For most Earth orbits which will be serviced by the Space Shuttle, the distances from the earth will be small in terms of Earth radii. For such orbits (even out to and beyond geosynchronous distance), the Hohmann transfer is the best transfer to use when transferring between circular coplanar orbits.

For transfers between circular coplanar orbits, the information usually given consists of the radii of the initial and final orbits. The information desired consists of the semi-major axis of the transfer orbit, the velocity increments at the ends of the transfer orbit, and the total velocity increment required for the transfer. The semimajor axis of the transfer orbit is given by \( a_T = \frac{r_i + r_f}{2} \). In order to calculate the required information, it is necessary to calculate the following four velocities:

- The velocity in the initial circular orbit, \( \mu \sqrt{r_i} \)
- The velocity in the transfer orbit at initial orbit height, \( \mu \sqrt{\frac{2}{r_1} - \frac{1}{a_T}} \)
- The velocity in the transfer orbit at final orbit height, \( \mu \sqrt{\frac{2}{r_2} - \frac{1}{a_T}} \)
- The velocity in the final circular orbit, \( \sqrt{\frac{\mu}{r_2}} \)

The initial velocity increment is then given by the equation

\[
\Delta V_1 = \sqrt{\frac{\mu}{r_1}} \left( \frac{2}{r_1} - \frac{1}{a_T} \right) - \sqrt{\frac{\mu}{r_1}}
\]

and the final velocity increment is given by

\[
\Delta V_2 = \sqrt{\frac{\mu}{r_2}} - \sqrt{\frac{\mu}{r_2}} \left( \frac{2}{r_2} - \frac{1}{a_T} \right)
\]

where
- \( r_i \) is the radius of the initial circular orbit
- \( r_f \) is the radius of the final circular orbit
- \( a_T \) is the semi-major axis of the transfer orbit
- \( (a_T = \frac{r_i + r_f}{2}) \), and
- \( \mu \) is the gravitational parameter of the central body.