EDSMAC-IV input	Value	Source Referenced in
Body overall length	402.5 in	This Attachment
Body CG to front	250.1 in	This Attachment
Body CG to Rear	152.4 in	This Attachment
Body Overall Width	Field measurement	
Total Weight	9050 lb	This Attachment
Yaw Inertia	$334{,}168.8 in * lb \bullet \sec^2$	This Attachment
A Stiffness	N/A	
B Stiffness	N/A	
Wheel Location X, Front Axle (Left side, pre-collision)	68.25 in	This Attachment
Wheel Location X, Front Axle (Right side, pre-collision)	68.25 in	This Attachment
Wheel Location X, Axle (Left side, post -collision)	68.25 in	This Attachment
Wheel Location X, front Axle (Right side, post-collision)	68.25 in	This Attachment
Wheel Location X, second Axle (left side)	28.4 in	This Attachment
Wheel Location X, Front Axlt (Right side, pre-collision)	28.4 in	This Attachment
Wheel Location X, front Axle (Left side, post -collision)	28.4 in	This Attachment
Wheel Location X, Front Axlt (Right side, pre-collision)	28.4 in	This Attachment

Trailer Dimensions and Moments of Inertia:

Field measurements

W_1 = Weight on first trailer axle = 1250lb

W_2 = Total Weight on second trailer axle = 2800lb

W_3 = Total weight on trailer third axle = 5000lb

R_1 = The distance from the front of the trailer hitch to the first axle = 181.75”

$R,$ = The distance from the front of the trailer hitch to the second = 230”

$R,$ = The distance from the front of the trailer to the third axle = 278.5”

R_{cg} = Distance front of the trailer hitch to the cg

FOH = the front overhang = the distance from the front axle to the trailer hitch =181.75

ROH = the rear overhang = the distance from the rear axle to the rear of the trailer = 126.1”

Total Weight (see previous section for data sources)

Total Weight = $W_1 + W_2 + W_3$ = 1250 lb +2800lb + 5000lb = 9050lb

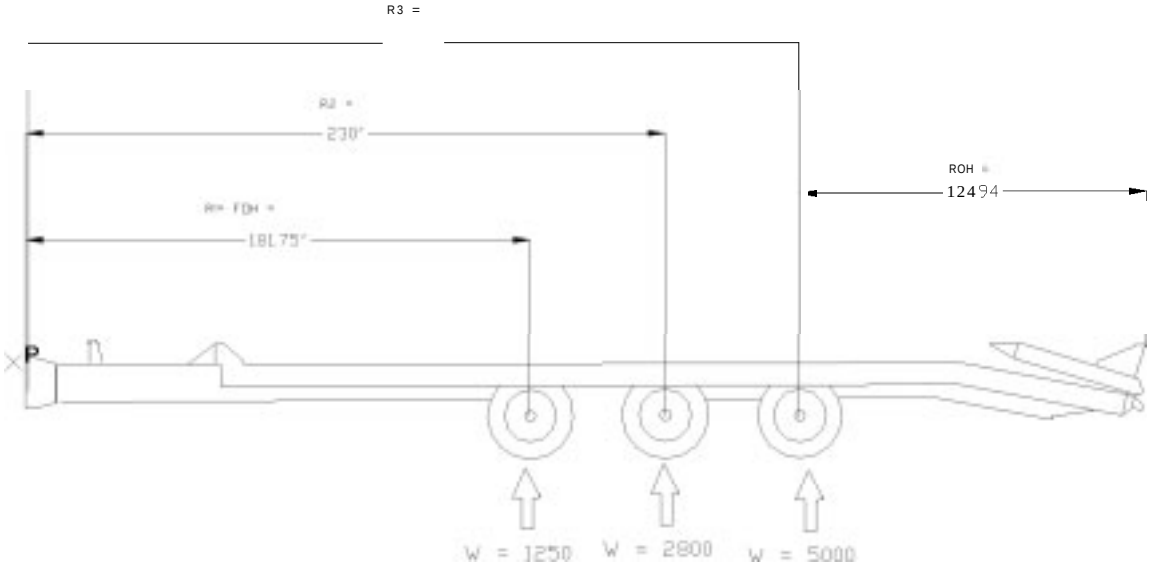
Body Overall Length

The Body Overall length is the distance from the rearmost point of the vehicle to the front of the hitch. This is the sum of the distance from the tip of the hitch to the front axle, R_3 (see Figure 1), plus the rear overhang (ROH Figure 1).

Body Overall length = OAL (in Figure 1) = R_3 +ROH = 402.5”

Figure 1-1 TAILER DIMENSIONS AND AXLE WEIGHTS

All weights are in lbs. Dimensions and weights are based on NTSB field measurements. Diagram is not to scale.



Calculation of cg location for trailer

(For previous sections of this attachment for data):

Summing moments around the front axle:

$$\sum mr = 0$$

$$\therefore R_{cg} = \frac{W_1 \cdot R_1 + W_2 \cdot R_2 + W_3 \cdot R_3}{W_T} = \frac{-(1250 \cdot 181.75) + (2800 \cdot 230) + (5000 \cdot 278.5)}{9050} = 250.13"$$

EDMAC IV did not allow for three axle trailers so the trailer was modeled as a two-axle trailer:

Calculation of distance between front axle and cg: (see Figure 1 for definitions of R and R_2)

A = the distance from the cg to the axle number 1
$= R_{cg} - R1 = 250.13 - 181.75 = 68.25"$

B = the distance from the cg to the rear axle
$= R_3 - R_{cg} = 278.5\text{-}250.13 = 28.4"$

The distance A and B are shown graphically for the model in Figure 2.

Calculation of the distance from the cg to the front of the hitch and to the rear of the trailer

(See previous sections for data used)

XF = the distance from the front of the trailer to the cg = FOH + A = 181.75 + 68.25 = 250.1"

XR= the distance from the cg to the front of the rear of the trailer =

=ROH + B=126.1”+28.4”=152.4”

The distances XF and XR are shown graphically in Figure 2

Wheel Locations X (Pre and post collision)

The Wheel Location X in the EDSMAC-IV program is the longitudinal distance fi-om the cg of the trailer to the wheel position. These distances were calculated in the previous section of this Attachment entitled “Calculation of CG location for Trailer” and are summarized in Figure 2.

Wheel position x, front axle, Left and right (pre- collision) = the distance A in Figure 2 = 68.25”

Wheel position x, second axle, Left and right (pre- collision) = the distance B in Figure 2 = 28.4”

Post collision measurements of wheel positions were the same as for pre-collision.

Body CG to the Front

The Body CG to front EDSMAC-IV program is defined as the distance from the cg of the trailer to the front of the hitch. This is equivalent to the distance XF calculated prior to this and shown graphically in Figure 2.

Body CG to Front = XF == 250.1”

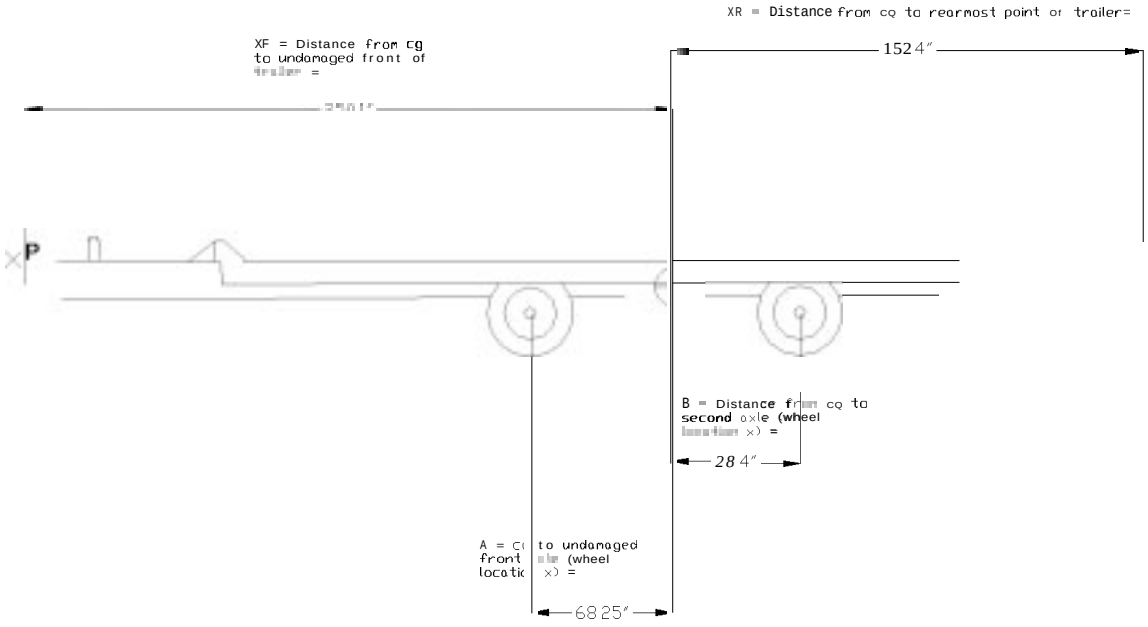
The Body CG to Rear

The Body CG to rear EDSMAC-IV program is defined as the distance from the cg of the trailer to the rear of the trailer. This is equivalent to the distance XR calculated earlier and shown graphically in Figure 2 :

Body CG to Front = XF == 250.1”

Figure [illegible] TRAILER MODEL CG LOCATION

(Diagram not to scale Due to model limitations the trailer was modeled as a two axle trailer preserving front and rear axle positions)



Yaw Inertia

The Yaw Inertia in EDSMAC-IV is defined as the total yaw moment of inertia about the cg. No data sources were availed for the yaw moment of inertia for this type of trailer. This variable was estimated using the Thin Rod approximation for a uniform rectangle of similar weight.

Thin Rod approximation

(For data see previous sections of this Attachment)

Formula: $I_{yy} = \frac{1}{12} \bullet m \bullet (OW^2 + OL^2)$

$$\therefore I_{yy} = \frac{1}{12} \bullet 23.42 \bullet ((96)^2 + 402.5^2) = 334{,}168.8 in * lb \bullet \sec^2$$