

# Mass Haul for the Masses: Civil 3D 2009

*This paper focuses on creating a mass haul diagram from Civil 3D 2009 volume reports. It is assumed that the reader is able to create corridor surfaces, create sample lines and compute materials.*

## Introduction

Contrary to popular belief, dirt is not cheap. Once you consider the equipment and workforce needed to excavate, move, waste, compact and/or test soil, costs add up quickly. For this reason contractors and engineers rely on mass haul diagrams to reduce the guesswork involved in road grading tasks, and to ensure everyone gets paid fairly for moving soil.

Consider the following example. The figure below shows an idealized mass haul diagram where the net volume at the last station is zero. This diagram also assumes no unsuitable materials are excavated from the site. Notice how certain features of the mass haul diagram line up with the profile. In this case, the free haul distance agreed upon by the contractor is 200.' That means that excavation outside of this range is a different pay item from excavation inside the range.

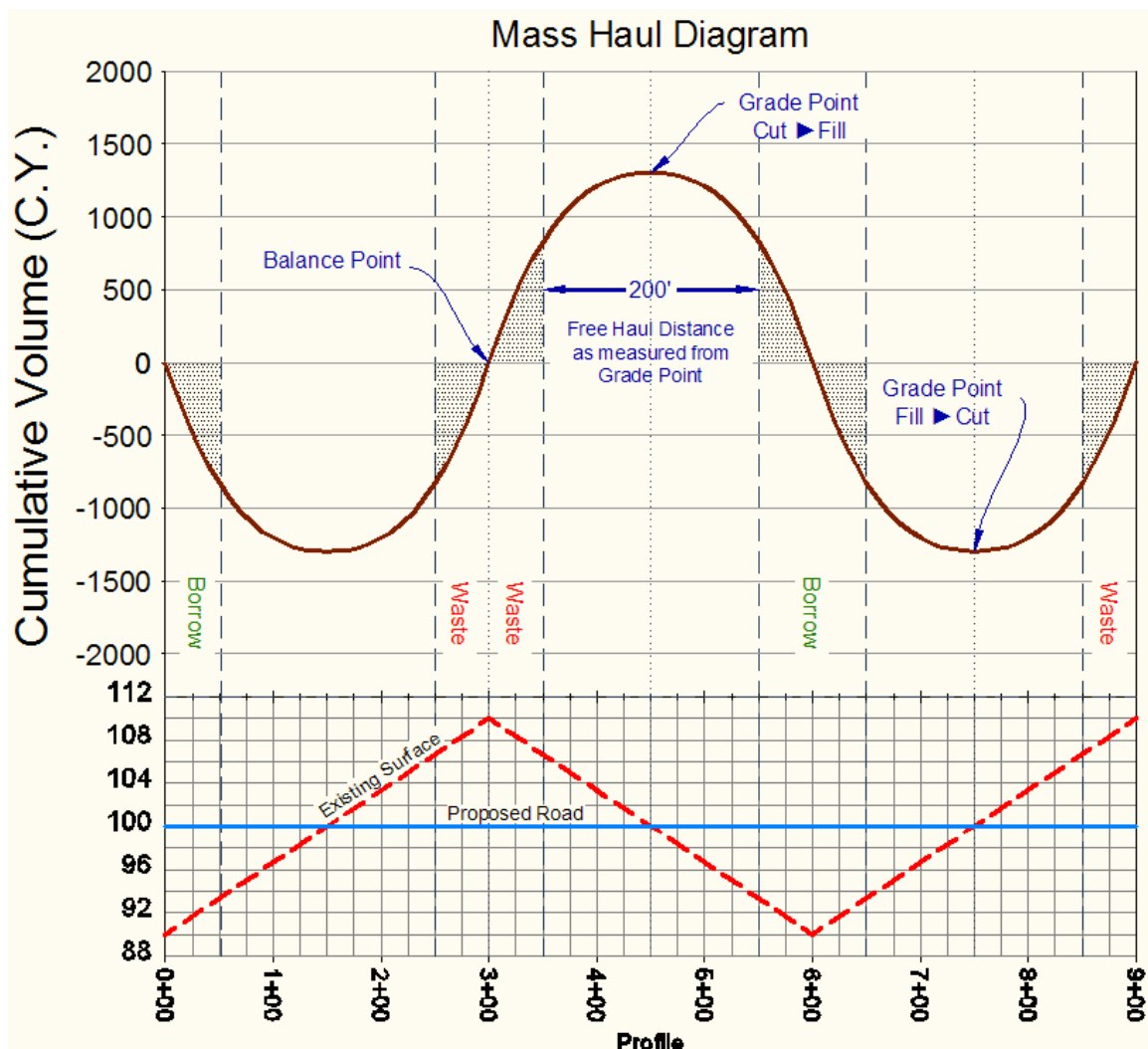


Figure 1

Terms to Know:

**Balance Point** – Anywhere the mass haul line crosses the 0 (zero) cumulative volume line on a mass haul diagram. This indicates that up to this station the cumulative cut and fill volumes are equal.

**Borrow** – Fill material that was not initially excavated from the project site.

**Free Haul Distance** – The distance the contractor has agreed to move earth without additional fees.

**Grade Point** – Transition between cut and fill on a mass haul diagram. This point coincides with a design profile intersecting the original ground profile. A “crest” on the mass haul line indicates a transition from cut to fill, and “sag” indicates a transition from fill to cut.

**Mass Haul Diagram** - A graph of cumulative volume moved on a project (usually a roadway project) along its length. Station values are along the X-axis and cumulative volume is on the Y-axis.

**Over Haul Distance** – Distances along the project that do not fall into a free haul area. Material in this area may be borrowed or wasted if it is more economical for the contractor.

**Waste** – Cut material that cannot be used on the project site, either because it is unsuitable material or because it is outside of a free haul distance.

# Creating a Mass Haul Diagram

The first step in creating a mass haul diagram is to compute average end area volumes along the length of the project.

In Civil 3D you need to:

1. Make sure a Datum surface has been created from your corridor.
2. Create Sample Lines
3. Compute Materials

When you are ready to create a Mass Haul Diagram, go to **Sections > Create Mass Haul Diagram**.

Next you will step through the Create Mass Haul Diagram Wizard

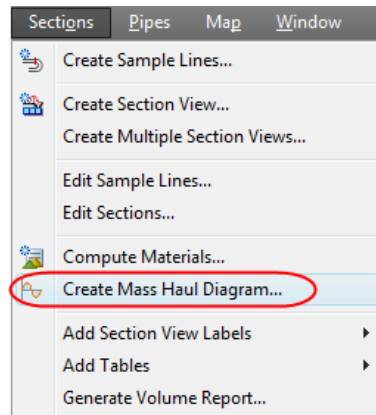


Figure 2

In the first step of the wizard (Figure 3):

- ✓ Select the Alignment
- ✓ Select the Sample Line Group
- ✓ Verify the view name (this is how it appears in Prospector)
- ✓ Add a description if you wish
- ✓ Set the Mass Haul View Style
- ✓ Click **Next**

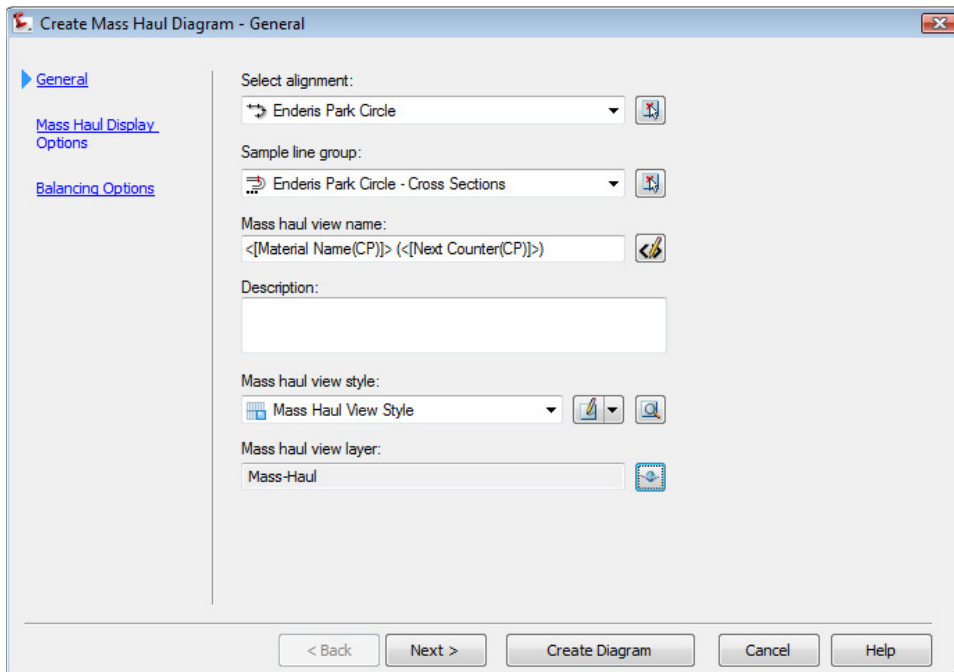
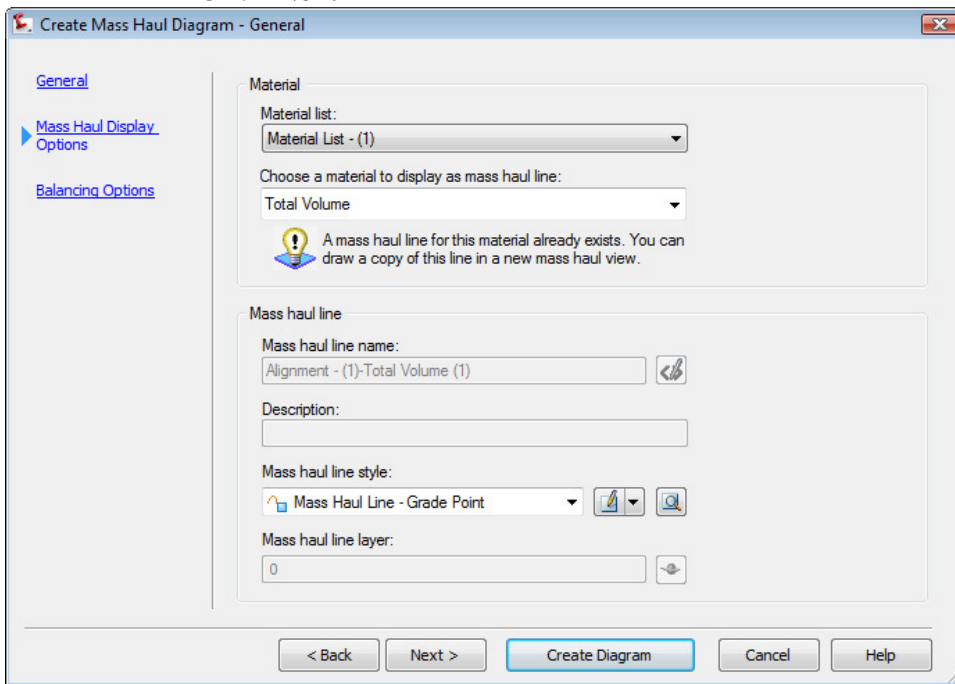


Figure 3

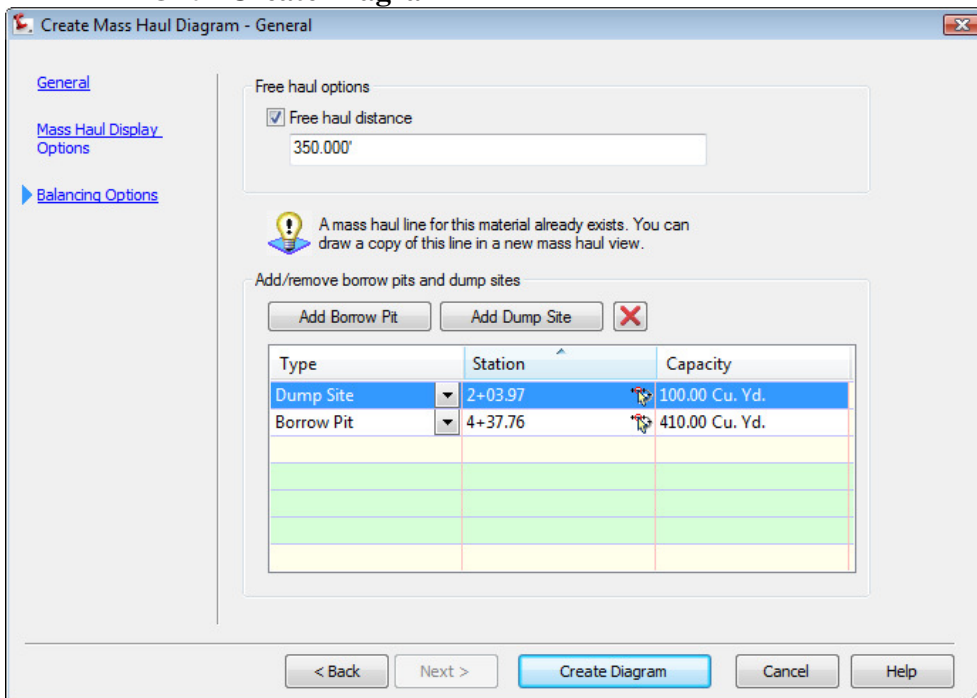
In the next step of the Wizard (Figure 4):

- ✓ Set the Material list
- ✓ Choose the material to display in the diagram
- ✓ Set Mass Haul Line Style
- ✓ Click **Next**



In the final step of the Wizard (Figure 5):

- ✓ Set the free haul distance, if applicable to the project
- ✓ Add borrow pits or Dump sites as applicable to the project
- ✓ Click **Create Diagram**



- ✓ Click in your drawing to locate the Mass Haul diagram.

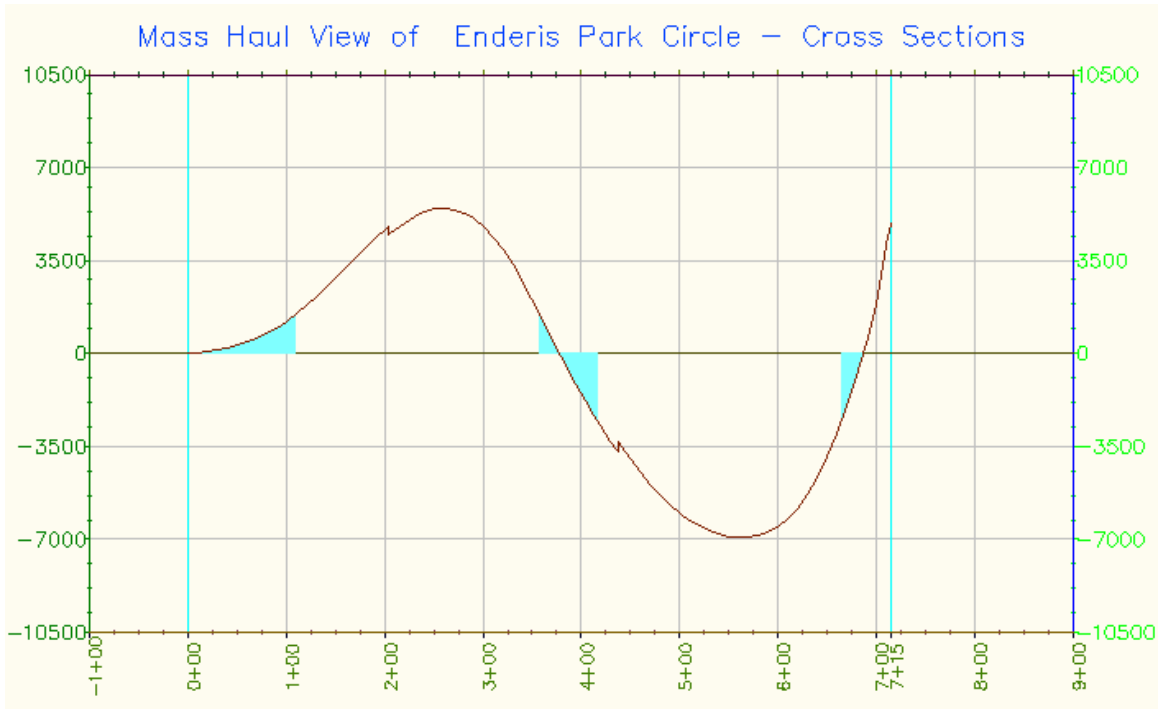


Figure 6

The “kinks” in Figure 6 are a result of the dump site and borrow pit added to this example.

The hatched areas represent cuts or fills outside of the free haul distance.

In this example, the mass haul line ends above zero. This represents an excess of material at the end of the project.

To change the balancing options you chose (such as free haul distance or borrow pit locations), right-click on the mass haul line itself and select **Mass Haul Line Properties**. The information you can change is in the Balancing Options tab, similar to Figure 5.

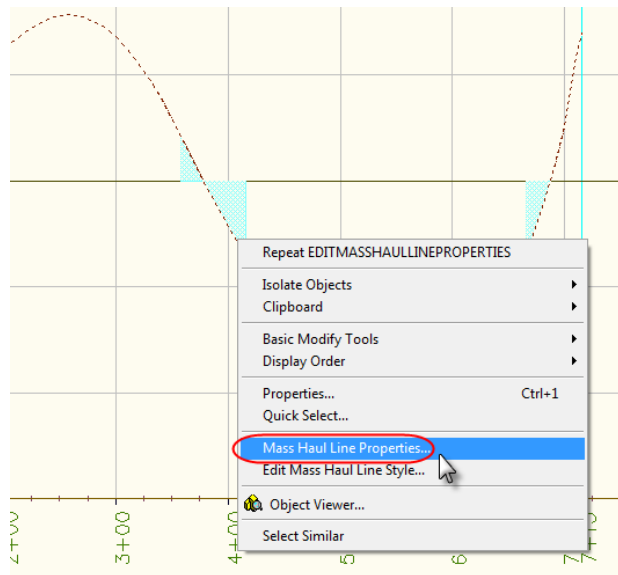


Figure 7

# Mass Haul Styles

There are two styles that control the look of the diagram:

- Mass Haul Line Style
- Mass Haul View Style

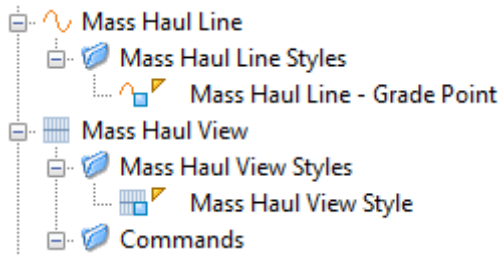
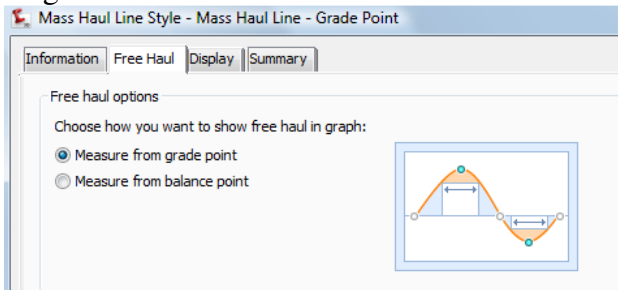


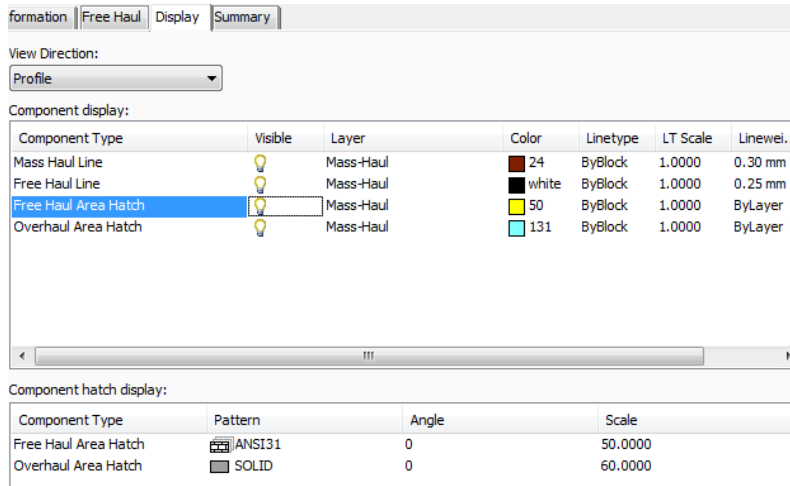
Figure 8

In Settings, the Mass Haul Line Style controls several aspects of the overall look of the diagram.



In the Free Haul tab, you can choose where the free haul distance is measured from.

Figure 9



In the Display tab, the style control which components are turned on or off. Notice that the hatch patterns for Free haul and Overhaul areas are at the bottom.

Figure 10

The Mass Haul View Style controls the view itself.

Many of the options are similar to what you would find in a profile view style.

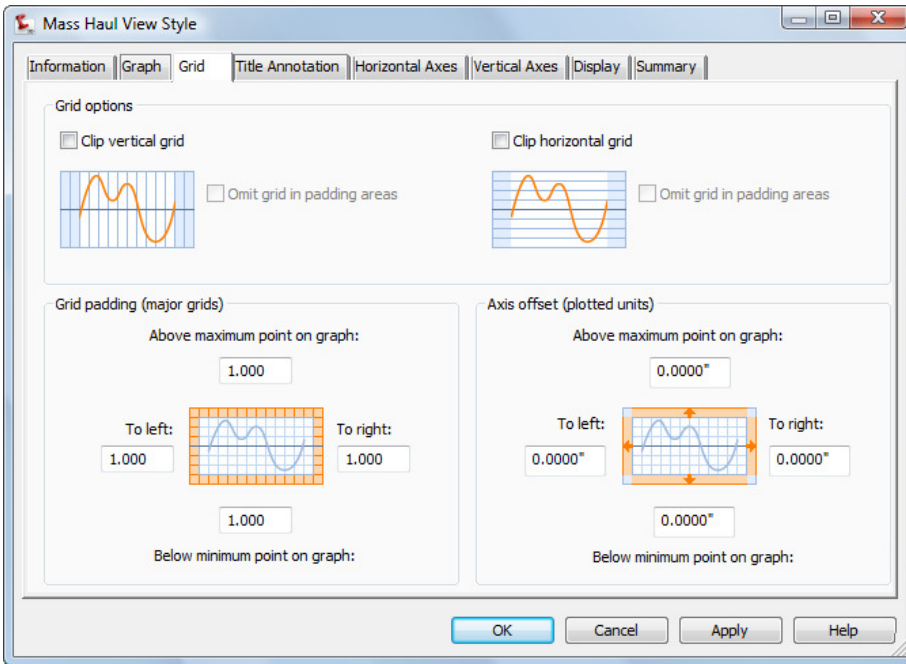


Figure 11