HOMESTAKE

Deep Underground Science and Engineering Laboratory

Announcement of 4850 Lab Opening

&

Request for Letters of Interest for the

Homestake

Deep Underground Science and Engineering Laboratory

1 November 2005

The South Dakota Science and Technology Authority (SDSTA) is pleased to announce that an agreement has been reached with Barrick Gold Corporation to transfer the Homestake Mine to the SDSTA. The South Dakota Legislature, in special session on October 14, 2005, appropriated an additional $19.9 million for the establishment of the Homestake Deep Underground Science and Engineering Laboratory. With this additional appropriation, a total of $45.6 million is available for the development and operation of this underground laboratory. Transfer of the property to the SDSTA is expected to take place December 15, 2005.

It is the intention of the SDSTA that the former mine will be developed in a manner that will make it competitive with other underground research sites in the world. The laboratory will provide the scientific community an opportunity to conduct experiments at a location in the U.S. that is the second deepest site in the world and which offers a short timeline to science.

The SDSTA will manage rehabilitation of the site and will participate in the management of the operation of the lab. The SDSTA plans to open the 4850 ft level and some higher levels for beneficial occupancy in early 2007 for scientific and engineering experiments and other technical uses. The funds available from the State of South Dakota will cover rehabilitation and basic laboratory operations into 2012.

The South Dakota Science and Technology Authority is now soliciting Letters of Interest for experimental uses of the Homestake Lab for underground science and engineering experiments, R&D, and education and outreach programs. These non-binding Letters will help us to establish the facility requirements and to work proactively with the proponents to ensure that Homestake fulfills their needs and is competitive with alternative underground sites.

Two main shafts provide access from the surface to the 4850 level (4200 mwe). The underground terminations of these shafts are connected by a 2900 ft long tunnel. This tunnel, which has a cross section of 13 ft by 15 ft, as well as a number of modest size existing rooms, will serve as the initial site for underground laboratories. The SDSTA is prepared to assist in the excavation of appropriate additional chambers at the 4850 ft level and to discuss additional infrastructure developments needed by experiments.

The attached, detailed **Request for Letters of Interest** provides additional information about the Homestake Lab, its characteristics and this solicitation.

We would appreciate a brief, initial response letter by **10 December 2005** indicating:

1) Title of your proposal,
2) List of participants (a partial list is fine),
3) A brief description of your proposed program,
4) A rough estimate of your space requirements and specific or unusual technical issues involved in your proposal,
5) An estimate of when you will require access to the underground facility, and
6) Any other general requirements or questions for the experiment, research, or outreach activities.

The initial response letter is encouraged to initiate discussions, but not required. After receipt of your initial letter, the SDSTA and Homestake Scientific Collaboration (HSC) will contact you to help with the development of your proposal and plans, and to initiate a review of safety and compatibility issues. We anticipate several iterations and discussions between proponents and the Homestake Lab before final proposals are completed.

Although the receipt and processing of pre-proposal letters of interest and proposals is an ongoing process, we plan to submit the initial suite of experiments for the Early Implementation Program to a Program Advisory Committee for review in the spring of 2006. Requested due date for Letters of Interest is **27 January 2006**.

Please let us know if you have questions about this facility or if there are aspects of the facility that could be modified or enhanced to better suit your requirements.

Letters and proposals can be submitted electronically (preferred) to: hlcp@state.sd.us, or by mail to:

South Dakota Science and Technology Authority
P.O. Box 8329, Rapid City, SD 57709

Please note that SDSTA anticipates moving its offices to the Homestake Administration Building, 630 E. Summit Street, Lead, SD 57754 on or about December 15, 2005.

Request for Letters of Interest for the Homestake

Deep Underground Science and Engineering Laboratory

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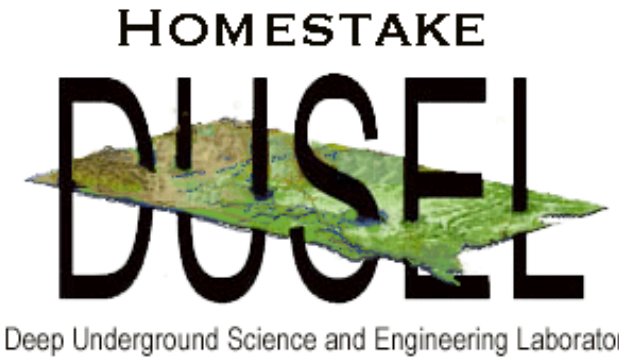

Request for Letters of Interest for the

Homestake

Deep Underground Science and Engineering Laboratory

1 November 2005

To:

Members of the International Scientific and Engineering Communities for Physics, Earth Science, Geology, Microbiology, Engineering, National Security & Homeland Security, Education & Outreach, and Industrial and other Applications using the underground environment

From:

Mr. Dave Snyder
Executive Director of the South Dakota
Science and Technology Authority
David.Snyder@state.sd.us

Dr. Kevin T. Lesko
Principal Investigator for the
Homestake DUSEL Proposal
KTLesko@lbl.gov

Dear Friends,

The South Dakota Science and Technology Authority (SDSTA) in concert with the Homestake Scientific Collaboration (HSC) is soliciting Letters of Interest (LOIs) for experiments and uses of the Homestake Deep Underground Science and Engineering Laboratory, in Lead, South Dakota, USA.

1. Introduction: Homestake Laboratory Goals

The goal for the Homestake Deep Underground Science and Engineering Laboratory is to develop a comprehensive site for underground research and associated education and outreach activities. We anticipate that many disciplines, fields, and users of the Homestake Lab will benefit from being co-located at a single laboratory site with a synergistic environment of underground research and education including international science and engineering communities. Laboratory support services and both surface and underground facilities will be developed in the coming years by the SDSTA and the DUSEL

process as experimental requirements are identified. Even in the first phase Homestake plans to be competitive with existing underground sites.

The site will be multidisciplinary with international participation by physics, earth science, engineering, biology, national security and the associated industrially focused initiatives. Research is anticipated to evolve and to exploit opportunities within a massive, deep facility accessing levels to 8000 feet below surface. The lab has potential for expansion in the near future across the entire ~30 km^3 underground site.

Homestake Lab will be a dedicated research site initially under operation and ownership by the SDSTA. All previous mining operations have ceased. Experimental programs will not suffer the potentially negative consequences of sharing infrastructure, access, and resources with a site host whose objectives may diverge from the scientific objectives of a research laboratory or whose use of the facility may cease before scientific goals are accomplished.

The site will be developed with a staged, evolutionary approach, which allows users to propose long term roadmaps for their programs and experiments. Programs that require preliminary R&D stages for development of experimental concepts and techniques are encouraged to submit LOIs and discuss the evolution of their programs. Planning for future development may exploit opportunities for research at unequaled depths below 8000 feet and for construction of new custom-built rooms and experimental facilities. Additional rooms, access to greater depths, and development of previously undeveloped regions of the site will be made available as experimental demand, requirements, and resources allow.

The first development phase for Homestake Lab is the Early Implementation Program (EIP) for access and underground facilities at the 4850 ft. level. The EIP is the first part of a proposed, long-range plan to completely rehabilitate facilities to the 8150 ft. level for the National Science Foundation (NSF) program to develop a large-scale Deep Underground Science and Engineering Laboratory (DUSEL). Details of the EIP and DUSEL can be found on the supporting web-pages (ref. http://neutrino.lbl.gov/Homestake). Initial rehabilitation of the lab to the 4850 level will be managed, financed and coordinated by the SDSTA in concert with the HSC. **Beneficial occupancy of the 4850 level is anticipated in early 2007**. The SDSTA has received funding authorization for the EIP from the State of South Dakota to re-open the former mine and to support basic maintenance and operating costs of the Homestake Lab to 2012.

Development of EIP experiments and facilities will be directed initially toward use of underground space at the 4850 level. Requests for access to higher levels will also be considered. SDSTA with HSC will aim to coordinate and consolidate development for users of the upper levels, as appropriate. Requests for new construction, alterations to existing space, or other special requirements (environment, access, isolation, etc.) are also solicited. We can then initiate a dialog with these proponents to refine the requirements and needs, and ensure that Homestake can attempt to fulfill these requirements and remain competitive with alternative sites.

Underground access for EIP will use the Yates and Ross shafts with existing hoists and equipment. Ventilation and electrical power distributions systems will be refurbished or replaced and tailored for experimental programs. Incoming surface water will be collected and expelled from the upper levels, and additional pumping at lower levels will ensure that experimental programs at 4850 level will not be impacted by accumulated water. We recognize that some programs may benefit from direct involvement

with the site rehabilitation program. Proposals for early sampling and site investigation are also encouraged for implementation concurrently with site rehabilitation.

Following the EIP and initial operations, SDSTA and HSC propose to develop the deep laboratory working with the international scientific community for the NSF DUSEL program. Concurrently with SDSTA's effort to secure the site, the Homestake Scientific Collaboration was awarded an NSF grant to develop a Conceptual Design Report (CDR) on establishing a deep underground laboratory at the site of the former Homestake mine. This was one of two NSF CDR awards, the other is for the Henderson Mine in Colorado. This CDR is to be completed in June 2006. NSF site selection for DUSEL is anticipated by the end of 2006. Construction funds for NSF DUSEL could begin as early as 2008, according to informal discussions with NSF. Current SDSTA estimates to regain access to the 8000 foot level indicate that an additional 12 to 18 months would be required to regain initial safe access.

2. Who should submit Letters of Interest (LOI)?

This call for LOIs is open to all potential academic, scientific, educational, industrial, and national security users. Investigations requiring shielding from cosmic rays, requiring ultra-low and controlled low background environments, those involving the study of the massive rock formations and the coupled processes associated with these formations will find many possibilities for research at Homestake.

Scientific users will include physics experiments requiring a large overburden for shielding against cosmic rays and geology and earth science experiments that make use of the rock mass and its drill core archive. Education and outreach efforts either associated with these scientific efforts or separately organized are actively encouraged. Industrial applications that could make use of the underground facility, including engineering, mining technology, mine training and underground safety are encouraged to consider the use of a dedicated facility. Other industrial uses and application-driven investigations that could make use of a constant and well shielded environment are similarly encouraged to consider investigating what Homestake Lab could offer. Defense and Homeland Security agencies are encouraged to consider the benefits of a large secure campus with depths ultimately to 8000 feet (~7200 mwe) or more below the surface.

The shielding from cosmic rays at the 4850 level has been documented at the Chlorine Experiment (Davis *et al.*) to be 4200±100 mwe. Along the 4850 level the cosmic ray shielding varies due to surface topology on the order of 100 mwe. Radon concentrations in the subsurface air at this level have been measured to be ~ 1-5 pCi/liter.

Examples of experiments and disciplines identified by the National Science Foundation DUSEL process and earlier National Academy Reports and Homestake Workshops include, but is not limited to (see, for example, http://www.DUSEL.org):

Physics:

Neutrinoless double beta decay,

Low energy solar neutrino experiments,

Direct searches for dark matter,

Geoneutrino measurements,

Nuclear astrophysics, including nucleosynthesis cross section measurements,

Long baseline neutrino studies including neutrino mass hierarchy, θ_{13} determinations, and ultimately CP violations studies, and

Nucleon decay experiments.

Earth Science, Geosciences, and Engineering:

Hydrology,

Geomicrobiology and genomic studies,

Geochemistry,

Economic geology,

Environmental and ecological studies,

Coupled processes,

Rock mechanics, geotechnical studies, and

Underground engineering.

Education and Outreach:

Endeavors associated with these scientific efforts,

Separately organized and coordinated efforts such as underground geology field-trips and intern training programs,

These efforts should consider engaging the underground scientific efforts and making use of the surface historic legacies.

Applications and Other Underground Uses:

Low Background Counting,

Underground Mining Technology Development,

Mining and Mine Safety Training and Instruction,

Processes Requiring Reduced Cosmic Ray Exposure and or constant environmental conditions.

Research and Development Projects

R&D projects and experiments requiring space to develop techniques and technologies are strongly encouraged to submit LOIs. These projects will be considered on an equivalent basis with other scientific and engineering programs.

3. Early Implementation Program (EIP) Timeline

1 November 2005 Call for Letters of Interest and Initial Use Responses (http://neutrino.lbl.gov/Homestake/LOI)

4,9 December 2005 AGU workshops for Earth Science and Engineering Uses (http://neutrino.lbl.gov/AGU)

10 December 2005 Due Date for Initial Responses

Jan. 2006 Workshop(s) for Physics (date TBD)

Dec. 2005 – Jan. 2006 Discussion of Experimental needs with Proponents, the SDSTA and HSC

27 January 2006 Due Date for First Round of Letters of Interest

End of January 2006/Early February Presentation of the LOIs to PAC (dates and details to be announced,)

Jan. – Dec. 2006 Site Rehabilitation, Development of Experimental Proposals, Safety and Compatibility Reviews, and Development of the Initial Homestake Experimental Operations

Spring 2007 Beneficial Occupancy (tentative).

Following the initial suite of experiments, we encourage additional LOIs. These requests will be accommodated in the coming years according to scientific needs, resources, and available funding. SDSTA and HSC plan to make periodic calls for Letters of Interest and review of proposals. Proposals may be submitted at any time over the coming years, however for planning purposes we prefer to receive earlier, though tentative, LOIs that will be subsequently refined and developed as experiments mature. LOIs and proposals for R&D and phased or complete experimental proposals are encouraged.

4. LOI Selection & Review Process

Disciplines with widely varying requirements and goals are invited to develop LOIs for Homestake. These efforts will be integrated into a science and engineering program at Homestake. A Program Advisory Committee (PAC) staffed with scientists and engineers experienced in these underground experimental fields and mining experts will review the LOIs and advise the SDSTA on a program of users for Homestake. The criteria used for evaluating proposals and establishing a scientific program will include:

- Scientific goals and merit,
- (Possible) impact on other proposals, users, and uses,
- Maturity of the technology for the application and likelihood for technical success,
- Maturity and strengths of the collaboration and likelihood for experimental success,
- Requirement for R&D activities to develop detectors, technology, or scientific bases,
- Assessment of experimental, personnel and facility risks and how these risks are managed and mitigated, and
- Status of funding for the proposals and uses.

In drafting LOIs, experimenters are encouraged to use the attached requirements check lists to indicate their best estimates of the infrastructure and access requirements and to consider the criteria for selecting the proposals. Thus the LOIs are encouraged to include discussion along these lines:

1) **Science Goals:** what are the scientific, educational, and/or applications motivations for this proposal? What are the goals for the proposal? If appropriate include as much information on experimental *reach* and parameter-space to be covered by the proposal. As appropriate if this proposal is part of the phased approach, what are the subsequent steps and how will the experiment evolve in latter phases?

2) **Infrastructure Requirements and Impact on Other Users**: Using the check lists, estimate the infrastructure requirements of the proposal. You may wish to contact the SDSTA in considering space and access requirements. How will your proposal impact other users? Does it need to be isolated from other users? Will special environmental, safety or health factors need special attention or isolation? What are the plans for decontamination and decommissioning?

3) **Readiness for Deployment - technology**: As appropriate describe the state of required technology. Will additional R&D be necessary to advance the proposal to the deployment phase? What are the plans for this R&D? Describe any risks to the success of the project due to critical technology developments that are required prior to successfully advancing to the deployment phase. Will this R&D be appropriate at Homestake Lab?

4) **Readiness for Deployment - effort and funding**: Describe the collaboration or manpower required to deploy this project. Do formal collaborative agreements exist and is there a functioning management plan/program in place? Are these required for the success of the project? Who are the collaborators on the proposal and what roles do they play and what effort is committed to the program? What is the current status of funding for the proposal? Are proposals or agreements in place with funding agencies? What are the schedules and plans to securing funding?

5) **Environment, Safety and Health**: What are the environmental and safety risks for the project? How will the risks be managed and mitigated? Discussions with Homestake personnel may be warranted to complete this section in completeness.

5. History and Recent Progress

The Homestake site is a vast former gold-mining facility, which was owned and operated by the Homestake Mining Company for most of its 125-year history. The mine played a seminal role in the birth of neutrino astronomy and astrophysics. In 1965 the world's first solar neutrino detector was installed at the 4850 (feet deep) level. In recognition of this achievement, Raymond Davis was awarded the National Medal of Science in 2001 and shared the Nobel Prize in 2002.

Mining operations ended in 2001, and the mine was closed and capped in 2003 by the current owners, Barrick Gold Corp. of Canada (Barrick). When the facility closed all surface access ports to the underground structures were sealed and the airflow restricted. Although this action preserved some of the infrastructure by reducing corrosion, it also had the negative impact of halting the removal of accumulating water in the facility. (At October 2005, the water is currently below the 6500 level.)

The plan to convert the Homestake site into DUSEL was formalized on January 12, 2004 when Barrick and the State of South Dakota signed an "Agreement in Principle" wherein Barrick agreed to donate the former Homestake mine to the State for the Deep Underground Science and Engineering Laboratory. In order to fulfill the requirements of this agreement, the 2004 South Dakota Legislature passed a series of five bills. One bill created the South Dakota Science and Technology Authority (SDSTA) to oversee the conversion of the former mine and to manage this facility for the State. The legislation also provided SDSTA with bonding authority. The remaining bills satisfied other requirements contained in the Agreement in Principle, including appropriations of $10M for an indemnity fund and other funds for liability insurance and the costs of closure. SDSTA is in possession of funds to complete the transfer of the former mine to the SDSTA. In addition, the State of South Dakota has $10M from a federal grant for rehabilitating the shafts, pumping out water and other uses that will help maintain the structural integrity. Thus the SDSTA is empowered to act as landlord, to hold title to the property, and to provide indemnification and a funding mechanism for development of the site with State bonds. Enactment of this legislation demonstrates the extremely strong State and local support for DUSEL, including a substantial monetary commitment.

The SDSTA contracted with a well-respected mine engineering company, Dynatec Ltd., to develop a "Conversion Plan" to determine feasibility and options for dewatering and rehabilitation of the mine. This plan has been refined and reviewed by a panel of independent mining experts and collaboration scientists. The initial focus of this plan was to preserve the Homestake site for consideration in the National Science Foundation's DUSEL process by reopening the mine and to mitigate potential problems due to the accumulated water. Subsequently, the plan was expanded to evaluate feasibility of "Early Access" to establish a significant scientific and user-driven presence in the facility immediately after re-opening the former mine to the 4850 level and above.

In September 2005 Barrick and the SDSTA announced they had reached agreement to transfer title of the facility under the conditions of the Early Implementation Program and the NSF DUSEL solicitation process. On 14 October 2005, the State of South Dakota held a special session of the state legislature and approved a bill to fund the Early Implementation Program and to fund the basic operation of the facility into 2012. This legislation provides an additional $20M funds from South Dakota to take ownership and to reopen the former Homestake mine, provide safe, redundant access to the 4850 level and above. It is anticipated that the Early Implementation Program will make space available for science and engineering experiments by early 2007. Development of deeper levels and additional major excavations are being planned as part of the DUSEL process in the coming years. These subsequent developments will not negatively impact nor interfere with on-going experiments.

6. Site Description

A cross section of the mine is shown in Figure 1 and also available at the supporting website with other information on the mine (http://neutrino.lbl.gov/Homestake). There are approximately 60 existing levels spanning the rock mass from the surface to 8000 feet below ground. More than 350 miles of drifts are spaced at roughly 150-ft intervals connected by many ramps. The underground space potentially available encompasses more than 32 cubic kilometers of rock mass. Information on this site has been extensively documented and a summary document is in preparation.

The Homestake Lab surface facilities include 162 acres with numerous buildings that for the initial phase will be converted for use as offices, meeting rooms, warehouses, staging and assembly and laboratories. The surface facility is presented in Figure 2.

The EIP will initially focus on making the 4850 level available for fixed-location experiments. Between the surface and the 4850 level there are drifts at approximately 30 levels as well as a ramp system. Many of these levels are directly connected by the Ross and Yates shafts. The existing openings on the 4850 level are presented in the Homestake Reference Book (http://homestake.sdsmt.edu/HRB/Refer.htm). Consideration will be given to users requesting access to other levels and locations above 4850, including several drifts which may be accessed from the surface via horizontal openings.

The drifts on the 4850 level and many other levels are typically 13 by 15 feet. The plan view of this level is presented in the Reference Book and below in Figure 3 and 3A. Existing excavations, rooms, and drifts would be made available for experimental uses. Requests for new construction, alterations to existing space, or other special requirements (environment, access, isolation, etc.) are also solicited. We can then initiate a dialog with these proponents to refine the requirements and needs, and ensure that Homestake can attempt to fulfill these requirements and remain competitive with alternative sites.

7. Drill-Core Archive, Homestake Geology and Mine Records

The Homestake Mine's drill-core archive was transferred to the SDSTA along with the ownership of the Homestake underground site. This archive is available to scientific and engineering users. Details of the archive are available at the South Dakota Geological survey (http://www.sdgs.usd.edu/). The protocol for this archive is being developed to follow standard core-library protocols. These will also be available at the SDGS website.

The geology of the Homestake site has been extensively surveyed and recorded. A high-level summary of the geology is presented in the reference book. As additional details and mine records are archived and made available as part of the ownership transfer process, we will update the Homestake Reference Book (HRB).

8. Homestake 4850 Laboratory Facility

The former Homestake Mine is a two-level facility: the upper levels from the surface to 4850 ft are serviced by one set of utilities, and the 4850 to 8000 levels by a second set. The SDSTA has created a comprehensive conversion plan to make it available for re-entry and early access initially down to the 4850 level. This plan forms the initial basis of the underground laboratory at Homestake.

The 4850 level provides opportunities for a unique underground laboratory. It will be the deepest laboratory in the United States and the second deepest laboratory in the world. Existing drifts and chambers on the 4850 level provide extensive space for early access experiments and opportunities to develop new experimental chambers. From direct rock strength measurements using the Homestake core repository, it has been established that chambers with spans of 50 meters can be readily and safely constructed at this level.

The main axis of the 4850 laboratory is the 2900 ft long, 13 ft by 15 ft cross section drift that connects the Ross and Yates shafts, the two main surface to underground access shafts. At the Yates end of this tunnel is the 2000 m^3 chamber that previously housed the chlorine solar neutrino detector. There are 30 levels between the surface and the 4850 level, providing options for labs at alternate levels, and a 3-dimensional matrix for geophysical investigation, with a cubic kilometer volume for exploration by geoscientists.

Exploratory downward and sideward drilling into virgin rock for biological and geophysical investigations can be carried out at a number of sites at and above the 4850 level without disturbing any of the other experiments. Rock excavation and cavity construction, necessary for the complete Deep Labs Conversion Plan for DUSEL, will not disturb existing experiments on the 4850 level or expose them to rock dust.

9. Underground Infrastructure and Services

The initial conversion project will provide general infrastructure and services to support science and engineering experiments at the 4850 level. Specific requirements and outfitting will be developed and coordinated for proposed laboratories or alternate levels, subject to SDSTA negotiations. We anticipate a phased development of levels and lab space, depending on funding profiles, and user requests and priorities. We encourage inquiries and requests to be included in the LOI's for specific phased development opportunities.

Services to the underground labs will include up to 8 MW of available electrical power. Permanent and supplemental spot chillers will be installed to provide sufficient air conditioning capacity for normal lab operations and for rehabilitation and construction work. Standby generator sets will provide up to 1500 kW of emergency power in the event of standard power outages in the facility. Both industrial and potable water will be available at the 4850 level. Approximately 6000 cfm compressed air will be in service for initial operations.

Existing data communication fiber optics cables are 24 pair, 62.5 micron, multi-mode, Tbase-10. These extend through the Yates Shaft to the 4850 level. As-needed, additional data communication cables and server capacity may be installed for specific lab requirements.

The SDSTA is open for discussions to understand the essential requirements for common space and for experimental specific needs. Topics for discussion include the development of support rooms for functions such as air filtration and cooling, electric utilities, wash/change room, cafeteria/refuge stations, equipment car wash, equipment storage and other common space. Similarly, lab-specific functions such as clean rooms, Radon-free sealants, technical shops, chemistry labs, low-background counting facility, etc. should be presented and discussed with the SDSTA and HSC.

10. Surface Facilities

Property transferred to the SDSTA includes many surface buildings. These include the Administration Building and the "Drys" associated with the Ross and Yates shafts. The Yates Dry (15,000 square feet) will be converted into offices, meeting rooms, and potential laboratory space as part of the EIP. Offices will be made available to experimental groups to use during their time at Homestake Lab.

Secure indoor storage for experimental apparatus will be made available for short-term storage and for shipping equipment to the site. Staging and assembly space will also be made available for equipment.

As part of DUSEL, we anticipate making additional major upgrades to the surface facilities, including various shops, clean assembly areas, laboratories, and additional administrative and office spaces.

11. Access to the 4850 level

Access to the 4850 level will be via the Ross and Yates shafts, primarily the Yates. As part of the EIP, these lifts will be inspected and rehabilitated. A cross section of the Yates conveyance is presented in Figures 4, 4A and 5 and in the HRB. The main compartments on both the Yates and the Ross are 54 inches wide, and 12 feet deep. The payload for each is approx. 6 tons.

12. Personnel Training, Environmental, Health, and Safety Requirements

Homestake Lab will develop an integrated and tailored safety program for the facility. As part of its integrated safety and management approach all users will require comprehensive training in mine safety and working safely in an underground environment. As the facility opens and the management of the new lab is completed, these requirements will be delineated.

All uses and experiments will be reviewed for environmental and safety issues to ensure that the experimental, personnel, and facility risks have been assessed, documented and mitigated. A decontamination and decommissioning (D&D) plan will be required from all users.

13. Infrastructure Requirements

To develop the necessary infrastructure for the EIP underground uses of the site, we need to understand and compile the experimental requirements. In addition to planning for the first suite of experiments this will permit us to plan the future expansion of the facility.

A check list and examples of generic experiments and R&D endeavors are included below and on the HRB. Experiments are likely to evolve with time, particularly for R&D efforts. A separate sheet can be used to estimate the facility requirements for each major stage or step of the program. For many proposals, it is likely that all the requirements are not yet available, nevertheless, a partial description of needs will facilitate planning and further discussions.

These check lists will help users evaluate and consider their space requirements, environmental factors, power requirements, personnel access requirements, and equipment shipping and transportation requirements needed to deploy experiments at Homestake Lab.

14. Workshops and Additional Resources to Aid in developing LOIs and Uses of Homestake Lab

The collaboration plans to establish several workshops to help experiments develop their plans, establish collaborations, and investigate new possibilities. The first set of workshops will be held in conjunction with the American Geophysical Union meeting in San Francisco 4-9 December 2005. The workshops are described at: (http://neutrino.lbl.gov/AGU). There will be two separate meetings to ensure that a broad fraction of the AGU attendees will be able to participate. You may also contact Professor Bill Roggenthen (william.roggenthen@sdsmt.edu), Dr. Tommy Phelps (phelpstj@ornl.gov), or Dr. Joe Wang (JSWang@lbl.gov) about these workshops. In addition to a general site description, at these workshops working groups will arrange presentations and discussions on:

Rock Mechanics, Economic Geology, Geochemistry, Engineering, Geotechnical studies, Geophysics, and Industrial Uses

Organizers: Bill Roggenthen, SDSMT, Herb Wang, UW,

Bob Bodnar, VT, Chris Laughton, FNAL

GeoMicroBiology, Evolutionary and Environmental Sciences, Hydrology

Organizers: Tommy Phelps, ORNL, Joe Wang, LBNL,

Mark Conrad, LBNL, Terry Hazen, LBNL

Large detectors and long baseline neutrino experiments will require special consideration in DUSEL. We are developing plans for a workshop on these items, including large scale engineering issues. **Milind Diwan, BNL** and **Ken Lande, U. Penn** are the organizers. We will advertise these plans when they are finalized.

The development of ultra-clean and very deep detectors has been discussed at several workshops and conferences internationally during the past several years. We do not anticipate hosting another workshop dedicated specifically to the science of these topics. PIs are encouraged to directly contact the above with any specific questions or concerns they may have in developing an LOI.

In view of the unique EIP option that Homestake Lab will provide, an additional physics-oriented workshop will be scheduled after receipt of the early LOI indications to facilitate accommodating both the more immediate EIP experiments and potential later occupants.

We are developing plans for a workshop specifically dealing with education and outreach opportunities at Homestake Lab. We will advertise these plans when they are finalized.

15. Additional Information and Contacts

We encourage you to attend one of the upcoming information sessions or workshops. For additional information either on the Homestake Lab, workshops, or LOIs please contact

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16. Figures

Figure 1. Homestake Mine Long-Section

Figure 2. Homestake Surface Site

Figure 3. and Figure 3A. 4850 Level Plan View

Figure 4. and Figure 4A. Yates Conveyances Plan View

Figure 5. Yates Headframe and Hoists

Figure 6. Lead, S.D. Aerial Photo

17. Web Sites

South Dakota Science and Technology Authority http://www.state.sd.us/homestake

Homestake Letters of Intent http://neutrino.lbl.gov/Homestake/LOI

Homestake Lab Reference Book	http://homestake.sdsmt.edu/HRB/Refer.htm
Homestake DUSEL	http://neutrino.lbl.gov/Homestake
Homestake Lab Information	http://homestake.sdsmt.edu/Resources.htm
South Dakota Geological Survey	http://www.sdgs.usd.edu/
NSF DUSEL	http://www.dusel.org

18. Check Lists for Assembling Letters of Interest

UNDERGROUND LABS and SPACE

Experiment or Program Name: _____
Principal Investigator or Contact Person: _____
Brief Summary:_____

Note: General requirements and lab module infrastructure for physics and earth sciences experiments have been compiled for DUSEL planning (ref. http://www.dusel.org/InfrastrMatrices_rev.xls). As-needed, use this checklist to add, update, or modify information for the proposed experiment.

1. Modules or Functional Uses:
_____
_____
_____
_____

2. General Information:

Probable Start (year) _____
Duration _____
Space (Volume) L x W x H (m^3)
_____
Depth/Shielding (mwe) _____
Occupancy (Peak/Avg) _____

3. Mechanical

Temperature
__ Uncontrolled
__ 20 +/- 5 deg. C (Air Cond.)
__ other: _____
Humidity
__ 50% +/- 20%
__ Uncontrolled
__ other: _____
Air Filtration/Recirculation (describe):_____
_____
__ Low-Radon Background (mBq/m^3) _____
Special Fume Exhaust requirements:
_____
Plumbing
__ Industrial Hot/Cold Water
__ Potable Hot/Cold Water
__ High Purity/DI Water
__ Steam/Condensate return
__ Safety Shower/Eyewash
__ Compressed Air

Cylinder Gases:
__ Inert
__ Flammable
__ Toxic
__ Carbon Dioxide
__ Nitrogen Gas
__ Liquid Nitrogen
__ other: _____

4. Electrical

Approx. total power (kW) (Peak/Avg.) _____
Other electrical needs (describe):
_____

5. Chemicals:

__ Bases
__ Acids
__ Solvents
__ Radioisotopes
__ Chemical inventory storage
__ Chemical waste storage
__ Biological storage
__ Radioisotope storage
__ Cryogenics
__ Hazardous/Special Handling:
_____
Other chemicals (describe):
_____

6. Architectural: Special needs:

Floors _____
Walls _____
Partitions _____
Clean Room_____
Storage_____

7. Special Facilities:

Material Access _____
Access Schedule _____
Cleanliness _____
Security _____
Data Communication: _____
_____

8. Laboratory, Machine Tools, and Other Equipment:
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

9. Other Needs or Requests:
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

SURFACE LABS and SPACE

Experiment or Program Name: _____
Principal Investigator or Contact Person: _____
Brief Summary:_____

1. Rooms or Functional Uses:
_____
_____
_____

2. General Information:

Probable Start (year) _____
Duration _____
Space (Approx. Floor Area or Volume)
_____
Occupancy (Peak/Avg) _____

3. Mechanical

Temperature
__ Uncontrolled
__ 20 +/- 5 deg. C (Air Cond.)
__ other: _____
Humidity
__ 50% +/- 20%
__ Uncontrolled
__ other: _____
Air Filtration/Recirculation (describe):_____
_____
Special Fume Exhaust requirements:
_____
Plumbing
__ Industrial Hot/Cold Water
__ Potable Hot/Cold Water
__ High Purity/DI Water
__ Steam/Condensate return
__ Safety Shower/Eyewash
__ Compressed Air

Cylinder Gases:
_____
_____
_____

4. Electrical

Approx. total power (kW) (Peak/Avg.) _____

Other electrical needs (describe):
_____
_____

5. Chemicals:

__ Bases
__ Acids
__ Solvents
__ Radioisotopes
__ Chemical inventory storage
__ Chemical waste storage
__ Biological storage
__ Radioisotope storage
__ Cryogenics
__ Hazardous/Special Handling:
_____
Other chemicals (describe):
_____

6. Architectural: Special needs:

Floors _____
Walls _____
Partitions _____
Clean Room_____
Storage_____
Other: _____
_____

7. Special Facilities:

Material Access _____
Access Schedule _____
Cleanliness _____
Security _____
Crane Access:_____
Data Communication: _____
_____

8. Laboratory, Machine Tools, and Other Equipment:
_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

9. Other Needs or Requests:
_____
_____
_____
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_____

LONGSECTION OF THE HOMESTAKE MINE
LEAD, SOUTH DAKOTA
1876–2002

HOMESTAKE MINING COMPANY

CITY OF LEAD
JUNE 2000

Open Cut

H13-1 Open Cut Mine

Hwy. 85

Deadwood

HWY 385

Kirk Road

City of Lead

City of Lead

MAIN ST HIGHWAY 85

EAST ADDIE

ELLISON

RAIL ROAD GRADE

WEST ADDIE

WEST ADDIE ST

WEST MCCLELLAN

UPPER MCCLELLAN A/K/A WEST MCCLELLAN

WEST HIGH

EAST HIGH ST

EAST SUMMIT

WEST SUMMIT

MATTHEW ST

HOUSTON ST

CEMETERY

EAST MAIN ST

WASHINGTON

MCCLOUD ST

GRANDVIEW AVE

WHITE ST

MAIN ST

PARK AVE

SAND ST

FRONT ST

CLARK

M13-1 WW Discharge Weir

M13-2 WW Open Cut Dump Station

M13-3 WW Warehouse

M13-12 WW Mechanical Bldg

M13-11 WW Sand Filter Bldg

M13-5 RBC Treatment Plant

M13-4 WW Lab/Fish House

M13-7 Settling Ponds

M13-8 Influent Bldg

M13-6 WW Clarifier

K13-16 Yates Compressor

L13-5 Yates Compressor Sub

L13-6 Yates Cooling Tower

K14-2 Mill Reservoir

K14-3 Steady Head Tank

L14-1 Yates Oil Storage

L14-2 Yates Hoist Sub

L14-5 Used Oil Storage

L14-4 Yates Hoist

K14-6A Plumbers Shed

K14-4 Tramway Roundhouse

K14-10 Paint Shop

K14-8 East Substation

K14-17 Bit Shop

K14-9 Wash Rack

K14-12 Battery Repair

K14-6 Main Warehouse

K14-3 Bottled Gas Storage

K14-7 Yates Sawmill

K14-5 Yates Yard Warehouse

K14-14 Iron House

K14-15 Machine Shop

K14-2A Motor Repair

K14-18A Yates Headframe & Crusher

K14-20 Mine Office

K14-10 Yates Dust Collector

K14-7 Yates Conveyor

K14-18 Yates Fuel

K14-21 Yates Safety & Dry

K14-22 Yates Power Station

K14-23 Yates Bosses Office

K14-9 Yates Lamp Room

K14-18A Metal Fab Shop

J15-4 Ross Air Tanks

J15-5 Ross Tramway Shed

K15-1 Kirk Fans

K16-1 Storage (Timber) Tunnel

J16-1 Ross Core Shed

J16-2 Ross Dry

J16-3 Ross Headframe

J16-2A Ross Ramp

J16-2 Ross Hoist Room

J16-3A Ross Crusher

J16-4 Ross Vent. Bag Room

J16-1 Ross Sub (69kv)

J16-4 Ross Pipe Shop

J16-5 Ross Boiler

J16-4 Ross Oil Tanks

J16-5 LHD Warehouse

J16-5 Ross Fuel Oil Tanks

J16-6 Power Tunnel

K17-1 Ore Hoists Fan

K17-2 Ore Hoists Substation

Access Easement to No.5-Shaft

NO.5 AIR SHAFT

M20-2 #5 Shaft Headframe

M20-3 #5 Shaft Heater Room

North

HOMESTAKE

0′ 300′ 600′ 900′

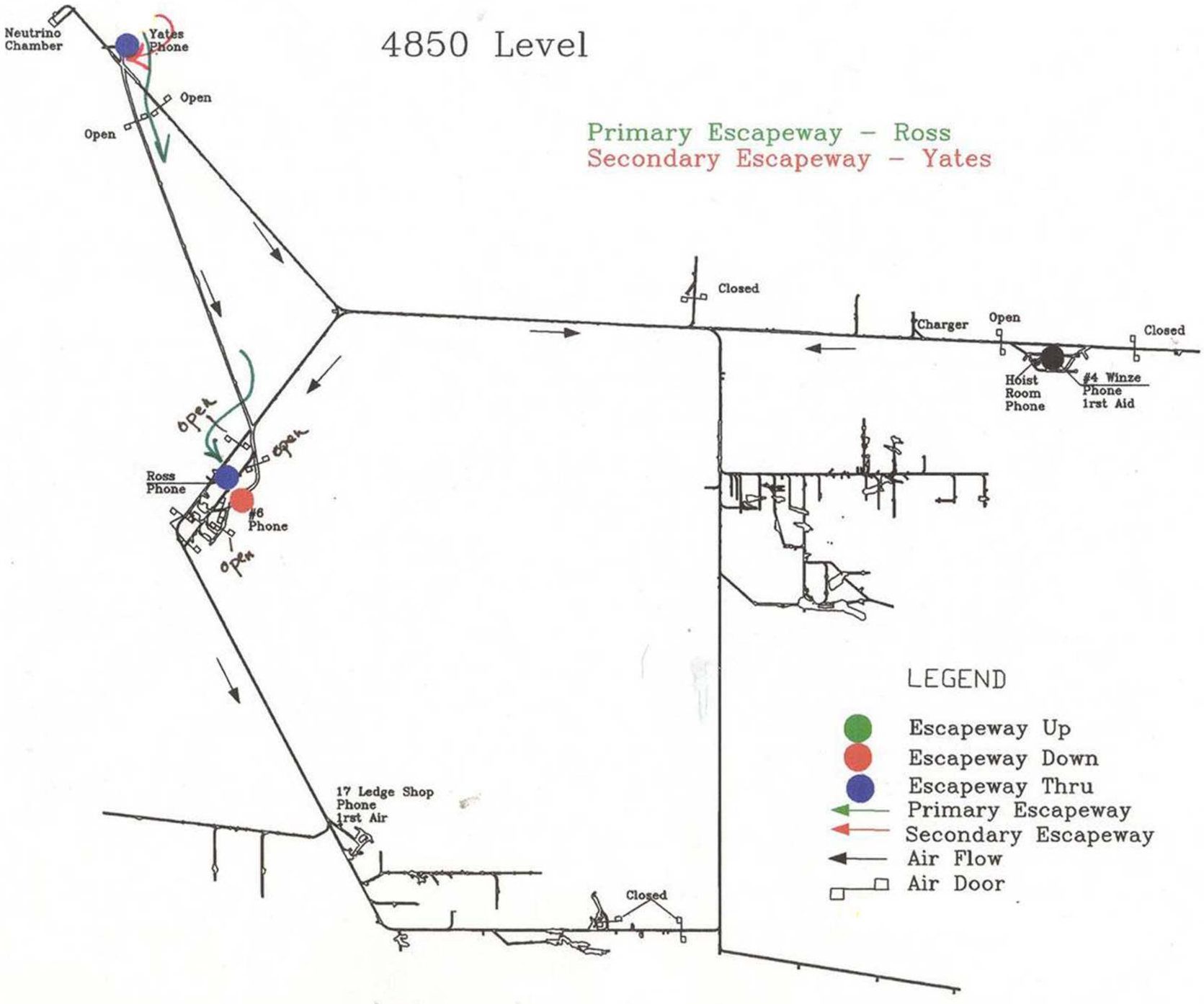
Fee Simple
162 Acres +/-

EXHIBIT 1 - SURFACE

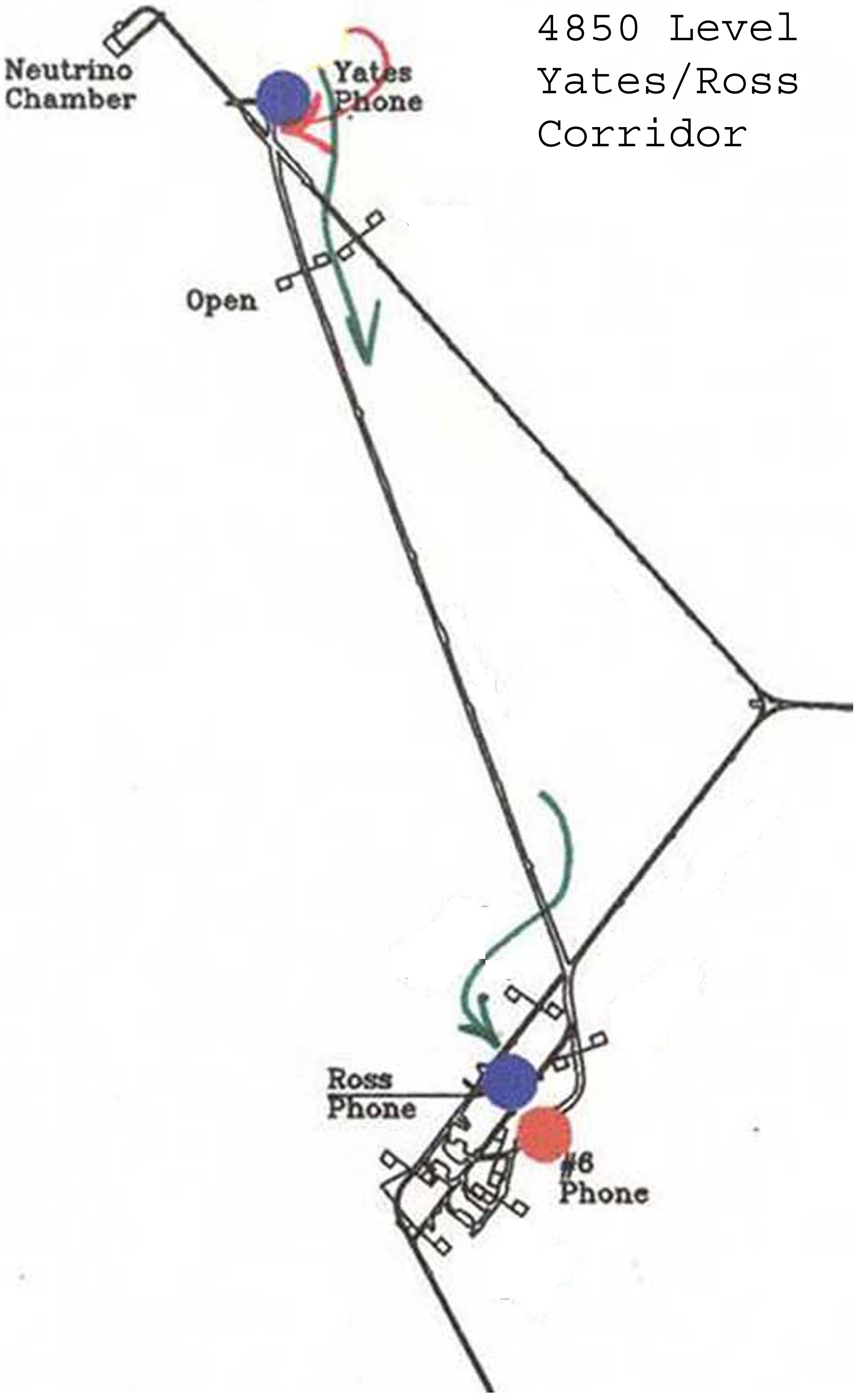
DATE: 9-12-2005
DRAWN BY: K.AUCHAMPACH
DWG: LabParcels/ Exhibit1-Surface.dwg

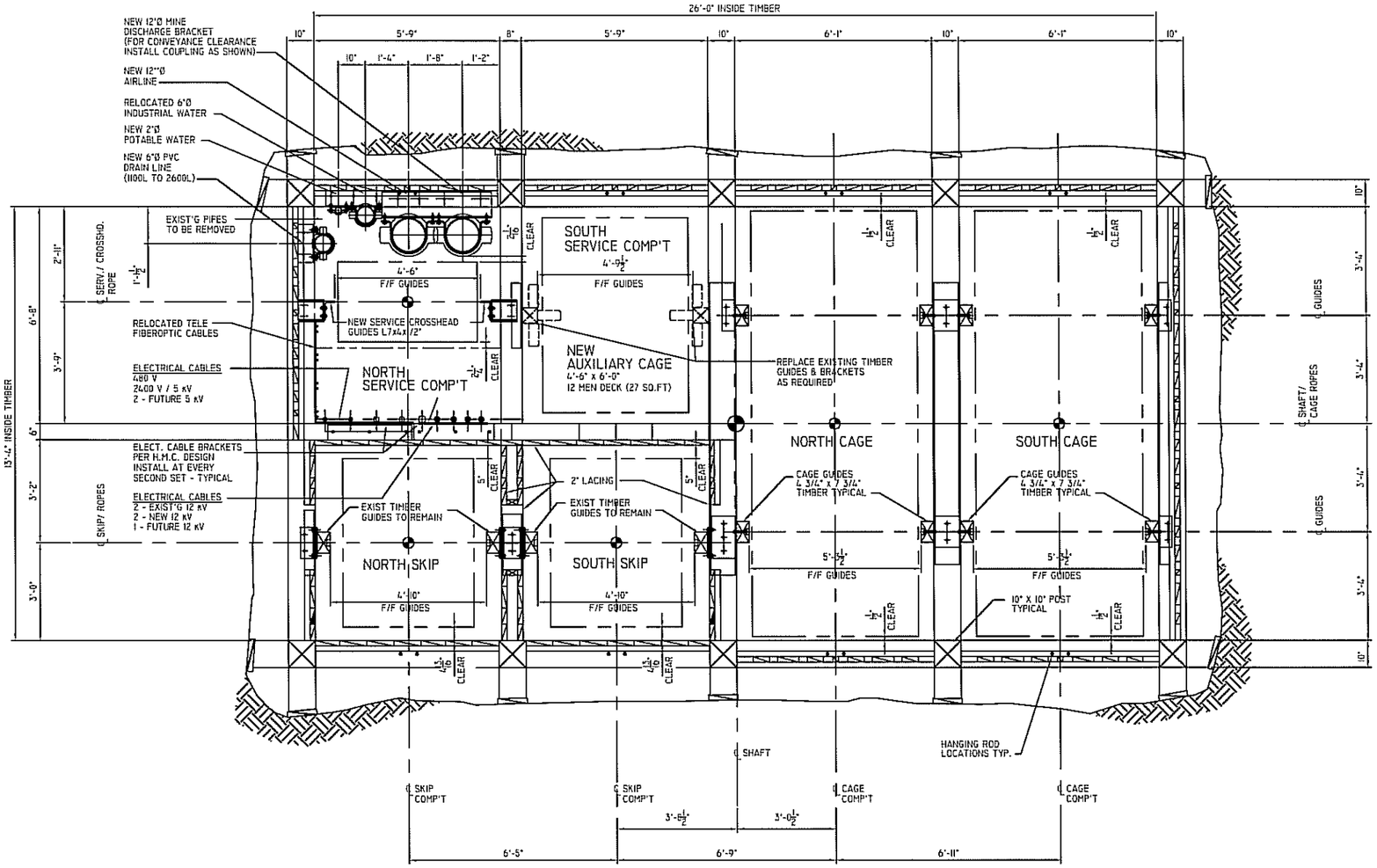
4850 Level

Primary Escapeway – Ross
Secondary Escapeway – Yates



4850 Level
Yates/Ross
Corridor





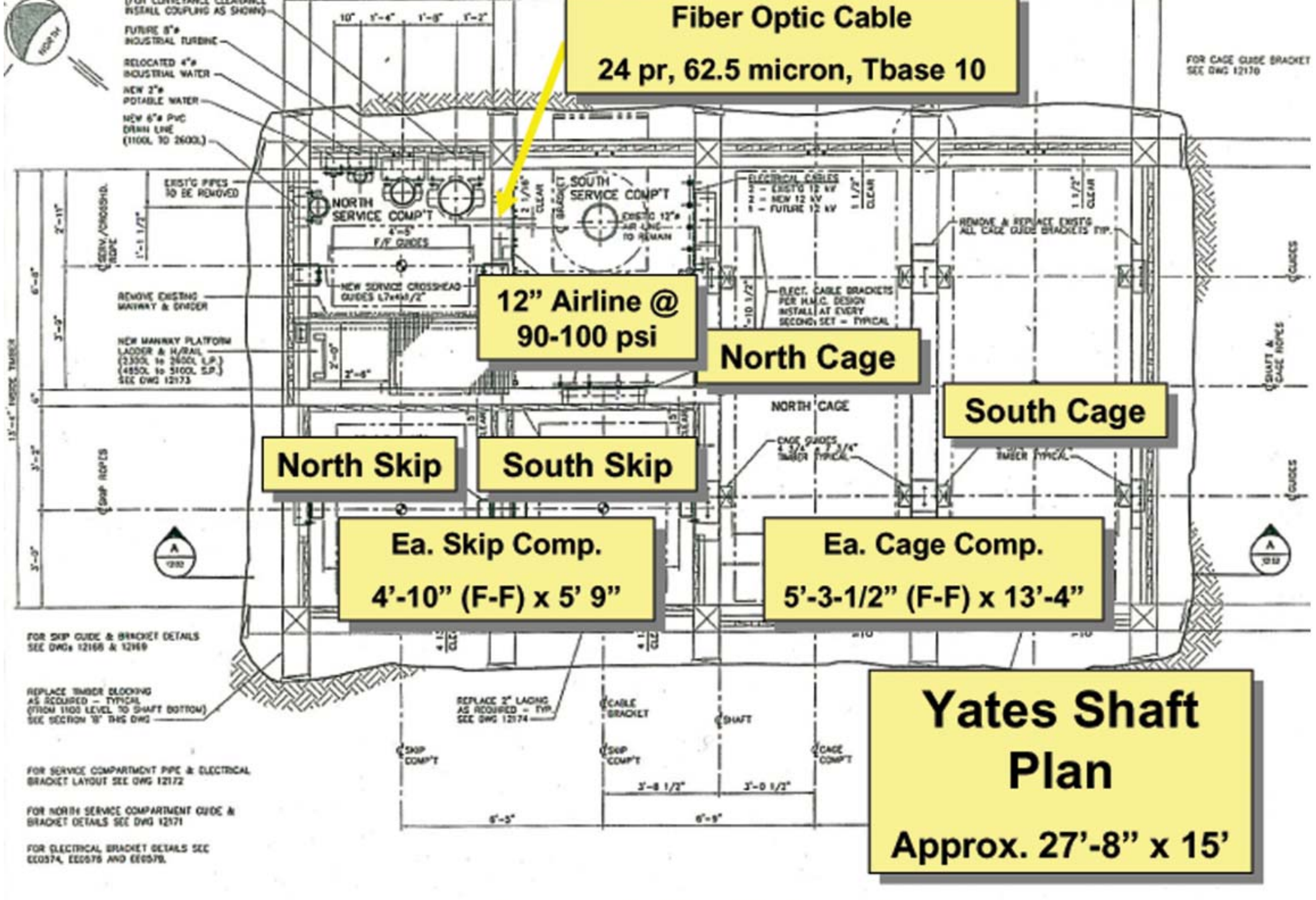
PLAN - TIMBER SETS - 1100 LEVEL TO BOTTOM

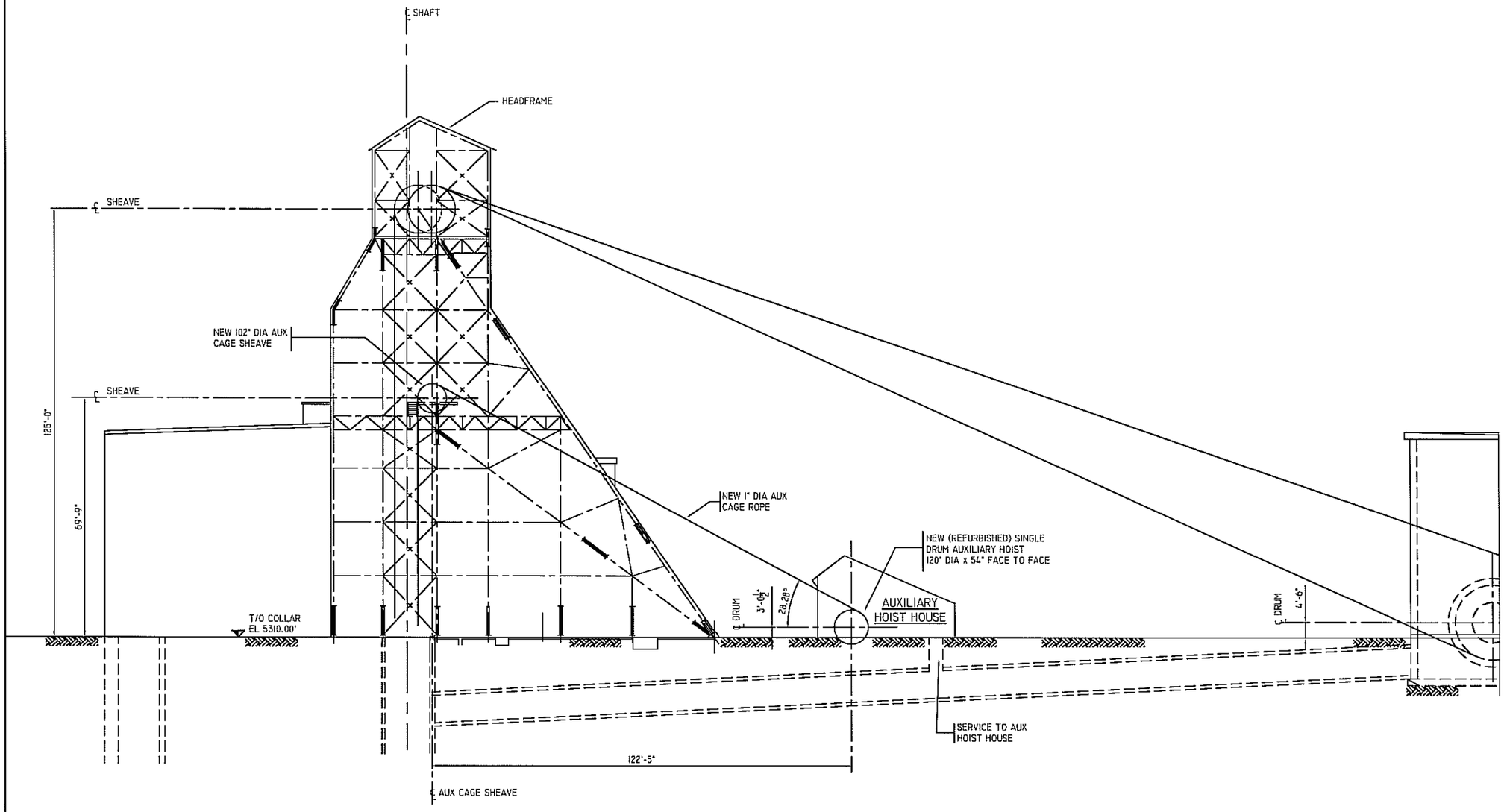
EXISTING SET SPACING 6'-0"

NUMBER	REFERENCE DRAWINGS		NO	DATE	REVISIONS	BY	APP.	NO	DATE	REVISIONS	BY	APP.
								A	16 DEC 03	FOR REVIEW	WS	SK

Dynatec
Mining Services Division
Telephone (905) 780-1960 Facsimile (905) 780-1990 www.dynatec.ca

DESIGNED	SD
DRAWN	WS
CHECKED	X
SCALE	1/2" = 1'-0"
DATE	DEC 03
APPROVED	
PROJECT ENGINEER	
PROJECT ENGINEERING MGR.	
CLIENT	


Fiber Optic Cable
24 pr, 62.5 micron, Tbase 10
12" Airline @
90-100 psi
North Cage
South Cage
North Skip
South Skip
Ea. Skip Comp.
4'-10" (F-F) x 5' 9"
Ea. Cage Comp.
5'-3-1/2" (F-F) x 13'-4"
Yates Shaft
Plan
Approx. 27'-8" x 15'
NORTH SERVICE COMP'T
SOUTH SERVICE COMP'T
NORTH CAGE
EXIST'G PIPES TO BE REMOVED
REMOVE EXISTING MANWAY & DIVIDER
NEW MANWAY PLATFORM LADDER & H/RAIL
FUTURE 8"ø INDUSTRIAL TURBINE
RELOCATED 4"ø INDUSTRIAL WATER
NEW 2"ø POTABLE WATER
NEW 6"ø PVC DRAIN LINE
REMOVE & REPLACE EXIST'G ALL CAGE GUIDE BRACKETS TYP.
ELECT. CABLE BRACKETS PER M.M.C. DESIGN
REPLACE TIMBER BLOCKING AS REQUIRED – TYPICAL
REPLACE 2" LAGING AS REQUIRED – TYP.
FOR SKIP GUIDE & BRACKET DETAILS SEE DWGs 12168 & 12169
FOR SERVICE COMPARTMENT PIPE & ELECTRICAL BRACKET LAYOUT SEE DWG 12172
FOR NORTH SERVICE COMPARTMENT GUIDE & BRACKET DETAILS SEE DWG 12171
FOR ELECTRICAL BRACKET DETAILS SEE EE0574, EE0576 AND EE0578.

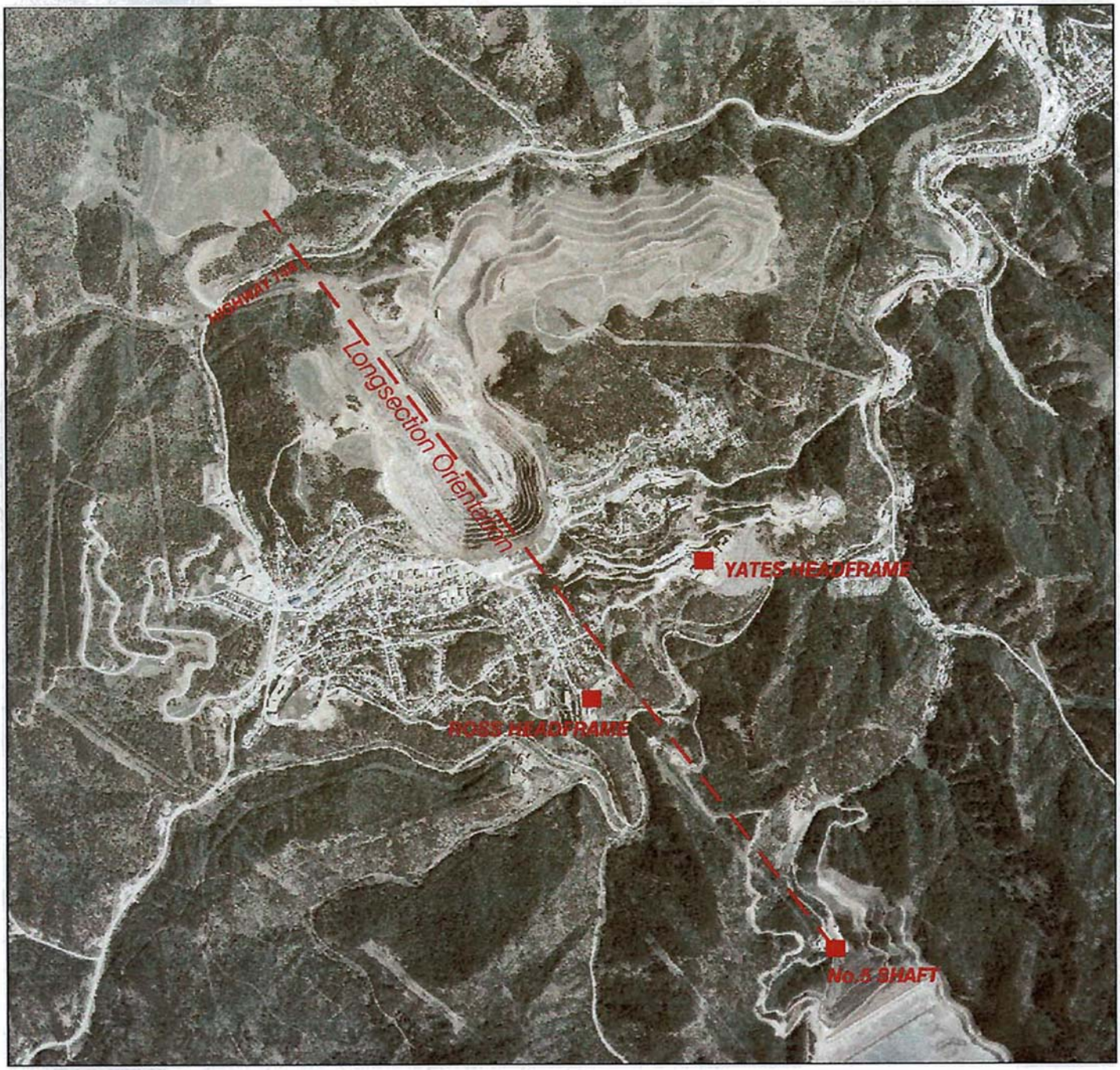


SOUTHEAST ELEVATION

NUMBER	REFERENCE DRAWINGS		NO	DATE	REVISIONS	BY	APP.	NO	DATE	REVISIONS	BY	APP.
								A	xx DEC03	FOR REVIEW	SS	SD

Dynatec
Mining Services Division
Telephone (905) 780-1900 Facsimile (905) 780-1990 www.dynatec.ca

DESIGNED	SD	APPROVED	
DRAWN	S SHABOO	PROJECT ENGINEER	
CHECKED	xx	PROJECT ENGINEERING MGR.	
SCALE	1/16" = 1'-0"	CLIENT	
DATE	DEC 03		



CITY OF LEAD
JUNE 2000