

Earthwork Example 1:

Determine the appropriate Pay Items and Quantities

Excavation from Cross Sections	Embankment from Cross Sections
90,000 CY	150,000 CY

Assume Shrinkage of 25%
Assume No Undercuts
Assume No Stripping
Assume No Unsuitable Material
Assume No Staging Required.

Determine appropriate method of payment from TOPPS 2434

Since no staging is required, the earthwork is measurable and the 210-0100 GRADING COMPLETE – Lump Sum pay item **cannot be used**.

If the borrow sources can not be measured or controlled, the appropriate pay item will be “In-Place Embankment”.

The earthwork pay quantities would be:
201-0100 Clearing and Grubbing – Lump Sum
208-0100 In Place Embankment - 150,000 CY

If the borrow source can be measured and controlled, the appropriate pay items would be Unclassified Excavation and Borrow, including Material.

The earthwork pay quantities would be:
201-0100 Clearing and Grubbing – Lump Sum
205-0001 Unclassified Excavation - 90,000 CY
206-0002 Borrow Excavation, incl. Matl. ???? CY

(Shrink on cut method)
????= $[150,000 - (90,000 \times (1-0.25))] / 1-0.25 = [82,500] / (1-.25) = 110,000$ CY Borrow

(Swell on fill method)
????= $150,000 / (1-0.25) - 90,000 = 110,000$ CY Borrow

Notice that the pay quantity is the same regardless of the method.

Earthwork Example 2:

Determine the appropriate Pay Items and Quantities

Excavation from Cross Sections	Embankment from Cross Sections
90,000 CY	150,000 CY

Assume Shrinkage of 25%

Assume No Stripping

Assume No Unsuitable Material

Assume No Staging Required.

Assume that an area of contaminated soil 900 feet long by 100 foot wide by 9 feet deep must be undercut and disposed of OFF the project. (Assume that this area is not shown in the Caice files.) $(900 \times 100 \times 9 / 27 = 30,000 \text{ CY})$

From TOPPS 2434

Since no staging is required, the earthwork is measurable and the 210-0100 GRADING COMPLETE – Lump Sum pay item **cannot be used**.

If the borrow sources can not be measured or controlled, the appropriate pay item will be "In-Place Embankment".

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – Lump Sum
208-0100 In Place Embankment - 150,000 + 30,000 CY
=180,000

If the borrow source can be measured and controlled, the appropriate pay items would be Unclassified Excavation and Borrow, including Material.

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – Lump Sum
205-0001 Unclassified Excavation - 90,000 + 30,000 = 120,000 CY
206-0002 Borrow Excavation, incl. Matl. ???? CY

(Shrink on cut method)

$$= [(150,000 + 30,000) - (90,000 \times (1-0.25))] / (1-0.25) = [112,500] / (.75) = 150,000 \text{ CY}$$

(Swell on fill method)

$$= (150,000 + 30,000) / (1-0.25) - 90,000 = 150,000 \text{ CY}$$

Notice that the pay quantity is the same regardless of the method.

Earthwork Example 3:

Determine the appropriate Pay Items and Quantities

Excavation from Cross Sections	Embankment from Cross Sections
90,000 CY	150,000 CY

Assume Shrinkage of 25%

Assume No Stripping

Assume No Unsuitable Material

Assume No Staging Required.

Assume that an area of soil (unsuitable to be used within 3 feet of the subgrade but may be used in the bottom of fills or outside the pavement) 900 feet long by 100 foot wide by 9 feet deep must be undercut. (Assume that this area is not shown in the Caice files.)
 $(900 \times 100 \times 9 / 27 = 30,000 \text{ CY})$

From TOPPS 2434

Since no staging is required, the earthwork is measurable and the 210-0100 GRADING COMPLETE – Lump Sum pay item **cannot be used**.

If the borrow sources can not be measured or controlled, the appropriate pay item will be “In-Place Embankment”.

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing –	Lump Sum
208-0100 In Place Embankment -	150,000 + 30,000 CY
	=180,000

If the borrow source can be measured and controlled, the appropriate pay items would be Unclassified Excavation and Borrow, including Material.

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing –	Lump Sum
205-0001 Unclassified Excavation -	90,000 + 30,000 = 120,000 CY
206-0002 Borrow Excavation, incl. Matl.	???? CY

(Shrink on cut method)

???? = $[(150,000 + 30,000) - (90,000 + 30,000) \times (1 - 0.25)] / (1 - 0.25) = [90,000] / (.75) = 120,000 \text{ CY}$

(Swell on fill method)

???? = $(150,000 + 30,000) / (1 - 0.25) - (90,000 + 30,000) = 120,000 \text{ CY}$

Notice that the pay quantity is the same regardless of the method.

Earthwork Example 4:

Determine the appropriate Pay Items and Quantities

Excavation from Final Cross Sections	Embankment from Final Cross Sections
90,000 CY	150,000 CY
Excavation from Cross Sections Stage 1	Embankment from Cross Sections Stage 1
25,000 CY	115,000 CY
Excavation from Cross Sections Stage 2	Embankment from Cross Sections Stage 2
65,000 CY	35,000 CY

Assume Shrinkage of 25%

Assume No Undercuts

Assume No Stripping

Assume No Unsuitable Material

Assume No Excavation in Stage 1 need to be refilled in Stage 2.

Assume No Embankment in placed in Stage 1 need to be Excavated in Stage 2.

Determine appropriate method of payment from TOPPS 2434

Since no soil requires multiple movements, the earthwork is measurable and the 210-0100 GRADING COMPLETE – Lump Sum pay item **cannot be used**.

If the borrow sources can not be measured or controlled, the appropriate pay item will be “In-Place Embankment”.

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – Lump Sum

208-0100 In Place Embankment - 150,000 CY

If the borrow source can be measured and controlled, the appropriate pay items would be Unclassified Excavation and Borrow, including Material.

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – Lump Sum

205-0001 Unclassified Excavation - 90,000 CY

206-0002 Borrow Excavation, incl. Matl. ???? CY

Stage 1

(Shrink on cut method)

???? = $[115,000 - (25,000 \times (1-0.25))] / 1-0.25 = [96,250] / (1-.25)=128,333$ CY Borrow

(Swell on fill method)

???? = $115,000 / (1-0.25) - 25,000 = 128,333$ CY Borrow

Stage 2

(Swell on fill method)

???? = $35,000 / (1-0.25) - 65,000 = -18,333$ CY (THIS IS WASTE) (NOT NEGATIVE BORROW)