

Earthwork Training

Introduction

We will cover 7 subjects

- 1 - General Info
- 2 - How to determine the appropriate method of payment
- 3 - How to calculate quantities
- 4 - How to set up CAiCE Files
- 5 - What to provide for FPRs
- 6 - What to provide District Earthwork Coordinator
- 7 - What to provide Contracts Administration

HANDOUTS

- TOPPS 2434
- Supplemental Spec 201 Clearing and Grubbing
- Sample Calculations
- Sample Designer Checklist

1 - General Info

Background

The contractor has to bid the project with the items and quantities that are in the plans.

1 - General Info (Cont'd.)

- What the designer can control
 - Pay items and Quantities in the Plans
 - Information in the plans
- What the designer cannot control
 - Erroneous Survey Info

1- General Info (Cont'd.)

Common Reasons for Errors

Not Familiar with Specs

Not Familiar with TOPPS 2434

Incorrect Addition, Subtraction, or other calculations

Overlaps / Gaps in Cross Sections

Did not apply shrinkage factor correctly

Applied shrinkage factor backwards

Incorrect or Outdated Survey Data

Inexperience or Lack of Training

Staging not Considered

Lack of QC (CAiCE and/or calculations not checked)

1- General Info (Cont'd.)

Common Reasons for Errors

- Assuming that if the Pay Item is “Grading Complete” earthwork is not important. Do all calculations as if the quantities were being used as pay items

1- General Info (Cont'd.)

How to Do Earthwork Correctly

- First **READ** Specifications 201, 205, 206, 208 and 209 and 210
- Then **READ** TOPPS 2434
- Use the following Glossary when using “Unclassified Excavation” and “Borrow, Including Material” pay items:

General Info (Cont'd.)

Glossary

- Raw Cut – Excavation volume as shown on cross sections
- Raw Fill – Embankment volume as shown on cross sections
- Unclassified Excavation – Volume of excavation within the R/W that will be paid.
- Stripping – Removal of Topsoil / Grass and tree roots
- Undercut – material that must be excavated that is not shown in the typical grading template.
- Intercept ditch – A ditch at the top of the cut that intercepts “off-site” water before it runs down the slope.
- Toe ditch – A ditch at the bottom of a fill slope that controls water running along the base of the fill.
- Berm Ditch – A ditch formed in a high cut or fill slope to intercept the water running down the slope.

General Info (Cont'd.)

Glossary

- Shrinkage – The percentage that soil **decreases** in volume from its undisturbed volume (prior to excavation) to the final “in-place” compacted volume (when placed in an embankment).
- Swell – The percentage that rock (and excavated pavement, curb and gutter, etc.) **increases** in volume from its undisturbed volume (prior to excavation) to the final “in-place” volume (when placed in an embankment).
- Neat Borrow – Confusing term, has no meaning, do not use
- Neat Excavation – See Raw Cut
- Cut (in CAiCE output) = Excavation
- Fill (in CAiCE output) = Embankment
- Waste – This is the excavated mass of earthwork that is left over at the end of the project that can not be used anywhere as fill material.
- Stockpile – Earthwork that is excavated from a Cut section that can be used throughout the project as fill material.

1 - General Info (Cont'd.)

Additional Stuff For PM to worry about

- The Design Project Manager must assume that the original ground has been verified for accuracy. If during the design of the project the PM notices anything that does not look right he should request a survey “re-verification”.
- Generally the first design run should use 6:1 or 4:1 slopes. Then the Designer must look at each area to determine where to use 2:1 slopes and guardrail. If the project is a “Waste” project be very liberal with the fill slopes.
- Plans need to include a Stake Out Sheet.

2 - What Pay Item to Use?

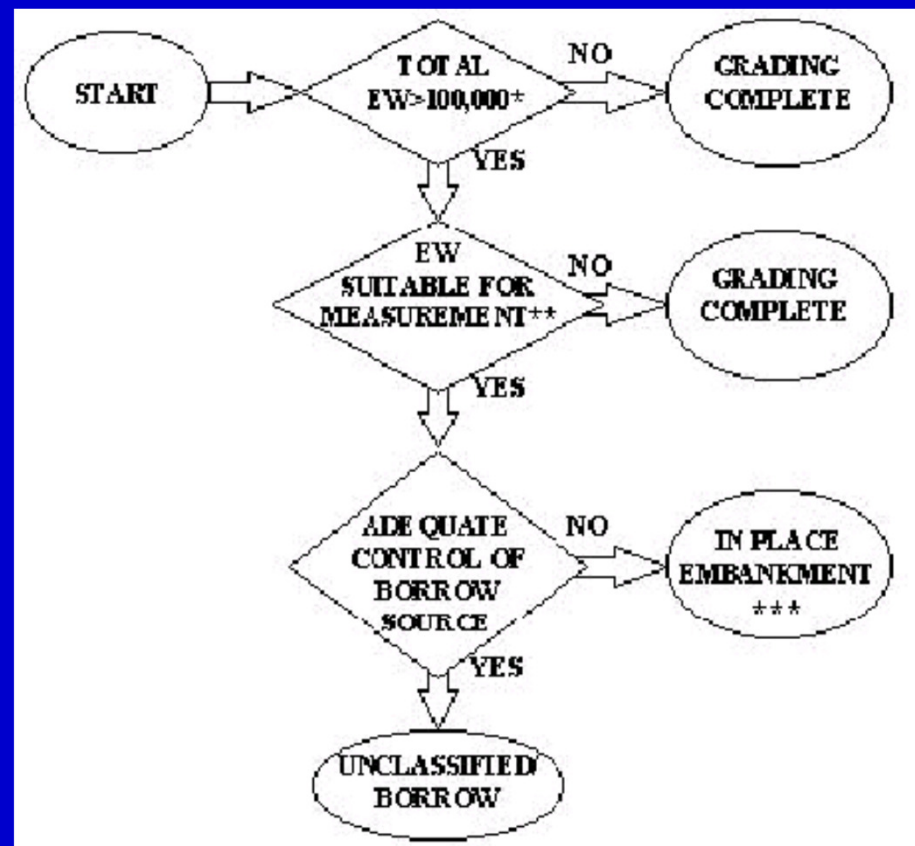
For Method of Payment See TOPPS 2434

There is a FLOW CHART to assist your selection.

TOPPS 2434

- The purpose of this document is to provide general guidelines for determining the method of payment for earthwork. These are general guidelines and are not inclusive of all types of projects. The field plan review inspection team will make recommendations as to the method of payment for earthwork using these general guidelines and the team's engineering judgment and experience to ensure the appropriate method of payment for earthwork is selected.
- * Unadjusted volume of cut + fill
- ** If total EW > 500,000*, or if no significant traffic control is required for the grading work except at tie-ins and crossroads, the project is suitable for earthwork measurement. Borrow pits that fill with water are suitable for measurement.
- *** In place embankment is acceptable for use only as follows:
- Locations where borrow sources (pits) will not be reserved for the exclusive use of the project. This is particularly applicable to urban areas.
- Embankment placed by dredging or hydraulic methods.

Selection Guide



- **Presentation of Earthwork in the Plans**

- No earthwork quantities should be shown anywhere in the plans except for the summary sheet and the detailed estimate. When a quantity is shown on the summary sheet, it should be the total quantity, not broken out by sheet, or station numbers.
- For **GRADING COMPLETE**, no quantity is shown in the plans just "lump sum" is shown on the detailed estimate sheet. However, calculations must still be computed in order to produce a cost for the designers estimate.
- For **UNCLASSIFIED EXCAVATION**, the neat volume of excavation is shown on the summary sheet and the detailed estimate.
- For **IN PLACE EMBANKMENT**, the neat volume of embankment is shown on the summary sheet and the detailed estimate.
- For **BORROW INCLUDING MATERIAL** , the volume of the borrow pit excavation is shown on the summary sheet and the detailed estimate. Where approved borrow sources can be identified, they should be indicated on the plans.
- The **GRADING PER MILE (KM)** pay item should not be used except on maintenance shoulder building projects.

2 – Method of Payment

Grading Complete

Grading Complete - All work shown in the plans is included in the Lump Sum price bid. This includes excavation inside the R/W, constructing the fills, any Borrow needed, and Clearing and Grubbing.

Small projects (Less than 100,000 CY total EW)

Volume of Earthwork is not related to the cost of Earthwork. (Significant Traffic Control) (Soil is moved for staging)

Grading Complete includes the grading shown on the plans. If grading is required but is not shown, it is not included.

2 - Method of Payment In-Place Embankment

- Projects with more than 100,000 but less than 500,000 Cubic yards. Where multiple Borrow pits will likely be used and the pits may not be reserved for exclusive use of the project. (Urban Areas) Grading Complete is often better for these type projects due to staging issues.
- Projects where the fill is being placed hydraulically, (Not likely with current Environmental Regulations)
- If the In-place Embankment pay item is used, the constructed fills are measured “in-place”. No separate payment is made for excavation or borrow.

2 - Method of Payment

Unclassified Excavation and Borrow

- Use when the total earthwork is over 100,000 CY and is measurable.
- **Unclassified Excavation** is all of the excavation on the project (shown in the cross sections) except excavation for:
 - bridge footings and channel excavation which are paid as separate items
 - minor structures which is not paid for separately (see Spec. 207)
- **Borrow** is the additional soil that is needed to construct the fills that are not available on the project R/W.

3- Calculation Methods

Grading Complete

You do not show quantities in the plans but you do calculate the quantities of Excavation and Borrow for:

To provide the construction cost estimate to Contracts.

To provide to Engineering Services with FPR request.

To provide to the District Earthwork coordinator.

These calculations are done the same as if the pay quantities were going to be “Unclassified Excavation” and “Borrow, Including Material”.

3- Calculation Methods

In-Place Embankment

If the In-place Embankment pay item is used, the constructed fills are measured “in-place”.

Therefore, no adjustments for shrinkage are required.

If your original ground line is correct and your grading template is correct the plan quantity will be the pay quantity.

You do not show quantities for excavation and/or borrow in the plans, but you do calculate the quantities of Excavation and Borrow to provide to Engineering Services and the District Earthwork Coordinators.

These calculations are done the same as if the pay quantities were going to be “Unclassified Excavation” and Borrow.

3- Calculation Methods

Unclassified Excavation and Borrow

There are two calculation methods that are normally used. Both methods will produce the same results if used correctly, but they cannot be mixed together.

The **“Swell the Fill” method** mathematically increases the volume of the fill and subtracts the raw cut volumes from this number. Note that the word “Swell” indicates the inverse of the Shrinkage and not the Swell percentage for rock.

The **“Shrink the Cut” method** basically reduces the volume of the excavation and subtracts this volume from the “Raw Fill”.

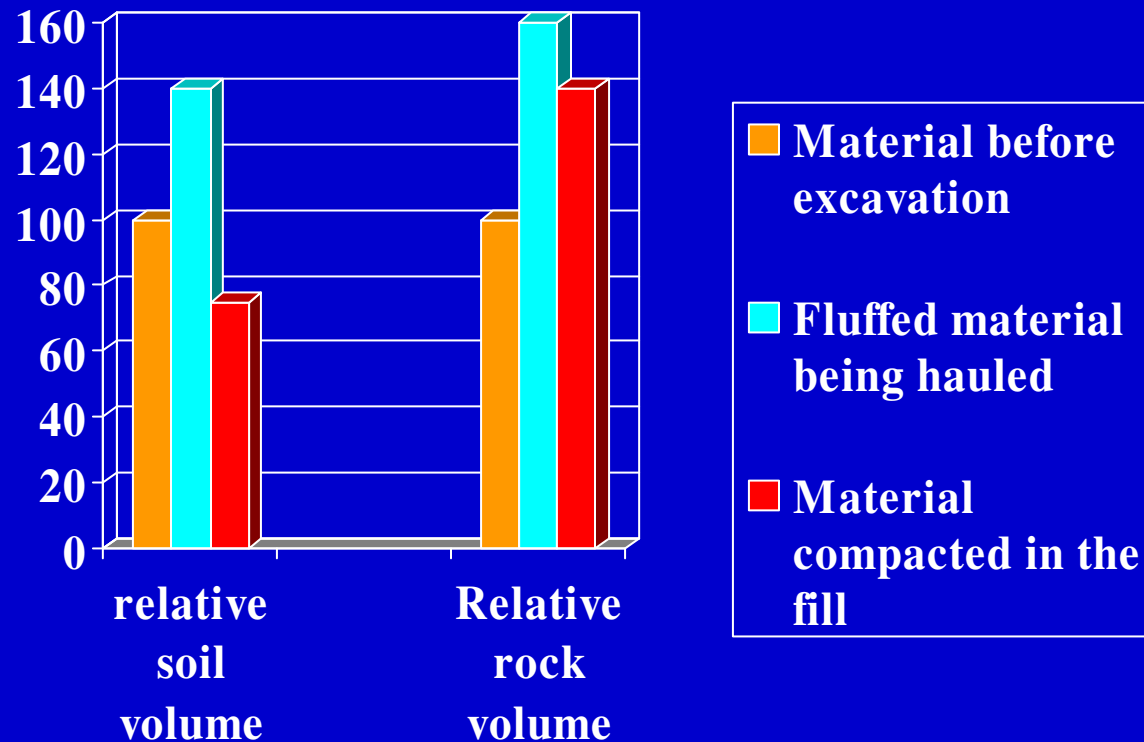
When the “Unclassified Excavation” and “Borrow, incl. Material” pay items are used, the “size of the hole” is measured for payment.

“Unclassified Excavation” is a hole on the R/W and “Borrow” is a hole (that the contractor provides) that is not on the R/W.

3- Calculation Methods

Unclassified Excavation and Borrow

It is easy to get confused when calculating these quantities.



Earthwork Example 1

- Determine the appropriate Pay Items and Quantities
- Excavation (cut) from X-Sections ----90,000 CY
- Embankment (fill)from X-Sections ---150,000 CY
- Assume Shrinkage of 25%
- Assume No Undercuts
- Assume No Stripping
- Assume No Unsuitable Material
- Assume No Staging Required.

Earthwork Example 1 (Cont'd.)

- Determine appropriate method of payment from TOPPS 2434
 - The total earthwork is 150,000+90,000 which is well over 100,000.
 - Staging is not a factor that would require significant traffic control.
 - Borrow pits can be controlled and is suitable for measurement.
 - Therefore, from the Selection Guide that we went over before, what would you include in this plans to pay for this?
- No, the 210-0100 GRADING COMPLETE – Lump Sum pay item cannot be used.

Earthwork Example 1 (Cont'd.)

If borrow is required and 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

Earthwork Example 1 (Cont'd.)

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

Note that in this example, the calculations will show that “Borrow” is required. (There is not enough excavated material (cut) on the project to build the fills.) If the earthwork Calculations show that there will be “waste” soil then the “Unclassified Excavation” pay item would be used and the “Borrow, incl. material” pay item would not be used.

Earthwork Example 1 (Cont'd.)

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – ????

Lump Sum

205-0001 Unclassified Excavation - ????

90,000 CY

206-0002 Borrow Excavation, including Material

???? CY

Earthwork Example 1 (Cont'd.)

(Shrink on cut method)

[150,000 (Embankment from Xsections)

minus

(90,000 (Cut from Xsections) X(1-0.25 (shrinkage)))]

divided by (1-0.25(shrinkage))

= [150,000 - 67,500] / (1-0.25)

Earthwork Example 1 (Cont'd.)

(Shrink on cut method) cont.

$$= [82,500] / (1-0.25(\text{shrinkage}))$$

$$= 110,000 \text{ CY Borrow}$$

Earthwork Example 1 (Cont'd.)

(Swell on fill method)

$150,000 / (1 - 0.25) = 200,000$ (Swelled Fill)

minus 90,000 (Excavation from Xsections)

= 110,000 CY Borrow

Please note that the pay quantity is the same regardless of the method. However, this check is mathematical swell and not the same factor used to compute for Rock.

Earthwork Example 2

Determine the appropriate Pay Items and Quantities

Excavation from Cross Sections -----90,000 CY

Embankment from Cross Sections ----150,000 CY

Assume Shrinkage of 25%

Assume No Stripping

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.) $(900 \times 100 \times 9 / 27 = 30,000 \text{ CY})$

Earthwork Example 2 (Cont'd.)

Determine appropriate method of payment from TOPPS 2434

The total earthwork is 150,000+90,000+30,000 which is well over 100,000.

Since no staging is required, the earthwork is measurable.

Therefore the 210-0100 GRADING COMPLETE – Lump Sum pay item **cannot be used**.

Note that **IF** the Grading Complete pay item is used **AND** the undercut **IS SHOWN** on the plans, the cost of the Undercut is included in the Grading Complete pay item.

Earthwork Example 2 (Cont'd.)

If the borrow is required and 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 - ????? CY

????= 150,000 plus 30,000 = 180,000 CY

Earthwork Example 2 (Cont'd.)

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

Earthwork Example 2 (Cont'd.)

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – ????

Lump Sum

205-0001 Unclassified Excavation - ????

90,000 plus 30,000 = ????

???? = 120,000 CY

206-0002 Borrow Excavation, including Material -

???? CY

Earthwork Example 2 (Cont'd.)

(Shrink on cut method)

[(150,000(Embankment from X-sections)+ 30,000
(undercut))

minus

(90,000 (Cut from X-sections) x(1-0.25 (shrinkage)))]

divided by (1-0.25(shrinkage))

= [180,000 - 67,500] / (1-0.25)

Earthwork Example 2 (Cont'd.)

(Shrink on cut method) cont.

$$= [112,500] / (1-0.25(\text{shrinkage}))$$

$$= 150,000 \text{ CY Borrow}$$

Earthwork Example 2 (Cont'd.)

(Swell on fill method)

$(150,000 + 30,000) / (1 - 0.25) = 240,000$ (Swelled Fill)

– 90,000 (**Excavation from X-sections**)

= 150,000 CY Borrow

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 -----90,000 CY

Embankment from Cross Sections ----150,000 CY

Assume Shrinkage of 25%

Assume No Stripping

Assume No Staging Required.

Assume that an area of soil (which is suitable to use after it is removed and re-compacted) 900 feet long by 100 foot wide by 9 feet deep must be undercut. The difference is that this soil can still be used, but this area is not shown in the CAiCE files. ($900 \times 100 \times 9 / 27 = 30,000$ CY)

Earthwork Example 3 (Cont'd.)

Determine appropriate method of payment from TOPPS 2434

The total earthwork is 150,000+90,000+30,000 which is well over 100,000.

Since no staging is required, the earthwork is measurable.

Therefore the 210-0100 GRADING COMPLETE – Lump Sum pay item cannot be used.

Note that **IF** the Grading Complete pay item is used **AND** the undercut **IS SHOWN** on the plans, the cost of the Undercut is included in the Grading Complete pay item.

Earthwork Example 3 (Cont'd.)

If the borrow is required and 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 plus 30,000 = 180,000 CY

Earthwork Example 3 (Cont'd.)

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

Earthwork Example 3 (Cont'd.)

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – ????

Lump Sum

205-0001 Unclassified Excavation - ????

???? = 90,000 plus 30,000 = 120,000 CY

206-0002 Borrow Excavation, including Material -
???? CY

Earthwork Example 3 (Cont'd.)

(Shrink on cut method)

[(150,000(Embankment from Xsections)+ 30,000
(undercut))

minus

((90,000 (Cut from Xsections) + 30,000 (undercut))

times (1-0.25 (shrinkage)))]

divided by (1-0.25(shrinkage))

= [180,000 - 90,000] / (1-0.25)

Earthwork Example 3 (Cont'd.)

(Shrink on cut method) cont.

$$= [90,000] / (1-0.25_{\text{(shrinkage)}}) =$$

120,000 CY Borrow

Earthwork Example 3 (Cont'd.)

(Swell on fill method)

$(150,000 + 30,000) / (1 - 0.25) = 240,000$ (Swelled Fill)

– $(90,000$ (Excavation from Xsections) + $30,000$ (undercut))

= $(240,000 - 120,000)$

= $120,000$ CY Borrow

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

Earthwork Example 4 (Cont'd.)

Assume Shrinkage of 25%

Assume No Undercuts

Assume No Stripping

Assume No Unsuitable Material

Earthwork Example 4 (Cont'd.)

Determine appropriate method of payment from TOPPS 2434

The total earthwork is 150,000+90,000 which is well over 100,000.

Staging is required, but the soil does not have to be moved multiple times, therefore the earthwork is measurable.

Therefore the 210-0100 GRADING COMPLETE – Lump Sum pay item cannot be used.

Note that even **IF** the Grading Complete pay item is used, **Staging Cross Sections should be provided** so that the contractor can determine how much soil will be required in Stage 1.

Earthwork Example 4 (Cont'd.)

If the borrow is required and 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

Earthwork Example 4 (Cont'd.)

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

Earthwork Example 4 (Cont'd.)

The earthwork pay quantities would be:

201-0100 Clearing and Grubbing – ????

 Lump Sum

205-0001 Unclassified Excavation - ????

 ???? = 90,0000 CY

206-0002 Borrow Excavation, including Material -
 ????

Note that this must be done by stages. If at any point during construction more soil is needed that has been excavated at that point, additional Borrow must be provided.

Earthwork Example 4 (Cont'd.)

(Shrink on cut method)

Stage 1

[(115,000(Stage 1 Embankment from Xsections)

minus

25,000 (Stage 1 Cut from Xsections) x(1-0.25)
(shrinkage)]

divided by (1-0.25(shrinkage)) =

Earthwork Example 4 (Cont'd.)

(Shrink on cut method) cont.

$$= [115,000 - (25,000 \times (1 - 0.25))] / (1 - 0.25)$$

$$= 128,333 \text{ CY Borrow in Stage 1}$$

Earthwork Example 4 (Cont'd.)

(Swell on fill method)

Stage 1

$(115,000) / (1 - 0.25) = 153,333$ (Swelled Fill)

– (25,000 Stage 1 Excavation (from X-Sect.))

= (153,333 - 25,000)

= 128,333 CY Borrow

Earthwork Example 4 (Cont'd.)

- For simplicity, the Stage 2 numbers will only be calculated with the “Swell on Fill Method”.

Stage 2 (Swell on fill method)

$$\text{Borrow} = 35,000 / (1-0.25) - 65,000$$

= - 18,333 CY Note that this is “Waste”, not “Negative Borrow”.

Earthwork Example 4 (Cont'd.)

- Therefore the Borrow Quantity shown on the plans is 129,000 CY.
- Note that the quantity of Borrow increased by 19,000 CY from Example 1 even though the final cross sections were the same.
- This may have been reduced if you had staged a side road or Cut section differently.
- Always consider staging!

Earthwork Calculation

Observations

- Notice that the pay quantity is the same regardless of the method.
- Notice also that the “Swell on Fill Method” is easier to use.
- Doing both methods is a very good check.
- Always consider staging to help reduce and/or to compute all of the quantities related to Earthwork correctly!

Earthwork Calculations

Special Cases

- The only time that you have to use the “Shrink on cut method” is if the soil has different shrinkage coefficients. This is normally a problem in only two cases.
- First, if a Borrow Pit has been located for the project and a Soil Survey was done for the Pit. It is not current GDOT policy to locate the pits before hand.

Earthwork Calculations

Special Cases

Second, if there are large rock cuts on the project. The rock will have an actual “Swell Factor”. If this is the case you need to carefully consider the staging. Large rock can only be placed deep in large fills. Often the fills have to be built before the rock is available. If this is the case, the rock may have to be “wasted”.

4 - Organization of Electronic CAiCE Data

- Proper organization of the electronic CAiCE data is critical for efficient data sharing between business units. Since this type of data sharing is standard practice within the Department, it is extremely important for all parties involved to follow the same data processing guidelines.
- The standards for processing CAiCE data are found in several guidelines documents which address each specific discipline in which the CAiCE software is employed.
- Electronic versions of these documents are available for download from the *GDOT CAiCE Support Homepage* web site at the following address:
<http://topps.dot.state.ga.us/homeoffs/osd.www/internal/graphics/caice.html>.

4 - Organization of Electronic CAiCE Data

- The *Guidelines for Processing Design Data in CAiCE* is the guidelines document for use by the project designers. This document prescribes standard CAiCE database object naming conventions and standard object feature codes in *Section 1.1*.
- Standard CAiCE file naming conventions are prescribed in *Section 1.2*.
- *Section 1.4* describes the standardized *Project Data Sheets* which are used to document how each of the critical CAiCE data elements are related to one another and to the roadway project. This section also specifies the location of the electronic versions of the *Project Data Sheets* for inclusion with the CAiCE archive file.
- *Section 3* describes the GDOT standard files which must be used for processing the CAiCE data. This section also includes instructions on how to use these standard files and how to obtain the latest versions of these files.
- The *Project Data Sheets* and the GDOT standard files are available for download from the *GDOT CAiCE Support Homepage* web site.
- Compliance with these guidelines will greatly reduce confusion when the electronic CAiCE data is shared.

5 - What to provide to Engineering Services with FPR requests

PFPR

A Summary of the output of the Earthwork Volume Calculations by Stages. The summary should be broken down by Stages and by sideroads, mainline, etc. (this summary should include the raw cut and raw fill from CAiCE and should include the shrinkage calculations showing the actual pay quantities. These numbers are needed even if the pay item will be “Grading Complete” or “In-Place Embankment”.

FFPR

Same info as with PFPR including all changes since the PFPR.

6 -

- Information that the Project Manager must provide District Earthwork Coordinators:
(The E/W coordinator becomes the liaison between Design and Construction for all Earthwork pay items. Everything in your design affects E/W so they are responsible for any discrepancies between the plans and the Contractors quantities.)

6 - For A PFPR

- When a PFPR Inspection is requested from Engineering Services the following information needs to be provided to the District EWC
- The total quantity of earthwork at the time of the PFPR (Raw Volume of Cut and Fill (Done by Stages)), via e-mail
- The Shrinkage Factor from the Soil Survey Report, via e-mail
- An Archived CAICE file (on a CD) including a completed Project Data Sheet, E/W quantity calculations, and a half-size set of plans that it matches are to be mailed to the District EWC

6 - CAiCE Files

CAiCE files should match the PFPR plans, follow ALL Department Guidelines, and of which some highlights include:

- Correct naming of files
- Only one DTM surface with enhancements of obscured areas included
- End Area Files included for both Mainline and each Side Road where the quantities can not be included in the Mainline quantities
- Horizontal Alignments to match the plans
- Vertical Alignments to match the plans
- Median Crossovers in place
- Right and Left Turn Lanes in place
- Special Ditches in place
- Guardrail Shoulders in place
- Correct Subgrade Blockout (Typical Section at time of PFPR)
- CAiCE Design File (.VRS) should be able to be reran and E/W quantities should match the quantities provided by the Designer.

6 - FFPR

When a FFPR Inspection request is submitted to Engineering Services the following information needs to be provided to the District EWC: Total Quantity of Earthwork at the time of the FFPR (Neat Number of Cut and Fill), via e-mail

- An Archived CAICE file (on a CD) including a completed Project Data Sheet, E/W quantity calculations, and a half-size set of plans it matches are to be mailed to the District EWC

6 - The CAiCE Files

- CAiCE files should now match the FFPR plans and still follow the same standards for the PFPR.
- The Subgrade Blockout (Typical Section) however, should now be updated to reflect the “approved pavement design”
- Once again, CAiCE Design Files (.VRS) should be able to be reran and E/W quantities should match the Designer provided quantities.

6 - Final Plans

Please Note: When Final Plans are sent out, the following information needs to be provided to all of the District Earthwork Coordinators (EWC):

6 – Final Plans

- The Archived CAiCE file (on a CD) including a completed Project Data Sheet, E/W quantity calculations, and a half-size set of Final Plans it matches are to be mailed to the District EWC
- Once again, CAiCE Design Files (.VRS) should be able to be reran and E/W quantities should match the Designer provided quantities.
- The Designer is to maintain updated Design (.VRS) files for each project to be provided to the District EWC each time a Plan Revision is sent out that would effect Earthwork Quantities. (Any field changes will be updated by the District EWC, themselves.)

7 - What to Provide Contracts Administration with the Final Plans

- Plans with the correct pay items
- Plans with the correct quantities
- See CAiCE Manual Chapter 7.3
- Do NOT provide the .ERP file which is generated in CAiCE that shows the .EAR output you use to calculate from.
- Only provide the following electronic files:

7 - What to Provide Contracts Administration with the Final Plans

- Provide Description Files of all the correct Geometry Chains (alignments). **“New Policy”**
- Provide Project Data Sheet with all the information filled out for each current alignment that is used in the plans.
- Include .END files (see next slide for an example) which is the preferred output of the End Area Files all burned on a CD.

7 - What to Provide Contracts Administration with the Final Plans

- EMX000 7.035 **KC11.END**
- -1 3500.000 3500.000 110673.79960000 493565.38200000
- L1 15.652378 271.277703
- L1 14.070538 271.259713
- L1 13.764995 271.256238
- L1 12.856763 271.245909
- L1 12.747674 271.244669
- L1 10.252977 271.256467
- L1 9.170855 271.244389
- L1 5.382713 271.202108
- L1 5.299986 271.201185
- L1 4.387850 271.189869
- L1 4.277920 271.188642
- L1 3.181378 271.178194
- L1 3.089205 271.177166
- L1 2.283521 271.171440
- L1 1.708322 271.165032
- R1 2.920898 271.131800
- R1 2.942881 271.131557
- R1 3.116789 271.122210
- R1 3.155311 271.121783
- R1 3.473039 271.112026
- R1 3.540119 271.111280
- R1 4.135385 271.104397



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CAiCE Visual Roads Design System
EarthWork Report from C:\KCDATA\122080\KC11.EAR : Thu Jul 22 15:35:37 2004
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EarthWork Class Table : C:\CAICE\EWCLASS\GDOTEWRK.TBL
Description           : GDOT Earthwork Class Table
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	Area Type	Area	Inc.Vol.	Cum.Vol.	MassHaul
Station 3+500.000	EMBANK	1.00			
	EXCAV	0.46			
	CUT	0.46			
	USABLE	0.46			
	FILL	1.00			
Station 3+520.000	EMBANK	7.66	86.56	86.56	
	EXCAV	0.00	4.57	4.57	
	CUT	0.00	4.57	4.57	
	USABLE	0.00	4.57	4.57	
	FILL	7.66	86.56	86.56	
					-82.00
Station 3+540.000	EMBANK	1.17	88.23	174.80	
	EXCAV	2.21	22.09	26.66	
	CUT	2.21	22.09	26.66	
	USABLE	2.21	22.09	26.66	
	FILL	1.17	88.23	174.80	
					-148.14
Station 3+550.000	EMBANK	1.39	12.77	187.57	
	EXCAV	3.03	26.19	52.84	
	CUT	3.03	26.19	52.84	
	USABLE	3.03	26.19	52.84	
	FILL	1.39	12.77	187.57	
					-134.72

Do Not Send to Contracts !!

Questions ???

