

Section 453

1 452-5 MEASUREMENT AND PAYMENT

2 *Sheet Pile Retaining Walls* will be measured and paid in square feet. Sheet pile walls will be
3 measured as the square feet of wall face area with the pay height equal to the difference between
4 top and bottom of wall elevations. Define “top of wall” as top of coping or top of piles for sheet
5 pile walls without coping. Define “bottom of wall” as where finished grade intersects the front
6 of sheet piles and no measurement will be made for portions of sheet pile walls below bottom
7 of wall elevations.

8 The contract unit price for *Sheet Pile Retaining Walls* will be full compensation for providing
9 submittals, labor, tools, equipment and sheet pile wall materials, installing sheet piles,
10 excavating, backfilling, hauling and removing excavated materials and supplying sheet piles,
11 backfill, coping and any incidentals necessary to construct sheet pile walls.

12 The contract unit price for *Sheet Pile Retaining Walls* does not include the cost for ditches,
13 fences, handrails, guardrail or barriers associated with sheet pile walls as these items will be
14 paid for elsewhere in the contract.

15 Where it is necessary to provide backfill material from sources other than excavated areas or
16 borrow sources used in connection with other work in the contract, payment for furnishing and
17 hauling such backfill material will be paid as extra work in accordance with
18 Article 104-7. Placing and compacting such backfill material is not considered extra work but
19 is incidental to the work being performed.

20 Payment will be made under:

Pay Item	Pay Unit
Sheet Pile Retaining Walls	Square Foot

21

SECTION 453

22

CIP GRAVITY RETAINING WALLS

23

453-1 DESCRIPTION

24 Construct CIP gravity retaining walls consisting of CIP concrete supported by and connected
25 to concrete footings. Construct CIP gravity retaining walls based on actual elevations and wall
26 dimensions in accordance with the contract, accepted submittals and if included in the plans,
27 standard CIP gravity wall detail. Define “CIP gravity wall” as a CIP gravity retaining wall.

28

453-2 MATERIALS

29

Refer to Division 10.

Item	Section
Geotextiles, Type 1	1056
Joint Materials	1028
Masonry	1040
Portland Cement Concrete, Class A	1000
Reinforcing Steel	1070
Subdrain Coarse Aggregate	1044-2
Subdrain Fine Aggregate	1044-1

30

Use geotextiles and subdrain aggregate for subsurface drainage at weep holes and reinforcing
31 steel for dowels.

32

453-3 GRAVITY WALL SURVEYS

33

The plans typically show a plan view, typical sections, details, notes and an elevation or profile
34 view (wall envelope) for each CIP gravity wall. Before beginning CIP gravity wall
35 construction, survey existing ground elevations along wall face locations and other elevations
36 in the vicinity of CIP gravity wall locations as needed. For proposed slopes above or below

1 CIP gravity walls, survey existing ground elevations to at least 10 feet beyond slope stake
2 points. Based on these elevations, finished grades and actual CIP gravity wall dimensions and
3 details, submit wall envelopes for acceptance. Use accepted wall envelopes for construction.

4 **453-4 CONSTRUCTION METHODS**

5 Control drainage during construction in the vicinity of CIP gravity walls. Direct run off away
6 from CIP gravity walls and backfill. Contain and maintain backfill and protect material from
7 erosion.

8 Excavate as necessary for CIP gravity walls in accordance with the plans. Embed bottom of
9 footings at least 2 feet below bottom of walls shown in the plans. If applicable and at the
10 Contractor's option, use temporary shoring for wall construction instead of temporary slopes to
11 construct CIP gravity walls. Define "temporary shoring for wall construction" as temporary
12 shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons
13 or the Contractor's convenience.

14 Notify the Engineer when foundation excavation is complete. Do not place concrete for
15 footings until excavation depth and foundation material are approved.

16 Construct CIP gravity walls at elevations and with dimensions shown in the plans and in
17 accordance with Section 420. Use dowels for construction joints at top of footings as shown in
18 the plans. Extend top of walls at least 6 inches above where finished grade intersects back of
19 CIP gravity walls.

20 Provide a Class 2 surface finish for exposed surfaces of CIP gravity walls that meets Subarticle
21 420-17(F). Construct wall joints at a maximum spacing of 10 feet. Make 1/2 inch thick
22 expansion joints that meet Article 420-10 for every third joint and 1/2 inch deep grooved
23 contraction or sawed joints that meet Subarticle 825-10(B) or 825-10(E) respectively for the
24 remaining joints.

25 Construct 3 inch diameter weep holes on 10 foot centers along CIP gravity walls. Provide
26 subsurface drainage at weep holes in accordance with Article 414-8. Exit weep holes just above
27 finished grade and slope holes at 1 in/ft through CIP gravity walls so water drains out of front
28 of walls. When single faced precast concrete barrier is required in front of and against CIP
29 gravity walls, extend weep holes through barrier at the same slope.

30 Do not remove forms or backfill behind CIP gravity walls until concrete attains a compressive
31 strength of at least 2,400 psi. Backfill for CIP gravity walls in accordance with Article 410-8.

32 If a brick veneer is required, construct brick masonry in accordance with Section 830. Anchor
33 brick veneers to CIP gravity walls with approved brick to concrete type anchors in accordance
34 with the manufacturer's instructions. Space anchors no more than 16 inches apart in the vertical
35 direction and no more than 32 inches apart in the horizontal direction with each row of anchors
36 staggered 16 inches from the row above and below.

37 **453-5 MEASUREMENT AND PAYMENT**

38 *CIP Gravity Retaining Walls* will be measured and paid in square feet. CIP gravity walls will
39 be measured as the square feet of wall face area with the pay height equal to the difference
40 between top of wall and top of footing elevations. Define "top of wall" as top of CIP concrete.

41 The contract unit price for *CIP Gravity Retaining Walls* will be full compensation for providing
42 submittals, labor, tools, equipment and CIP gravity wall materials, excavating, backfilling,
43 hauling and removing excavated materials and supplying concrete, dowels, subsurface
44 drainage, weep holes and any incidentals necessary to construct CIP gravity walls. The contract
45 unit price for *CIP Gravity Retaining Walls* will also be full compensation for brick veneers, if
46 required.

47 No separate payment will be made for temporary shoring for wall construction. Temporary
48 shoring for wall construction will be incidental to the contract unit price for *CIP Gravity*
49 *Retaining Walls*.

Section 454

1 The contract unit price for *CIP Gravity Retaining Walls* does not include the cost for ditches,
2 fences, handrails, guardrail or barriers associated with CIP gravity walls as these items will be
3 paid for elsewhere in the contract.

4 Where it is necessary to provide backfill material from sources other than excavated areas or
5 borrow sources used in connection with other work in the contract, payment for furnishing and
6 hauling such backfill material will be paid as extra work in accordance with Article 104-7.
7 Placing and compacting such backfill material is not considered extra work but is incidental to
8 the work being performed.

9 Payment will be made under:

Pay Item	Pay Unit
CIP Gravity Retaining Walls	Square Foot

10 SECTION 454 11 SEGMENTAL GRAVITY RETAINING WALLS

12 454-1 DESCRIPTION

13 Construct segmental gravity retaining walls consisting of segmental retaining wall (SRW) units
14 supported by aggregate footings. Provide CIP concrete slope protection as required. Design,
15 if required, and construct segmental gravity retaining walls based on actual elevations, wall
16 dimensions and batter in accordance with the contract, accepted submittals and if included in
17 the plans, standard segmental gravity wall detail.

18 Define “block wall” as a segmental gravity retaining wall and “standard block wall” as a block
19 wall that meets the standard segmental gravity retaining wall details. Define “blocks” as SRW
20 units, “cap blocks” as SRW cap units and “Block Vendor” as the vendor licensing the block
21 producer. Define “slope protection” as CIP concrete slope protection.

22 454-2 MATERIALS

23 Refer to Division 10.

Item	Section
Geotextiles, Type 2	1056
Joint Materials	1028
Portland Cement Concrete, Class B	1000
Segmental Retaining Wall Units	1040-4
Select Material	1016
Subsurface Drainage Materials	815-2

24 Provide Type 2 geotextile for separation geotextiles. Use Class VI select material for No. 57
25 stone and Class B concrete for slope protection. Provide PVC pipes, fittings, outlet pipes and
26 concrete pads for subsurface drainage materials. For PVC pipes behind block walls, use pipes
27 with perforations that meet AASHTO M 278.

28 Provide cap blocks that meet the material requirements for blocks. Use blocks from producers
29 approved by the Department and licensed by the Block Vendor. Notify the Engineer of the
30 name and NCDOT ID number of the SRW unit production facility before beginning block
31 production. Provide blocks with a depth (front to back) of at least 12 inches and cap blocks
32 with a depth of at least 8 inches.

33 Use approved SRW units for standard block walls. Blocks for standard block walls are
34 approved for either 2 foot or 4 foot maximum design heights with the design height as shown
35 in the standard segmental gravity wall details. The list of approved SRW units with maximum
36 design heights is available from the Geotechnical web site.

37 Do not mix blocks from different Block Vendors on the same block wall. Damaged blocks
38 with excessive discoloration, chips or cracks as determined by the Engineer will be rejected.