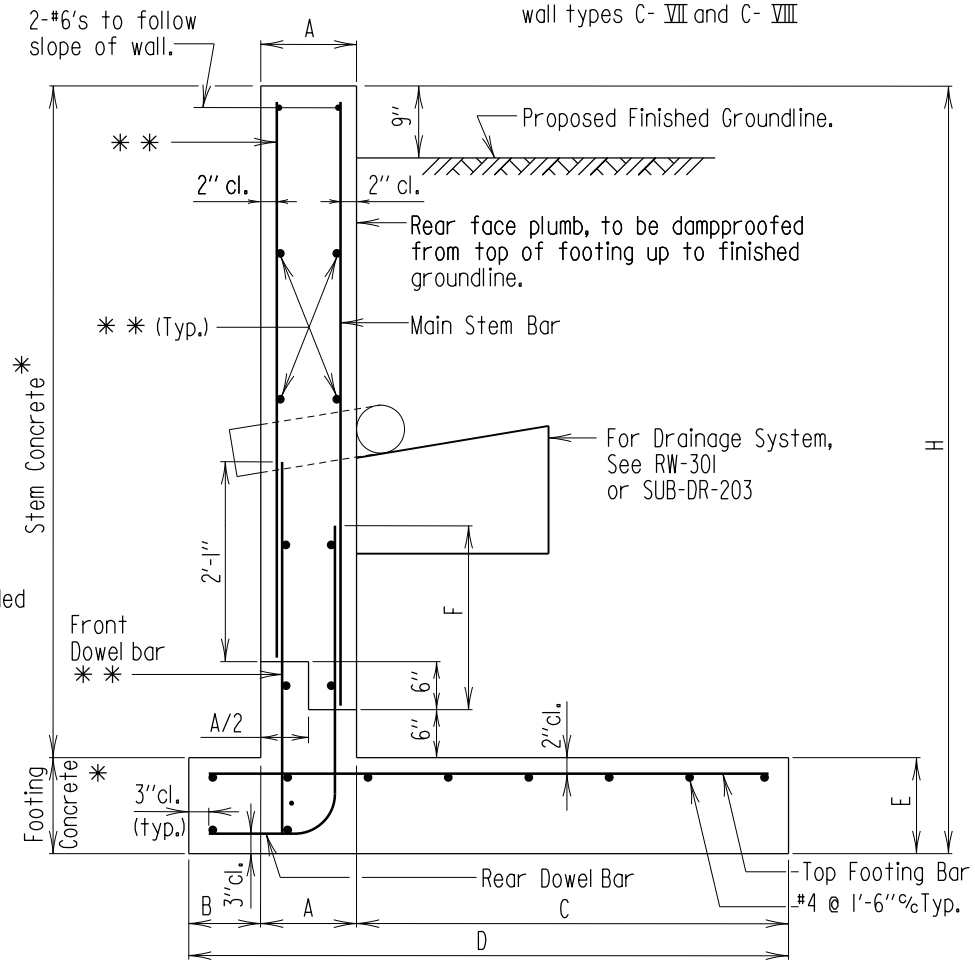


DETAIL A

Scale: None

(See note 2 below)

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



TYPICAL SECTION

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

* 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.

Wall Type	H	A	B	C	D	E	F	Rear Dowel Bar	Main Stem Bar	Top Foot. Bar
C-I	6'-0"	1'-0"	9"	2'-6"	4'-3"	1'-0"	2'-2"	#5 @ 1'-0"c/c	#5 @ 1'-0"c/c	#5 @ 1'-0"c/c
C-II	8'-0"	1'-0"	9"	3'-6"	5'-3"	1'-0"	2'-2"	#5 @ 1'-0"c/c	#5 @ 1'-0"c/c	#5 @ 1'-0"c/c
C-III	10'-0"	1'-0"	1'-0"	4'-6"	6'-6"	1'-3"	2'-7"	#6 @ 6"c/c	#6 @ 1'-0"c/c	#6 @ 6"c/c
C-IV	12'-0"	1'-0"	1'-0"	5'-6"	7'-6"	1'-3"	2'-7"	#6 @ 6"c/c	#6 @ 1'-0"c/c	#6 @ 6"c/c
C-V	14'-0"	1'-3"	1'-6"	6'-0"	8'-9"	1'-6"	3'-6"	#7 @ 6"c/c	#7 @ 1'-0"c/c	#7 @ 6"c/c
C-VI	16'-0"	1'-6"	2'-3"	6'-9"	10'-6"	1'-6"	3'-6"	#7 @ 6"c/c	#7 @ 1'-0"c/c	#7 @ 6"c/c
C-VII	18'-0"	2'-3"	3'-0"	7'-3"	12'-6"	1'-9"	3'-6"	#7 @ 6"c/c	#7 @ 1'-0"c/c	#7 @ 6"c/c
C-VIII	20'-0"	2'-3"	4'-0"	8'-9"	15'-0"	1'-9"	4'-7"	#8 @ 6"c/c	#8 @ 1'-0"c/c	#8 @ 6"c/c

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 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.

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E.S. Freedman DIRECTOR
OFFICE OF STRUCTURES

DATE: 12/04/2013

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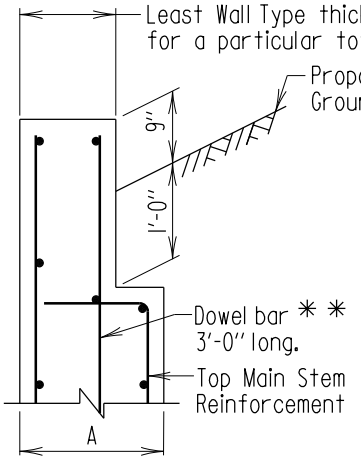
TYPE C RETAINING WALL SECTION (FOR POOR SOIL CONDITION AND TWO FOOT SURCHARGE)

DETAIL NO. RW-104

SHEET 1 OF 1

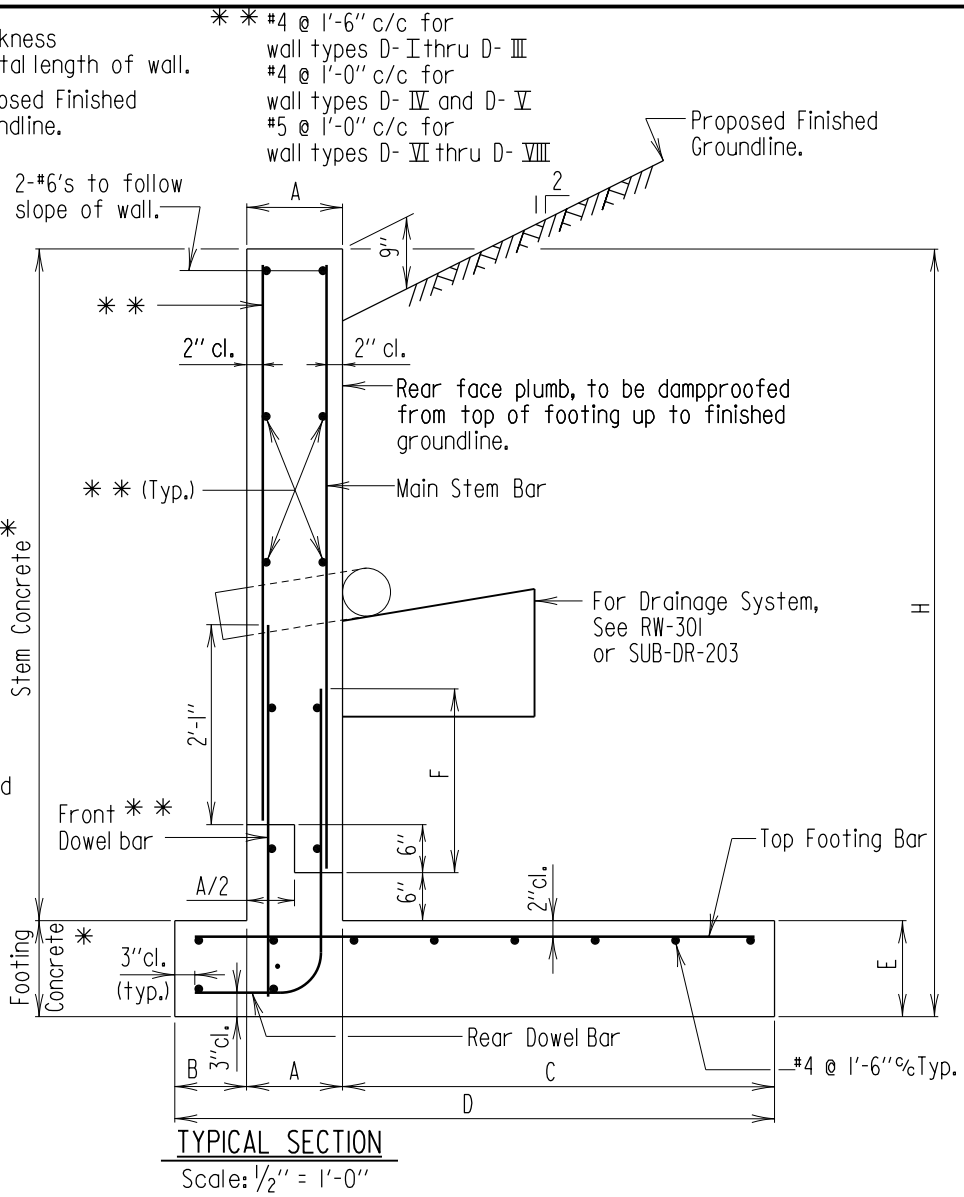
RETAINING WALLS



DETAIL A

Scale: None

(See note 2 below)



TYPICAL SECTION

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

* 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.

Wall Type	H	A	B	C	D	E	F	Rear Dowel Bar	Main Stem Bar	Top Foot. Bar
D-I	6'-0"	1'-0"	1'-3"	2'-6"	4'-9"	1'-0"	2'-2"	#5 @ 1'-0" c/c	#5 @ 1'-0" c/c	#5 @ 1'-0" c/c
D-II	8'-0"	1'-0"	1'-6"	4'-3"	6'-9"	1'-3"	2'-2"	#5 @ 1'-0" c/c	#5 @ 1'-0" c/c	#5 @ 1'-0" c/c
D-III	10'-0"	1'-0"	1'-6"	6'-0"	8'-6"	1'-6"	2'-7"	#6 @ 1'-0" c/c	#6 @ 1'-0" c/c	#6 @ 6" c/c
D-IV	12'-0"	1'-6"	1'-6"	7'-0"	10'-0"	1'-6"	2'-7"	#6 @ 1'-0" c/c	#6 @ 1'-0" c/c	#6 @ 6" c/c
D-V	14'-0"	1'-9"	1'-9"	8'-3"	11'-9"	1'-6"	3'-6"	#7 @ 1'-0" c/c	#7 @ 1'-0" c/c	#7 @ 6" c/c
D-VI	16'-0"	1'-9"	1'-9"	10'-0"	13'-6"	1'-9"	4'-7"	#8 @ 6" c/c	#8 @ 1'-0" c/c	#8 @ 6" c/c
D-VII	18'-0"	2'-0"	2'-3"	11'-0"	15'-3"	2'-0"	5'-9"	#9 @ 6" c/c	#9 @ 1'-0" c/c	#9 @ 6" c/c
D-VIII	20'-0"	2'-6"	2'-6"	12'-6"	17'-3"	2'-6"	5'-9"	#9 @ 6" c/c	#9 @ 1'-0" c/c	#9 @ 6" c/c

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.

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E.S. Freedman DIRECTOR
OFFICE OF STRUCTURES

DATE: 12/04/2013

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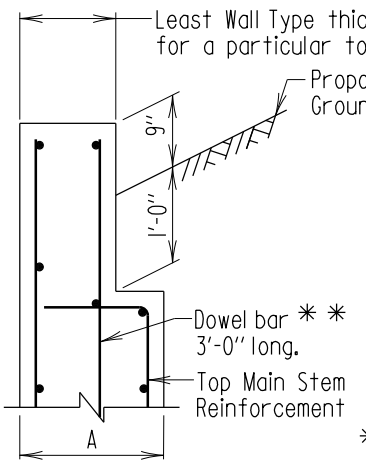
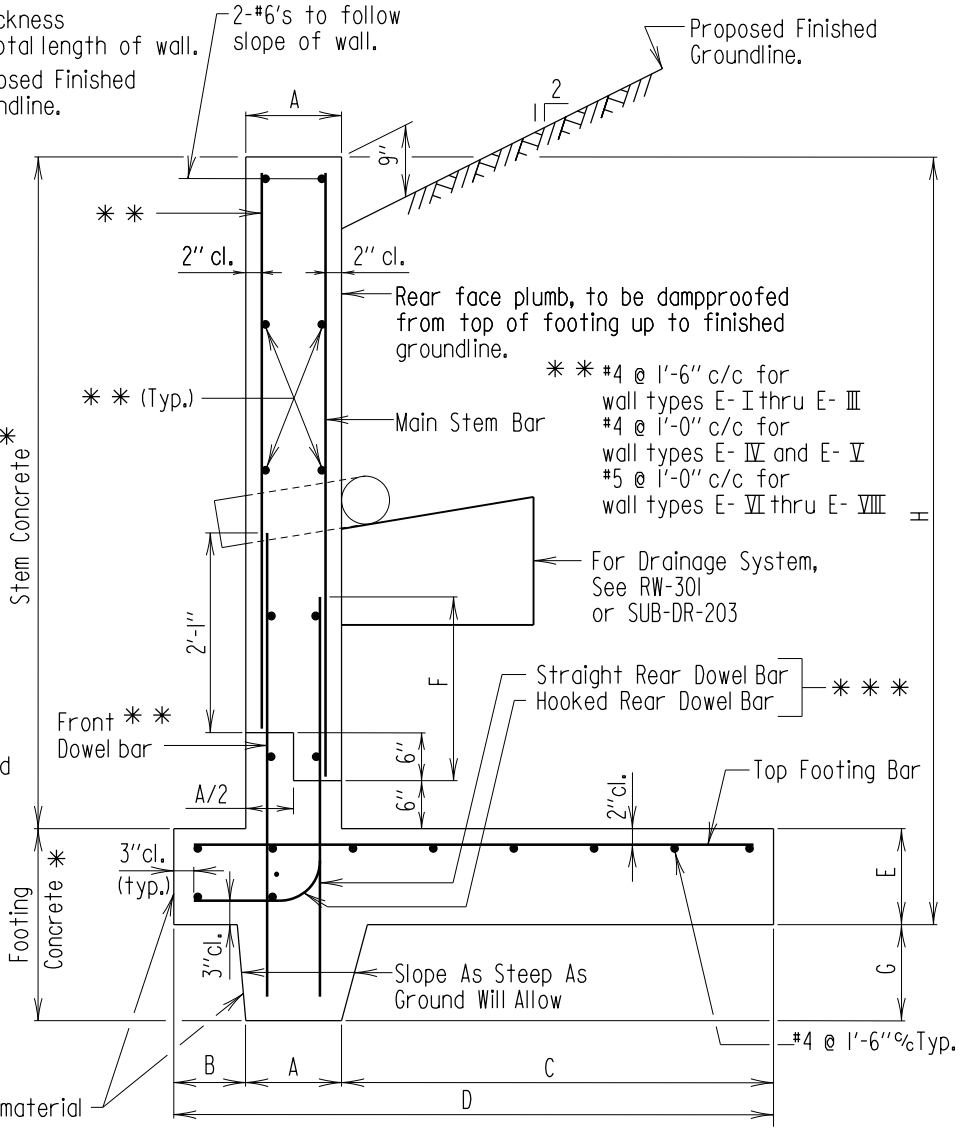
TYPE D RETAINING WALL SECTION (FOR EXCELLENT SOIL CONDITION AND SLOPING GROUNDLINE)

DETAIL NO. RW-105 SHEET 1 OF 1

RETAINING WALLS



DETAIL A
Scale: None
(See note 2 below)



TYPICAL SECTION
Scale: 1/2'' = 1'-0''

* * * Alternate Hooked Bars with Straight Bars

* 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.

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''c/c	#5 @ 2'-0''c/c	#5 @ 1'-0''c/c	#5 @ 6''c/c
E-II	8'-0''	1'-0''	1'-9''	4'-9''	7'-6''	1'-0''	2'-2''	1'-0''	#5 @ 2'-0''c/c	#5 @ 2'-0''c/c	#5 @ 1'-0''c/c	#5 @ 6''c/c
E-III	10'-0''	1'-0''	1'-9''	5'-6''	8'-3''	1'-0''	2'-7''	2'-0''	#6 @ 1'-0''c/c	#6 @ 1'-0''c/c	#6 @ 1'-0''c/c	#6 @ 6''c/c
E-IV	12'-0''	1'-3''	2'-0''	7'-3''	10'-6''	1'-6''	3'-6''	2'-0''	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 6''c/c
E-V	14'-0''	1'-6''	2'-6''	7'-6''	11'-6''	1'-9''	3'-6''	3'-0''	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 6''c/c
E-VI	16'-0''	1'-9''	3'-0''	8'-6''	13'-3''	2'-0''	4'-7''	3'-0''	#8 @ 1'-0''c/c	#8 @ 1'-0''c/c	#8 @ 1'-0''c/c	#8 @ 6''c/c
E-VII	18'-0''	2'-3''	3'-6''	10'-3''	16'-0''	2'-3''	5'-9''	3'-0''	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 6''c/c
E-VIII	20'-0''	2'-9''	4'-3''	12'-0''	19'-0''	2'-6''	5'-9''	3'-0''	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 6''c/c

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°.
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.

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E.S. Freedman DIRECTOR
OFFICE OF STRUCTURES
DATE: 12/04/2013
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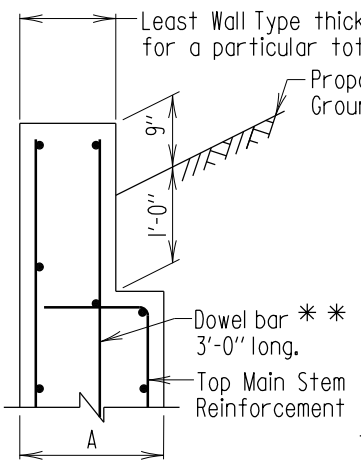
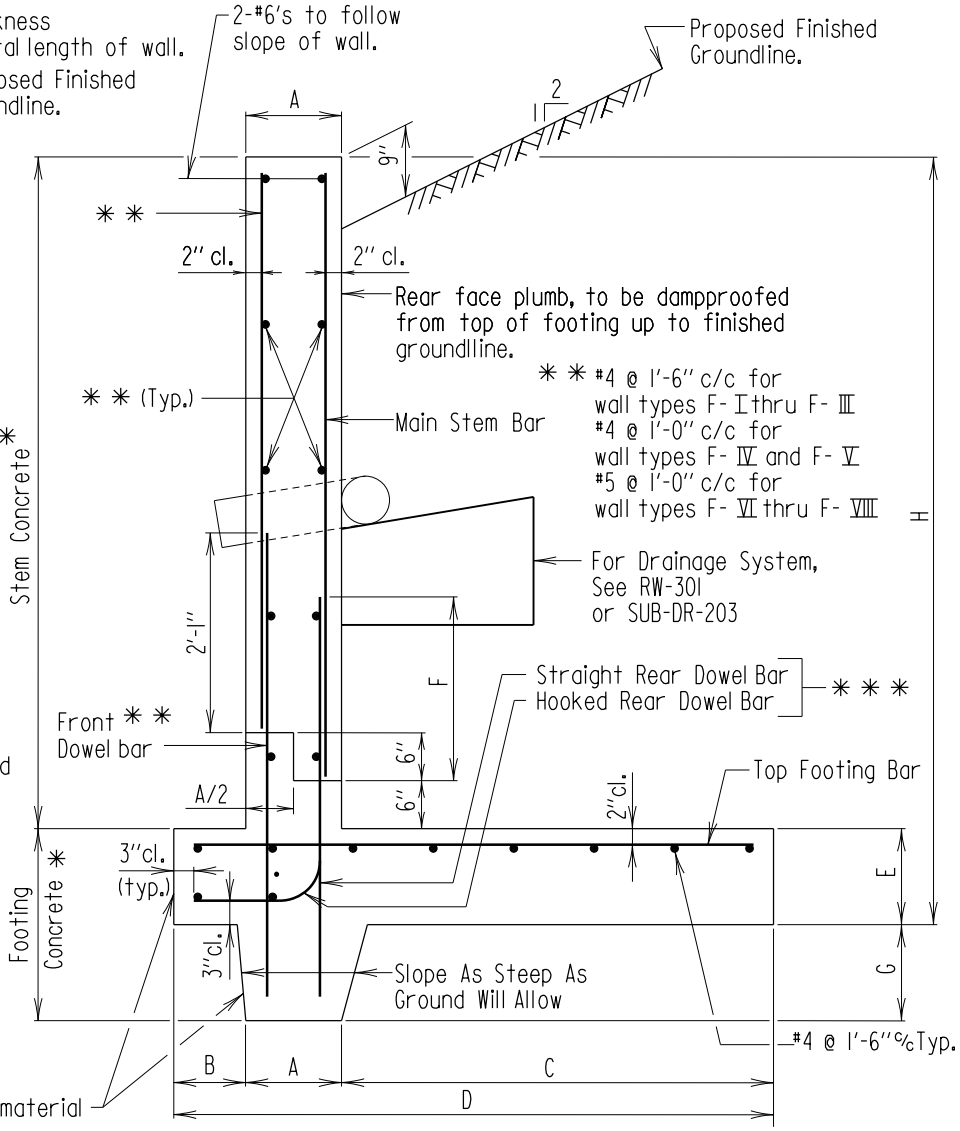
TYPE E RETAINING WALL SECTION (FOR GOOD SOIL CONDITION AND SLOPING GROUNDLINE)

DETAIL NO. RW-106 SHEET 1 OF 1

RETAINING WALLS



DETAIL A
Scale: None
(See note 2 below)



TYPICAL SECTION
Scale: 1/2'' = 1'-0''

* * * Alternate Hooked Bars with Straight Bars

* 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.

Wall Type	H	A	B	C	D	E	F	G	Straight Rear Dowel Bar	Hooked Rear Dowel Bar	Main Stem Bar	Top Foot. Bar
F-I	6'-0''	1'-0''	1'-9''	4'-6''	7'-3''	1'-0''	2'-2''	1'-0''	#5 @ 2'-0''c/c	#5 @ 2'-0''c/c	#5 @ 1'-0''c/c	#5 @ 6''c/c
F-II	8'-0''	1'-0''	1'-9''	4'-9''	7'-6''	1'-0''	2'-2''	1'-0''	#5 @ 2'-0''c/c	#5 @ 2'-0''c/c	#5 @ 1'-0''c/c	#5 @ 6''c/c
F-III	10'-0''	1'-0''	1'-9''	5'-6''	8'-3''	1'-0''	2'-7''	2'-0''	#6 @ 1'-0''c/c	#6 @ 1'-0''c/c	#6 @ 1'-0''c/c	#6 @ 6''c/c
F-IV	12'-0''	1'-3''	2'-0''	7'-3''	10'-6''	1'-6''	3'-6''	2'-0''	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 6''c/c
F-V	14'-0''	1'-6''	3'-0''	7'-6''	12'-0''	1'-9''	3'-6''	3'-0''	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 1'-0''c/c	#7 @ 6''c/c
F-VI	16'-0''	1'-9''	4'-0''	8'-6''	14'-3''	2'-0''	4'-7''	3'-0''	#8 @ 1'-0''c/c	#8 @ 1'-0''c/c	#8 @ 1'-0''c/c	#8 @ 6''c/c
F-VII	18'-0''	2'-3''	5'-0''	10'-3''	17'-6''	2'-3''	5'-9''	3'-0''	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 6''c/c
F-VIII	20'-0''	2'-9''	6'-3''	12'-0''	21'-0''	2'-6''	5'-9''	3'-0''	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 1'-0''c/c	#9 @ 6''c/c

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 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.

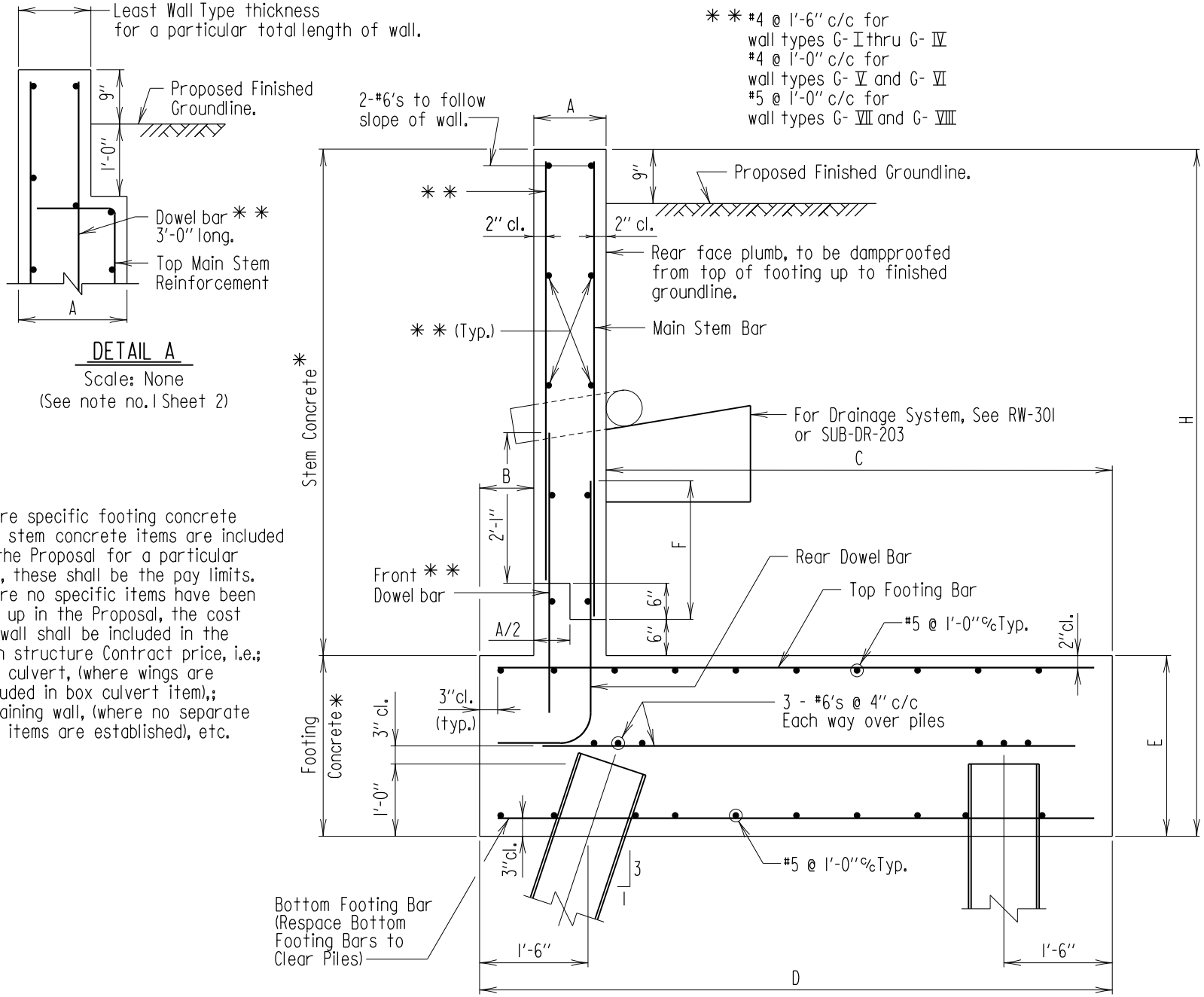
APPROVAL
E.S. Freedman DIRECTOR
OFFICE OF STRUCTURES
DATE: 12/04/2013
VERSION
1.0

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

TYPE F RETAINING WALL SECTION (FOR POOR SOIL CONDITION AND SLOPING GROUNDLINE)

DETAIL NO. RW-107 SHEET 1 OF 1

RETAINING WALLS



* 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.

APPROVAL
E.S. Anderson DIRECTOR
OFFICE OF STRUCTURES
DATE: 12/04/2013
VERSION
1.0

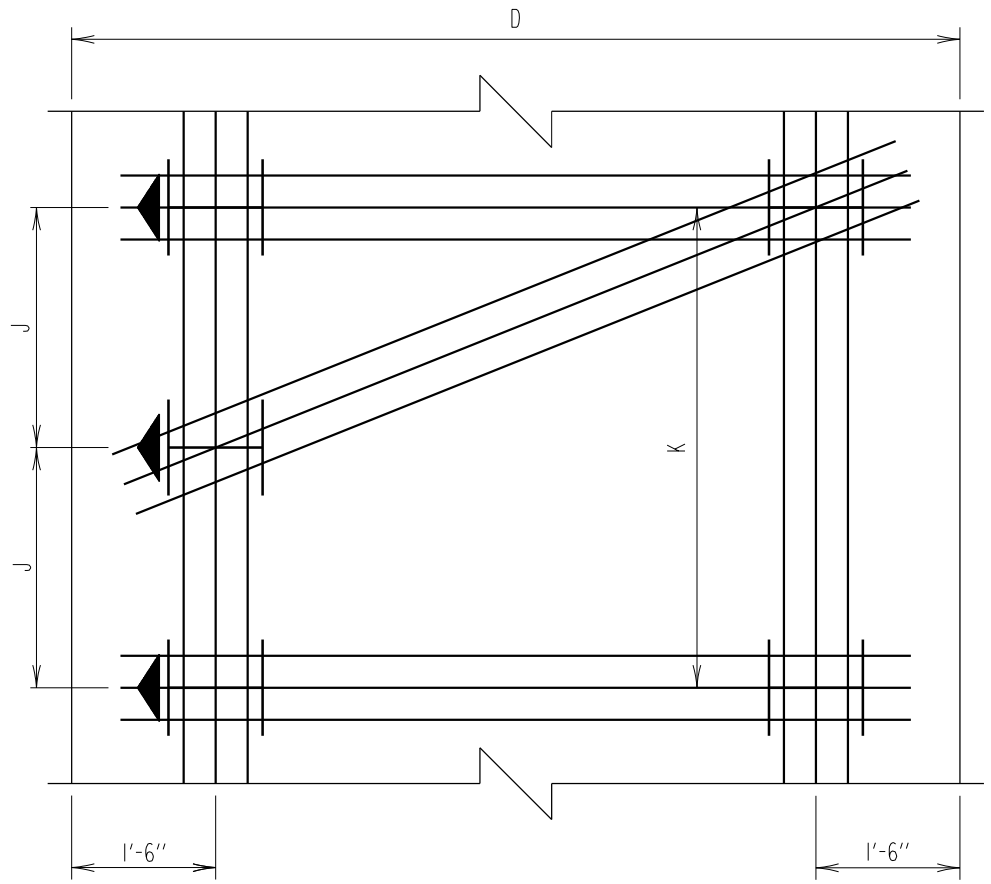
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

TYPE G RETAINING WALL SECTION (FOR PILE FOOTING AND TWO FOOT SURCHARGE)

DETAIL NO. RW-108

SHEET 1 OF 2

RETAINING WALLS



TYPICAL PILE PLAN

Scale: 1/2" = 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. For pile type, see Pile Layout on pertinent Contract Drawing.
4. Pile spacings are maximum. For actual pile spacing, see Pile Layout on pertinent contract drawing.
5. These walls are valid if traffic is present on the level area adjacent to the wall.
6. Capacities include resistance factors (LRFD only).

Wall Type	H	A	B	C	D	E	Rear Dowel Bar	Main Stem Bar	Top Footing Bar	Bottom Footing Bar	F	PILE CAPACITY - DESIGN LOAD							
												25 TONS		40 TONS		55 TONS		70 TONS	
												J	K	J	K	J	K	J	K
G-I	6'-0"	1'-0"	0'-9"	4'-3"	6'-0"	2'-3"	#5 @ 1'-0"	#5 @ 1'-0"	#5 @ 1'-0"	#5 @ 1'-0"	2'-2"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"
G-II	8'-0"	1'-0"	0'-9"	4'-3"	6'-0"	2'-3"	#5 @ 1'-0"	#5 @ 1'-0"	#5 @ 1'-0"	#5 @ 1'-0"	2'-2"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"
G-III	10'-0"	1'-0"	0'-9"	4'-3"	6'-0"	2'-3"	#5 @ 6"	#5 @ 1'-0"	#5 @ 6"	#5 @ 1'-0"	2'-2"	4'-0"	8'-0"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"
G-IV	12'-0"	1'-0"	1'-0"	4'-3"	6'-3"	2'-3"	#7 @ 6"	#7 @ 1'-0"	#7 @ 6"	#7 @ 1'-0"	3'-0"	2'-9"	5'-6"	4'-9"	9'-6"	4'-9"	9'-6"	4'-9"	9'-6"
G-V	14'-0"	1'-3"	1'-6"	4'-3"	7'-0"	2'-3"	#7 @ 6"	#7 @ 1'-0"	#7 @ 6"	#7 @ 1'-0"	3'-0"			3'-6"	7'-0"	4'-6"	9'-0"	4'-6"	9'-0"
G-VI	16'-0"	1'-6"	1'-9"	4'-3"	7'-6"	2'-6"	#7 @ 6"	#7 @ 1'-0"	#7 @ 6"	#7 @ 1'-0"	3'-6"			2'-9"	5'-6"	3'-9"	7'-6"	4'-6"	9'-0"
G-VII	18'-0"	1'-9"	2'-3"	4'-3"	8'-3"	2'-6"	#8 @ 6"	#8 @ 1'-0"	#8 @ 6"	#8 @ 1'-0"	3'-6"					3'-0"	6'-0"	3'-9"	7'-6"
G-VIII	20'-0"	2'-0"	2'-6"	4'-3"	8'-9"	2'-9"	#8 @ 6"	#8 @ 1'-0"	#8 @ 6"	#8 @ 1'-0"	4'-7"							3'-0"	6'-0"

APPROVAL
E. S. Graham DIRECTOR
OFFICE OF STRUCTURES

DATE: 12/04/2013

VERSION 1.0

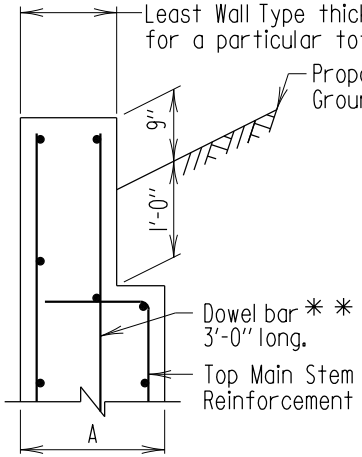
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

TYPE G RETAINING WALL SECTION (FOR PILE FOOTING AND TWO FOOT SURCHARGE)

DETAIL NO. RW-108

SHEET 2 OF 2

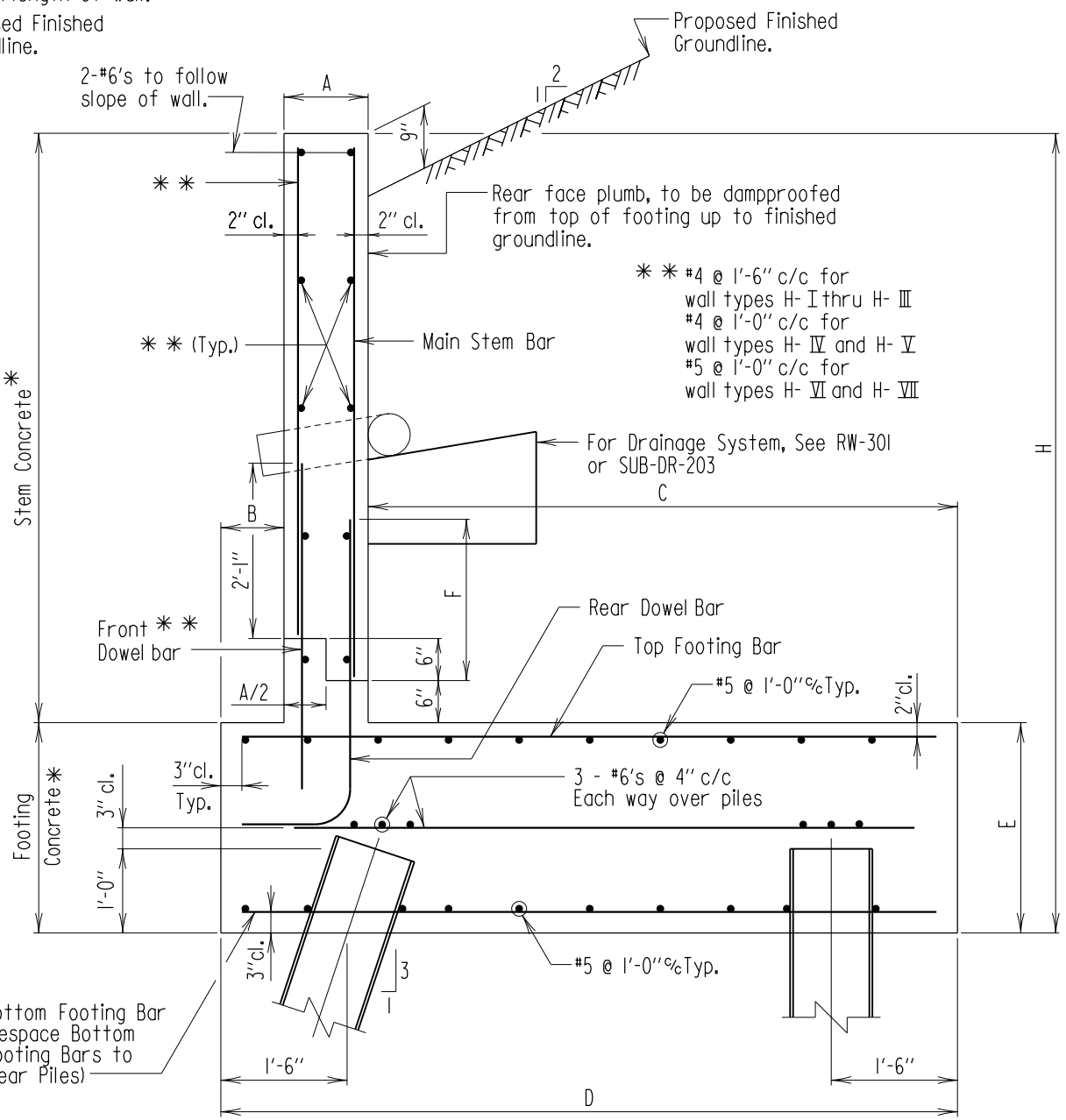
RETAINING WALLS



DETAIL A

Scale: None

(See note no. 1 Sheet 2)



TYPICAL SECTION

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

* 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.

APPROVAL

E.S. Anderson DIRECTOR
OFFICE OF STRUCTURES

DATE: 11/13/2007

VERSION 1.0

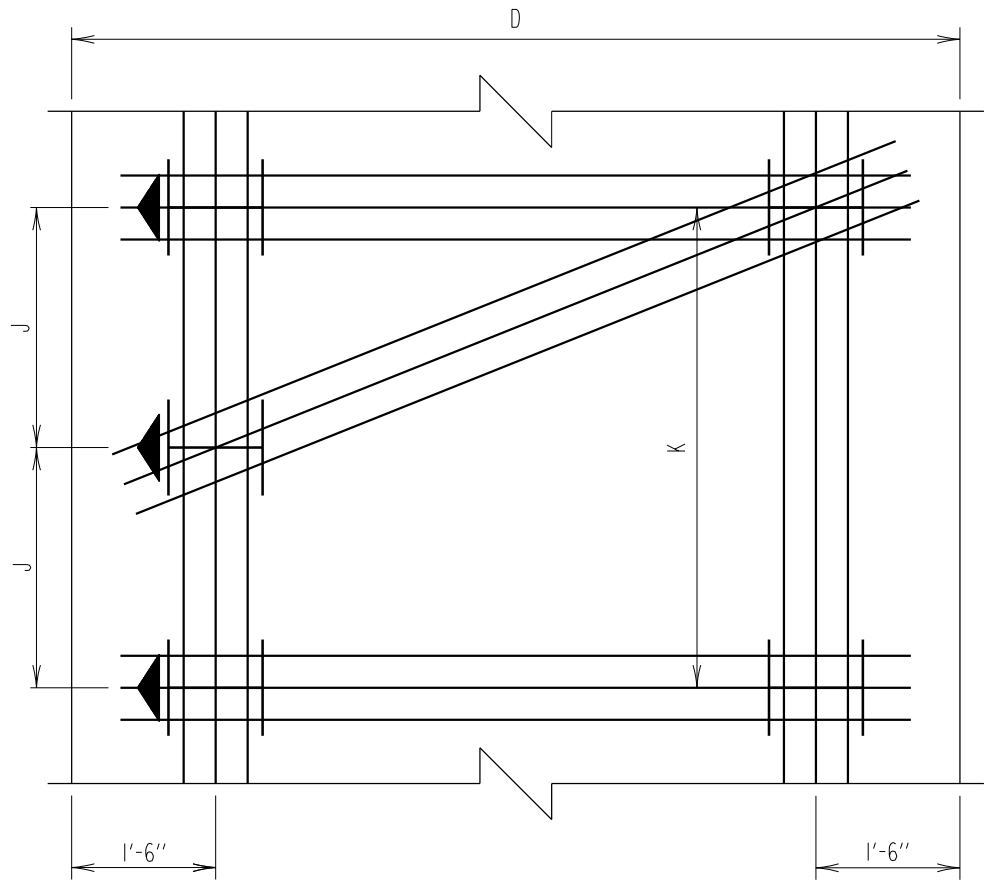
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

TYPE H RETAINING WALL SECTION (FOR PILE FOOTING AND SLOPING GROUNDLINE)

DETAIL NO. RW-109

SHEET 1 OF 2

RETAINING WALLS



TYPICAL PILE PLAN

Scale: 1/2" = 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. 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).

												PILE CAPACITY - DESIGN LOAD							
												25 TONS		40 TONS		55 TONS		70 TONS	
Wall Type	H	A	B	C	D	E	Rear Dowel Bar	Main Stem Bar	Top Footing Bar	Bottom Footing Bar	F	J	K	J	K	J	K	J	K
H-I	6'-0"	1'-0"	9"	4'-3"	6'-0"	2'-3"	#5 @ 1'-0"	#5 @ 1'-0"	#5 @ 6"	#5 @ 1'-0"	2'-2"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"
H-II	8'-0"	1'-0"	1'-6"	4'-3"	6'-9"	2'-3"	#6 @ 1'-0"	#6 @ 1'-0"	#6 @ 6"	#6 @ 1'-0"	3'-0"	3'-6"	7'-0"	5'-0"	10'-0"	5'-0"	10'-0"	5'-0"	10'-0"
H-III	10'-0"	1'-0"	2'-0"	4'-3"	7'-3"	2'-6"	#7 @ 1'-0"	#7 @ 1'-0"	#7 @ 6"	#7 @ 1'-0"	3'-6"			4'-0"	8'-0"	4'-0"	8'-0"	4'-0"	8'-0"
H-IV	12'-0"	1'-3"	2'-6"	4'-3"	8'-0"	2'-6"	#8 @ 1'-0"	#8 @ 1'-0"	#8 @ 6"	#8 @ 1'-0"	4'-7"					4'-0"	8'-0"	4'-0"	8'-0"
H-V	14'-0"	1'-9"	3'-0"	4'-3"	9'-0"	2'-6"	#8 @ 6"	#8 @ 1'-0"	#8 @ 6"	#8 @ 1'-0"	4'-7"					3'-0"	6'-0"	3'-9"	7'-6"
H-VI	16'-0"	2'-0"	3'-6"	4'-3"	9'-9"	2'-6"	#8 @ 6"	#8 @ 1'-0"	#8 @ 6"	#8 @ 1'-0"	4'-7"							3'-0"	6'-0"
H-VII	18'-0"	2'-6"	4'-0"	4'-3"	10'-9"	2'-6"	#8 @ 6"	#8 @ 1'-0"	#8 @ 6"	#8 @ 6"	4'-7"								

APPROVAL
OFFICE OF STRUCTURES DIRECTOR

DATE: 11/13/2007

VERSION 1.0

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

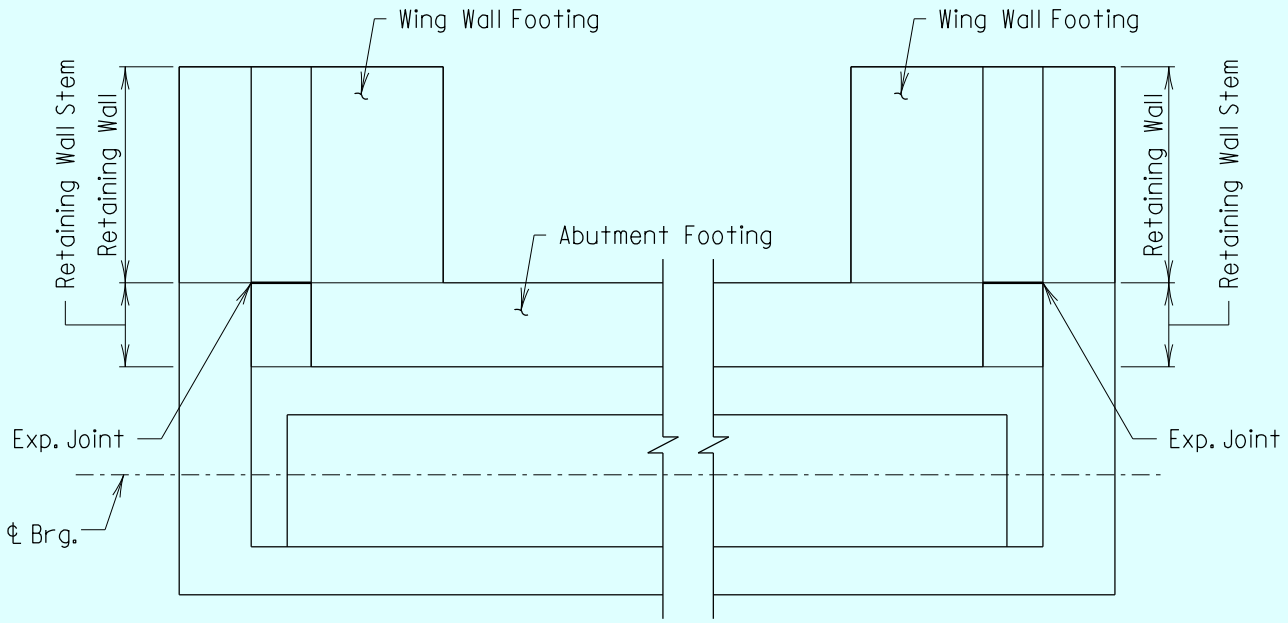
TYPE H RETAINING WALL SECTION (FOR PILE FOOTING AND SLOPING GROUNDLINE)

DETAIL NO. RW-109

SHEET 2 OF 2

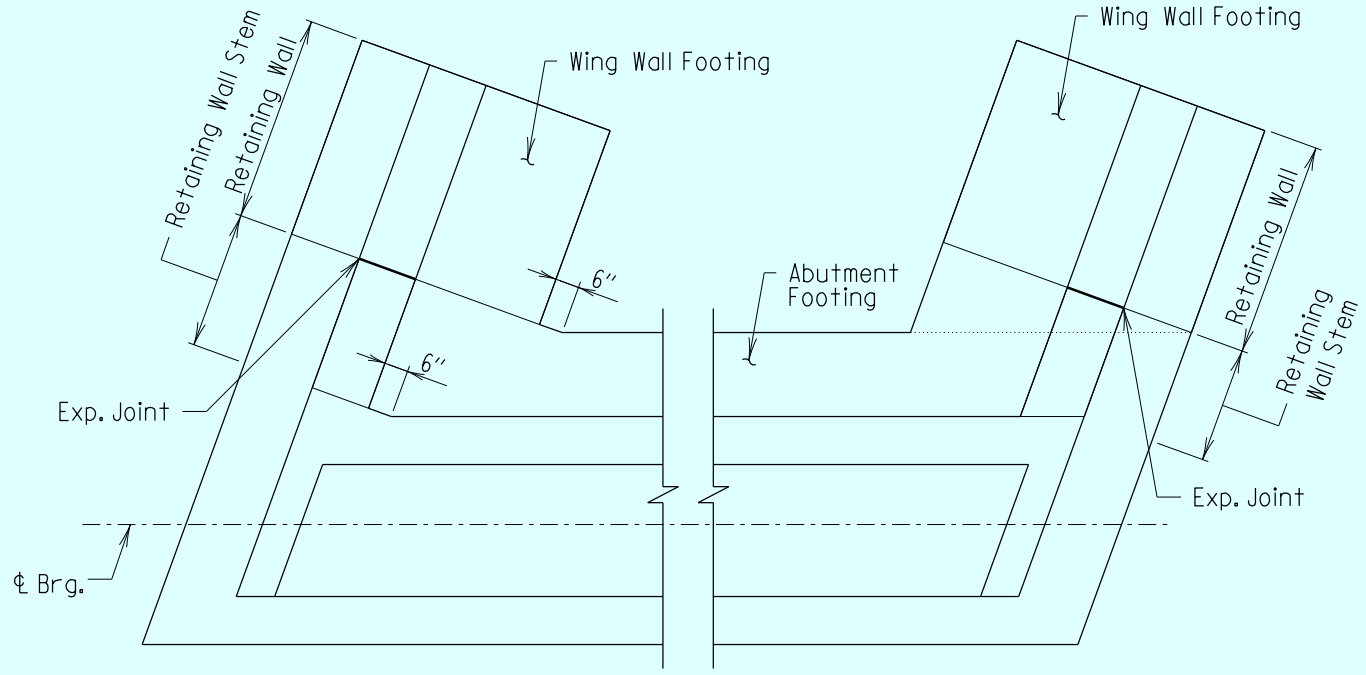
RETAINING WALLS

GUIDE FOR ABUTMENT AND WING WALL FOOTING INTERSECTION



90° ABUTMENT

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



SKEWED ABUTMENT

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

Note:
For additional details of expansion joint refer to SUB-WW-101

* FOR OFFICE USE ONLY *

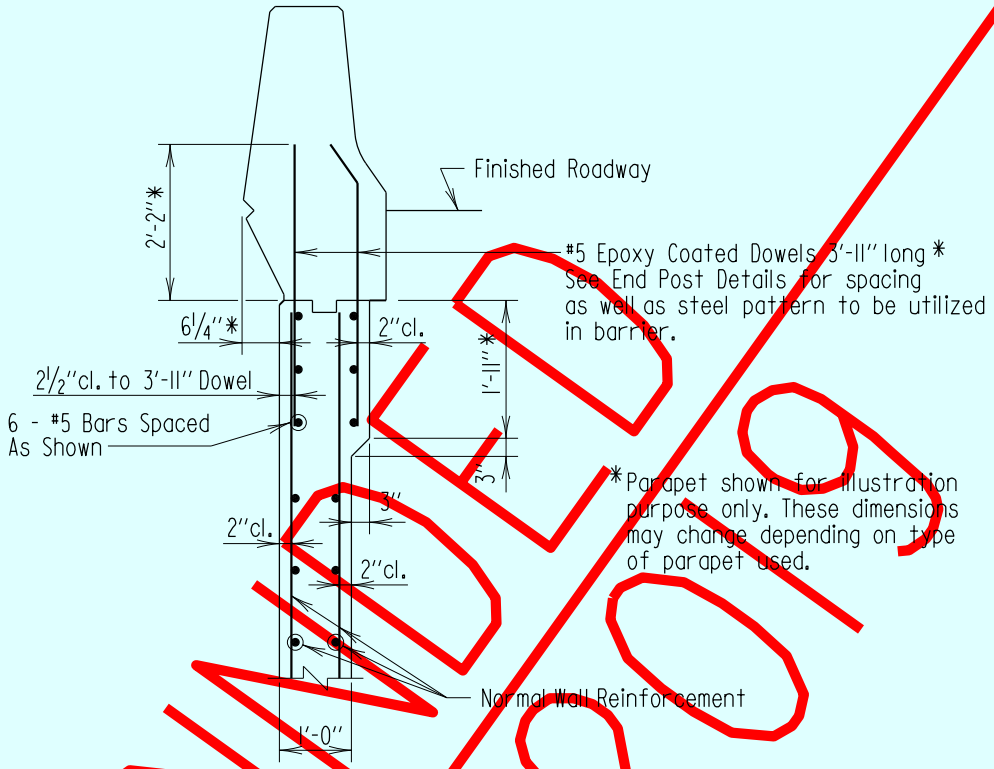
APPROVAL
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES
DATE: 09/16/2019
VERSION
1.01

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

RETAINING WALL DETAILS

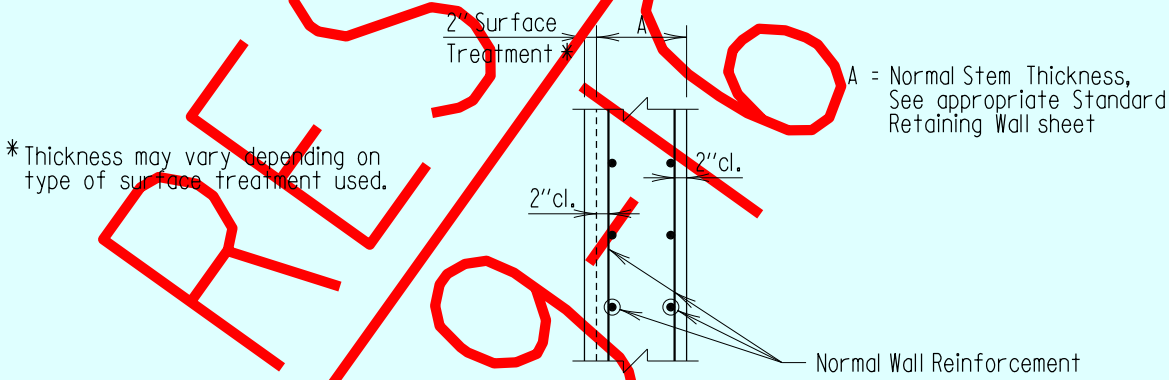
DETAIL NO. RW-201 SHEET 1 OF 1

RETAINING WALLS



GUIDE FOR PARAPET ATTACHMENT FOR WALLS WITH 1'-0" STEM THICKNESS

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



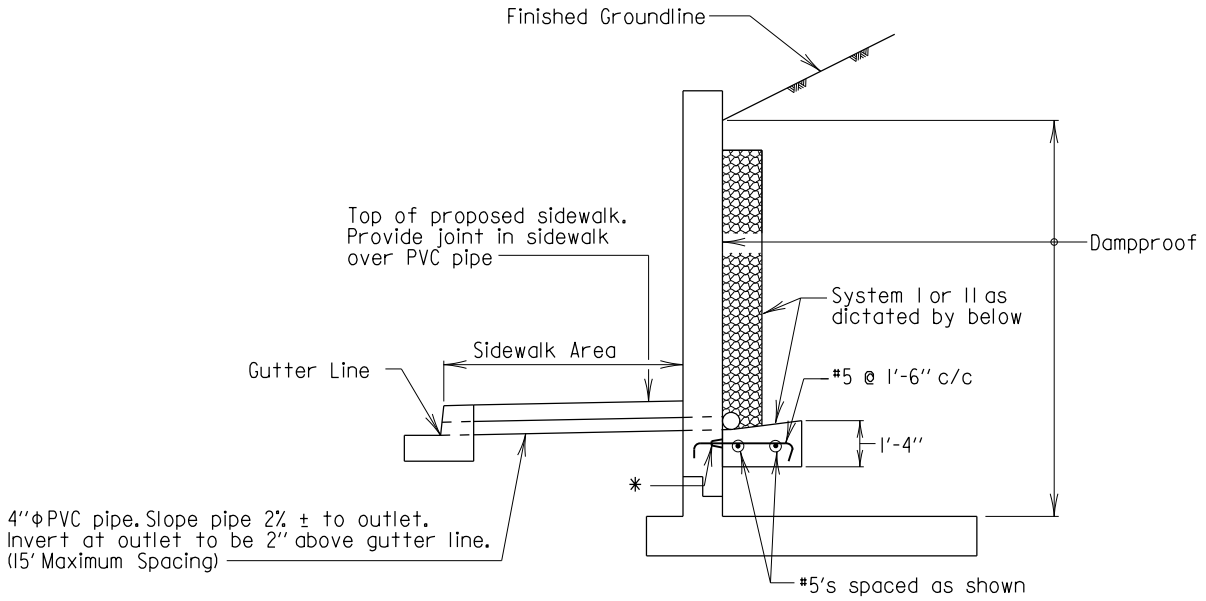
GUIDE FOR WALLS WITH AESTHETIC SURFACE TREATMENT

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

* FOR OFFICE USE ONLY *

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES DATE: 07/16/2002	STANDARD RETAINING WALL STANDARD DETAILS
VERSION 1.0	DETAIL NO. RW-201 SHEET 2 OF 2

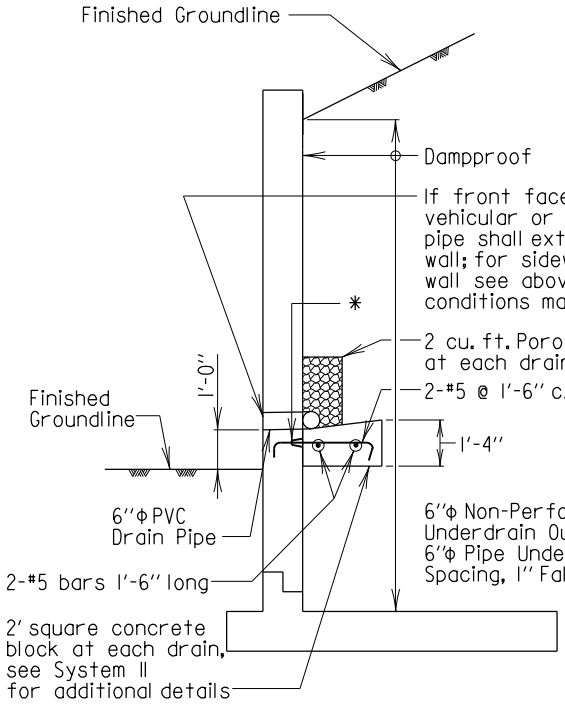
DETAIL NO. RW-201 (sheet 2) RESCINDED
SEE BRIDGE DESIGN MANUAL FOR
INFORMATION ON BARRIER CONNECTION



DRAIN AT SIDEWALK

Scale : None

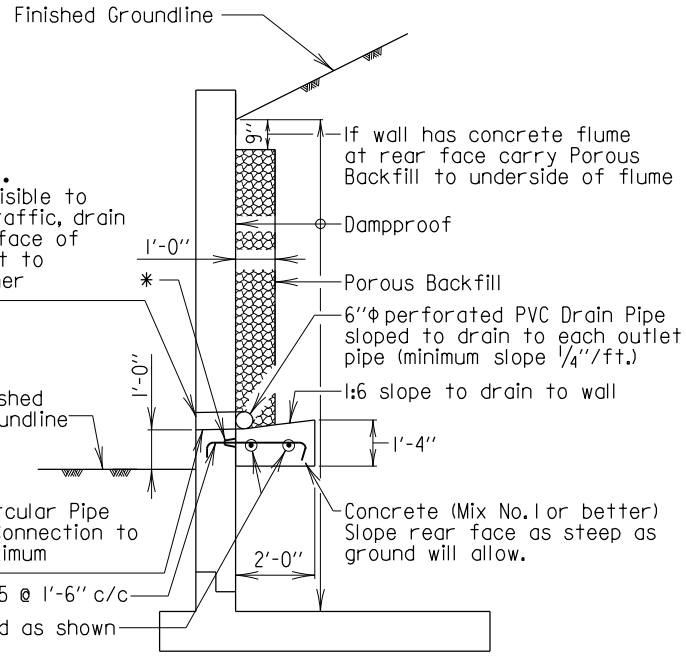
* #5 Threaded Rebar Dowel Coupler at 1'-6" c/c.



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 16' high (height of wall from bottom of footing to top of highest section). One drain shall be placed at ℄ 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



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

SYSTEM II

Scale : None

Note:
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.

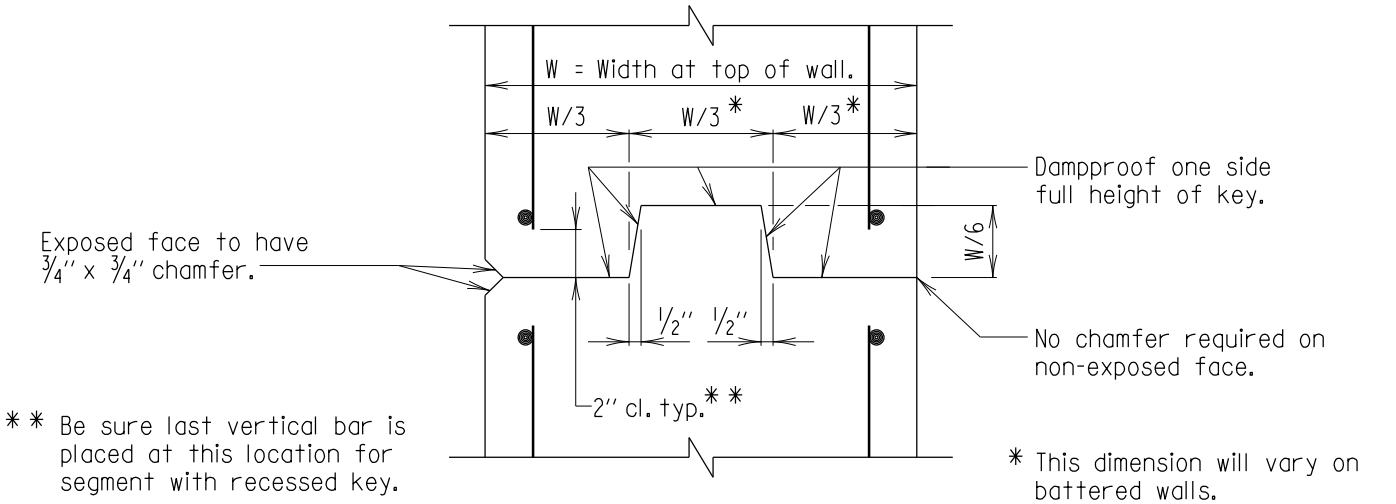
APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 01/22/2001
VERSION
1.0

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

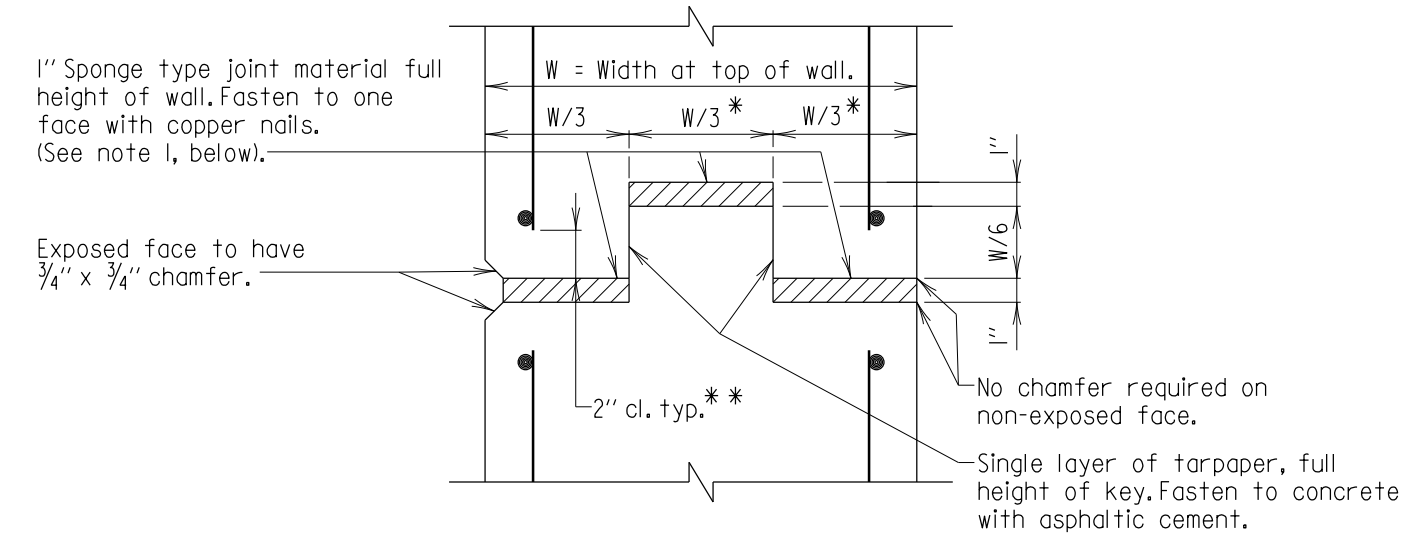
RETAINING WALL AND WING WALL DRAINAGE SYSTEMS

DETAIL NO. RW-301 SHEET 1 OF 1

RETAINING WALLS



SECTION
STEM CONTRACTION JOINT
Scale: 1 1/2" = 1'-0"



SECTION
STEM EXPANSION JOINT
Scale: 1 1/2" = 1'-0"

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).

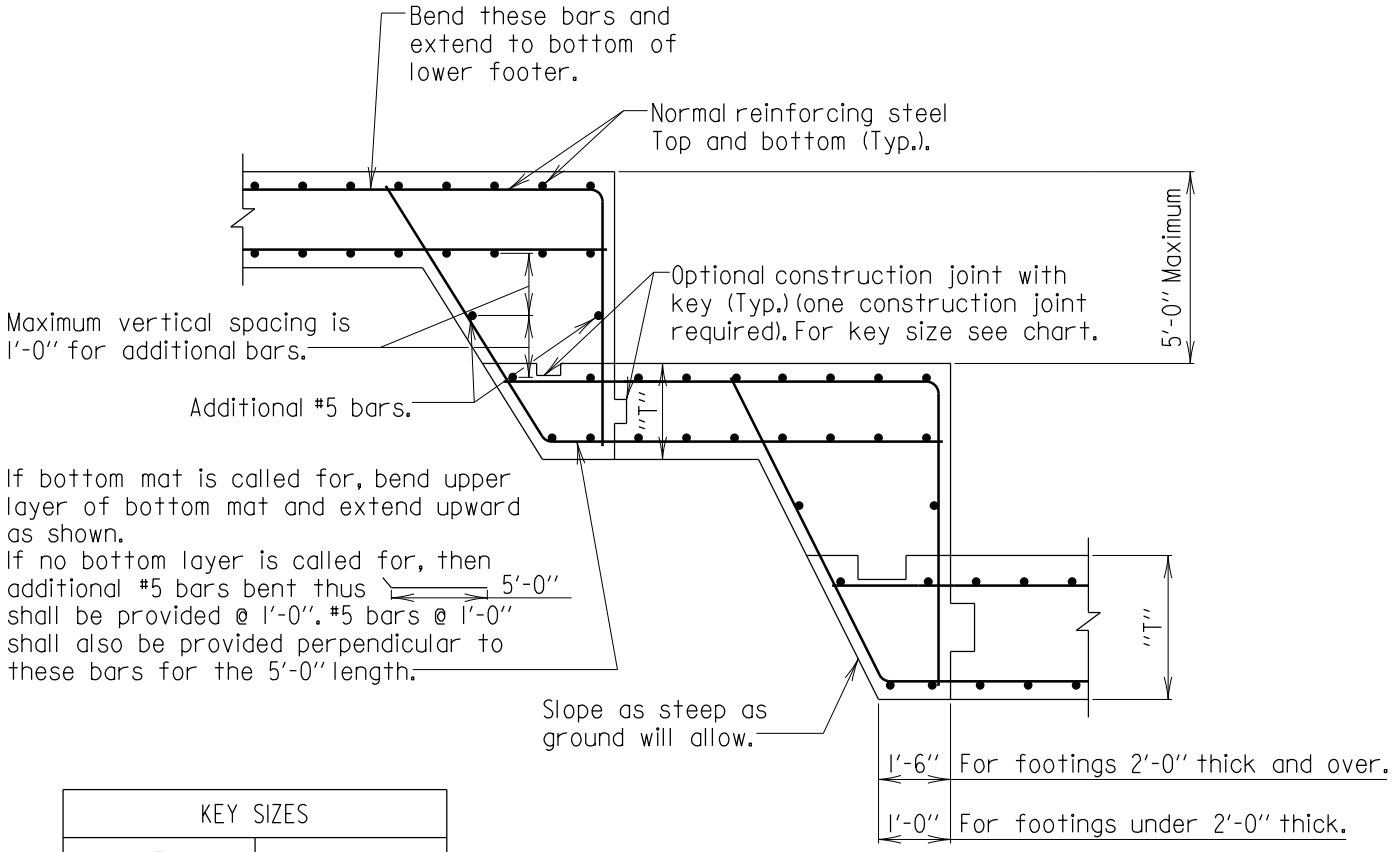
APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 05/04/2006
VERSION
1.0

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

CONCRETE RETAINING WALL CONTRACTION AND EXPANSION JOINTS

DETAIL NO. RW-401 SHEET 1 OF 1

RETAINING WALLS



KEY SIZES	
T	Key
1'-0" to 1'-5"	2" x 4"
1'-6" to 1'-11"	3" x 6"
2'-0" to 2'-5"	4" x 8"
2'-6" to 3'-0"	5" x 10"

TYPICAL SECTION

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

Notes:
1. All keys are nominal size.

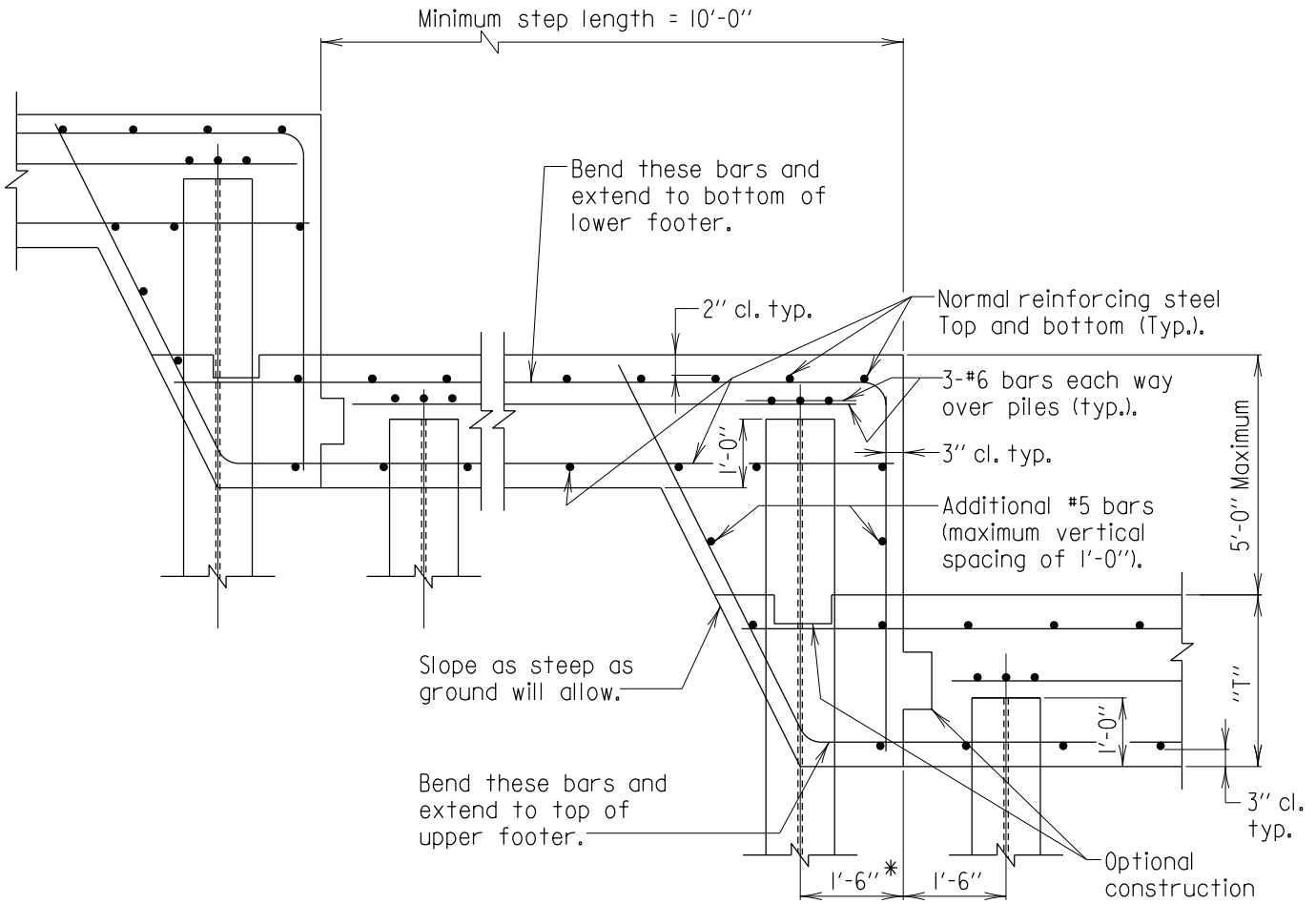
APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 08/28/2002
VERSION
1.0

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

STEPPED FOOTING DETAIL

DETAIL NO. RW-402 SHEET 1 OF 1

RETAINING WALLS



KEY SIZES	
T	Key
2'-0" to 2'-5"	4" x 8"
2'-6" to 3'-0"	5" x 10"

TYPICAL SECTION

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

Notes:
1. Steel H piles shown. Other pile types similar.
2. See Plan of Footing for orientation of piles.

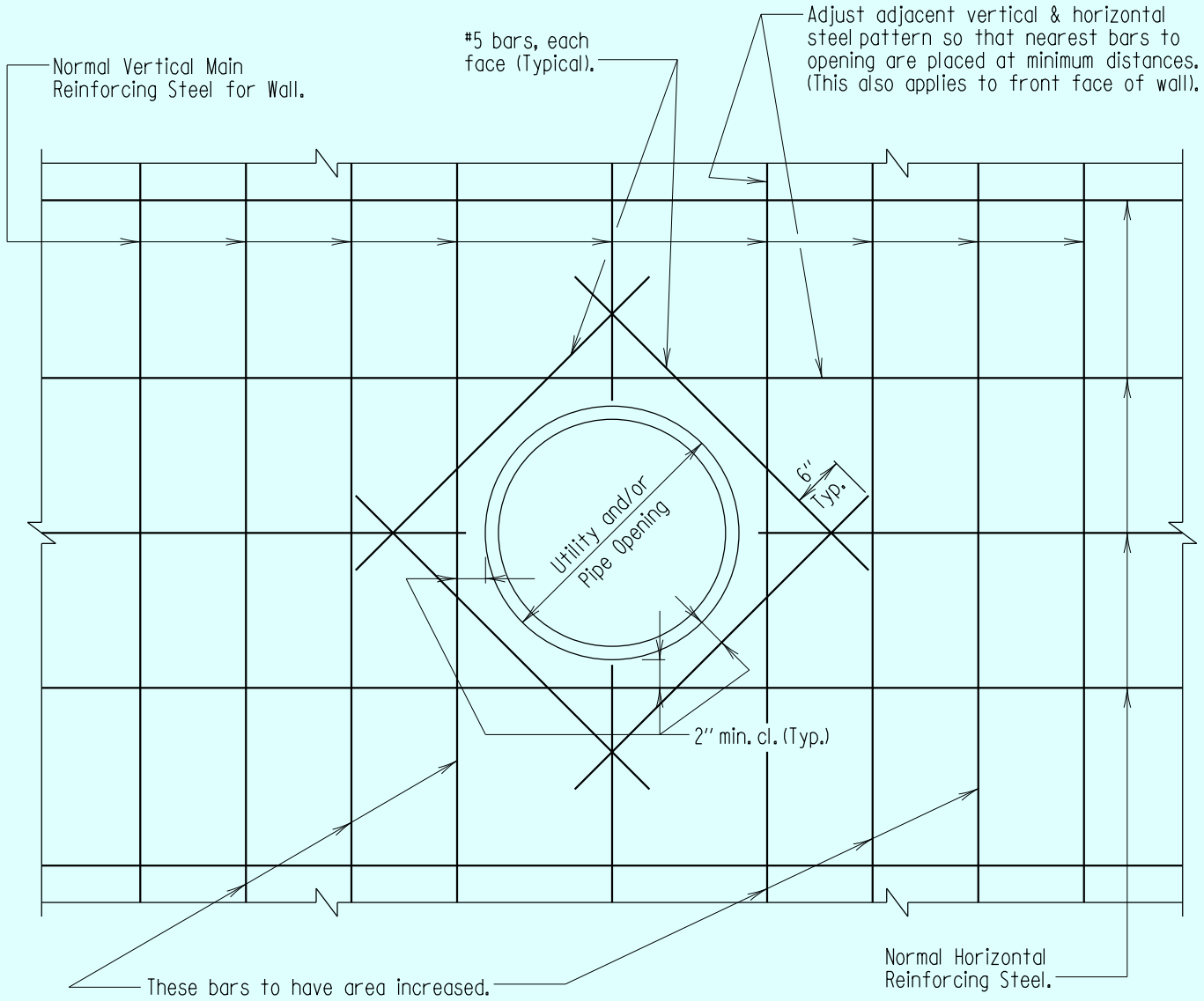
APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 07/16/2002
VERSION
1.0

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

STEPPED FOOTING DETAIL WITH PILES

DETAIL NO. RW-403 SHEET 1 OF 1

RETAINING WALLS



ELEVATION
Scale: None

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 addded over and below opening to transfer load to adjacent full sections of wall.
3. In no case shall concrete cover be less than 2".

* FOR OFFICE USE ONLY *

APPROVAL
E.S. Freedman DIRECTOR OFFICE OF STRUCTURES
DATE: 07/02/1993
VERSION
1.0

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

RETAINING WALLS