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RE: Distribution of Final Findings Report for the Assessment of Physical Hazards of Buildings and Facilities, Aerial Survey, and Topographic Mapping at American Flat Mill Site, Storey County Nevada
MESA Contract No. W912PP-09-D-0026, Task Order 0001

Ladies and Gentlemen:

MaxFour has incorporated all of the review comments into the Final Findings Report and is pleased to present the referenced document, attached for your use.

Should you have any questions or need clarification please contact me at 303.471.9288.

Sincerely yours,

David Theisen, P.E.

Encl
Final Findings Report

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Prepared for:

RESTORATION OF ABANDONED MINE SITES (RAMS PROGRAM)

MESA Contract No. W912PP-09-D-0026, Task Order 0001

FINAL FINDINGS REPORT FOR THE ASSESSMENT OF PHYSICAL HAZARDS OF BUILDINGS AND FACILITIES, AERIAL SURVEY AND TOPOGRAPHIC MAPPING AT AMERICAN FLAT MILL SITE, STOREY COUNTY NEVADA

March 2010

Prepared by:

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1 INTRODUCTION

1.1 OVERVIEW

The U. S. Bureau of Land Management (BLM), U. S. Army Corps of Engineers (COE), and the State of Nevada Division of Minerals (NDOM) are working in cooperation to assess and abate safety hazards associated with the American Flat Mill site and while evaluating the cost associated with the protection of the existing structures on the site. The COE has contracted this assessment to include an aerial survey with production of a topographic map, a physical safety assessment of the structure's integrity, and an order of magnitude cost estimate for both mitigating physical hazards of the existing structures and demolition of the structures with a comparison of the alternatives. This project is executed under the Restoration of Abandoned Mine Sites (RAMS) Program, MESA Contract No W912PP-09-D-0026, Task Order 0001.

1.2 SITE DESCRIPTION

1.2.1 PROJECT LOCATION

Work under this contract is located within the northeast quarter of Section 7, Township 16 North, Range 21 East, of the Mt. Diablo Meridian, Storey County, Nevada. The site is located approximately 1 ¼ miles northwest of Silver City, Nevada, and 12 road miles northeast of Carson City, Nevada, on public lands managed by the Bureau of Land Management. The site can be accessed from Carson City by traveling five miles east on U.S. Highway 50, then five miles north on State Highway 341, then one mile west on a graded dirt road to American Flat, and then one-half mile south on an unimproved two-track dirt road. See Drawing 1 for Project Site Location Map.

1.2.2 SITE HISTORY

The United Comstock Merger Mill (currently known as American Flat Mill Site) was built in 1922 to process local gold and silver ore utilizing cyanide solution and Merrill-Crowe process (a separation technique for removing gold from a cyanide solution). The mill operated from 1922 to about 1926 and produced $7.5 million worth of silver and gold. Over its short life the mill was owned by two different corporate entities, the United Comstock Mines and the Comstock Merger Mines. The project site is commonly known by a geographically derived name, the American Flat Mill, and hereafter in this document it will be referred as the American Flat Mill. At the time it operated the American Flat Mill was considered the largest, most modern and sophisticated mill of its type in the United States. The mill was shut down due to metallurgical problems and the dropping price of silver. When the 7.0-acre mill site was closed all equipment, metal, and wood materials were scrapped and salvaged. During the salvaging process little care was taken in the removal of equipment and other materials and concrete structural components were cut and broken as required to facilitate the removal process. This salvage process resulted in a great deal of damage including large holes/void left in the concrete, cut reinforcing steel, and broken concrete structural members. This along with years on decay and vandalism has taken a toll of the once impressive structures.

Today the existing structures of the site are in ruins with badly decaying concrete, exposed reinforcing steel, broken structural members, and large holes in the concrete floors leaving only the deteriorated concrete skeletons of the structures remaining. Beginning in 1998, the mill site has repeatedly been fenced, gated, signed, and access roads scarified for public safety reasons. In response to a fatality at the site, the BLM officially closed the property to public entry in February 1997. Even with the closure, the site receives an estimated sixty visitors a week, mainly juveniles who climb on the structures to post graffiti and hold parties. According to the Storey Co. Sheriff's Department, police officers and emergency vehicles respond to issues associated with the site several times a month. See Appendix E for the Storey County Sherriff's Office – Report of the history of responses or incidents associated with the American Flat Area (3-17-2007 through 3-21-2010). Because of the steadily disintegrating nature of the concrete structures, injuries and deaths occurring at the site are likely to increase.

1.2.3 SITE DESCRIPTION

The American Flat Mill consists of the following structures:

a. Ore Bin. The Ore Bin and massive supports for the steel rotating tipple are made of concrete and are largely intact (the tipple has been removed). In addition to the walls and deck, large concrete buttresses project from both sides of the structure (built to bear the weight of the ore trains and to offset the rotary action of the tipple).

b. Coarse Crushing Plant (with two basement levels and 10,000 linear feet of tunnels). The Coarse Crushing Plant was constructed entirely of reinforced concrete. The building is 192 ft. by 46 ft. in plan and at the time it was built the structure was 80 ft. tall. Two other mill components were a structural part of the coarse crushing plant, including a machine shop which was 50 ft. by 80 ft and 32 ft. tall, and a blacksmith shop which was 32 ft. by 48 ft. in plan. The upper walls of the coarse crushing plant had a reinforced concrete skeleton filled with Fenestra steel sash windows and corrugated galvanized steel (the steel was salvaged in 1927 and is no longer present). Run-of-Mine ore was delivered to this facility via a 10,000 ft. long underground tunnel. Electric railcars dumped ore here to be crushed. A heavily reinforced concrete receiving ore bin occupies the northeast side of the building. Crushed ore from this facility was sent to the fine crushing and concentration plant. Today the building consists of five levels, including two basement levels (now flooded). The upper levels are now only bare skeletons of concrete with protruding rebar.

c. Fine Grinding and Concentration Plant (with basement levels). The Fine Grinding and Concentration Plant is a reinforced concrete building that is 240 ft. by 89 ft. in plan and stands 83 ft. tall. The building is roughly rectangular in shape, with a rectangular extension on the east side and the remains of a conveyor belt support structure on the west. The structure was built on the side of a hill and has multiple levels of varying heights, including two levels below surrounding ground on the north side and one subgrade level on the south side. This building contained ball mills and classifiers that crushed and washed the ore. Material from this plant was sent to the Cyanide Plant.

d. Cyanide (CN) Plant. The Cyanide Plant is 325 ft. by 296 ft. in plan covering about 2.5 acres, most of which has reinforced concrete floors, retaining walls, tunnels, equipment mountings, and cast sills which supported an array of 40 redwood mixing and leaching tanks. Roof support columns were placed so as not to interfere with the leaching and mixing tanks. The tanks rested on concrete sills placed directly onto the concrete floor. The building is set onto cut-and-fill terraces that facilitated gravity flow of the process solutions. Output from the cyanide process was sent to the filter or tank house located at the northwest corner of the cyanide plant. Product from the tank house was delivered to the precipitation and refinery building. The basement at the lowest level of the concrete skeleton of this building is now flooded and has several concrete posts protruding from it.

e. Precipitation and Refinery Building. The Precipitation and Refinery Building was constructed of reinforced concrete and is 112 ft. by 32 ft. in plan. Gold and silver were extracted from pregnant cyanide solutions in this building. The building held two rectangular tanks and housed four Merrill-Crowe presses. The remainder of the building held the refinery and included a vault for bullion storage. The windows in this building were covered with heavy metal grates, which have since been removed.

f. Assay Office and Testing Plant. The Assay Office and Testing Plant is a two story building 38 ft. by 66 ft in plan and rectangular in shape. The first story was constructed of reinforced concrete and contained equipment for testing and sample grinding equipment. The second story consisted of a metal frame covered with metal lath and cement plaster inside and out. The building contained a furnace room, laboratory, and mill superintendent's office. The building has a concrete daylight basement with a small porch made of cast concrete.

g. Warehouse Building. The Warehouse was built of solid concrete 32 ft. by 96 ft. in plan, and 13 ft. tall. It was located adjacent to a railroad spur. The warehouse was surrounded by a concrete platform 8 ft. wide and 4 ft. above the ground level. Most of the interior of this building is now open.

h. Substation. The Substation was the small building located behind the coarse-crushing and fine-crushing buildings. All that is left of this building is a 30 ft. by 60 ft. rectangular slab foundation with remnants of concrete stem walls surrounded by an array of concrete pillars.

Other items associated with the site of notable importance include;

- Historic Removals. All steel, metal trusses, grates, wood planking, roofing, and tanks have been removed from the buildings leaving only the concrete skeletons remaining.

- Voids and Tunnels. Little is known about the underground mill sumps and concrete-lined tunnels which underlie the property. The tunnels carried process materials to the next processing stage, mostly on conveyers and through pipes.

2 DATA GATHERING

2.1 AERIAL SURVEY

2.1.1 SURVEY AREA

The aerial survey limits included the mill site (approximately 10 acres) and surrounding areas for a total survey area of approximately 40 acres.

2.1.2 SURVEY CONTROL

Survey Control included the establishing of vertical and horizontal control for the project and the setting of 5 RTK Panels for aerial photography and map compilation.

Basis of Bearings: North American Datum (NAD) 1983/94 as based on static and real time kinematic (RTK) GPS observations made October 19, 2009 and using the Washoe County, Nevada published coordinates for continuously operating reference station (CORS) DOT1. Coordinates and distances have been scaled by a grid to ground factor of 1.00025.

Basis of Elevations: North American Vertical Datum (NAVD) 1988 as based on static and real time kinematic (RTK) GPS observations made October 19, 2009 and using the Washoe County, Nevada published coordinates for continuously operating reference station (CORS) DOT1. .

2.1.3 AERIAL PHOTOGRAPHY

The 40 acre site was photographed at a height of approximately 1:4800 and the aerial photograph was used for digital mapping. See Appendix A, Photograph A1.

2.1.4 ORTHOGRAPHIC PROCESSING

The Aerial photography was Orthographic processed at approximately 0.2 foot color pixel.

2.1.5 MAP COMPILATION

Map compilation was preformed to produce a digital map of the 40 acre area at a 2 foot contour interval.

2.1.6 AUTOCAD MAP

Aerial survey data was used to produce AutoCAD-format topographic contour map and data points (x, y and z coordinates) for grade breaks and building components. The topographic map included mill site structures and surrounding existing ground features. See Drawing 02 for AutoCAD survey map. Also included with this report is CD containing an electronic copy of all files generated as part of the topographic survey.

2.2 ON-SITE FIELD EVALUATION AND MEASUREMENTS

2.2.1 GENERAL EXISTING SITE CONDITIONS

- Existing structures were photographed to document current conditions. See Appendix A, Photographs A2 through A12 for views of existing structures and deteriorated conditions of some of the concrete structures.
- General condition of the site was poor with structures in ruins and having the potential to be structurally unstable.
- Several structural concrete areas have deteriorated to a point that excessive rebar has been exposed and some on these areas have started to collapse under their own weight.
- Partial collapse of structural members within some of the buildings could change the overall reactions of the structural system and potentially leave the remaining structural members with inadequate strength capacity to handle the added loading.
- Historical salvaging of equipment and other items have produced voids in concrete structural members including fracturing of the concrete and cutting of the reinforcing steel. These actions can greatly reduce the strength of the structures and make them unstable.
- Existing site conditions contained a large number of voids and tunnels throughout the site. The extent and size of the voids and tunnels is largely undocumented, and unknown voids under structures and between structures are likely to exist.

2.2.2 EXISTING CONCRETE CONDITION

- Historically concrete used in construction during the 1920 does not meet the standards of today. By today's standards the concrete used to construct the structures contained substandard cement, aggregate, and quality control.
- It is typical in the engineering field to use a design service life for a structure. Although this data is not available today it is likely, based on the type of structure, that the design life was probable 50 years or less.
- During the late 1920's the plant was closed and salvage operations implemented. The salvaging operation produced a twofold effect on the concrete life. The uncontrolled cutting of concrete to remove equipment produce large voids of removed concrete and exposed and cut reinforcing steel, both affecting the overall strength of the structures. The second effect was that the removal of all the roofs, windows, and doors left the concrete exposed to the elements,

including precipitation and freeze thaw cycles which both greatly reduce the service life of the concrete.

- Air entrainment in concrete, common today, was pretty much unheard of during the construction of American Flat. Air entrainment in concrete is important in increasing the life of the concrete by reducing the effects of freeze thaw. This is apparent in the condition of the existing concrete surfaces. See Appendix A, Photographs A2 through A12 the several large areas of scaling concrete, evidence of the effects on freeze thaw over the years of exposure.
- In general, two items have probably contributed to the existing structures lasting as long as they have. First, all structures are designed with multipliers to account for unpredictable variations in material and workmanship. Second, although the salvaging of materials left much damage as described above, the salvaging also greatly reduced the live loads (vibrations of equipment and moving material through the mill) and dead loads (weight of equipment and other materials) applied to the structures, thus equating to a larger design multiplier.
- Although some of the structures are still standing and will probable stand for many more years, overall, the existing structures of the site have outlived their service life and will continue to degrade and ultimately collapse as several portions of the structures have already done.

2.2.3 FIELD MEASUREMENTS OF EXISTING STRUCTURES

- Field measurements of typical building structural members were performed and recorded to establish general dimensions of columns, beams, floor slabs, and other structural features.
- Approximate location and sizes of observed voids, openings, and tunnels were estimated and documented.
- Only easily and safely accessible features were measured and documented. No confined space entry, climbing, or walking on marginally safe areas was performed.
- Dimensions not obtained by field measurement, due to safety reasons, were estimated from survey data, photographs, or historical documents.
- Visual observations and photographs were used as necessary to count and estimate the number of columns, beams, floor slabs, and other structural features.
- For the purpose of this study the Site was broken down into eight designated building areas. See Drawing 3 for General Site Layout and Building Area Designations.
- Sketches based on field observations and measurements were developed for each significant structure on the site. See Drawings 4 through 12 for existing building layouts with dimensions.

3 ASSESSMENT OF PHYSICAL HAZARDS OF BUILDINGS AND FACILITIES

Based on the review of the site a number of possible physical hazards were noted and this information was compiled to develop a rating tool to be used to prioritize the amount of risk associated with the different building areas. See Drawing 3 for General Site Layout and Building Area Designations. Descriptions of the criteria use to assess risk are provide below.

3.1 Historical Risk Evaluation

- Review available records to determine if a death has resulted from an accident at the facility.
- Review available records to determine if a serious injury has resulted from an accident at the facility.

3.2 Potential Risk Evaluation

- Review the facility to determine if there is any potential for a fall of greater than ten feet. This included climbing hazards.
- Review the facility to determine if there is any potential for a fall of greater than twenty feet. This included climbing hazards.
- Review the facility to determine if there is any potential for a fall of greater than thirty feet. This included climbing hazards.
- Review the facility to determine if the water in a quantity great enough to produce a possible drowning hazard. This may include shallow water with the potential to slip under a confining layer.
- Review the facility to determine if there are any voids, tunnels, or openings that a person may enter and become trapped or lost within.
- Review the facility to determine if there are any openings or holes in ground level floors, or drop-offs from ground level walking surfaces. This item is not meant to include climbing of vertical structures that was covered earlier, but is intended to address areas where a person may think they are safe at ground level access and unexpectedly step into a hazard. The item would include holes in floors large enough to fall or partially fall through, open vents, elevator shafts, and abandon stairwells or drop-offs left on the edge of a floor by the past removal of railing or wall.

- Review the facility to determine if there are any exposed reinforcing steel or other sharp edges that may present an impaling or cutting hazard.

- Review the facility to determine if there are any limited vertical clearances that may represent a possible head injury. Several locations on the site have partial collapses that have partially blocked doorways, hallways, and other normal walking area that may present a hazard.

3.3 General Risk Factors

- Review the location of the facility to determine if it is easily accessible. Determine if there are any fences or natural barriers that may limit access.

- Review the facility to determine if there are any features that will appear attractive to the visitors and motivate them to explore the facility.

TABLE 1 FACILITY RISK RATING

The table below was developed to help characterize the risk association with the eight designated building areas.

DESCRIPTION OF RISK	Building 1	Building 2	Building 3	Building 4	Building 5	Building 6	Building 7	Building 8
HISTORICAL RISK								
Death has occurred			X					
Serious injury has occurred		X	X	X				
POTENTIAL RISK								
Falling height of greater than 10 feet	X	X	X	X	X	X	X	
Falling height of greater than 20 feet		X	X	X				
Falling height of greater than 30 feet			X					
Drowning hazard		X						
Confined space or entrapment hazard	X	X	X	X				
Unexpected surface level openings or drop-offs		X	X	X			X	
Impaling hazard/exposed reinforcing steel or sharp edges		X						
Limited vertical clearances		X						
GENERAL RISK FACTORS								
Accessibility	X	X	X	X	X	X	X	X
Visitation attractant	X	X	X	X		X		
TOTAL RISK POINTS	4	10	9	7	2	3	3	1

4 PHYSICAL HAZARDS REDUCTION ALTERNATIVES

The objective for this item was to examine alternatives and the associated cost for the reduction of physical hazards associated with the Site. The study included the option of No Action and evaluated two alternatives including:

- Alternative A – Demolish Mill Buildings and Facilities
- Alternative B - Stabilize Mill Buildings and Facilities to Reduce Physical Safety Hazard Potential.

Alternative A – Demolish Mill Buildings and Facilities including:

- The demolition of vertical structures.
- The fracturing and disposal in-place of ground level slabs and foundations.
- The use of demolition debris to cover and/or fill all known voids and tunnels.
- The disposal of the remaining demolition debris on-site and the grading of the debris to maintain drainage.
- The covering of disposal materials with native soil.
- The broadcast seeding of cover material to re-establish vegetation.

Alternative B – Stabilize mill building and facilities to reduce physical safety hazard potential to acceptable levels. For the purpose of this work plan acceptable levels will include the reduction of fall heights to a maximum of 10 feet and the filling in or blocking off of all known underground voids. This alternative includes:

- The demolition of structures above the height of 10 feet, the filling of vertical drops of greater than 10 feet with a maximum slope of 3:1, or a combination of the two methods.
- The use of demolition debris to cover and/or fill all known voids and tunnels.
- The use of demolition debris to fill vertical drops and high walls of greater than 10 feet.
- The disposal of the remaining demolition debris on-site and the grading of the disposal area to maintain drainage. Excess demolition debris from one building area may be used as fill on another building area or disposed of in a separate on-site disposal area.
- The covering of disposal materials with native soil.
- The broadcast seeding of cover material to re-establish vegetation.

An Order of Magnitude Cost Estimate has been prepared for each alternative. The cost estimate was based on the general assumptions stated above and the estimated volumes developed during the Field Evaluation and Data Gathering phases. The Order of Magnitude Cost Estimate will be used as a relative comparison of each Alternative.

For the purpose of this study the Site was broken down into eight designated building areas. See Drawing 3 for General Site Layout and Building Area Designations.

4.1 NO ACTION

This involves no further action to assess or correct the physical hazards associated with the Site. This option will not meet any of the objectives for the reduction of the physical hazards associated with the Site. There is no direct capital or operating cost associated with this alternative. However, it may provide a future liability cost which cannot be estimated.

4.2 ALTERNATIVE A – DEMOLISH MILL BUILDINGS AND FACILITIES

This alternative involves the complete demolition of all buildings and facilities on the Site, on-site landfill disposal of demolition debris generated, final grading to maintain drainage, the covering of the demolition debris with native soil material and the re-establishing of vegetative cover. Cover material thickness will vary from a minimum of 2 feet on smaller structures to a maximum of 5 feet of cover material for larger more reinforced structures. Cover material will consist of native soils that will be generated through the use of on-site borrow areas adjacent to the site. This alternative will best meet the objectives for the reduction of the physical hazards associated with the site, but may require some maintenance of native cover material to prevent future exposure to demolition debris due to erosion or settlement.

4.2.1 BUILDING 1- ORE BIN

The approach used to estimate the cost for this building area was to demolish all concrete structure members above grade and use demolition debris to backfill voids and depressions around the structure. The remaining demolition debris will be piled on top of the structure's foundations, and shaped/graded to maintain drainage. Then the debris will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 4 and 13 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B1.

4.2.2 BUILDING 2- COARSE CRUSHING PLANT

The approach used to estimate the cost for this building area was to demolish all concrete structure members above grade, break or fracture concrete slab at or below grade, and use demolition debris to backfill voids and depressions around and within the structure. Voids filled with water will be pumped out and water generated used for dust control or discharged onto the surrounding ground (no treatment of water was included in the cost estimate). The remaining demolition debris will be piled on top of the structure's foundations and subgrade levels, and shaped/graded to maintain drainage. Then the debris will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 5 and 14 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B2.

4.2.3 BUILDING 3- FINE GRINDING & CONCENTRATION

The approach used to estimate the cost for this building area was to demolish all concrete structure members above grade, break or fracture concrete slabs at or below grade, and use demolition debris to backfill voids and depressions around and within the structure. The remaining demolition debris will be piled on top of the structure's foundations and subgrade levels, and shaped/graded to maintain drainage. Then the debris will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 6, 7 and 15 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B3.

4.2.4 BUILDING 4- CYANIDE PLANT

The approach used to estimate the cost for this building area was to break or fracture concrete slabs at or below grade including pipe raceways and tunnels, demolish all concrete structure members above grade, use demolition debris to backfill voids from pipe raceways and tunnels, and backfill against the retaining walls on the northeast and northwest sides of the structure. Any remaining demolition debris will be piled on top of the structure's foundations and shaped/graded to maintain drainage. This building area has potential room for disposal of large quantities of construction debris and it will probably be feasible to dispose of demolition debris from several building areas in this site. The debris will then be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 8, 9 and 16 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B4.

4.2.5 BUILDING 5- WAREHOUSE

The approach used to estimate the cost for this building area was to demolish all concrete structure members above grade, fracture the foundation/slab on-grade, and pile the demolition debris on top of the structure's foundation/slab. The debris can then be shaped and graded to maintain drainage. Then the debris will be covered with 3 feet of native soil material and seeded to reestablish vegetation. See Drawings 10 and 17 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B5.

4.2.6 BUILDING 6- PRECIPITATION & REFINING BUILDING

The approach used to estimate the cost for this building area was to demolish all concrete structure members above grade, fracture the foundation/slab on-grade, and pile the demolition debris on top of the structure's foundation/slab. The debris can then be shaped and graded to maintain drainage. Then the debris will be covered with 3 feet of native soil material and seeded to reestablish vegetation. See Drawings 11 and 18 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B6.

4.2.7 BUILDING 7- ASSAY OFFICE

The approach used to estimate the cost for this building area was to demolish all concrete structure members above grade, fracture the foundation/slab on-grade, and pile the demolition debris on top of the structure's foundation/slab. The debris can then be shaped and graded to maintain drainage. Then the debris will be covered with 2 feet of native soil material and seeded to reestablish vegetation. See Drawings 12 and 19 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B7.

4.2.8 BUILDING 8- SUBSTATION

This building area has little left but a slab on grade. The approach to this building area was to fracture the slab on-grade, cover with 2 feet of native soil material being sure to shape cover for proper drainage, and then seed the area to reestablish vegetation. No Drawings have been provided for this building area.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix B, Table B8.

4.2.9 TOTALS SUMMARY FOR ALTERNATIVE A

Quantities and cost associated with each building area were tabulated, totaled, and presented in the totals summary order of magnitude quantities and cost breakdown provided in Appendix B, Table B9.

4.3 ALTERNATIVE B – STABILIZE MILL BUILDINGS AND FACILITIES TO REDUCE PHYSICAL SAFETY HAZARD POTENTIAL.

This alternative involves the combination of selective cutting and demolition of vertical structures greater than 10 feet high along with the backfilling of open voids under structures and the backfilling against vertical structures to reduce the total vertical height to less than 10 feet. Portions of structures being demolished will be used as backfill for voids under structures and as backfill against other vertical structures. All demolition material used as backfill will be graded to maintain drainage, covered with native soil material, and then seeded to reestablish the vegetative cover. Cover material thickness will vary from a minimum of 2 feet on smaller structures to a maximum of 5 feet of cover material for larger more reinforced structures. Cover material will consist of native soils that will be generated through the use of on-site borrow areas adjacent to the site. This alternative will reduce the physical hazards associated with falls to a maximum height of 10 feet and will minimize the risk of entrapment in voids under structures while maintaining the general basic layout and history of the site. The objective of this alternative was to find a balance between preserving the existing structures on the site while reducing the physical safety hazards associated with the site. This alternative will require significant additional present day cost compared with Alternative A and will still require future maintenance cost to provide for the upkeep of preserved structures and to prevent future exposure to demolition debris due to erosion or settlement.

4.3.1 BUILDING 1- ORE BIN

The approach used to estimate the cost for this building area was to provide a balance of fill for lower areas and demolition of the vertical structure members above the finished height of 10 feet. This included the removal of the slab forming the rail spur just above the existing truss beam. The removed demolition debris will then be used to fill in the underground voids and bring the finished grade up to surrounding ground level and shape the area for drainage by backfilling the voids and depressions around the structure. The demolition debris disposed of as fill at this building area will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawing 4 and 20 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C1.

4.3.2 BUILDING 2- COARSE CRUSHING PLANT

The approach used to estimate the cost for this building area was to provide a balance of fill for lower areas and demolition of vertical structure members above the finished height of 10 feet. This included the removal of the upper levels of the structure approximately following the existing contour of the surrounding grade. The removed demolition debris from the upper levels will then be used to fill in the underground voids, bring the finished grade up to surrounding ground level, and shape the area for drainage by backfilling the voids and depressions around the structure. Voids filled with water will be pumped out and water generated used for dust control or discharged onto the surrounding ground (no treatment of water was included in the cost estimate). The demolition debris disposed of as fill at this building area will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 5 and 21 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C2.

4.3.3 BUILDING 3- FINE GRINDING & CONCENTRATION

The approach used to estimate the cost for this building area was to provide a balance of fill for lower areas and demolition of vertical structure members above the finished height of 10 feet. This included the removal of the upper levels of the structure approximately following the existing contour of the surrounding grade. The removed demolition debris from the upper levels will then be used to fill in the underground voids and bring the finished grade up to surrounding ground level and shape the area for drainage by backfilling the voids and depressions around the structure. Based on the size of this structure there will be a surplus of demolition debris that will need to be disposed of at an alternate location on the site or at one of the other building areas. The demolition debris disposed of as fill at this building area will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 6, 7 and 22 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C3.

4.3.4 BUILDING 4- CYANIDE PLANT

This building area contained three different structure types with different approaches to meet the objectives of this alternative. The north side of the area included several tank pad foundations built on grade and terraced with vertical high walls into the side of the hill. The south side of the building area included several tank pads built on elevated structural members, and the west corner of the building area included 16 elevated concrete tanks/hoppers.

The approach used to estimate the cost for this building area was to provide a balance of fill against vertical high walls and demolition of vertical structure members above the finished height of 10 feet. This included the removal of the 16 concrete tanks/hoppers from the west side of the building area and the removal of the upper structural members from the south elevated tank pads. The removed demolition debris from these two structures will then be used to fill in the underground voids in the area and to backfill against the vertical high walls bounding the north two sides of the building area. This area will require a large quantity of debris to backfill the vertical walls to a height that will leave only 10 feet exposed. This building area will be a likely place to dispose of excess demolition debris from other building areas around the site and help achieve a balance of demolition debris generated and debris disposal volumes. Once this building area has been backfilled with demolition debris and shaped to drain, the debris will be covered with 5 feet of native soil material and seeded to reestablish vegetation. See Drawings 8, 9 and 23 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C4.

4.3.5 BUILDING 5- WAREHOUSE

The approach used to estimate the cost for this building area was to cut and demolish all concrete walls and structural members at a line approximately 10 feet above existing grade. The demolition debris generated will be disposed of at an alternate location on site or at one of the other building areas. The debris disposal area will need to be shaped and graded to maintain drainage, covered with native soil material, and seeded to reestablish vegetation. For costing purposes it was assumed that the excess demolition debris will be disposed of at the Building 4 area. See Drawings 10 and 24 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C5.

4.3.6 BUILDING 6- PRECIPITATION & REFINING BUILDING

The approach used to estimate the cost for this building area was to cut and demolish all concrete walls and structural members at a line approximately 10 feet above existing grade. The demolition debris generated will be disposed of at an alternate location on site or at one of the other building areas. The debris disposal area will need to be shaped and graded to maintain drainage, covered with native soil material, and seeded to reestablish vegetation. For costing purposes it was assumed that the excess demolition debris will be disposed of at the Building 4 area. See Drawings 11 and 25 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C5.

4.3.7 BUILDING 7- ASSAY OFFICE

The approach used to estimate the cost for this building area was to demolish the roof structure and cut off all concrete walls and structural members at a line approximately 10 feet above existing grade. The demolition debris generated will be disposed of at an alternate location on site or at one of the other building areas. The debris disposal area will need to be shaped and graded to maintain drainage, covered with native soil material, and seeded to reestablish vegetation. For costing purposes it was assumed that the excess demolition debris will be disposed of at the Building 4 area. See Drawings 11 and 25 for the approximate before/after representations.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C7.

4.3.8 BUILDING 8- SUBSTATION

This building area has little left but a slab on grade. The approach used to estimate the cost for this building area was to fill any minor voids around the structure, provide general cleanup of any existing debris, cut off any existing exposed rebar, and provide minor grading to drain the site. No Drawings were provided for this building area.

The order of magnitude quantities and cost breakdown for the work associated with this building area are provided in Appendix C, Table C8.

4.3.9 TOTALS SUMMARY FOR ALTERNATIVE B

Quantities and cost associated with each building area were tabulated, totaled, and presented in the totals summary order of magnitude quantities and cost breakdown provided in Appendix C, Table C9.

5 COMPARISON AND SUMMARY OF FINDINGS

This Findings Report estimated cost associated with the option of No Action and the two alternatives listed below:

- Alternative A – Demolish Mill Buildings and Facilities
- Alternative B - Stabilize Mill Buildings and Facilities to Reduce Physical Safety Hazard Potential.

A summary of cost associated with each alternative has been tabulated and presented in the Appendix D, Table D1. All costs presented in this findings report were determined based on order of magnitude estimating and engineers opinion of probable construction methods.

5.1 NO ACTION

No Action had the lowest initial principal cost investment, but also produced no reduction in the physical hazards associated with the site. This in turn may provide a future liability cost which cannot be estimated. This option also provided for the maximum amount of preservation of existing structures located on the site.

5.2 ALTERNATIVE A – DEMOLISH MILL BUILDINGS AND FACILITIES

This alternative had the mid-level cost of approximately 3.5 million dollars and also produced the highest level of reduction in the physical hazards associated with the site. However, this alternative would preserve almost none of the existing structures located on the site.

5.3 ALTERNATIVE B – STABILIZE MILL BUILDINGS AND FACILITIES TO REDUCE PHYSICAL SAFETY HAZARD POTENTIAL

This alternative had the highest initial cost investment, approximately 3 to 4 times the cost of Alternative B. This cost estimate was based on a moderate amount of effort to preserve the ground level appearances of the structures on the site, but could greatly increase if more stringent structural preservation was required. This alternative also produced a mid-level reduction in the physical hazards associated with the site and a mid-level preservation of the existing structures located on the site.