Installation
CDR 0.4 Configuration

Overview
The Installation cost estimate for the Lehman review was done as a percentage (20%) of the hardware costs for each area. This was assumed to include all preparation for installation, management during the install process, hardware installation, all equipment and material required, alignment, and system checkout. No cost was estimated for site-wide installation issues. A detailed cost estimate is being worked on for the CDR 0.4 model which will include all the items listed above.

Space for the Installation Assembly Facility is being accounted for in the Manufacturing Facility TSET. Long-term storage has also been considered by the manufacturing Facility TSET. Storage space local to the install site is presently being determined.

Key Requirements
Conventional Facilities will provide housings ready for beneficial occupancy prior to installation. Details of what this includes will be well defined early in the project. Other information needed from Conventional facilities is the site map including building locations, storage facilities size and distance from install site, tunnel and gallery configuration, access points size and location.

There is a need for a comprehensive and integrated logistics system. The goal of this logistics system is to ensure the equipment arrives, well marked, at the right destination, in the right quantity, on schedule (not too soon to avoid long storage and not too late to avoid planning delays), undamaged, without disturbing other equipment in situ and as cheaply as possible.

The following information tools will be necessary for this logistics system:

**Scheduling database**
Dictionary database: A set of dictionaries of installation details, including a dictionary of components, a dictionary of buildings and locations and a dictionary of handling means. Each one should contain a list of official codes, descriptions, people responsible and specific characteristics such as size and weight for components and dimensions and position for buildings. Dictionaries should be accessible to the public, so everyone and each application has access to the most recent and valid data. The establishment of naming conventions early in the project is important.

**Logistics database:** Data stored here includes definition of the equipment to be installed, the final position of the component in the tunnel, its date of installation, and the access shaft where it has to be lowered, installation sequences and the grouping of components for transport. Should provide information on availability and location of equipment to be installed, the loads on access points, the travel distance of the components, time required to perform installation activities for the component. Prior to installation program will be used to simulate installation conditions so that planning can be optimized. During installation database will track progress.

**Transport List:** Generated from the databases used above. Issued each week from the data inserted or calculated by the logistics database. Provides information to people responsible for transport and installation coordination, system managers, site managers,
installation coordinators, installation crews, and transport teams. Shows all equipment to be installed during a given week through a given access shaft. The equipment is grouped according to the system, which it belonged.

Installation will create the delivery demand for components from other groups based upon Project schedule goals.

An “installable unit” is the component or set of components assembled to their most complete stage prior to installation. A “transportable unit” is the largest number of installable units that can be conveyed together.

These units must be defined by the other TSET’s or Area Managers in terms of what they consist of (including supports and hardware), parts count for all areas, the size and weight of each unit, what equipment is required to install the unit, a unique name for each unit and a location of installation.

Components will first pass through the Installation Facility for kit assembly into installable and transportable units and the establishment of installation tracking. The assumption is that Installation is not responsible for tracking or storing components until after they enter this facility.

The cost drivers for transportation from the surface to the tunnel are the number of trips made and the handling time (frequency and duration) not the distance between access shafts or speed of transit.

Since the major costs of installation are labor, use of a Project labor rate table is important.

For scheduling purposes, the workday is assumed to be two, consecutive eight-hour shifts. The third shift may be used to schedule transportation of components and equipment if required.