

## Surface Facility Planning and Design for the Homestake Mine

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The transfer of the Homestake Mine to the South Dakota Science and Technology Authority presents a wonderful opportunity for both research and outreach in the Black Hills. While the focus of the research opportunities are deep underground, the surface of the mine is the juncture connecting research and outreach programs with the millions of tourists who travel to the Black Hills every year. This project will *investigate and design facility options for the surface of the Homestake Mine*. The design team will conduct a needs analysis by contacting the constituencies directly and through market research. Facility design options will be created using the needs analysis, a structural condition assessment of the current Homestake buildings, a safety assessment, and a concern for economic feasibility. This engineering design project will culminate in a set of options presented to the SDSTA for the facility design and use.

A major advantage of this project is the ability to tie together the advancement of SDSTA's vision for the Homestake Mine with the educational mission of SDSMT. Through the involvement of student teams and student workers, this faculty-led engineering design project will also be an opportunity for hands-on, real world student learning.

### Needs Analysis

All of the design options for the surface of the Homestake Mine must serve three constituency groups whose needs are distinct yet overlapping: the tourists who will visit the mine, the participants in the outreach programs designed for the mine, and the researchers who conduct work at the mine. The project team will use market research and direct contact through interviews and focus groups with the constituencies to determine the needs and relative priorities of the three groups. Areas of need to be considered include, but are not limited to:

#### *Tourist Needs*

- What level of interaction do tourists expect when visiting the mine (e.g. a museum, a tour, an activity/ride)?
- How much, if at all, are tourists willing to pay to visit the mine? How does the amount and structure (e.g. by the person, by the carload) change with the level of interaction?
- Is tourist interest in the mine seasonal, i.e. are tourists not likely to want to tour the mine in the winter?
- How can safety and liability concerns be remediated for the tourists visiting the mine? How are these concerns affected by the research projects in the mine?

#### *Outreach Needs*

- What type of space is needed for the outreach programs? How flexible should this space be (e.g. individual classrooms, a large space that can be subdivided, etc.)?
- Is laboratory space needed as well as classroom space?

- What additional outreach opportunities might be created or moved to the Homestake site in the future? For example, might a field camp or similar activity occur at Homestake and what type of space needs would it have?

*Researcher Needs*

- What types of space will researchers need on the surface of the mine to conduct and monitor experiments (e.g. laboratory, office, etc.)?
- Will researchers need bed-space for overnight use?
- What are the appropriate OSHA and MSHA training requirements? A plan will be developed to provide this training.

**Other Concerns**

While there are many concerns that the project team must take into account when creating a facility design, safety and economic feasibility are vital.

*Safety and Ergonomics*

Safety is of utmost priority for all of the constituency groups. All facility designs and potential tourist activities will be scrutinized by the project team member who is a Certified Safety Professional (CSP). Safety will be a part of the needs assessment as well as considered in every design option presented to the SDSTA. Ergonomic concerns within the facility design must also be addressed. The project team will survey the ergonomic needs of the constituency groups and integrate the principles of good ergonomics into the design of the facilities and work spaces. The Certified Professional Ergonomist (CPE) on the project team will play a significant role in this area.

*Economic Feasibility*

Economic feasibility is a concern in every design. A structural condition assessment will be performed on the existing buildings to determine where existing structures can be used safely in the new design. Expertise will also be acquired to assess the electrical and plumbing systems of the existing facilities for use in the new design. Additional economic considerations include construction and remodeling costs, costs of on-going operations, and potential income streams.

**Timeline and Resource Needs**

The project team estimates that the engineering design study will take two years; approximately one year for the needs and structural conditions assessments and one year to create and determine economic feasibility for the design options. The resource needs are minimized by utilizing a team of highly motivated SDSM&T students to aid the project faculty. The anticipated monetary needs for the whole project are:

Faculty time	\$ 65,000
Student stipends	\$ 38,000
Other consulting	\$ 15,000
Other expenses	\$ 10,000
TOTAL	<u>\$128,000</u>

Additional resources will include time with the SDSTA leadership and access to the Homestake Mine property.